



# Study on administrative and frequency fees related to the licensing of networks involving the use of frequencies

## Report to the European Commission
## Directorate General Information Society

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# 1 INTRODUCTION

## 1.1 Context of the Study

The purpose of this Study was to examine the various elements taken into account by EU Member States in developing licensing regimes and setting fees and charges for telecommunication networks involving the use of radio frequencies. Most of these networks are used to provide public telecommunications services, such as GSM mobile or wireless local loop (WLL). However private networks deploying terrestrial point to point fixed links (radio relay) and satellite earth stations were also included within the scope. The actual levels of fees and charges were also analysed and compared, on a country by country basis and between services. Non-telecommunications services such as broadcasting were not covered, nor were private mobile radio, trunked mobile radio or licence exempt services.

Information on the structure and level of licence fees and charges for telecommunications networks and services is included in the Commission's Annual Reports on the Implementation of the Telecommunications Regulatory Package ("Implementation Reports"). However to date there has been insufficient data on the fees and charges relating specifically to use of the radio spectrum to enable meaningful comparison between Member States. This point was raised by the European Parliament in the context of the Commission communication on the Fifth Implementation Report.

The wide disparity between Member States in the approaches to setting fees and charges for use of radio spectrum also makes comparison difficult. For example, some Member States have adopted administrative pricing methods[1] in an attempt to encourage more efficient use of the spectrum, whereas others adopt a cost recovery approach or apply market based methods, such as auctions, for large spectrum assignments. In the case of fixed links and WLL, a variety of different frequency bands have been used which further complicates the comparison process.

A key objective of the Study was to aid the transparency of national licensing regimes and to clarify the justification for administrative fees and spectrum fees / charges. As part of the Study, comparisons were made between the various approaches used by Member States to determine fees and charges, and

[1] Administrative *pricing* refers to the setting of spectrum charges that reflect the economic value of the spectrum resource, rather than merely the costs associated with licensing and managing the spectrum. The term should not be confused with administrative fees, which are set on a cost-recovery basis.

consideration given to possible approaches to good practice in terms of meeting the objectives of the Licensing Directive[2].

For the purpose of the Study, and in line with existing terminology within the framework of the Licensing Directive, Administrative Fees and Spectrum Charges have been defined as follows:

*Administrative Fees* are fees intended to cover the costs of examining an application for a licence, granting the relevant authorisation and verifying compliance with the terms and conditions set once the service or network is operational. Under the terms of the Licensing Directive (Article 11.1), Member States are required to ensure that such fees seek only to cover the administrative costs incurred in the issue, management, control and enforcement of the applicable individual licences. In the case of General Authorisations, Article 6 of the Licensing Directive requires fees to cover only the administrative costs associated with the authorisation scheme but does not require costs to be apportioned to individual applicants.

*Spectrum Charges* are charges which reflect the need to ensure the optimal use of scarce resources. Article 11.2 of the Licensing Directive allows Member States to levy such charges on a non-discriminatory basis, taking into particular account the need to foster the development of innovative services and competition.

For the purposes of the study we have also defined a third category of payment, namely a *Spectrum Fee*, which, whilst being based on the amount and type of radio spectrum that is licensed, is set by reference to the NRA's overall costs. We have treated these spectrum fees separately from other administrative fees and included them in the overall category of spectrum charges, partly because of their direct correlation with the amount of spectrum used (and hence their potential role in promoting optimal use of scarce spectrum resources) and partly because in general they do not appear to bear any obvious correlation with the costs relating to the specific licence or service category concerned.

The Study has been carried out on behalf of the Commission by Aegis Systems Ltd and Connogue Ltd. Comprehensive information has been gathered on administrative fees and spectrum charges levied by each Member State, and comparisons have been carried out by applying these fees and charges to specific case studies relating to the five telecommunication services covered by the study. These are:

i) GSM Mobile Telephony

ii) 3rd Generation Mobile Telecommunications (IMT-2000 / UMTS)

iii) Terrestrial point-to-point fixed links (radio relay)

2 Directive 97/13/EC of the European Parliament and the Council of 10th April 1997 on a common framework for general authorisations and individual licences in the field of telecommunications services (O.J L 117/15, 07.05.97).

iv) Permanent satellite earth stations

v) Wireless local loop (WLL)

During the Study, a comprehensive questionnaire relating to these five services was sent to the regulatory authorities in each Member State, supplemented by face-to-face meetings with administration representatives where necessary. Information was also gathered from a number of public sources, including NRA web sites, published documents and the ETO on-line Licensing Database. A summary of the questions raised in the questionnaires is presented in Annex F.

## 1.2 Structure of the Report

The report comprises four main sections, addressing the following specific topics:

i) Licensing regimes for telecommunications services using spectrum in EU Member States (chapter 2)

ii) Approaches to setting administrative fees and spectrum charges (chapter 3)

iii) Case studies for each of the telecommunications services addressed by the study (chapter 4)

iv) Conclusions and Recommendations (chapter 5)

A series of appendices provide further detail on specific aspects of licensing, fees and charges relevant to the study, and further information on the conduct of the study.

## 1.3 Exchange Rates

The following Euro exchange rates have been assumed for currencies outside the Euro zone, based on rates current at 15th June, 2001:

Denmark: €1 = DKR 7.46

Sweden: €1 = SKR 9.18

UK: €1 = GBP 0.62

## 1.4 Glossary

A comprehensive glossary of the acronyms and specialist terms used in the report can be found at Annex A.

## 1.5 Acknowledgements

The authors wish to record their appreciation for the assistance provided by NRA representatives in the preparation of this report. Completed questionnaires were received from the following NRAs: Belgium (Belgian Institute of Posts and Telecommunications), Denmark (National Telecom Agency), Germany (Federal

Industry for Economics and Technology), Spain (Secretariat General for Telecommunications), France (Ministry of Economics, Finance & Industry), Ireland (Office of the Director of Telecommunications), Italy (Ministry of Communications), the Netherlands (Radiocommunications Agency), Austria (Federal Ministry for Transport, Innovation and Technology), Portugal (Portuguese Institute for Communications), Finland (Telecommunications Administration Centre), Sweden (National Post and Telecom Agency) and the United Kingdom (Radiocommunications Agency). Face-to-face meetings were held in Belgium, Germany, France, Ireland, Italy, the Netherlands, Spain, Austria, Portugal and the United Kingdom.

## 1.6 Disclaimer

Whilst every effort has been made to ensure the accuracy of the information contained in this report, the authors can not accept any responsibility for actions or decisions that may be taken as a result of the information herein.

The opinions expressed in this Report are those of the authors and do not necessarily reflect the views of the Commission, nor does the Commission accept responsibility for the accuracy of the information contained herein.

# 2 SUMMARY OF EUROPEAN AND NATIONAL SPECTRUM MANAGEMENT REGIMES FOR TELECOMMUNICATIONS SERVICES USING RADIO SPECTRUM

## 2.1 European Regulatory Framework

The European framework for the licensing and authorisation of radio networks using radio spectrum falls within the remit of two bodies, namely the European Union (EU) and the Conference of European Posts and Telecommunications Administrations (CEPT). The EU framework defines the scope for individual licences and general authorisations and endeavours to promote a harmonised market for radiocommunication services, particularly where international mobility is involved. CEPT, whose membership extends beyond the EU and currently includes 44 countries in the European region, is responsible for co-ordinating spectrum management and allocation activities at a regional level, within the global framework defined by the International Telecommunications Union (ITU).

The following sections review briefly the role and activities of the EU and CEPT in relation to licensing, fees and charges for radiocommunication services.

### 2.1.1 European Union

The current EU regulatory framework for the licensing of telecommunications networks and services, including those using spectrum, is enshrined in the Licensing Directive and has facilitated an effective transition from monopoly provision of telecommunications networks and services to a competitive, liberalised environment. The main provisions of the Licensing Directive which relate to licence fees and charges are those in Article 11, referred to in section 1.1 above. There are a also a number of service-specific legislative instruments which relate to services covered by this report, notably the GSM Directive[3], the Mobile Directive[4] and the UMTS Decision[5].

Increasing convergence between telecommunication, information technology, broadcasting and other media sectors prompted the Commission to review the

3 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 European Community (OJ L196/85, 17.07.87)

4 Commission Directive 96/2/EC of 16 January 1996 amending Directive 90/388/EEC with regard to mobile and personal communications (OJ L 20/59, 26.01.96)

5 Decision 128/1999/EC of the European Parliament and of the Council of 14 December 1998 on the co-ordinated introduction of a third-generation mobile and wireless communications system (UMTS) in the Community. (OJ L 17/1, 22.01.99)

regulatory framework for all forms of electronic communication (the "1999 Review"). The 1999 Review concluded that all transmission networks and services for electronic communication should be covered by a single regulatory framework, and a package of legislative measures has been proposed by the Commission to this effect.

The proposed new regulatory framework package comprises the following five Directives:

i) On a common regulatory framework for electronic communication networks and services (the Framework Directive);

ii) On the authorisation of electronic communications networks and services (the Authorisation Directive);

iii) On access to, and interconnection of, electronic communication networks and associated facilities;

iv) On universal service and users' rights relating to electronic communications networks and services; and

v) On the processing of personal data and the protection of privacy in the electronic communications sector.

In addition, a new Decision on a regulatory framework for radio spectrum in the Community has been proposed (the Spectrum Decision), to establish a procedural framework for the development of spectrum policy and harmonisation of radio frequencies (through the use of comitology procedures). The scope of the proposed Spectrum Decision is not limited to electronic communication services but extends to other internal market policy areas such as transport and R&D.

The proposed Authorisation Directive[6] would require NRAs to issue general authorisations for all electronic communication networks and services, but allows for individual rights of use to be granted for radio spectrum where this is necessary, for example to avoid harmful interference. NRAs may limit the number of such rights of use only where this is necessary to ensure the efficient use of radio frequencies.

Article 12.1 of the proposed Authorisation Directive requires administrative charges[7] for general authorisations and rights of use to cover only the following:

> *"administrative costs which will be incurred in the management, control and enforcement of the applicable general authorisation scheme and of rights of use […], which may include costs for international co-operation, harmonisation and standardisation, market analysis, monitoring compliance*

6 Council common position adopted on 17 September 2001.

7 Note this is a change in terminology from the Licensing Directive, which defined such payments as Administrative Fees.

*and other market control, as well as regulatory work involving preparation and enforcement of secondary legislation and administrative decisions…".*

Article 12.1(b) goes on to state that such charges shall:

*"be imposed upon the individual undertakings in an objective, transparent and proportionate, manner which minimises additional administrative costs and attendant charges."*

Article 13 of the proposed Authorisation Directive provides that Member States may allow NRAs to:-

*"impose fees for the rights of use for radio frequencies… which reflect the need to ensure the optimal use of these resources. Member States shall ensure that such fees shall be objectively justified, transparent, non-discriminatory, and proportionate in relation to their intended purpose and shall take into account the objectives in Article 7 of Directive .../../EC [Framework Directive]."*

The proposed Framework Directive[8] requires (Article 8) Member States to *"ensure the effective management of radio frequencies for electronic communication services in their territory"* and to "*ensure that the allocation and assignment of such radio frequencies by national regulatory authorities are based on objective, transparent, non-discriminatory and proportionate criteria".*

The Framework Directive also makes provision for NRAs to permit the transfer of rights to use radio spectrum between undertakings, subject to notification to the NRA and on the condition that competition is not distorted as a result of such transfer, and that no change of use to harmonised spectrum allocations is involved.

Article 15 of the Authorisation Directive relates to availability of information on fees and charges, requiring Member States to

*"ensure that all relevant information on rights, conditions, procedures, charges, fees and decisions concerning general authorisations and rights of use is published and kept up to date in an appropriate manner so as to provide easy access to that information for all interested parties."*

It should be noted that there is a fundamental difference in terminology between the Licensing and Authorisation Directives, in that the term Administrative Fees is replaced by Administrative Charges in the new Directive, and charges (relating to scarce resources) are replaced by fees for the right of use of radio frequencies.

### 2.1.2 CEPT ERC

The European Conference of Posts and Telecommunications (CEPT) is the regional regulatory telecommunications body for Europe and currently has a membership of

8 Council common position adopted 17 September 2001.

44 European and neighbouring countries. CEPT's European Radiocommunications Committee (ERC) co-ordinates the use of radio spectrum across the CEPT region. It has five permanent working groups concerned with frequency management (FM), spectrum engineering (SE), radio regulation (RR), WRC preparation and ITU council conference preparation. The RR working group has responsibility for matters relating to fees and charges for radio spectrum.

ERC's stated aim is "to ensure that European administrations, industry, broadcasters, service providers, operators and users derive maximum benefit from the finite spectrum resource". In line with wider European moves to develop a fully integrated single market, ERC is endeavouring to harmonise frequency allocations as far as possible throughout Europe. Whilst some harmonisation initiatives (e.g. those relating to GSM and UMTS) have been backed by Commission Directives or Decisions, in many other cases the Commission has delegated this responsibility to CEPT, whose mandates take the form of ERC Decisions, whereby administrations commit themselves to the implementation of harmonised use of specific frequency bands or standards.

A number of important elements concerning licensing and associated fees and charges are contained and discussed in ERC Report 53 (May 1998) on the introduction of economic criteria in spectrum management and the principles of fees and charging in the CEPT countries. The report discusses both the traditional licensing mechanisms and a number of aspects of spectrum pricing (administrative pricing, auctions, secondary market for spectrum rights) and its potential influence on spectrum re-farming, implementation of migration plans, and the adaptation of traditional spectrum fees to market conditions.

## 2.2 National Regulatory Regimes

There are three principal elements of telecommunication networks using radio spectrum that may be subject to licensing within EU Member States. These relate to the service or services provided *(service licence)*, access to the radio spectrum required to deliver the service *(spectrum licence)*, and installation / operation of the network apparatus to deliver the service *(network licence)*. Whether one, two, or all three elements need to be licensed and whether a single or multiple (integrated) licence is involved varies both among Member States and between the services under consideration. Historically, licensing of fixed telecommunications has tended to be application or service oriented, whereas for mobile services and to a lesser extent WLL services the emphasis has been more technology or system oriented. This reflects partly the greater need for harmonisation of standards in the mobile case (to facilitate international roaming and free circulation of terminals) and the involvement of a scarce resource (radio spectrum) which limits the number of networks that can be licensed.

In general, provision of telecommunication services other than voice telephony is covered by general authorisations, which may involve notification or registration with

the NRA and payment of a fee to cover the costs associated with managing the authorisation regime. Voice telephony generally requires individual licensing to enforce obligations such as access to emergency services and directory enquiries.

Most Member States require some form of individual licence or authorisation to be held in order to utilise radio spectrum for any of the five service types covered by this report. In Belgium, Germany, Greece, France and Luxembourg a specific "spectrum licence" as such is not required, but a frequency assignment must still be obtained using procedures akin to those used for spectrum licensing in other Member States, with fees and/or charges applying to these assignments.

Individual licensing of networks applies in some Member States and typically covers the right to install and operate network infrastructure. In some cases this includes the right to use radio spectrum and a separate spectrum licence is therefore not required. In general, non-public fixed links or satellite earth stations do not require an individual network or service licence, only a spectrum licence or frequency assignment. In Denmark there is currently a requirement for a licence for the establishment and operation of a mobile network, although no fees are charged for this licence and there are plans to discontinue this requirement, so that only a licence to use radio frequencies will be required. There is no requirement for a service licence in Denmark. In the Netherlands there is no requirement for a licence to operate public networks or provide public services, but an individual licence is required to use spectrum for these services. In Finland a network operating licence is required for mobile networks but notification is sufficient for fixed services. In Sweden, only large public networks require an individual service licence, otherwise notification is sufficient. Elsewhere, a licence is required both for public network / service provision and use of spectrum.

Table 2.1 indicates for each Member State whether a service, spectrum and/or network licence is required and summarises the specific licensing requirements for each of the services addressed by the study. In general, the licensing regime for public telecommunications services such as GSM, 3G mobile and WLL is similar, as is the approach to fixed link and satellite licensing. However differences tend to exist between these two groups, since fixed links and satellites are usually licensed on a "first come, first served" basis and can be for either private or public use. Hence the table distinguishes between these two broad categories. A more detailed description of the national spectrum, service and network licensing regimes in each Member State is presented in Annex B.

The organisational approach to licensing also varies among the Member States. Some have a single, integrated body dealing with all aspects of spectrum and service licensing, whilst others split these activities between different organisations. In some cases, the broad policy framework is determined within a Ministerial Department, while the day-to-day issuing and enforcement of licences is handled by a separate regulatory body which may report to the Ministerial Department or may be autonomous. A number of Member States have also established an

independent telecommunications regulator[9] responsible for overseeing competition aspects and enforcing service licence conditions (e.g. price caps on incumbent operators). Although generally appointed by government, independent regulators are able to intervene autonomously in areas such as licence infringements or anti-competitive practices, and act as the NRA with regard to these activities. For the purposes of international representation, there is usually one designated NRA in each Member State, although responsibility for specific activities may be delegated to other relevant bodies such as independent regulators. For the purposes of the study, we have used the term NRA in the generic sense to refer to all bodies involved in the licensing and spectrum management processes.

Table 2.2 lists the main organisations involved in spectrum and service licensing in each of the Member States. Note that in most Member States (10 out of 15), there are two organisations involved in the licensing process, generally a Ministerial Department dealing with policy matters and a separate department or Agency dealing with day-to-day licensing activities. In Spain, two Ministerial Departments are involved - the Ministry of Economic Affairs supervises the regulator, CMT, while the Ministry of Development's SETSI is responsible for issuing licences. In the Netherlands and UK there are separate, independent regulators (OPTA and Oftel) which are involved in some aspects of licence enforcement (mainly competition aspects) and which command fees from licensees. France has separate NRAs dealing with telecommunications (ART) and radiocommunications (ANFR). Austria has regional bodies (fernmeldebüro) which are involved in issuing and enforcing some radio licences.

It can be argued that the involvement of several organisations in the licensing process may have a negative effect on transparency, however this need not be the case if the organisations co-operate in providing information and dealing with the licensing process. For example, availability and clarity of information relating to licensing in Austria was generally very good despite there being a number of organisations involved in the process. In general, so long as appropriate links and cross-references are provided between the various organisations' web sites the involvement of several organisations does not appear to have a bearing on the quality or the accessibility of licensing information. Indeed, given the specialist nature of many of the activities related to the licensing process (e.g. economic or technical) there can be merits in these being dealt with by separate, specialist organisations.

9 The term "independent regulator" in this context refers to an organisation that is independent of Government.

**Table 2.1: Service, Spectrum and Network Licensing Requirements in EU Member States**

| | GSM, 3G Mobile and WLL Licence requirements (service, spectrum or network) | | | | Fixed Link and Satellite Licence requirements (service, spectrum or network) | | | |
|---|---|---|---|---|---|---|---|---|
| | **Serv** | **Spec** | **Netw** | **Details** | **Serv** | **Spec** | **Netw** | **Details** |
| **B** | √ | | √ | For public mobile networks, an individual Mobile Telecommunication Licence must be held by each operator . This covers network infrastructure, service and spectrum elements, hence currently a public mobile service can only be provided by a mobile network operator.<br>For WLL networks, in common with other fixed networks, an individual licence is required for the network, but service provision requires only notification to the NRA, except for voice telephony, which is subject to an individual licence. The network licence also covers access to spectrum. | | | √ | Notification to the BIPT and frequency assignment required for spectrum use, individual licence required for each fixed link.<br><br>An individual licence is required for the installation and exploitation of public telecommunication networks and for the provision of public voice telephony services. |
| **DK** | | √ | √ | Individual licence required for frequency use and mobile networks, although no fee is payable for the latter. No individual licence required for telecommunication services or to operate fixed public networks - operators apply only for numbers. | | √ | | An individual licence is required for frequency use. |
| **D** | √ | | √ | Licence required for operation of a public network and provision of network services under the Telecommunications Act. | √ | | √ | Licence required for operation of a public network and provision of network services under the Telecommunications Act. Frequency assignment required for all links and earth stations but no licence required for private systems. |
| **EL** | | | √ | Individual telecommunications licence required for the deployment of network infrastructure and provision of services using scarce (spectrum) resources. Access to spectrum is covered by this network licence. Separate registration for a General Licence for telecommunications service provision is also required. | | | √ (PTN) | All services other than voice telephony, telex, mobile radio and paging are defined as liberalised services and require submission of a declaration to the NRA with information on the service to be provided. This will normally be endorsed within 3 months. A frequency assignment (concession) is required for each link or earth station. |
| **E** | √ | √ | √ | Type B2 (Public mobile telephony with network) individual licence is required for GSM and 3G mobile networks, which includes access to radio spectrum. For WLL, a type C2 licence (for the operation of public networks) is required. | √ (PTN) | √ | | Individual service licence required to provide public telephony services. Spectrum licence required for all fixed links and transmitting earth stations. VSAT licence excludes basic telephony, sound and TV broadcasting. No network licence is required for self-provided systems but a licence is required for using of the public radio domain. Systems providing services to third parties require an individual licence. |

| | GSM, 3G Mobile and WLL Licence requirements (service, spectrum or network) | | | | Fixed Link and Satellite Licence requirements (service, spectrum or network) | | | |
|---|---|---|---|---|---|---|---|---|
| | **Serv** | **Spec** | **Netw** | **Details** | **Serv** | **Spec** | **Netw** | **Details** |
| **F** | √ | | √ | Individual network licence required which also entitles holder to apply to ANFR for radio spectrum. Individual service licence required for public services. No separate spectrum licence required.<br>For 3G mobile, the individual authorisation takes the form of a Ministerial Decree to which a schedule of conditions is annexed which formalises the rights and obligations of the holder. | √ (PTN) | | | General authorisation sufficient for private services. Individual service licence is required for public telecommunications services. No individual spectrum licence required but application must be made to ANFR for frequencies and spectrum charges are payable. |
| **IRL** | √ | √ | | Individual telecommunications licence required to provide public mobile or fixed telephony services. Individual wireless telegraphy licence required to access spectrum, also covers installation and operation of network apparatus. | √ (PTN) | √ | | Individual telecommunications service licence required for networks which provide access to the PSTN. Individual wireless telegraphy licence required to access spectrum, also covers installation and operation of network apparatus. |
| **I** | √ | | √ | Individual service licence required for voice telephony provision, which also covers installation of a telecommunication network. | √ (PTN) | √ (excl. PTN) | √ (PTN) | Individual licence is necessary for the assignment of radio frequencies or specific numbers for the provision of services to the public other than voice telephony, installation and provision of public telecommunications networks, mobile and personal communications services. For provision of voice telephony to the public using radio spectrum or operation of a public telecommunications network using radio spectrum, the assignment of spectrum is included in the individual service / network licence for voice telephony or the public telecommunications network. |
| **L** | √ | | √ | An individual licence is required to provide mobile or fixed public telephony services, which includes the network infrastructure. Frequencies are assigned to specific networks by Decree on advice of the NRA. | √ (PTN) | | √ | An individual licence is required for operators of public telecommunications networks or providers of public telecommunications services. Frequencies must be assigned by the NRA and are subject to once-off and annual charges (royalties), but an individual spectrum licence is not required. |
| **NL** | | √ | | Licence gives the right, during the term of the licence, to use the frequencies assigned by the licence for setting up and operating a telecommunications network in accordance with the conditions and technical standards specified in the licence. There is no licence or authorisation required to provide services or operate networks, only registration with OPTA. | | √ | | For the use of frequencies for fixed links or satellite earth stations, a licence from the Radiocommunications Agency (RDR) is required. No licence is required for receive-only terminals. |
| **A** | √ | √ | √ | Individual radio spectrum authorisation required which covers frequencies, conditions for the use of frequencies, installation and operation of infrastructure. Separate individual “Konzession” covers service provision. Network | √ (PTN) | √ | | Individual radio spectrum authorisation is required. Public voice telephony and leased lines require an individual service “Konzession”. Provision of other telecommunications services requires only notification to the NRA. |

| | GSM, 3G Mobile and WLL Licence requirements (service, spectrum or network) | | | | Fixed Link and Satellite Licence requirements (service, spectrum or network) | | | |
|---|---|---|---|---|---|---|---|---|
| | **Serv** | **Spec** | **Netw** | **Details** | **Serv** | **Spec** | **Netw** | **Details** |
| | | | | authorisation is implicitly included in spectrum authorisation. | | | | |
| **P** | | √ | √ | An individual licence is required to operate public telecommunications networks. An individual licence must be obtained to provide services requiring the granting of radio frequencies, as so identified in the national frequency plan.. | √ (PTN) | √ | √ (PTN) | An individual licence must be obtained to provide public voice telephony services or to set up and operate public telecommunications networks. An individual licence must be obtained to provide services using radio frequencies (but only if it requires the granting of radio frequencies, as so identified in the national frequency plan).. No service licence required for private use (fixed links and satellite). |
| **FIN** | | √ | √ | Individual operating licence is required for provision of public mobile communication networks. Regional WLL networks are granted spectrum licences on a first-come, first served basis. No service or network licence is required for WLL, only notification to the NRA. | | √ | | Notification to the NRA is required for provision of public fixed telephone network or telecommunication services to 500 or more subscribers. Otherwise no licence or authorisation is required to operate networks or provide services, but an individual licence is required to use radio spectrum. |
| **S** | √ | √ | | Individual service licence required for provision to the public of mobile telecommunications or network capacity where this is on a substantial scale. Individual spectrum licensing is applied to all radio equipment including those of licensed public operators. | √ (PTN) | √ | | Larger public networks may require an individual licence, otherwise notification is sufficient. Individual licensing is applied to all radio equipment including those of licensed public operators. |
| **UK** | √ | √ | | An individual service licence is required, which can cover the services provided by multiple networks (e.g. separate service licences are not required for GSM and 3G mobile networks). An individual spectrum licence is required for each network | √ (PTN) | √ | | An Individual licence is required for provision of public telecommunication services. An individual spectrum licence is required for all fixed link networks and satellite earth stations, except mobile earth stations and receive-only satellite terminals, which are licence exempt. |

**Table 2.2 : Organisations responsible for licensing telecommunication services, radio spectrum and networks in EU Member States**

| | National Regulatory Authority for telecommunications service using radio spectrum | Other Organisations involved in licensing services, spectrum or networks | Notes |
|---|---|---|---|
| B | Belgian Institute for Postal Services and Telecommunications (BIPT). | Minister of Communications and Infrastructure | The Minister is responsible for political matters. BIPT is, inter alia, responsible for management and control of licensing, frequencies and the numbering plan |
| DK | Telestyrelsen (National Telecommunications Agency – NTA). | The Information Technology (IT) Department of the Ministry of Research and Information Technology. | NTA is a government Agency under the Ministry of Research and Information Technology |
| D | Regulatory Authority for Telecommunications and Post (RegTP) | Federal Ministry of Economics and Technology | Fees and charges are set by the Minister for Economics and Technology in consultation with other government departments. |
| EL | National Telecommunications and Posts Commission (EETT) | Ministry of Transport and Communications (MTC) | The Ministry has the exclusive competence for strategy as regards the telecommunications sector and to introduce legislation. However, the competent authority for the regulation and supervision of the telecommunications market is by law EETT, which is the appointed independent regulatory authority for telecommunications. EETT is also the competent authority for the award of the individual licences, allocation of radio frequencies, management and supervision of the spectrum use. |
| E | Secretaría de Estado de Telecomunicaciones y para la Sociedad de la Información (SETSI), a unit of the Ministry of Science and Technology | Ministry of Economic Affairs Comisión del Mercado de las Telecomunicaciones (CMT) | SETSI is responsible for policy making and issuing both telecommunications and radio spectrum licences. CMT arbitrates in disputes between network operators and service providers, advises SETSI on tariffs and regulatory proposals and deals with applications for telecommunications service licences. CMT may also issue licenses when scarcity is not an issue. The Ministry of Economic Affairs is responsible for supervision of CMT. |
| F | Ministry of Telecommunications | Agence National des Fréquences (ANFR)<br><br>Autorité de Régulation des Télécommunications (ART) | Ministry issues public telecommunication licences and is responsible for determining frequency fees. ART is responsible for other licensing activities, including licensing of private networks. ANFR is responsible for planning, managing and monitoring spectrum use. |
| IRL | Office of the Director of Telecommunications Regulation (ODTR) | Department of Public Enterprise (DPE) | DPE is responsible for telecommunications and radio spectrum regulatory policy. ODTR is responsible for licensing and enforcement activities. |
| I | Communications Authority (AGCOM - Autorità per le Garanzie nelle Comunicazioni) . | Ministry of Communications | AGCOM is responsible for frequency planning and defines licensing procedures. The Ministry assigns frequencies to operators and grants radio spectrum licences. |
| L | Luxembourg Institute of Regulation (ILR) | Ministry of Communications | The Ministry is responsible for telecommunications policy and for final granting of licences after analysis of applications by ILR. ILR is responsible for regulation of the telecommunications, electricity, postal and gas services. It replaced the former Luxembourg Institute of Telecommunications under new legislation in July 2000. ILR is a financially and administratively |

| | National Regulatory Authority for telecommunications service using radio spectrum | Other Organisations involved in licensing services, spectrum or networks | Notes |
|---|---|---|---|
| | | | independent authority under the supervision of the Ministry of Communications. |
| NL | Ministry of Transport, Public Works & Water Management (Directorate General of Telecommunications & Posts - DGPT) | Radiocommunications Agency (Rijksdienst voor Radiocommunicatie - RDR)<br>Onafhankelijke Post en Telecommunicatie Autoriteit (OPTA) | DGPT is responsible for policy matters<br><br>RDR is part of the Transport and Water Management Inspectorate and is responsible for implementation of radio spectrum policy and licensing<br><br>OPTA is responsible for competition and fair trading matters. |
| A | Broadcast and Telecommunications Regulator (Rundfunk und Telekom Regulierungs – RTR GmbH)<br><br>Telekom-Control Commission (TKK) | Regional Telecommunications Authorities (Fernmeldebüro):<br><br>Büro für Funkanlagen und Telekommunikationsendeinrich-tungen (BFT)<br>Frequency Office (Frequenzbüro)<br><br>Federal Ministry for Transport, Innovation and Technology | RTR GmbH replaced former Telekom Control GmbH<br><br>Fernmeldebüro deal with operating licences for radio equipment, also monitoring of frequencies and investigation of interference.<br><br>Frequenzbüro deals with international and national frequency co-ordination.<br><br>The Federal Ministry is the supreme telecommunications authority, which prepares laws and issues ordinances regarding licensing of radio communication services.<br><br>BFT will deal with placing on the market, free circulation and use of telecommunication equipment according to the R&TTE Directive. |
| P | Portuguese Communications Institute (ICP) | Ministry of Social Equipment | The Ministry is responsible for government policy on telecomms.<br>ICP reports to the Ministry. ICP is autonomous in its decision making and its main responsibilities include support to the Ministry in planning legislation and managing radio spectrum, granting licences, supervising authorisations and inspect, certify and assess conformity of communications equipment). ICP is responsible for the national frequency plan. The Ministry is responsible for setting spectrum charges. |
| FIN | The Communications Administration Department (CAD) in the Ministry of Transport and Communications. | Telecommunications Administration Centre (FICORA) | CAD is responsible for legislation, overall regulation and supervision of telecommunications. FICORA is in charge of technical regulations, frequency and number management. FICORA is an Agency under the Ministry of Transport and Communications |
| S | National Post and Telecom Agency (NPTA) | Department of Communications, Ministry of Transport and Communications | NPTA is in charge of telecommunications regulatory affairs and frequency management. The Department is responsible for preparing governmental policy on telecomms, overseeing NPTA. and institutional representation of the Swedish government at international level |
| UK | Radiocommunications Agency (RA) | Department of Trade and Industry (DTI), Communications and Information Industries Division (CII)<br>Office of Telecommunications (Oftel) | Radiocommunications Agency (executive agency of DTI) issues and enforces licences and collects fees, on behalf of Secretary of State for Trade and Industry. |

## 2.3 Public availability of information relating to fees and charges

All European NRAs make extensive use of the Internet to aid the transparency of their procedures. Access to information has also been helped by the activities of CEPT and the EU, including moves to harmonise licensing procedures where feasible and the setting up of the ETO "One stop shop" (OSS) facility for licence applications[10]. Initially, the latter was aimed at the satellite community to facilitate the pan-European licensing of satellite networks, but the licensing information database has since been expanded to include other telecommunications services.

However, despite these welcome improvements, there is still a wide variation in the amount of information made available by individual NRAs and the ease with which this information can be accessed. Whilst some NRAs place all relevant information in the web, others restrict this to national official journals or printed information sheets which must be procured from the NRA or other Government Department. In some cases there appears to be no publicly available information concerning fees and charges for certain services.

As part of the Study an evaluation was made of the extent to which information relating to licensing procedures, spectrum allocations and charges was available to the public. The evaluation focussed on two principal information sources, namely the Internet sites of the NRAs and related bodies, and the ETO One Stop Shop facility. To provide a meaningful comparison, availability of specific items such as a national frequency allocation table, licence application forms and details of national legislation were sought. Table 2.3 summarises the extent to which this information is available via the national web sites and the OSS.

It can be seen that in most Member States comprehensive information about licensing, radio spectrum allocations, fees and charges is available via the Internet.

10The OSS procedure is a simplified procedure for applicants who wish to obtain licences or authorisations in one or more CEPT countries. The procedure offers the applicant the possibility to deal with a single point of contact, to use an electronic Combined Application Form (CAF) and to obtain information about the regulatory situation in CEPT countries from an on-line information bank. The OSS facility can be accessed on the Internet at www.eto.dk

However, in Germany and Greece frequency allocation tables are not available on line and fees information for Greece is only available in hard copy from the National Official Gazette. Participation in the ETO OSS varies, with only Denmark, France, Ireland and the UK currently participating in both the satellite and other liberalised service categories.

**Table 2.3 Comparison of Information available from NRAs via their web sites and the ETO One-stop-shop**

| | Web site(s) | Availability of information on web site | | | | Participation in ETO OSS | | Licensing info (voice telephony) on ETO web site | Frequency allocation table link on ERO web site |
|---|---|---|---|---|---|---|---|---|---|
| | | Licensing procedures | Legislation | Levels of fees and charges | Table of Frequency Allocations | Satellite Services | Other Liberalised Services | | |
| B | BIPT (www.ibpt.be)<br><br>Ministry of Communications & Infrastructure (http://vici.fgov.be)<br><br>Le Moniteur Belge (Official Journal) (www.moniteur.be) | Yes (BIPT) | Yes (BIPT, Le Moniteur) | Yes (BIPT | Yes | No | Yes | Yes | Yes |
| DK | NTA (www.tst.dk) | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| D | RegTP (www.regtp.de)<br><br>Ministry of Economics & Technology (www.bmwi.de) | Yes | Yes | No | No | No | Yes | Yes | No |
| EL | EETT (www.eett.gr)<br><br>MTC (www.yme.gr) | Yes | Yes | No | No. | No | No | No | No |
| E | Ministry of Science and Technology (www.setsi.mcyt.es)<br>CMT (www.cmt.es) | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes |
| F | ART (www.art-telecom.fr)<br><br>ANFR (www.ansi.fr)<br><br>Ministry of Finance & Industry (www.minefi.gouv.fr) | Yes | Yes | Yes | Yes | Yes (VSAT & SNG) | Yes | Yes | Yes |
| IRL | ODTR (www.odtr.ie)<br><br>DPE (www.irlgov.ie/tec/) | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| I | Ministry of Communications (www.comunicazioni.it) | Yes | Yes | Yes | Yes | No | Yes | Yes | Yes |

| | Web site(s) | Availability of information on web site | | | | Participation in ETO OSS | | Licensing info (voice telephony) on ETO web site | Frequency allocation table link on ERO web site |
|---|---|---|---|---|---|---|---|---|---|
| | | Licensing procedures | Legislation | Levels of fees and charges | Table of Frequency Allocations | Satellite Services | Other Liberalised Services | | |
| | Communications Authority (www.agcom.it) | | | | | | | | |
| L | Luxembourg Institute of Telecomms (www.ilt.lu)<br><br>Ministry of Communications | Yes | Yes | Yes | No | No | Yes | Yes | No |
| NL | RA (www.rdr.nl)<br><br>DGPT<br><br>OPTA | Yes | Yes (DGPT) | Yes | Yes | No | Yes | Yes | Yes |
| A | Ministry of Transport, Innovation and Technology (www.bmv.gv.at)<br><br>RTR GmbH (www.rtr.at/) | Yes | Yes | No (but available from Official Gazette web site) | Yes | Yes | No | No | Yes |
| P | ICP (www.icp.pt)<br><br>Ministry of Social Equipment | Yes | Yes | Yes | Yes | No | Yes | Yes | Yes |
| FIN | FICORA (www.thk.fi)<br><br>CAD | Yes (FICORA) | Yes (FICORA) | Yes (FICORA) | Yes | No | Yes | Yes | Yes |
| S | NPTA (www.pts.se)<br><br>Ministry of Transport & Communications | Yes (NTA) | Yes (NTA) | No | No | No | Yes | No | Yes |
| UK | RA (www.radio.gov.uk)<br><br>Oftel (www.oftel.gov.uk)<br><br>DTI (www.dti.gov.uk) | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

## 2.4 Legislative basis of licensing, fees and charges

In most Member States, there are two levels of legislation which relate to the licensing of telecommunications and other radiocommunication services. Primary legislation, i.e. Acts or Laws enacted by national Parliaments, typically provide the broad framework for licensing, such as defining the role and responsibilities of the NRA and the circumstances under which fees or charges can be levied. Secondary legislation, in the form of decrees, executive orders or statutory instruments are typically used to set the level of fees or charges, or to transcribe European Directives into national law. All Member States have enacted primary legislation as part of the telecommunications liberalisation process, and it is this legislation that is used as the basis for setting administrative fees for service licences. In many cases this legislation also addresses spectrum licensing. However Denmark, Ireland, Finland, Sweden and the UK have separate primary legislation addressing radio and telecommunications licensing. In some cases the radio legislation predates liberalisation (Ireland - 1926, Belgium - 1979, Finland - 1988), though in each case the legislation has been amended periodically to cope with new developments.

Table 2.4 summarises the main primary legislation relating to telecommunications service and radio spectrum licensing in each of the Member States. A more comprehensive description of relevant national legislation, including specific statutory instruments defining individual fees or charges for specific services, are presented in Annex C. Further details of the legal basis of fees and charges applied to specific radiocommunication services can also be found in section 3.10.

**Table 2.4: Legal Basis of Telecommunications Service, Spectrum and Network Licensing in EU Member States**

| | Principal Legal Basis (Primary Legislation) relating to National Licensing Regime |
|---|---|
| **B** | Act of 21 March 1991 concerning the reform of certain public companies (The 1991 Act): specifies requirements for provision of telecommunications services, establishment and operation of telecommunications networks and for mobile networks and services.<br><br>Act of 30 July 1979 on radio communications: establishes the general condition for the provision of radio communications. The Act was implemented by the Royal Decree of 15 October 1979 and the Ministerial Decree of 19 October 1979 concerning private radio communications. Specific decrees on spectrum charges are issued under this Act. |
| **DK** | Regulation of radio frequency allocations and assignments is regulated by Act No. 394 of 10 June 1997 on Radio Communications and Assignment of Radio Frequencies (the Act on Frequencies) as amended by Act No.1011 of 23 December 1998, Act No. 1096 of 29 December1999 and by Act No. 232 of 5 April 2000. Allocation of mobile licences is regulated by Act No. 468 of 12 June 1996 on Public Mobile Communications (the Mobile Communications Act), as amended by Act No. 396 of 10 June 1997, Act No. 1096 of 29 December 1999 and Act No. 418 of 31 May 2000. The auction of 3G mobile licences was enabled by Act no. 1266 of 20th December 2000. |
| **D** | Telecommunications Act of 25th July 1996: set up the regulatory framework and provided the legal basis for establishment of the NRA (RegTP). The Act defines the scope of licensing for telecommunications networks, services and radio spectrum. |
| **EL** | Law 2867/2000, introduced on 1st January 2001, defines the regulatory framework for the Greek telecommunications market. The Law enhanced the role of the independent regulator, EETT, which is now the competent authority for the award of individual licences, allotment of frequency bands, assignment of individual radio frequencies and the management and supervision of spectrum use. The Law entitles the Minister of Transport and Communications to limit the number of individual licences if this is necessary for the effective use of radio frequencies and to determine the kind of procedure for the award of such licences. A public consultation, must be conducted by EETT when a limited number of licences is awarded. |
| **E** | Law 11/1998, of 24th April, General Telecommunications Act : defines broad framework of telecommunications regulation in Spain, including scope of general authorisations and individual licences, management of and access to the radio spectrum and levels of administrative fees and spectrum charges. Current spectrum charges are specified in Article 66 of Law 13/2000. |
| **F** | Telecommunications Act, 1996: defines licensing requirements and fees for telecommunications networks and services, including those using the radio spectrum. Royalties (annual fees) are defined in Articles L.33-1, L.33-2 and L.34-1 of the posts and telecommunications code.<br><br>Article 45 of the Finance Law for 1987 (as amended under Finance Law for 2001) defines fee levels for telecommunications licences issued under Articles L.33-1, L.33-2 and L.34-1 of the Posts and Telecommunications Code. |
| **IRL** | Telecommunications Act 1983 (as amended) governs licensing of telecommunications services . 1996 Amendment created the NRA (ODTR) and empowered Director to grant telecommunications licences. Licences to provide telecommunications services are issued under section 111(2) of the 1983 Act .<br><br>Wireless Telegraphy Acts 1926 - 1988: govern licensing or exemption from licensing of radiocommunications apparatus. Licences are granted under section 5 of the Act |

| | |
|---|---|
| | to keep, have possession of, install, maintain, work and use apparatus in a specified place. |
| **I** | Law no. 249 of 31st July 1997 on the Creation of the telecommunications NRA (AGCOM) and provisions on telecommunications and broadcasting systems. |
| **L** | Telecommunications Act of 21st March 1997 set up the regulatory framework for telecommunications and provided legal basis for establishment of NRA (ILR). Article 7 of the Act defines which types of network or service require individual licences. Articles 29 - 32 define the approach to managing and assigning frequencies, including provision for Grand-Ducal Decrees to determine specific frequency allocations and to set fees and charges for access to spectrum. |
| **NL** | Telecommunications Act (T Act) : States that a licence is required for the use of frequencies and must be requested from the State Secretary of Transport, Public Works and Water Management. Under the T Act , licences are only required for the use of frequencies and numbers. For operators of public telecommunications networks, leased lines or broadcasting networks and for providers of public telecommunications services and conditional access systems (decoders) simple registration is sufficient. This registration is handled by OPTA (the independent telecommunications regulator). |
| **A** | Federal Telecommunications Law of 1 August 1997 (as amended) provides regulatory framework and legal basis for the establishment of the NRA . The Law distinguishes between granting of authorisations for importation, sale, ownership, installation and operation of radio equipment and granting of Konzessions for provision of telecommunication services using radio equipment. The scope of the Law is to promote competition in telecommunications and includes the efficient and interference-free use of available frequencies. Specific clauses relate to annual spectrum charges for all authorised radio networks and once-off charges for spectrum assignment.<br><br>On 1 June 2000 an amendment of the Telecommunications Law entered into force providing, inter alia, the basis for the forthcoming 3G licensing procedure. Further major legislative measures came into force recently , including a further revision of the Telecommunications Law and a complete reorganisation of the regulatory authorities, establishing a Communications Commission and the Rundfunk und Telekom Regulierungs-GmbH (RTR GmbH, formerly Telekom Control ). |
| **P** | Basic Telecommunications Law (no. 91 of 1st August 1997): defines the general regulations for the setting up, management and operation of telecommunications networks and the provision of telecommunications services.<br><br>Decree-Law 381-A/97 of 30th December 1997, as amended, defines regulations for the activities of public telecommunications network operators and service providers, determining which activities are subjected to licensing/registration.. |
| **FIN** | Telecommunications Market Act (396/1997): set up legal framework for telecommunications and provided legal basis for creation of NRA (FICORA)<br><br>The Radio Act (517/1988) govern radio equipment and its possession and use as well as the protection of radiocommunications from interference |
| **S** | The Telecommunications Act (1993:597) and the Radiocommunications Act (1993:559), both with later amendments, set up the regulatory framework for telecommunications and the establishment of the NRA (National Post and Telecommunications Agency). |
| **UK** | Telecommunications Act 1984 covers licensing of telecommunication services.<br><br>Wireless Telegraphy Acts 1949 and1998 covers licensing of radiocommunication networks and apparatus. The 1998 Act updated earlier legislation, making provision for auctions and administrative pricing. |

## 2.5 Change of Control Rules relating to radio spectrum licences

Telecommunications and radio spectrum licences are generally not transferable without the approval of the NRA or other national government representative. Typically, specific provisions relating to the transfer of licences under specific circumstances (such as a change of ownership of the licence holder) are included within national legislation or within individual licences. Details of specific change of control rules applied by Member States are summarised in Table 2.5 below.

**Table 2.5 NRA "Change of Control" rules for radio spectrum licences.**

| | |
|---|---|
| **B** | For private networks (fixed links / satellite), authorisations and frequency assignments can not be transferred but must be cancelled and new ones issued. For GSM, 3G mobile and WLL, transfer of licences is subject to BIPT approval and changes in ownership must also be notified (this is addressed in individual service-specific Decrees). |
| **DK** | Licences may only be assigned wholly or partly to other parties if the licence holder has obtained the consent of the NTA thereto, prior to the assignment. Such assignment includes indirect assignment such as stocks, shares or other ownership interests that involve changes in the control of the licence holder. Section 7 of the Mobile Communications Act states that licences may not be assigned in whole or in part without the approval of the NRA. Assignment in this context also relates to indirect changes of control of the licensee. Assignment to a third party of some of the licensed spectrum (i.e. spectrum trading) is also not permitted. |
| **D** | Telecommunications licences may be transferred in accordance with § 9 of the Telecommunications Law. Written agreement of the NRA is required. Radio frequencies cannot generally be transferred but must be handed back to the NRA and re-assigned. |
| **EL** | Licence transfer requires the prior approval by EETT, who will ensure that the new licence holder can fulfil the licence terms and that no restrictions in competition arise. Where a limited number of licences have been issued (e.g. 3G mobile, GSM, WLL), a licence cannot be transferred for a period of nine months after award and a new entrant is not able to sell its licence to an Incumbent at a price lower than the average paid for comparable licences in the licensing process, or the relevant reserve price for Incumbents. Any transfer of shares worth 2% or more of the share capital of the holder of an individual licence, must be notified to EETT within 15 days of the transfer. |
| **E** | The new owner must maintain existing licence obligations. Where scarce spectrum resources are involved, there is a minimum time before takeovers or mergers can take place. Competition rules do not allow large operators to take over smaller competitors. |
| **F** | Any significant change of capital structure of licensed PTO must be notified to ART, but there are no specific rules to prevent such changes other than general competition law. |
| **IRL** | Service and spectrum licences are not transferable and the Director's consent is required for any change of control or ownership. Service licences include a clause stating that the Licensee shall not issue or transfer or redeem shares such as would give rise to a change in control of the Licensee or a material change in the ability of the Licensee to perform the Licensed Services without the prior consent of the Director (which shall not be unreasonably withheld). |
| **I** | An individual licence can be transferred to third parties only after the approval of the NRA. |
| **L** | Conditions of transfer of individual licences are included in individual licence schedules. Licences are generally not transferable. The Minister of Communications must be informed, at least two months in advance, of any proposed change to the control of the capital of the licence holder. The Minister may then specify, on advice from the ILR, the conditions and procedures required. The Minister may prohibit the change if he considers it contrary to the public interest or if the ILR has a serious doubt about the ability of the licence holder to fulfil its obligations stated in the Telecommunications Act or relevant Decree, taking into account the change of shareholding thus occurred. Frequencies associated with the licensed network or service are transferable under the same conditions. |
| **NL** | A licence may be transferred to another upon application by the holder of that licence with the permission of the Minister. Conditions may be attached to such permission, which may be altered from time to time (article 3.8 of the T Act). Mergers and takeovers are subject to approval of the independent regulator (OPTA). |
| **A** | §16 of the Telecommunications Law states that a licence can only be transferred with the agreement of the Regulator. Agreement may be denied if the new owner lacks the necessary technical competence or there is reason to assume he will not provide the relevant service in accordance with the licence. There is also an obligation in the 3G licences that substantial changes in ownership structure require the consent of the Telekom-Control Commission. For operation of authorised radiocommunication equipment the licensee has to inform the Fernmeldebüro (regional offices) of any change of ownership. |
| **P** | Ministerial authorisation based on ICP advice is required in the case of 3G mobile and WLL licences. |

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|---|---|
| | Decree Law also states that if an entity wishes to transfer a licence it must obtain ICP's authorisation. |
| **FIN** | No specific change of control rules. |
| **S** | Transfer of an individual licence is not permitted. |
| **UK** | Licences are "not assignable", i.e. legal rights to the licence cannot be transferred to another undertaking. Mergers and Acquisitions may be referred to the Monopolies and Mergers Commission where they are likely to have an impact on competition in the provision of telecommunication services. In general changes of ownership must be notified to the NRA and are subject to the agreement of the Secretary of State. Subject to competition issues not being distorted, the Secretary of State will normally endeavour to issue a replacement licence to a new undertaking on the same terms. |

## 2.6 Relationship between Licensing, Fees and Charges.

As noted in section 2.2, there are generally three possible licensing regimes applicable to telecommunications services using radio spectrum, namely network, service and spectrum licensing. Under the terms of the Licensing Directive, charges over and above the costs associated with the licensing process may only be levied in the case of access to scarce resources, e.g. radio spectrum.

Network and service licensing, e.g. for the provision of voice telephony services or the operation of a fixed telephony network, is generally independent of the technology deployed (e.g. copper, fibre or WLL) and is therefore subject to administrative fees that should be determined on a cost basis. Spectrum licensing concerns the right to access a potentially scarce resource and therefore may command charges that are in excess of the cost of licensing, to reflect the scarcity value of the resource. Note that in some Member States, the right to use spectrum is currently incorporated into the network licence rather than being covered by a separate spectrum licence, in which case the network licence may be subject to above-cost charges to reflect spectrum scarcity (see Table 2.1).

There are a number of approaches to setting spectrum charges where there is scarcity and these are addressed in section 3.4. It should however be noted that spectrum need not always be treated as a scarce resource. In some frequency bands and geographic areas, there may be little foreseeable demand for spectrum and in such instances it would not be appropriate to levy charges above those required to cover costs. Hence it may be appropriate for some spectrum licences to be subject to cost-based fees and others subject to above-cost charges, depending upon whether there is likelihood of scarcity. In some Member States, there is a mixed approach to spectrum licensing, with fees based on the costs of specific spectrum management or licensing activities and a separate spectrum charge applied only where there is a scarcity.

Some Member States apply spectrum fees which, whilst set with reference to the NRA's overall costs, are apportioned to individual licensees on the basis of the amount of spectrum and/or frequency band licensed. In this study, we have differentiated between spectrum fees of this type and purely administrative fees which take no account of the amount of spectrum licensed. This is because spectrum fees set in this way may significantly exceed the costs associated with individual licences, particularly where large bandwidths and/or low frequency bands (which attract a higher fee) are involved. Table 2.6 provides a summary of the types

of fees and charges that are applied in each Member State , while further details relating to specific services are presented in Table 2.7.

Finally, it should be noted that cost-based administrative or spectrum fees may incorporate elements of indirect costs which, whilst not relating directly to the licence or authorisation concerned, nevertheless are legitimate and necessary costs associated with the running of the NRA. The apportionment of such costs, which are addressed in more detail in section 3.2.4, is a complex issue and is open to various interpretations which can lead to significant variations in the level of fees in different Member States.

**Table 2.6: Summary of application of administrative fees, spectrum fees and spectrum charges applied in each Member State**

| | Administrative fees for service / network licence | Administrative fees for spectrum licence | Spectrum fees (cost-based) | Spectrum charges (above cost) |
|---|---|---|---|---|
| B | Yes | Yes (satellite only) | Yes (all services except GSM and fixed links) | Yes (auction for 3G, administrative pricing for GSM, fixed links |
| DK | No | Yes | Yes (all services including those auctioned) | Yes(auction for 3G) |
| D | Yes | Yes | Yes (GSM and WLL) | Yes(auction for 3G) |
| EL | Yes (levy) | No | Yes (except mobile and WLL) | Yes (auction for mobile and WLL, |
| E | Yes (levy) | No | No | Yes (administrative pricing for all) |
| F | Yes | Yes | No | Yes (administrative pricing |
| IRL | Yes (levy) | No | Yes (except mobile and WLL) | Yes (administrative pricing for mobile and WLL) |
| I | Yes | Yes | Yes (except mobile) | Yes (auction for 3G), No charge applies for GSM, but operators are subject to an above-cost general levy on turnover, along with other licensed PTOs |
| L | Yes | No | Yes | No |
| NL | Yes (mobile PTN) | No | Yes (all services including those auctioned) | Yes (Auction for 3G and some GSM licences) |
| A | Yes (levy) | Yes | Yes (except mobile and WLL) | Yes (Auction for mobile and WLL) |
| P | Yes | Yes | Yes | No |
| FIN | No | Yes | Yes | No |
| S | Yes (levy) | Yes | No | No |
| UK | Yes (levy) | No | No | Yes (auction for 3G and some WLL, administrative pricing for others) |

Note that all Member States apply administrative fees of some description, in some cases for spectrum licences and in some cases for network / service licences. The latter only apply to public telecommunications networks.

In those countries that do not apply administrative fees for spectrum licensing, relevant costs are recovered either by means of cost-based spectrum fees or are recovered from the proceeds of administrative pricing or auctions. For cost-based spectrum fees, all the NRA's relevant costs are recovered from all the licensees, but the amount recovered from individual licensees is a function of the amount and type of spectrum resource that is licensed.

**Table 2.7: Application of administrative fees, spectrum fees and spectrum charges to spectrum licences in each Member State**

| | GSM | 3G Mobile | WLL | Fixed Links | Satellite |
|---|---|---|---|---|---|
| **B** | Initial spectrum charge ("unique concession fee" for GSM; auction bid for 3G) and annual spectrum fee for spectrum management and co-ordination, charged on a per-channel basis. | | | Annual spectrum fee applies, based on bandwidth and frequency band | Initial administrative fee and annual spectrum fee, based on licensed bandwidth |
| **DK** | The Act on Frequencies 1997 requires annual spectrum fees to reflect licence holders' use of spectrum. Fees therefore reflect exclusive or shared use, bandwidth assigned and geographic coverage of the licence. However, the basis of the calculation of fees is the cost of administration and other services provided by NTA to the telecommunications sector in the field of radiocommunications. This amount is approved by parliament yearly and is divided over the licence holders according to their spectrum use. Denmark applies a cost based system with differentiation based on certain models for the different services, although when setting individual fees, political considerations may play a role. All licence holders in Denmark pay a yearly fee for issuing the yearly licence. The fee is a called a usage fee and for 2001 the fee is €24. In addition there is also a spectrum fee, which is annual and depends on the bandwidth licensed. The total fee payable for all licensees is therefore €24 (usage fee) plus the spectrum fee.<br>Once-off fees only apply for licences that are limited in time. For 3G mobile, this took the form of an auction payment a process enabled by specific legislation (note that the annual spectrum fee is payable in addition to this once-off payment). Details of the auction process are presented in Annex D.2.2.2. | | | | |
| **D** | An initial service licence fee is payable along with an initial spectrum fee, based on the assigned bandwidth, which reflects the costs associated with frequency assignment and enforcement. An annual administrative fee also applies which is independent of bandwidth. | Initial payment takes the form of an auction bid. There is an annual administrative fee applied after three years of operation, based on costs associated with maintaining and enforcing the licence. | Initial service licence fee, based on population in coverage area Initial frequency assignment fee, based on the number of base stations. Annual administrative fee after three years of operation, based on costs associated with maintaining and enforcing the licence. | Once-off cost-based administrative fee within set upper and lower limits. Annual fixed administrative fee, irrespective of link type. | Initial fixed administrative fee and annual administrative fee set within upper and lower limits, irrespective of type of station. |
| **EL** | An initial licence fee is payable, which is the amount bid at auction by the licence holder. As this essentially reflects the value of the right to use scarce spectrum resources, it is treated in this Study as a spectrum charge. Annual spectrum charges that would otherwise be incurred are offset against this initial payment. An annual administrative) fee of between 0.025% and 0.5% of turnover is payable (see note 1 below) | | | Annual spectrum fees apply to all radio frequency concessions. An annual administrative fee of between 0.025% and 0.5% of turnover is payable where public telecommunication service are provided (see note 1 below) | |
| **E** | An initial administrative fee applies to all general authorisations and individual licences for telecommunications networks and services. An annual levy of not more than 0.2% of gross income (currently 0.15%) is also applied to providers of public telecommunications services. An annual spectrum charge is payable, reflecting the amount of spectrum resource licensed and subject to change on an annual basis. An initial spectrum charge may also be payable where exclusive national assignments (e.g. GSM or 3G mobile) are concerned. | | | | |
| **F** | Initial administrative fees apply to cover NRA costs. Amount depends on geographic coverage of the licence. Annual fees also apply to cover monitoring of spectrum assignments and enforcement of licence obligations. An annual spectrum charge is levied on GSM networks as an incentive to efficient spectrum use. For 3G mobile this has been replaced with a fixed one-off charge, although repayment of this is phased over the life of the licence | | An annual frequency management administrative fee applies along with a spectrum charge based on the bandwidth, frequency band, and geographic area. | An annual frequency management administrative fee applies along with a spectrum charge based on the bandwidth, frequency band, and, for block allocations of spectrum, geographic area. | A fixed annual administrative fee applies per transmitting station. There is currently no spectrum charge. |

| | | | | | |
|---|---|---|---|---|---|
| **IRL** | Initial spectrum access charge applies to mobile networks (not WLL) , which may be predetermined or may be part of the comparative evaluation process. An annual spectrum charge applies to all networks, as do initial administrative fees for issue of the service licence and to cover tender costs. An annual levy of 0.2% of turnover applies. | | | Annual spectrum fee applies to all links. Initial administrative fee applies where a service licence is required (for PSTN access). | Annual spectrum fee applies and there is an initial administrative fee where frequency co-ordination is required. Further initial administrative fee where service licence required. |
| **I** | Once-off and annual administrative fee applies to cover expenses incurred by AGCOM in issuing and enforcing the licence. A concession fee was paid by TIM, other operators were required to pay compensation to military services which were currently using the spectrum. An annual levy of 3.0% on the turnover of all licensed telecom operators was set in 1999, reducing in stages to 1.5% in 2003. No separate GSM spectrum charge is imposed. Annual fees and charges will be reviewed in 2003. | Spectrum charge takes the form of a once-off auction payment. Once-off and annual administrative fee applies to cover expenses incurred by AGCOM in issuing and enforcing the licence. An annual levy of 3.0% on the turnover of all licensed telecom operators was set in 1999, reducing in stages to 1.5% in 2003. Annual fees and charges will be reviewed in 2003. | Approach to WLL still under consideration. | Administrative fees (once-off and annual) apply to public services. Annual spectrum charges apply to all links and earth stations. An annual levy of 3.0% on the turnover of all licensed telecom operators was set in 1999, reducing in stages to 1.5% in 2003. Annual fees and charges will be reviewed in 2003. | |
| **L** | Once-off and annual administrative fees apply to the service licence. Once-off and annual spectrum charges (royalties) apply to the frequency assignments. All fees and charges are specified in Grand-Ducal Decrees or ILR Decisions relating to specific licences. | | | Once-off and annual administrative fees apply to individual service licences where these are required. Lower fees apply to other services that require only declaration to the NRA. Once-off and annual spectrum charges (royalties) apply to all frequency assignments. | |
| **NL** | Once-off and annual administrative fees are payable for registration of a mobile telephony service and for registration of a mobile network operator with SMP. Once-off fee is deducted from auction bids. Annual spectrum fee applies, in addition to auction bid, based on amount of spectrum licensed. The Netherlands only have cost-based pricing (initial costs and annual costs). Auctions are separate as a means of dividing spectrum in a transparent and objective manner and the proceeds go to the general budget (after deducting the costs of the auction and licensing process). | | To be decided (WLL not yet licensed) | Once-off and annual administrative fees apply for registration of fixed telephony or data services. Annual spectrum fee based on frequency band and bandwidth for recovering the costs for enforcement and monitoring. | A once-off administrative fee apples for each licence and an annual spectrum fee, based on recovering the cost of enforcement and monitoring and are calculated on base of bandwidth, applies for each transmitter. |

| | | |
|---|---|---|
| **A** | Public telecommunications Konzessions are subject to an initial licence fee to cover administration costs arising from granting the licence. Licensees are also required to pay a levy based on their annual turnover (currently between 0.1 and 0.2 %), which contributes to the NRA's costs, in particular administration, supervision and enforcement of the licence. §21 of the Telecommunications Law provides requires licence applicants to specify a frequency usage fee, on a once-off or regular basis, that the applicant is willing to pay in addition to the annual frequency charge which is specified in the Telecommunication Fee regulations. This is the basis for the auctions that have been held for 3G mobile, GSM and WLL services. | Public telecommunications Konzessions relating to fixed links are subject to an initial licence fee and annual levy on the same basis as mobile and WLL licensees. §51 of the Telecommunication Law requires a one-off allocation fee and an annual usage fee to be paid for access to spectrum. The fees cover the costs of planning, co-ordinating and managing the use of frequencies, including necessary measurements, tests and investigations to ensure efficient and interference-free usage. Fee levels are specified in the Telecommunication Fee ordinance. As annual fees depend on the amount of spectrum resource consumed, they are treated in this Study as spectrum charges. |
| **P** | Initial and annual administrative fees are based on the costs associated with administrative, technical, operational and inspection tasks, and constitute a revenue of ICP. Annual spectrum charges take account of type and amount of spectrum resource used (frequency band, bandwidth, and geographic coverage). There is also a once-off spectrum administrative charge to cover costs of frequency assignment, co-ordination etc. | |
| **FIN** | Annual spectrum charges, based on the frequency band, bandwidth and area coverage apply to the possession and use of licensed radio transmitters as base stations of public mobile networks or FWA networks. An individual network licence is also required for mobile networks but there are no separate administrative fees | Fixed links and satellite earth stations are subject to fixed annual licence fees that reflect the costs of frequency co-ordination and licensing. Whilst these fees relate to the right to use spectrum, they are entirely cost based and not in any way dependent on the amount of spectrum licensed, hence they are regarded as administrative fees in this Study. |
| **S** | Administrative fees only (all fees are cost based and do not take account of the amount of spectrum licensed) | |
| **UK** | Once-off administrative fees and annual levy (up to 0.08% of turnover) required for service licence, where required. Annual spectrum charge for spectrum licence, except where licences have been auctioned (3G mobile and some WLL licences), where the auction payment represents the entire spectrum charge and there is no annual charge. | |

**Notes:**

1. All enterprises providing telecommunications services in Greece are subject to annual fees which amount to between 0.5% and 0.025% of total gross income, in accordance with the following table. In any case, the annual fees may not be less than GDR 100,000.

| Total gross income (GI) (in GDR billion) | Annual fees (in GDR billion) |
|---|---|
| GI < 100 | 0.005*GI |
| 100 < GI < 200 | 0.5 + 0.002*(GI-100) |
| 200 < GI < 300 | 0.7 + 0.0015*(GI-200) |
| 300 < GI < 400 | 0.85 + 0.001*(GI-300) |
| 400 < GI <500 | 0.95 + 0.0005*(GI-400) |
| GI > 500 | 1.0 + 0.00025*(GI-500) |

# 3 APPROACHES TO SETTING FEES AND CHARGES FOR TELECOMMUNICATIONS SERVICES USING RADIO SPECTRUM

## 3.1 Purpose of Administrative Fees and Spectrum Charges

There are two principal reasons why it is necessary to levy fees and charges for telecommunications services using radio spectrum. Firstly, administrative fees are required to cover the costs associated with issuing licences, monitoring market behaviour and enforcing licence conditions. Such market intervention is necessary in the telecommunications market partly because of the disproportionate strength of incumbent operators relative to new market entrants and, in the case of services using radio spectrum, because of the limited amount of spectrum resources which in turn limits the number of players that can enter the market and may constrain the development of a fully competitive market without regulatory intervention.

Secondly, spectrum charges should reflect the need to provide an incentive for those using spectrum to do so in the most efficient manner, to ensure optimum use of scarce spectrum resources in line with the Licensing Directive. For the purposes of this study, we have considered "efficiency" to be the conveyance of the maximum amount of voice, data or other traffic within a given geographic area and with a given amount of spectrum. Hence for example, spectrum efficiency for a voice telephony network may be quoted in terms of erlangs / MHz / $km^2$. In general, there is a trade-off between the amount of spectrum available to a network and the density of infrastructure required, since cellular techniques allow the same spectrum to be re-used intensively even within a relatively small geographic area. It should be noted however that individual Member States may well take a different view of efficiency, perhaps including social or economic objectives within its scope, and this may lead to different approaches to setting spectrum charges (e.g. the application of lower charges to encourage service rollout).

Charges may also be applied to encourage users who have a viable alternative (e.g. the use of fibre optic cable instead of fixed radio links) to vacate spectrum, making way for new market entrants or new service offerings. In a competitive bidding scenario, spectrum charges can also provide an objective and transparent means of awarding licences where the number is limited due to the scarcity of spectrum.

The radio spectrum is a finite resource, representing a relatively small amount of the broader electromagnetic spectrum that includes infra-red and optical frequencies with many orders of magnitude more bandwidth. The value of spectrum is not so much its capacity for information transmission, but its ability to convey such information to remote users under a wide variety of scenarios. This value is particularly apparent in mobile and broadcast applications, where radio spectrum provides the only means for wide area wireless delivery of services over non-line of sight paths.

The attractiveness of certain parts of the spectrum is further enhanced by the physical properties of the spectrum (notably the available bandwidth, geographic range and re-use capability) and the service to which the spectrum has been allocated by the ITU and regional bodies such as the CEPT. In practice, terrestrial broadcasting and wide area mobile communications are constrained to frequencies below 3 GHz (to provide wide area non-line of sight coverage), whereas line of sight applications such as terrestrial fixed links or satellite systems can take advantage of the greater bandwidths available in the higher frequency bands.

Access to spectrum is required by a wide range of users, including non-commercial organisations such as the military, public safety organisations and navigation services. Much of this spectrum must also be in the sub-3GHz region, further reducing the spectrum available for mobile and broadcast applications. Effective utilisation of this remaining spectrum requires careful management on the part of the NRA and, where demand exceeds supply, a means of assigning spectrum to those who are most likely to make optimum use of scarce resources, in line with the Licensing Directive. Fees and charges relating to spectrum address these two aspects, i.e. recovery of the costs associated with good spectrum management practice and providing a financial incentive to users to make most efficient use of this limited resource.

## 3.2 Approaches to setting Administrative Fees

### 3.2.1 Introduction

Administrative fees enable NRAs to recover the costs associated with spectrum management and licensing. Some of these costs are incurred prior to licence issue and may therefore be recovered as a single payment when the licence is issued. Other costs are ongoing, relating to maintenance and enforcement of licences and the broader management of the radio spectrum. There are also indirect costs incurred by the licensing body, such as personnel, training or other overheads, which need to be recovered within the administrative fee framework.

The following sections address each of these three cost elements. We then go on to review the main approaches currently used by Member States to determine the appropriate level of administrative fees

### 3.2.2 Costs associated with Licensing

Licensing costs fall into two broad categories, namely those associated with the preparation and issuing of the licence or authorisation, and those associated with maintenance and enforcement. The former may include costs associated with any necessary enabling legislation and the holding of auctions or beauty contests, in addition to the direct costs of drafting and issuing the licence. Where a number of licences are issued simultaneously, there is a good case for apportioning the costs evenly among the recipients, and this approach is often taken, for example, towards

recovering the cost of licence tenders. However, where a number of licences have been let over a prolonged period, such as was the case with GSM in most Member States, the costs associated with the early licences may be significantly greater than the costs associated with subsequent licences that essentially follow the same format. In such cases a single fixed fee applied to all the licences, which broadly reflects the NRA's costs may be more appropriate.

Ongoing costs include those associated with enforcing licence conditions, for example relating to competition or fair trading. It may also be necessary to update licences from time to time to take account of changes in national or European legislation. There are two approaches to recovering such costs, namely the application of a fixed annual fee for each type of licence, and the application of a levy based on the licensee's turnover or profitability. Whilst a fixed fee is more directly related to the costs associated with a specific licence, a levy may be seen as more equitable in terms of the apportionment of costs to large and small players. By reducing the costs for smaller enterprises, this approach has the potential to facilitate market entry, particularly by service providers or smaller regional operators where the licensing costs might otherwise be disproportionate to the total investment.

Currently, levies are imposed by the following Member States:

| | |
|---|---|
| EL | Between 0.025% and 0.5% of turnover |
| E | 0.15% of turnover |
| IRL | 0.2% of turnover |
| A | 0.1 – 0.2 % of turnover |
| S | 0.15% of turnover |
| UK | Up to 0.08% of turnover |

A significantly higher annual levy is currently imposed on all Italian licensed telecommunications operators, including GSM operators, for whom no separate annual spectrum charge is payable. The levy was introduced in1999 at 3.0% and is being reduced year-on-year to 1.5% in 2003, at which point it may be replaced by a more conventional form of spectrum charging. Currently it is 2.5%.

### 3.2.3 Costs associated with Spectrum Management

Management of the radio spectrum is a complex task involving long-term, strategic planning, day-to-day assignment of spectrum to individual users, enforcement of licence conditions and obligations, and dealing with unlicensed or unauthorised users. Depending on the national regulatory regime, these functions may be undertaken by a single body or be delegated to different bodies either within or outside government. Similarly, costs may be allocated directly to specific functions or services, or aggregated, either to broad groups of services or functions or across the entire spectrum management regime. In some cases, costs may not even be specifically allocated to spectrum management, but may include other regulatory aspects such as the enforcement of competition or price control legislation on licensees.

Among the specific, identifiable costs which can be directly associated with spectrum management are:

- Participation in international fora, e.g. the ITU, CEPT and ETSI. In some cases, such as attendance at ITU Radiocommunications Sector (ITU-R) or European Radiocommunications Committee (ERC) meetings, the activities specifically relate to spectrum management. In other cases, such as standards bodies addressing third generation mobile or other services, the work is only partly related to spectrum management but nevertheless may involve a considerable expenditure on the part of NRA spectrum management staff.
- Licensing of radiocommunication services. In most administrations, licences range from individual fixed links or private mobile radio stations, perhaps costing as little as €100, to national mobile telecommunication networks where the cost may be millions or even billions of euro. The workload involved for the NRA is not generally related to the value of the licence to the user (a complex PMR network with several base stations may involve as much work to licence as a national GSM network but will generate only a small fraction of the revenue for the licensee).
- Co-ordination. Radio signals do not respect national boundaries, nor is it generally possible for two different users to share a radio channel in the same area without causing mutual interference. It is therefore necessary for the NRA to co-ordinate frequency assignments, both within its own territory and with neighbouring administrations.
- Enforcement of licence conditions. This may involve, for smaller users, ensuring that the equipment used is compliant with appropriate standards and is properly installed so as to avoid causing undue interference, or in the case of large public networks ensuring that obligations relating to coverage or service quality are met. The approach taken may vary according to the resources of the administration, and may range from self-declaration on the part of licensees to active monitoring using sophisticated equipment and dedicated teams of engineers.
- Policing the spectrum. This may involve taking action against unlicensed or unauthorised users of the spectrum, or those who knowingly or otherwise cause interference to licensed spectrum users. In some countries there is a growing problem with "pirate" broadcasters, for example, or illicit use of high powered cordless telephones in the GSM band. Interference can also result from badly maintained industrial or consumer equipment, which may require action by NRA enforcement officers.

### 3.2.4 Indirect costs

In addition to the direct costs relating to the process of licensing and maintenance of a specific radiocommunication licensee, there are a number of functions that NRAs

undertake that can be considered as 'indirect costs' to the process of spectrum management. Since the Licensing Directive infers that costs incurred which exceed the amount required for the licensing process may only be levied in the case of scarce resources, e.g. over-subscribed portions of the radio spectrum, the recovery of indirect costs may not be a straightforward matter.

Typical indirect costs could include:

- Research and development of new technologies to the benefit of spectrum users,
- Market surveillance,
- Marketing and public relations,
- National database management,
- Participation in a variety of international regulatory and standardisation fora,
- Monitoring and enforcement procedures and
- Administrative functions including IT, Finance and Human Resources.

It is reasonable for some or all of the above costs to be recovered by the licensing process, since without undertaking such functions the overall quality of the spectrum management activity may decline. Some administrations therefore include indirect as well as direct costs in the setting of annual administrative fees.

The above discussion prompts the question of whether administrative fees are set by Member States in order to cover specific categories of costs or whether all costs (including indirect) are aggregated for the purposes of determining fees. As we have seen in section 2.6, most Member States do not have procedures in place to apportion costs on an individual basis to specific licence categories, nor do they in general appear to have specific procedures for differentiating between direct and indirect costs. Instead, the total costs of the NRA and other bodies involved with the licensing process are amortised across all licensees, either on the basis of their turnover (where a levy is applied) or on the basis of fixed fees which in total should approximate to the costs of the NRA.

In section 3.10 we address how administrative fees are determined in each Member State for each of the five services under consideration, and the extent to which these relate to direct and indirect costs associated with the individual licences or licence categories.

## 3.3 Approaches to setting Spectrum Fees

Cost-based spectrum fees are similar to administrative fees in that they are intended to recover the costs incurred by NRAs in the licensing and/or frequency management processes. However, unlike administrative fees, spectrum fees for individual licences take account of the type and/or amount of spectrum resource assigned to that licence. Typically they are set on a per-bandwidth basis, and may

also take into account the frequency band. The costs that are to be recovered generally include both direct and indirect costs, though in most cases there is little or no information on how such charges are apportioned. Since there is not in practice a direct correlation between the amount or type of spectrum licensed and the costs incurred, cost-based spectrum charges may not reflect the costs associated with individual licences or authorisations, or even broad categories of licence or authorisation. Hence they do not appear to meet the Licensing Directive requirement (Article 11) for administrative fees "only to cover the administrative costs incurred in the issue, management, control and enforcement of applicable individual licences". For this reason, we have differentiated between spectrum fees and administrative fees within this study.

## 3.4 Approaches to setting Spectrum Charges

### 3.4.1 Introduction

Like spectrum fees, spectrum charges are generally based on the amount or type of spectrum that is licensed. However, unlike spectrum fees, charges may be set at a level that produces overall revenue in excess of the NRA's cost, where this can be justified on the basis of ensuring optimal use of scarce spectrum resources.

There are two main approaches to determining spectrum charges, namely administrative pricing and market-based mechanisms such as auctions. Administrative pricing is typically used in conjunction with beauty contests, since the scarcity tends to limit the number of licences that can be offered. However it may also be applied to services that are licensed on a first come first served basis, such as fixed links, to differentiate between congested and uncongested frequency bands or geographic areas.

The following sections provide a brief overview of administrative and market based spectrum pricing concepts.

### 3.4.2 Administrative Pricing

In instances where spectrum is congested (i.e. demand exceeds supply), administrative pricing offers an approach by which the value of the use of radio frequencies is taken into account and reflected in spectrum charges, thereby encouraging users who have an alternative to migrate to other technologies or frequencies. Under an administrative pricing regime spectrum charges tend to be set with reference either to the cost of the next best alternative technology or service, or to the level of profit that will be foregone if the user ceases to use the spectrum. The purpose of administrative pricing is to ration demand for spectrum in a way that promotes the economically efficient use of spectrum.

Administrative pricing may also be applied where there is no scarcity, by applying lower charges (potentially below cost) to frequency bands and/or locations that are not congested in order to encourage migration from congested bands or locations.

For example, when administrative pricing was introduced in the UK, although charges in congested areas rose, there were corresponding reductions in some of the charges elsewhere.

Administrative pricing may be used both with "first come first served" and beauty contest approaches to licensing. A "first come first served" approach is typically used for licensing of individual terrestrial fixed links or satellite earth stations. Beauty contests have historically been the most common approach to awarding licences where demand exceeds supply, and continue to be widely used for the award of mobile and WLL licences. The procedure involves defining a set of criteria against which applications are judged. The applications which most closely meet the defined criteria are awarded the licence. The criteria may include economic, technical service related or other factors, such as:

- Introduction of innovative new services or technologies
- Proposed speed of deployment
- Geographic coverage
- Efficiency with which spectrum will be used
- Track record of applicant in providing similar services elsewhere
- Effect on promoting competition in the market

Examples of specific selection criteria that have been used in EU countries for the licensing of 3G networks are presented in Annex D. Beauty contests often require one or more payments from successful applicants at the time of licence award, in addition to any ongoing annual fees or charges. Either cost based fees or administrative pricing, or a combination of the two may be applied where scarce resources are involved. The level of fees charged in beauty contests varies considerably, as the following table illustrates. It can be observed that there have been a greater number of applicants where lower charges have applied.

**Table 3.1: Fees and charges payable on issue of licences awarded in European 3G Mobile beauty contests**

| | Licences offered | Applicants | Total Payments (all operators, €M) | Total payments per capita (€) |
|---|---|---|---|---|
| E | 4 | 6 | 523 | 13.37 |
| F[11] | 4 | 2 | 9,908 | 169.08 |
| P | 4 | 6 | 400 | 40.28 |
| FIN | 4 | 15 | Nil | Nil |
| S | 4 | 10 | 0.1 | 0.01 |

[11] As in force at the time of first licensing round; in October 2001 the French Government had announced that it intended to reduce the total spectrum charge per operator to € 619.25, combined with a levy on operators' future turnover (level to be determined).

### 3.4.3 Auctions

Essentially an auction involves the awarding of licences to those who bid the greatest amount in monetary terms. There are many varieties of auction and their design is a specialised skill. However, in all cases it is likely that certain pre-qualification criteria must be met to enable bidders to participate. These may be limited to simply demonstrating that the bidder has the financial resources to back up its bid, or may extend to meeting certain minimum service criteria or obligations should a licence be awarded. Details of 3G mobile spectrum auctions held in specific Member States can be found in annex D.

The awarding authority is usually responsible for designing the auction, setting up the procedures for running the auction, ensuring that all potential bidders have full knowledge of the rules and procedures and for running the auction to a conclusion. Auctions may be run on site with all bidders in attendance or they may be run remotely.

Experience of spectrum auctions around the world has shown that spectrum used in certain applications, in particular mobile communications, can be perceived as extremely valuable and this is reflected in the very high prices that have been paid. In Europe, auctions have been used by several Member States to assign licences for 3G mobile services. To ensure bona-fide bidders and reduce the risk of market collusion depressing the price paid, a minimum reserve price is normally set. There appears to be no common approach to determining the appropriate level of the reserve price, though in every case so far this has been considerably higher than the likely administrative costs associated with the auction. Hence the reserve price may be regarded as a form of administrative pricing,

Table 3.2 compares the number of licences and bidders, and the levels of reserve prices and amounts actually paid, in each Member State which has opted for an auction process for licensing 3G mobile services. As with beauty contests there is a significant variation, both in the reserve prices and the amounts actually paid. Early auctions held in Germany and the UK attracted the most bidders and the greatest premium over the reserve price. In some more recent cases the number of bidders has fallen, to the extent that in Belgium and Greece fewer bids were received than there were licences offered.

**Table 3.2 European 3G Mobile auction bids and reserve prices**

| | Licences offered | Bidders | Reserve Total (€M) | Total winning bids (€M) | Reserve per capita (€) | Total bids per capita (€) |
|---|---|---|---|---|---|---|
| BE | 4 | 3 | 600 | 450.2 | 59.00 | 44.29 |
| DK | 4 | 5 | 268 | 509.4 | 50.50 | 96.02 |
| D | 4 - 6 | 12 | 613 | 50,800 | 7.47 | 618.76 |
| EL | 4 | 3 | 587 | 484.5 | 55.27 | 45.64 |
| I | 5 | 6 | 10,329 | 14,640 | 181.75 | 257.75 |
| NL | 5 | 6 | 213 | 2,680 | 13.61 | 167.41 |

| | Licences offered | Bidders | Reserve Total (€M) | Total winning bids (€M) | Reserve per capita (€) | Total bids per capita (€) |
|---|---|---|---|---|---|---|
| A | 4 - 6 | 6 | 738 | 831 | 90.77 | 102.21 |
| UK | 5 | 13 | 810 | 36,205 | 14.06 | 628.58 |

### 3.4.4 Hybrid approach

A hybrid approach combines elements of both auctions and administrative pricing, for example by including a financial bid as one element of a beauty contest. An example is the Italian approach to the licensing of 3G mobile services, which included three distinct phases, namely:

- Pre-qualification
- Detailed technical and commercial evaluation
- Auction

The initial pre-qualification phase required submission of financial information, detailing the ownership and structure of each bidder, together with basic technical information demonstrating a track record in providing telecommunication services. Those who satisfied these initial requirements (seven of the original eight applicants) were permitted to progress to the evaluation (beauty contest) phase on payment of a € 2.5 billion deposit.

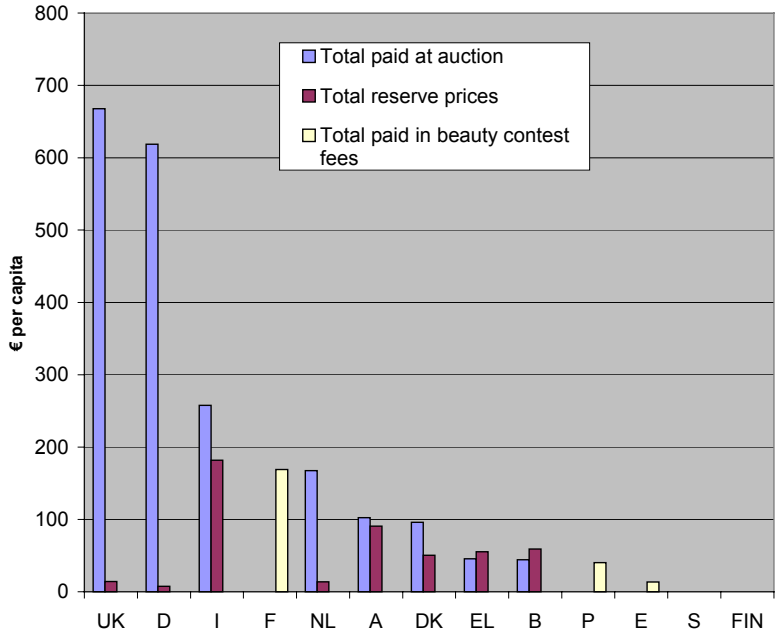
The evaluation phase involved a detailed assessment of the technical and commercial capabilities of the potential bidders (a summary of the criteria involved is presented in Annex D). However, the evaluation did not seek to rank the applicants, rather to ensure that any company entering the auction phase has a genuinely viable commercial and technical plan upon which to develop a 3G service. Finally, those who had successfully met the requirements of the evaluation phase (six of the seven pre-qualified applicants) were allowed to proceed to the final, auction phase which was a conventional ascending bid auction.

### 3.4.5 Comparison of amounts paid in auctions and beauty contests

The figure below shows the total amount paid by all successful applicants or bidders in each Member State where 3G licences have been issued at the time of writing. Note that the amounts refer to the once-off payments either bid at auction or imposed by the NRA and do not take account of any deferred payment arrangements (these are addressed in section 3.6.2) or recurring annual fees or charges. In some cases, the latter can be significant:, e.g. in Spain the initial licence fee was €129 million, whereas the proposed annual spectrum charge at the time of

writing is approximately €61 million[12], representing a far larger total payment over the duration of the licence. The combined effect of both once-off and recurring payments over the duration of a licence is addressed within the case studies (chapter 4).

**Figure 3.1: Comparison of total amounts paid per capita in European 3G auctions and beauty contests**




The above discussion raises the question of whether spectrum charges, whether based on administrative pricing or market based mechanisms, set by Member States actually achieve efficient use of spectrum in the manner defined in section 3.1 above, or whether other objectives or efficiency definitions (e.g. taking greater account of economic or social benefits) may be apparent. This question is considered in the context of spectrum charges in each Member State in section 3.10

## 3.5 Secondary Trading

As part of the study, NRAs were asked whether they had any plans to introduce any form of spectrum trading, i.e. the ability of a licensed spectrum user to sell on all or part of his assigned spectrum to a third party. Only the UK is actively pursuing this option at the time of writing, having held an initial public consultation and preparing a second. In France, the matter is under consideration but no political decision has

[12] The annual spectrum charge in Spain at the time 3G mobile licences were awarded was €5 million per licence, this was subsequently increased to € 163 million per licence, but at the time of writing the Government had proposed an average 65% reduction in the charges (the actual reduction may vary among the four licensees).

yet been made on whether trading should be accommodated. Some other countries noted that licences are already transferable (subject to NRA or Government approval) which is itself a form of trading. Most NRAs currently have no firm plans to introduce secondary trading, but do not object to its introduction in other Member States.

## 3.6 Special payment arrangements for administrative fees and spectrum charges

### 3.6.1 Introduction

Administrative fees and spectrum charges comprise either a single, up-front payment made at the time of licence issue, or an ongoing, regular payment, typically annually on the anniversary of licence issue. The annual payment is likely to be subject to periodic review to take account of inflation or changes in the NRA's cost base or its approach to setting charges (e.g. the introduction of administrative pricing).

Some Member States have however introduced payment schemes which reduce the impact of fees and charges during the early stages of network rollout. There are two principal schemes, namely deferred payment of up-front charges and "escalator" arrangements for annual payments. Deferred payments enable large sums such as those that might be bid at auction to be paid back partly at a later stage, when network rollout is complete and subscriber revenue is being generated. Escalator arrangements reduce the level of the annual fee payment by a pre-determined amount in the early years of network rollout and operations. For example, a licensee may pay only a quarter of the full annual fee in year one, half in year two, three quarters in year three and the full amount thereafter.

### 3.6.2 Deferred Payment Arrangements

The following examples of deferred payment arrangements have been identified during the course of the Study.

#### *3.6.2.1 Denmark: 3G Mobile Auction*

The payment of the amount bid at auction for 3G mobile licences in Denmark will be phased as follows:

i) an initial payment on award of the licence of 25% of the amount bid;

ii) ten equal annual instalments comprising in total 75% of the amount bid, with the first instalment due on the first anniversary of licence award.

If either the initial payment or any of the deferred instalments is not paid by the due date interest may be charged on the overdue amount. If licensees should decide to hand back their licences at any time, they will still be liable for payment of the up-front element and the first three annual instalments. Licensees are required to

provide a rolling bank guarantee on their deferred payments, sufficient to cover the next three instalments (or all remaining instalments if fewer than three). The guarantee will be payable on demand.

#### *3.6.2.2 France: 3G spectrum charge*

After many months of debate between the French government and the telecommunications regulator (ART), and having considered the result of the UK 3G mobile auction, which involved payment of prices significantly higher than had widely been anticipated, the French government decided to proceed with a beauty contest and set the payment at € 4, 955 million per operator over fifteen years. Half of this amount was to be paid within the first two years and the balance over the next thirteen years, in accordance with the following schedule:

| Payment Date | Amount (€ million) |
|---|---|
| 30 September 2001 | 619.25 |
| 31 December 2001 | 619.25 |
| 31 March 2002 | 309.62 |
| 30 June 2002 | 309.62 |
| 30 September 2002 | 309.62 |
| 30 December 2002 | 309.62 |
| 30 June 2003 | 176.99 |
| 30 June 2004 | 176.99 |
| 30 June 2005 | 176.99 |
| 30 June 2006 | 176.99 |
| 30 June 2007 | 176.99 |
| 30 June 2008 | 176.99 |
| 30 June 2009 | 176.99 |
| 30 June 2010 | 176.99 |
| 30 June 2011 | 176.99 |
| 30 June 2012 | 176.99 |
| 30 June 2013 | 176.99 |
| 30 June 2014 | 176.99 |
| 30 June 2015 | 176.99 |
| 30 June 2016 | 176.99 |
| **Total Payable** | **4,954.84** |

Assuming a 5% per annum discount rate, this equates to a net present value of €4,076M, a total saving of €878M, or 18% relative to a single, up-front payment. Note that in October 2001 the French Government announced that the charges payable would be reduced to € 619.25, combined with a levy on future 3G turnover (not yet determined).

#### *3.6.2.3 Greece: 3G spectrum charge (auction bid)*

The payment arrangements for the 3G licences auctioned in Greece were dependent upon the number of licences awarded (ultimately there were three). There were two components, the first being an initial up-front payment to be made within 20 days of completion of the Licensing Process. This would have been equal to 40% of the value of the bid had there been four licences awarded, but in the case

of three licences this was increased to 70% of the value of the bid. Had only two licences been awarded the full bid amount would have been payable at this time.

The second component comprised a deferred payment to be paid in four equal annual instalments starting in 2005, with no interest charges. This would have been equal to 60% of the value of the bid had there been four licences awarded, but in the case of three licences this was reduced to 30%.

In addition, the telecommunications levy which for 3G mobile services is set at 2% of turnover, is not payable until 2005.

### 3.6.3 "Escalator" arrangements

In some Member States where annual spectrum charges are levied, these are reduced in the early years after licence issue to offset the operators' costs in rolling out the networks and reduced cash flow as a subscriber base is built up. This arrangement is sometimes referred to as an "escalator" in that the charges commence at a low level and progressively escalate to the full level, which may be determined either by costs or administrative pricing. The following examples of escalator arrangements have been identified during the course of the study.

#### *3.6.3.1 Finland GSM and 3G Mobile*

Annual spectrum charges for public mobile networks in Finland are subject to a reduction in the first years after licence award, as follows:

3G Mobile:

| Annual payment | Reduction |
|---|---|
| 1st | 90% |
| 2nd | 90% |
| 3rd | 80% |
| 4th | 80% |
| 5th | 60% |
| 6th | 40% |
| 7th | 20% |
| 8th and subsequent | Nil |

The effect of this arrangement on the 3G mobile spectrum fees is to reduce the net present value of the spectrum charges for each licence over 20 years, assuming a 5% discount rate, from € 20,434,000 to € 13,891,000, a reduction of 32%.

GSM

| Annual payment | Reduction |
|---|---|
| 1st | 80% |
| 2nd | 80% |
| 3rd | 60% |
| 4th | 40% |
| 5th | 20% |
| 6th and subsequent | Nil |

This corresponds to a reduction in NPV over a 20 year licence of 16%.

*3.6.3.2 Ireland WLL*

A reduced spectrum licence fee applies during the first two years after licence issue, as follows (from SI no. 287 of 1999, the Wireless Telegraphy (FWPMA) Regulations):

| | |
|---|---|
| On issue of WT licence: | € 762 per MHz |
| On first anniversary of licence issue: | € 1,333 per MHz |
| On second and subsequent anniversaries of licence issue: | € 1, 905 per MHz |

Assuming a 5% annual discount rate, the overall effect for a 10 year licence is to reduce the NPV of the spectrum charge from € 15,288 per MHz to € 13,059 per MHz, a reduction of 15%.

*3.6.3.3 United Kingdom WLL*

**4 GHz band:** €6,833 on licence issue, going up to €13,666 on 1st anniversary, €20,499 on 2nd, €27,333 on 3rd, €40,999 on 4th and €54,665 on 5th and thereafter. Assuming a 5% annual discount rate, the effect of the escalator is to reduce the NPV of the spectrum charges over the 20 year period from €701,000 to €549,000, a reduction of 22%. Note that these fees relate to spectrum shared with earth stations. Different fees apply to spectrum that is shared with earth stations and fixed links (see Table 3.19 for details), but a similar escalator applies.

**10 GHz band:** €5,468 per MHz on licence issue, going up to €10,935 on 1st anniversary, €16,403 on 2nd anniversary, €21,870 on 3rd anniversary, €32,805 on 4th anniversary and €43,740 on 5th anniversary and thereafter. This also results in a 22% reduction in the NPV of the spectrum charges over the 20 year service licence (note however that 10GHz FWA licences are renewable annually, they are not for a fixed period).

Similar arrangements have been applied in the past to GSM licences in the UK.

### 3.6.4 Other special payment arrangements

Other opportunities exist to reduce the level of charges. For example, in Portugal the spectrum charge for WLL services is reduced if coverage is extended to certain geographic areas. The following formula is used to determine the annual charge for networks using the 3600 – 3800 MHz and 24.5 – 26.5 GHz frequency bands:

$$€\ 304{,}260 \times \{1 - 0.45\ (\Delta EB_A / \Delta EB) - 0.3\ (\Delta EB_B / \Delta EB)\},$$

where $\Delta EB_A$ = no. of additional base stations installed in zone A in previous year

$\Delta EB_B$ = number of additional base stations installed in zone B in previous year

$\Delta EB$ = total number of additional base stations installed in previous year

Zones A and B are defined in Administrative Rule no. 667-A/2001.

## 3.7 Current Approaches to setting spectrum charges used in Member States, for specific radiocommunication services

Table 3.3 summarises the licensing and pricing approaches adopted in each Member State for the services covered by this Study. Details of how specific fees and charges are determined in each Member State for specific radiocommunication services are presented in section 3.10.

In this Study, we have made a distinction between administrative fees, which are intended to reflect the cost of individual licences or general authorisation processes, and spectrum fees. The latter typically reflect the cost of spectrum related activities, such as monitoring, frequency co-ordination or participation in international regulatory fora (see section 3.2.3 for a more detailed discussion), but are applied to licensees in a manner that takes some account of the amount of spectrum resource used. For example, the spectrum fee may be based on the licensed bandwidth, frequency band, geographic area, number of transmitters or a combination of such factors, rather than simply based on the costs associated with a particular licence or licence category. However, unlike administrative pricing or market based approaches such as auctions, spectrum fees do not take any account of the economic value of the spectrum, only the costs associated with administering it.

From Table 3.3 it is apparent that spectrum fees apply in most Member States for at least some services, although these are increasingly being complemented by auctions or administrative pricing. In Finland and Sweden all charges are cost based, although Finland is planning to introduce administrative pricing for fixed links in the future. In Spain, administrative pricing is used for all services, and in the UK for all services except satellite (satellite was about to be added at the time of writing – see section 3.11.1.15 for details) and licences that are subject to auction. In Spain, France and Ireland beauty contests are used in conjunction with administrative pricing, whilst in other Member States spectrum fees are broadly cost-based, other than where auctions or hybrid approaches have been used.

The table shows which approaches are used in each Member State and, where beauty contests are used, whether these involve cost-based or administrative pricing.

**Table 3.3: Current approaches to spectrum pricing and award of licences in EU Member States**

| | Cost-based Pricing (Spectrum Fees) | Administrative Pricing | Auctions | Beauty contests | Payment Arrangements |
|---|---|---|---|---|---|
| B | Used for annual spectrum fees for mobile, satellite and WLL services | New charges for fixed links and WLL take account of frequency band and bandwidth | Used for 3G mobile licences | Used in conjunction with cost-based prices for WLL licences. Hybrid approach (beauty contest with financial bid as one of the parameters) used for licensing 2nd and 3rd GSM networks. | Auction bids and other initial fees and charges payable in full on licence issue. Recurring charges payable annually on fixed date (31st December) |
| DK | The basis of the calculation of all spectrum fees (except auction bids) is the cost of NTA's administration and other services in the field of radiocommunications, but costs are apportioned between licence holders according to their spectrum use. Methods that may be applied where demand exceeds supply include administrative redistribution, requirements for changeover to more frequency effective methods of utilisation or technologies, reduced usage or administrative withdrawal of frequencies. | | Used for 3G mobile licences. | Used for GSM and WLL licences, with cost-based pricing. | Spectrum charges payable annually. In the planned 3G mobile auction, it is proposed that 25% of the price bid will be paid immediately and the balance paid over the next ten years |
| D | All spectrum users are required to pay an annual contribution to the costs of the NRA. Costs are apportioned to specific user groups (e.g. cellular mobile, fixed links, etc) | A once-off fee is applied to all services, which may take account of the amount of spectrum used and/or geographic coverage of the service. | Auction held for 3G mobile spectrum. | Beauty contest held for WLL licences, with cost-based pricing. | Once-off fees payable in full on licence issue; recurring fees payable annually. |
| EL | Used for fixed links and satellite | . | Used for GSM, 3G mobile and WLL licensing | Not used | For spectrum assigned up to 31st December, charges are payable for the following year in January. For spectrum assigned during the year, charges for that year are applied pro-rata, with the calculation commencing from the first day of the month during which the spectrum was assigned. Once-off fees, including auction bids, are due within 20 days of licence award. Deferred payment arrangements apply for 3G mobile licence fees (see section 3.6.2.3 for details). |
| E | Not used | Administrative pricing is applied to all telecommunication | Not used | Used for GSM, 3G mobile and WLL licences, in conjunction | Once-off fees payable in full on licence issue; recurring fees |

| | Cost-based Pricing (Spectrum Fees) | Administrative Pricing | Auctions | Beauty contests | Payment Arrangements |
|---|---|---|---|---|---|
| | | services using spectrum. Charges take account of geographic coverage as well as frequency band and bandwidth assigned. | | with administrative pricing of spectrum. | payable annually. |
| F | Applies to VSAT licensing | Applies to GSM, 3G mobile, WLL and fixed link licensing (charges are intended to provide an incentive to efficient use of spectrum) | Not used. | Used for GSM, 3G mobile and WLL licences, with administrative pricing. | Deferred payment scheme for once-off 3G mobile spectrum charge (see section 3.6.2.2 for details) |
| IRL | Used for fixed links and satellite earth stations | Used for GSM, 3G mobile and WLL, to reflect scarcity value of spectrum. Applies to initial spectrum access fee and annual spectrum charges for these services. | Not used | Used for GSM, 3G mobile and WLL., with administrative pricing | Service licence fee and spectrum access fee (where required) paid in full on licence issue. Spectrum charges levied annually. Telecommunications levy paid quarterly. |
| I | Applies to private fixed links and satellite earth stations | Administrative pricing is used for public fixed links. | Hybrid auction / beauty contest approach adopted for 3G mobile licensing. Beauty contest approach adopted for GSM. | | |
| L | Spectrum fees are defined by Grand-Ducal Decree for specific services | Not used | Not used | Used for GSM, 3G mobile and WLL. | |
| NL | All annual spectrum charges are currently cost based. | There are plans to introduce administrative pricing for some services to reflect the commercial value of licensed radio spectrum. These fees may be based on the operator's profit or turnover. | Have been used for GSM and 3G mobile licences. May be used for WLL licensing. | Used for 2nd GSM licence, in conjunction with cost-based pricing, and may be used for WLL, in conjunction with administrative pricing. | Auction bids and initial administrative fees are payable upon licence issue or registration. Other fees and charges are payable on the anniversary of licence issue or registration. |
| A | Annual spectrum fees for all services and the once-off assignment fee for fixed links and satellite earth stations are based on NRA costs associated with frequency allocation and management. Spectrum fees for individual authorisations, although cost based at licence category level, taking account of frequency band, bandwidth and/or transmitter power, for individual assignments. | Not used. | Used for 3rd and 4th GSM licences, 3G mobile and WLL licences. | Used for 2nd GSM licence, with administrative pricing. | Auction payments and initial assignment fees payable in full on issue of Konzession and authorisation respectively. Annual spectrum fees are levied on a monthly basis but payable annually on the anniversary of licence issue. |

| | Cost-based Pricing (Spectrum Fees) | Administrative Pricing | Auctions | Beauty contests | Payment Arrangements |
|---|---|---|---|---|---|
| P | Although spectrum fees are cost based, the amount paid by individual licensees reflects the amount of spectrum resource used (frequency, bandwidth, geographic area). A more formal system of administrative pricing, which will take account of regional congestion and charge all spectrum on a per bandwidth rather than per station basis, is planned in the near future. | | Not used. | Used for GSM, 3G mobile and WLL licences, using cost-based pricing. | Once-off fees are payable in full on licence issue. Service / network licence fees are payable annually. Spectrum fees are payable at six-monthly intervals. |
| FIN | A fixed annual fee per transmitter currently applies to fixed links and satellite earth stations, but there are plans to introduce administrative pricing. | Currently applied to GSM, 3G mobile and WLL licences. | Not used. | Used for GSM and 3G mobile, in conjunction with administrative pricing. | Fees payable annually on anniversary of licence issue. |
| S | All fees are cost based. | Not used | Not used | Used for GSM and 3G mobile, with cost-based pricing. Likely to be used for WLL licensing. | Fees payable annually on anniversary of licence issue. |
| UK | Currently used for satellite services but has been replaced by administrative pricing in 2001/2002 for certain licence categories | Used for most services except where licence awarded by auction | Used for 3G mobile and Broadband WLL at 28GHz. Likely to be used for future licensing of major national or regional networks. | Have been used for GSM and WLL, formerly with cost-based pricing but now with administrative pricing. | Spectrum charges for GSM and WLL networks awarded by beauty contests subject to "escalator" arrangement in early years of operation (see section 3.6.3.3). Other fees and charges payable in full as due. A deferred payment scheme was available for 3G mobile auction participants (see Annex D.2.15.2 for details) but was not taken up by any licensees. |

## 3.8 Relationship between administrative fees and NRA costs

As part of the Study, information was gathered on the licensing costs and revenues associated with each of the service categories, for each Member State. In particular, attempts were made to assess the following:

- the extent to which cost-based fees are determined on the basis of directly attributable costs for the services concerned, and
- whether any of the revenue generated from fees and charges is attributed to specific activities such as spectrum management, research and development or re-farming existing spectrum users to accommodate new services.

Table 3.4 summarises the situation in various Member States where the NRA has been able to provide information. Whilst all NRAs profess to set administrative fees on a cost basis, few appear to have any formal and fully transparent process in place for cost allocation to specific licences or licence categories. Exceptions are the Netherlands, which has developed a cost model that can be publicly inspected at the NRA's headquarters, and Germany, which sets most fees on a case by case basis within pre-defined upper and lower limits. Ireland also recovers the costs for beauty contests on a case by case basis.

Most NRAs publish annual accounts which detail total costs and revenues but do not provide breakdowns for specific licence categories. In some Member States administrative fees are applied in the form of a levy on turnover, which in some cases can be varied depending on the costs of the regulator relative to the aggregate turnover of all the licensees subject to the levy. Hence the levy is usually capped or, in the case of Ireland, there is provision in the legislation for monies raised which exceed costs to be refunded.

**Table 3.4: Approaches to cost attribution and the setting of administrative fees in EU Member States (where information provided by NRA)**

| | Approach to cost attribution | Basis of setting administrative fees | Spectrum related activities to which funds are attributed |
|---|---|---|---|
| DK | NTA's total relevant costs are approved by Parliament each year and divided among licence holders according to their spectrum use. | No administrative fees apply, but spectrum fees are cost based | Revenue is allocated to spectrum management, e.g. participation in international work and development of legislation, and to re-farming and relocation of existing spectrum users. |
| E | The Budget of the State for expenses of personnel is joint and breakdown by individual Departments does not exist | An annual levy is applied on turnover, which is capped at 0.2%. The current rate is 0.15% | No direct attribution to specific activities |
| F | No direct attribution of licensing costs to specific licence holders or licence categories. Fees are fixed for all licence holders in Art.45 of the Finance Law for 1987, as modified from time to time, and are a function of the geographic area covered by the licence and the procedure used to award licences (fees are doubled where beauty contests are used). | Initial licence fee for public networks is intended to cover costs associated with holding beauty contest and issuing licence, but is also based on geographic coverage. Annual fees covers costs of monitoring frequencies and ensuring compliance with licence conditions. | No direct allocation of revenue to specific costs. |
| IRL | No cost allocation for specific licence or service types, except for administrative cost of beauty contests. Cost centres cover a broad range of licences. ODTR is self-financing via licence fees and the telecommunications levy. Excess licence fee and spectrum charge revenue (over costs) is passed to the exchequer. | Fees and charges reflect ODTR costs associated with licensing, spectrum management and enforcement. A telecommunications levy (currently 0.2% of turnover) covers expenses incurred by the Director in discharging her functions under the 1983 Act and to enable the Minister to pay contributions or membership charges to international telecommunications organisations. Excess telecommunications levy revenue (over ring-fenced costs) is required to be refunded to the operators. | No direct allocation of revenue to specific costs, except for beauty contest participation fees. |
| NL | All administrative fees and spectrum fees are cost based. Costs are allocated to broad service categories, e.g. fixed links, satellite earth stations or GSM. A cost model has been developed to enable costs to be apportioned to separate service categories. An annual charge figure is specified in the annual RDR Charges Order and a percentage of this figure applied to each service. Currently 30% is applied to fixed links and 30% to public mobile telephony and paging. | By Government Decree rules are laid down concerning compensation for the costs made by OPTA or RDR related to registration (once-off fee) and the supervisory tasks (annual fees). | Once-off spectrum fees reflect the costs of issuing the licence, frequency planning and management, international co-ordination, administrative costs and investment in equipment. Annual charges cover enforcement efforts, i.e. activities that contribute to ensuring compliance with rules and relating to the use of frequencies and equipment. |
| A | All administrative fees and spectrum fees are currently cost based, except for the once-off frequency usage charge applied to mobile and WLL operators. Costs are not allocated to individual licensees but apportioned equally in the case of service licences and on the basis of spectrum utilisation in the case of spectrum licences. Specific fees are charged for frequency co-ordination, where required. | The initial service licence fee covers administration costs arising from granting of the licence. The annual contribution (levy) is intended to cover the cost of the NRA, in particular administration, supervision and implementation of the licence and is set at between 0.1% and 0.2% of turnover. The contribution is based on the licensee's turnover and share of the Austrian telecommunications market.<br>According to § 51 of the Telecommunications Law, only administrative fees are paid for the assignment and use of | No direct allocation of revenue to specific costs. |

| | | | |
|---|---|---|---|
| | | frequencies. These fees are intended to cover the costs of administering the frequencies, planning, co-ordination and managing the use of frequencies, including the necessary measurements, tests and compatibility investigations to ensure efficient and interference-free use of frequencies. The fees consist of a one-off assignment fee and an annual fee for the use of frequencies. In particular consideration is given to personnel and material costs. Consideration is also given to the question of whether frequencies are to be used commercially. | |
| P | Allocated cost information not currently available, but a costing process is being implemented which will enable this in the future. | Fees are established by the Government and are based on the costs associated with the administrative, technical, operational and inspection tasks of ICP. | Generally there is no direct allocation of revenue to specific costs, but in some cases ICP may contribute to the costs of moving existing spectrum users to other bands (i.e. refarming). |
| S | Administers a cost recovery system for licensing and charging for radio equipment and spectrum management. Any licensee who uses the resources of the administrative authority and thereby causes costs to it is charged an appropriate charge/fee to cover the NRA's costs for granting the claimed resources. | Charges and fees must be cost based. Charges and fees are determined to enable the NRA to recover directly attributable costs caused by a certain inquiry or application, but also to recover other necessary unattributable costs, e.g. costs incurred for having technical expertise and know-how within the administration, the costs for regulatory obligations or the costs for supervisory obligations etc. The reasoning behind this is that the duties carried out by the administrative authority must be considered to be for the benefit of any licensee. An annual levy, currently 0.15% applies to public telecommunications operators. | |
| UK | Costs are attributed to broad licence categories, e.g. fixed links and satellite services are a single category as are public mobile networks. Costs are not attributed to individual licensees. | Recurring administrative fees take the form of a levy on licensees' turnover, the level of which is determined (subject to an overall cap of 0.08%) from the overall annual costs incurred by the NRA in licence enforcement and related activities. | No direct allocation of revenue to specific costs. |

Table 3.5 summarises the approximate annual overall costs and revenues associated with spectrum management and licensing for each NRA, where this is available. Revenues are broken down by service category and include annual spectrum fees or charges only (i.e. exclude once-off payments or deferred auction payments). Costs are not generally available on a similar service category basis, however we have attempted to differentiate between direct and indirect costs wherever possible[13].

**Table 3.5: NRA Revenues and Costs associated with spectrum licensing (year 2000 figures, where information provided by NRA)**

| | Annual Revenues (€ million)[14] | | | | | Annual Costs (€ million) | | | Total Staff[15] |
|---|---|---|---|---|---|---|---|---|---|
| | GSM | 3G | WLL | Fixed | Satellite | Direct | Indirect | Total | |
| B[5] | 9.2 | | 0.05 | 4.2 | [1] | [1] | [1] | 22.6[6] | 90 |
| DK | 0.96 | - | n/a | 1.9 | 0.04 | 18.2 | 0.5 | 18.7 | 154 [2] |
| E | 165 [3] | 523 [3] | 46.8 | [1] | [1] | [1] | [1] | [1] | 550 |
| IRL | 11.0 | - | 6.8 | 3.8 | 0.03 | [1] | [1] | [1] | 16 |
| L | 0.53 | | [1] | [1] | [1] | [1] | [1] | [1] | [1] |
| NL | 0.95 | 0.56 | - | 0.90 | 0.06 | 14.9 [3] | 12.0 [3] | 26.9 [4] | 233 [4] |
| A | 2,2 | - | - | 8.7 | 0.19 | 8.9 | 7.9 | 16.7 | 167 |
| P | 43.5 | - | 4.5 | 4.65 | 1.68 | [1] | [1] | 34.0 | 88 |
| FIN | 7.7 | 6.4 | [1] | [1] | [1] | 8.0 | 0.6 | 8.6 | 89 |
| UK | | 0 | [1] | [1] | [1] | [1] | [1] | 50.1 | 502 |

Notes: [1] information not available from NRA
[2] includes staff working on non-spectrum related activities
[3] subject to review by NRA
[4] RDR costs associated with frequency management, equipment standardisation and enforcement
[5] In comparing the total staff and the revenues, a distinction needs to be made between the initial fee and the annual fee. The most important initial fee is not for the BIPT but for the treasury.
[6] Includes staff involved in control of spectrum

## 3.9 NRA Objectives in setting fees and charges

Part of the brief of this Study was to investigate Member States' priorities in setting administrative fees and spectrum fees / charges. Each Member State was therefore asked to evaluate the relative importance of various parameters that might be taken into account in setting fees and charges. The results for those Member States that responded are presented in the table below. Note that these results reflect the views of NRA representatives and are not intended to imply any legal or policy basis for setting fees and charges.

13 Direct costs are those attributable to the licensing of specific services (e.g. processing licence applications, running licence competitions, frequency co-ordination etc), whereas indirect costs are those which relate to the licensing process but can not be attributed to specific services (e.g. overheads, research, monitoring, enforcement and international representation).

14 Sum of annual fees and charges plus initial fees and charges amortised over the life of the licence (10 years assumed for fixed links and satellite). 5% p.a. interest and 3% p.a. inflation assumed.

15 Staff involved with spectrum management and licensing / authorisation (unless otherwise stated)

**Table 3.6: Relative importance of various factors in setting fees and charges**

| | B | DK | E | F | IRL | I | NL | A | P | FIN | S | UK | Overall Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Spectrum Fees / Charges** | | | | | | | | | | | | | |
| Promotion of spectrum efficiency | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 3 | 2 | | 3 | 28 |
| Simplicity and transparency | 3 | 3 | 1 | 2 | 3 | 2 | 1 | 3 | 2 | 1 | | 3 | 24 |
| Recovery of costs | | 3 | 0 | 0 | | | 3 | 3 | 3 | 3 | 3 | 1 | 19 |
| Reflecting market value of spectrum | | 0 | 3 | 3 | 3 | | | 0 | 2 | 0 | 0 | 3 | 14 |
| Promotion of competition | | 1 | 0 | 0 | 3 | 3 | 0 | 0 | 2 | 2 | 0 | 2 | 13 |
| Geographical Coverage | | 2 | 1 | 3 | | | | 1 | 3 | 2 | 0 | 2 | 14 |
| Raising revenue for Government | | 0 | 0 | 0 | 1 | 1 | 0 | 0 | | 0 | 0 | 0 | 2 |
| **Administrative Fees** | | | | | | | | | | | | | |
| Recovery of costs | 3 | | 3 | 3 | | 3 | 3 | 3 | 3 | 2 | 3 | | 26 |
| Simplicity and transparency | | | 2 | 3 | | 2 | 1 | 3 | | 3 | 0 | | 14 |
| Geographical Coverage | | | 0 | 3 | | 0 | 0 | 3 | | 0 | 0 | | 6 |
| Promotion of competition | | | 0 | 2 | | | 0 | 0 | | 1 | 0 | | 3 |

Key:

| 3 | Very important | 2 | Important | 1 | Slightly important | 0 | Not important | | No response |
|---|---|---|---|---|---|---|---|---|---|

The above information relates to service allocated by beauty contest or on a first come first served basis. Responses sometimes differed where auctions had been held, as the following table indicates:

**Table 3.7: Relative importance of various factors in adopting an auction approach for awarding licences**

| | B | DK | I | NL | A | UK | Overall Score |
|---|---|---|---|---|---|---|---|
| Simplicity and transparency | 3 | | 2 | 3 | 3 | 3 | 14 |
| Promotion of spectrum efficiency | | 3 | 3 | 1 | 2 | 3 | 12 |
| Promotion of competition | | 1 | 3 | 2 | 3 | 3 | 12 |
| Reflecting market value of spectrum | | 0 | 3 | 2 | 3 | 3 | 11 |
| Recovery of costs | | 3 | | | | 1 | 4 |
| Geographical Coverage | | 2 | 0 | | 0 | 1 | 3 |
| Raising revenue for Government | | 0 | 1 | 0 | 1 | 0 | 2 |

Key:

| 3 | Very important | 2 | Important | 1 | Slightly important | 0 | Not important | | No response |
|---|---|---|---|---|---|---|---|---|---|

Note that in both cases promotion of spectrum efficiency is an important objective, although simplicity and transparency appears to be of greater importance where auctions are involved. Reflecting the market value of the spectrum is also considered a relatively high priority, even where auctions have not been deployed

## 3.10 Basis for setting administrative fees and spectrum fees / charges for radiocommunication services in Member States

In this section, the legal basis and the method of calculation of administrative fees and spectrum fees / charges is addressed, for each of the five service categories covered by the Study. The broader legislative basis relating to service and spectrum licensing has been addressed in section 2.4.

### 3.10.1 GSM

#### *3.10.1.1 Background and Context*

In most European countries, the first GSM services were introduced prior to full liberalisation of the telecommunications market. Hence in many cases, the first GSM licence was issued by direct allocation to the incumbent operator, although in most cases at least one further competitive operator was licensed either at the same time or shortly afterwards. Further networks have since been licensed in all EU countries, pursuant to the requirements of the Mobile Directive, which required Member States to license GSM 1800 services by no later than 1st January 1998.

Most non-incumbent networks have been licensed by beauty contests, although in recent years there has been a trend in some countries towards the use of auctions. Table 3.8 shows the number of licences let by direct allocation, beauty contest and auction in each Member State. In most Member States, incumbent operators have been required to pay an initial charge comparable to that paid subsequently by competitive operators who acquired licences in beauty contests or auctions.

**Table 3.8: Procedure adopted for GSM licensing in EU Member States**

| | Number of Licensed Operators | | | | | |
|---|---|---|---|---|---|---|
| | **Direct Allocation** | **Beauty contest** | **Auction** | **Hybrid** | **Total** | **Notes** |
| B | 1 (Belgacom) | 0 | None | 2 | 3 | Belgacom Mobile was assigned frequencies prior to January 1994 (date from which the operator started commercial operations). However, the licence is considered to be valid from April 1995, i.e. when the Royal Decree of 7 March 1995, which opened the mobile sector to competition, entered into force. The frequency assignment was subject to the payment of the same concession fee as that offered by Mobistar. Hybrid approach based on proposed entrance fee, roll out and tariffs. |
| DK | 1 (TeleDanmk) | 3 | None | None | 4 | TeleDanmark was automatically granted a GSM licence as an incumbent monopoly NMT operator. Sonofon licence awarded at same time by comparative selection. No fee was payable for the licences (other than annual spectrum use charge) |
| D | 1 (T-Mobil) | 3 | None | None | 4 | |
| EL | | | 3 | None | 3 | |
| E | 1 (Telefonica) | 2 | None | None | 3 | |
| F | 2 (FT, SFR) | 1 (Buoygues) | None | None | 3 | |
| IRL | 1 (Eircell) | 2 | None | None | 3 | Initial licence granted to incumbent analogue cellular operator (Eircell). Subsequent licences awarded by beauty contest. Financial bid was one of the criteria but subject to a cap of € 12.7 M. Eircell required to pay fee equivalent to that bid by winner of 2nd licence (€ 12.7 M). |
| I | 1 (TIM) | 3 | None | None | 4 | |
| L | None | 2 | None | None | 2 | |
| NL | 1 (KPN) | 1 (Libertel) | 3 | None | 5 | Initial licence awarded to incumbent (KPN) in 1994, further licence awarded by beauty contest in 1995. Auction held in 1998 comprised two combined GSM900 / GSM1800 licences, each comprising 2 x 15 MHz in the 900 MHz band and 2 x 5 MHz in the 900 MHz band. 16 further GSM1800 licences were also offered, each comprising between 2 x 2.4 and 2 x 4.4 MHz. Applicants were able to acquire a maximum of one combined licence and/or up to 16 GSM1800 licences. The two existing operators were not permitted to bid for the combined licences and were not allowed to use the GSM 1800 frequencies in the first two years. . |
| A | 1 (Mobilkom) | 1 (MaxMobil) | 2 | None | 4 | |
| P | 1 (TMN) | 2 | None | None | 3 | TMN was granted a licence administratively as an incumbent operator. |
| FIN | | | None | | | |
| S | 1 (Telia) | 3 | None | None | 4 | Operations started in 1992 in accordance with a Decision by the Government, however telecommunications licences were not issued until 1995. |
| UK | 2 (Cellnet, Vodafone) | 2 | None | None | 4 | |
| **Tot-al** | **14** | **35** | **5** | **2** | **54** | |

In some Member States, GSM services require both a spectrum licence and a service or network licence, issued under separate legislation. In some cases, a separate licence is required for installation and/or operation of network infrastructure and for the provision of telecommunication services. The duration of the service and spectrum licences differs in many countries, with the spectrum licence typically being subject to annual renewal whilst the service licence is more likely to be between 15 and 25 years duration. Table 3.9 summarises the licensing requirements for GSM services in each Member State.

**Table 3.9: Licensing requirements for GSM in each EU Member State**

| | Spectrum Licence | Service Licence | Network Licence |
|---|---|---|---|
| B | No (covered by network licence) | No (covered by network licence) | Yes - 15 yrs. Also covers services and spectrum |
| DK | Yes – 10 yrs. Also covers network. | No | No |
| D | No (but frequency assignment is required and spectrum fee payable) | Yes – 20 yrs | Yes – 20 yrs |
| EL | Access to spectrum covered by network licence | General Licence / Registration required | Yes - 15 - 25 yrs |
| E | Yes - 20 yrs (GSM900), 30 yrs (GSM 1800) | Yes - 30 yrs | Yes – 30 yrs |
| F | No (but frequency assignment is required and spectrum fee payable) | Yes - 15 yrs | Yes - 15 yrs. Includes right to use spectrum |
| IRL | Yes – annual renewal* | Yes - 15 yrs | No |
| I | No | Yes - 15 yrs | Included in service licence |
| L | No | Yes - 15 yrs | No |
| NL | Yes - 15 yrs | No - just registration | No |
| A | Yes - 20 yrs (Konzession for spectrum blocks) | Yes - 20 yrs (Konzession for service provision) | Yes - 20 yrs (authorisation for base stations / infrastructure) |
| P | Yes - 15 yrs | Yes - 15 yrs | Yes – 15 yrs |
| FIN | Yes - 10 yrs max. | Yes - 20 yrs | No |
| S | Yes – 15 yrs | Yes – 15 yrs | No |
| UK | Yes - annual renewal* | Yes -25 yrs | No |

*In Ireland and the UK, all wireless telegraphy (spectrum) licences are subject to annual renewal (excluding UK licences which have been auctioned), however there is a presumption that such renewal will take place for as long as the spectrum is required to comply with the obligations of the service licence, and subject to the annual fee being paid when due.

In general a similar approach has been taken by Member States to the setting of fees and charges for all GSM networks, the only significant differences within individual countries arising where different award procedures (auction or comparative selection) have been used.

Most EU countries have no plans to award further GSM licences, although few are using all of the internationally allocated spectrum. Some countries may however make further GSM spectrum available either to existing operators to cater for expansion or as part of the 3G mobile licensing process.

Sections 3.10.1.2 and 3.10.1.3 explain how administrative fees and spectrum fees / charges for GSM services are determined in each Member State. Section 3.10.1.4 tabulates the level of fees and charges currently paid by each European GSM operator, where the information is available.

*3.10.1.2 Administrative Fees*

Administrative fees are generally set on a cost basis, although the precise means of recovering these costs varies from country to country. All Member States with the exception of Denmark and Finland apply administrative fees to GSM operators. Of these, all except Greece and Spain apply both once-off and annual fees. Most include an initial fee for the issue of the licence as well as an annual fee.

Where levies are applied, it has not been possible to determine the amounts paid by individual operators, however this is considered in the case studies (section 4.2), where it will be seen that this has the largest bearing on the level of administrative fees applied to GSM networks. Since levies are generally applied uniformly to both fixed and mobile telecommunications operators and the latter are currently growing at a significantly faster rate, mobile networks account for an increasingly large share of NRA's licensing revenue in Member States which apply levies.

**Table 3.10 Legal basis and structure of GSM administrative fees in EU Member States**

| | Once-off Fees | | | Recurring Fees | | |
|---|---|---|---|---|---|---|
| | **Fee** | **Legal Basis** | **Basis of Calculation and Payment Terms** | **Fee** | **Legal Basis** | **Basis of Calculation and Payment Terms** |
| B | Filing Fee | Royal Decrees of 7th March 1995 and 24th October 1997 | € 12,500 | Fixed recurring administrative fee | Royal Decrees of 7th March 1995 and 24th October 1997 | € 250,000 Euro |
| DK | No individual licence is required for telecommunication services and network operation is covered by the spectrum licence. Hence there are no administrative fees in Denmark, only spectrum fees. | | | | | |
| D | Telecommunications Licence Fees (Class 1 & 4) | Ordinance concerning telecommunication licence fees of August 1996 | Fees are based on the actual administrative expenditure incurred in each case, within the range €7,669 to €2,556,560 (Class 1) and €1,023 to €1,533,876 (Class 4). | Frequency Use Contribution | Ordinance concerning contributions for frequency usage or 13th December 2000. | Currently € 201,138 fixed annual fee per network. |
| EL | Information not available. | | | Annual fee | Information not available | A levy of between 0.5% and 0.025% applies (see note 1 to Table 2.7 for details) |
| E | No once off fees apply | | | Annual licence fee (levy) | Article 71 of General Telecommunications Law. To support the expenses of the CMT | Must not exceed 0.2% of gross income. Currently 0.15%. |
| F | Participation Fees (cover administration costs of beauty contest and licence issue) | Defined in Articles L.33-1 and L.34-1 of Posts & Telecommunications Code; Levels set in Article 45 of the Finance Law of 1987 (as amended) | L33-1: € 266,786<br>L34-1: € 38,112<br>Both payable in full on licence issue. Amount depends on geographic coverage of the licence. | Spectrum fee (for control of spectrum assignments and network licence obligations)<br><br>Licence Fee (for control of service licence obligations) | Article L.33-1 of the Posts & Telecommunications Code<br><br>Article L.34-1 of the Posts & Telecommunications Code | €133,393, payable annually on 1st December<br><br>€19,056, payable annually on 1st December |
| IRL | Administrative Fee | Section 111 of the Telecommunications Act | Applied to 3rd licence only: € 1,904,607 | Telecommunications Levy | Statutory Instrument no. 43 of 1998 (Levy Order) | 0.2% of turnover, payable annually |
| I | Initial Licence Fee for provision of voice telephony (national coverage) | Decree of 5th February 1998, "Determination of contributions for general authorisations and individual licences for offering public telecommunication services" | € 56,810 | Annual fee for provision of voice telephony (national coverage) | Decree of 5th February 1998, "Determination of contributions for general authorisations and individual licences for offering public telecommunication services" | € 61,975 |

| | Once-off Fees | | | Recurring Fees | | |
|---|---|---|---|---|---|---|
| | **Fee** | **Legal Basis** | **Basis of Calculation and Payment Terms** | **Fee** | **Legal Basis** | **Basis of Calculation and Payment Terms** |
| L | Initial Licence Fee | Grand-Ducal Regulation of 25 April 1997, on schedule of conditions for GSM and GSM/DCS1800 services | € 1,859,200 payable on day of signature of licence | Annual rental for management of the licence | Grand-Ducal Regulation of 25 April 1997, on schedule of conditions for GSM and GSM/DCS1800 services | € 743,680 payable on each anniversary of licence issue |
| NL | Initial registration fee<br><br>Auction bid | Telecommunications Act | Operator with SMP: € 363<br><br>Initial administrative costs are deducted from auction bids. | Annual fee<br><br>OPTA monitoring fee | Telecommunications Act / RDR Charges Order<br><br>Telecommunications Act | Provision of public mobile telephony services:<br>€ 217,815<br>Operator with SMP: € 2,723<br><br>€ 136,134 currently, mainly to cover cost of coverage monitoring & enforcement. |
| A | Service Licence Fee | §17 of the Telecommunications Law requires a fee to cover administration costs arising from granting the licence. | Determined by ordinance of the Federal Minister of Transport, Innovation and Technology in consultation with the Federal Minister of Finance. Paid in full on licence issue. Currently €7,267 | Telecommunications Levy: | §10 of the amended Telecommunications Law requires a Levy based on licensees' annual turnover and their share of the Austrian telecoms market. Covers the cost of the Regulator, in particular administration, supervision and implementation of the licence. | Prescribed by the NRA and is currently between 0.1 – 0.2 % of turnover |
| P | Administrative Licence Fee<br><br>Tender Fee | By Order 1230 of the Ministry of Social Equipment of 31/12/1998 .<br><br>Required to purchase tender document | €49,880, payable in full at licence issue (after 31st Dec 1998; lower fee (€4,988) applied previously)<br><br>€ 499, payable in full, to enter licence tender<br><br>. | Service Licence Fee | Order 1230 of the Ministry of Social Equipment of 31/12/1998. | €9,976 payable annually. |
| FIN | A network licence is required, which incorporates the right to use spectrum and thus incurs an annual spectrum charge, but no administrative fees apply. | | | | | |
| S | Application Fee | In accordance with PTSFS (Regulations of the NPTA) 2000:13 | Once off fee of € 10,893 | Annual administrative fee | In accordance with PTSFS 2000:12 | € 5,447 annually plus 0.15% of turnover |
| UK | Service Licence Fee: | Telecommunications Act | € 64,800, payable in full at | Service Licence annual fee: | Telecommunications Act | Upper limit 0.08% of |

| | Once-off Fees | | | Recurring Fees | | |
|---|---|---|---|---|---|---|
| | **Fee** | **Legal Basis** | **Basis of Calculation and Payment Terms** | **Fee** | **Legal Basis** | **Basis of Calculation and Payment Terms** |
| | | 1984 | licence issue | levy determined by Oftel, to cover costs of maintaining and enforcing service licence | 1984 | turnover. Actual amount depends on costs relative to total amount of operators' relevant turnover. |

*3.10.1.3 Spectrum Fees / Charges*

A number of different approaches are taken within the EU to setting spectrum fees / charges for GSM networks. In most cases, the charges relate to the amount of spectrum assigned to the operator, although this is not currently the case in Portugal and Sweden, where the charge is based on the number of base stations and/or mobile terminals connected to the network. In Italy, no annual spectrum fee or charge is applied to GSM operators currently, but an annual levy is applied to all licensed telecommunications operators. Unlike the administrative fee levies applied in other Member States this levy is not based on the NRA's costs. The levy was set in 1999 at 3% of turnover and is reduced progressively each year, to 1.5% in 2002. A review of annual fees and charges is planned thereafter. An initial spectrum charge was also applied to Omnitel, in the form of a concession charge, and all of the Italian GSM operators were required to pay compensation to incumbent users of the GSM 1800 spectrum.

Spectrum fees / charges are generally levied on an annual basis and subject to periodic review, but several Member States also levy an initial charge. The latter may either take the form of a monetary bid, where an auction has been held, or a fixed sum determined in advance by the NRA where a beauty contest has been held or additional spectrum granted to an existing licensee. Several Member States differentiate between the two GSM bands (900 MHz and 1,800 MHz), applying a higher fee to the former to reflect its greater coverage potential.

**Table 3.11:Parameters used in the calculation of GSM spectrum fees / charges**

| | B | DK | D | EL | E | F | IRL | I | L | NL | A | P | FIN | S | UK | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Frequency Band | | | | | ١ | | √ | | | | | | √ | | √ | 4 |
| Amount of Spectrum (channels) | √ | √ | √ | | ١ | ١ | √ | | √ | √ | ١ | | √ | | √ | 11 |
| Number of Base Stations | | | | | | | | | | | | ١ | | ١ | | 2 |
| Number of Mobile Terminals | | | | | | | | | | | | ١ | | | | 1 |
| Market Value of Spectrum | √ | | | √ | ١ | ١ | | | | √ | ١ | ١ | | | √ | 6 |
| Licensing costs | | | | | | | | | | √ | ١ | ١ | √ | ١ | | 4 |
| Frequency Management Costs | | | | | | ١ | | | √ | √ | ١ | ١ | √ | ١ | | 6 |
| Financial performance / turnover | | | | | | | | [1] | | | | | | | | 1 |

[1] Levy on turnover of all licensed telecommunications operators; no separate spectrum charge imposed

It can be seen that in most cases the amount paid is directly related to the amount of spectrum licensed. This is consistent with the requirement in the Licensing Directive to promote optimal use of scarce resources, although the extent to which this objective is achieved depends very much on the actual level of the charges and how these compare to the additional infrastructure costs that would be incurred were less spectrum available. In general, charges applied are significantly less

than the infrastructure costs, which are likely to be hundreds of millions of Euro for larger national networks. Note however that six Member States (principally those that have adopted auctions or administrative pricing) include the market value of the spectrum as one of the criteria in determining charges. This argument is developed further in the context of the GSM case study, in section 4.2.3.

Two Member States, Portugal and Sweden, charge on the basis of the number of base stations (terminals are also factored into Portugal's charges), which could be argued to run counter to the objective of ensuring optimal use of scarce resources by penalising operators for investing in further infrastructure and thus making more efficient use of licensed spectrum. In practice however, the fee applied is relatively low and is unlikely to have any bearing on the operator's infrastructure investment decision. Fees based on the number of terminals are more likely to have an adverse effect as average revenue per subscriber falls, and are more difficult to justify as terminals are licence-exempt and do not incur costs for the NRA. It is noted that Portugal is planning to move towards an administrative pricing approach in the near future which will be based on the amount of spectrum utilised rather than the number of base stations and terminals.

Perhaps surprisingly, only four Member States (Spain, Ireland, Finland and the UK) differentiate between the GSM frequency bands in setting charges, despite the greater availability in most countries of spectrum in the 1800 MHz band and the higher costs associated with using this spectrum due to its shorter operating range.

Table 3.12 describes the legal basis and the method of calculation used by each Member State for setting GSM spectrum fees / charges. All Member States except Greece and Italy (which latter country imposes a levy on all licensed telecommunications operators) apply an annual spectrum charge for GSM operators. A once-off charge applies in Belgium, Germany, Greece, Ireland, the Netherlands and Austria. In the cases of Greece, the Netherlands and Austria this took the form of an auction bid. In Italy, operators were required to compensate the Defence Ministry (the incumbent user) for the use of GSM 1800 spectrum. The total compensation payment was determined by the Ministry of Defence, in accordance with Decree no. 113 of 25$^{th}$ March 1998 and was reported in the press as €231.4 million, to be shared between all the GSM operators and spread over a five year period. Under the Decree, half of the amount payable by each operator is apportioned according to the amount of spectrum assigned and, where appropriate, the proportion of national population served by the spectrum concerned. The other half is apportioned according to the revenue of the operator. Details of the actual amounts paid by each operator are not available, hence we have assumed that the payment Is split equally between the four operators and have treated the total payment as a once-off charge.

**Table 3.12 Legal basis and structure of GSM spectrum fees / charges in EU Member States**

| | Once-off Charges | | | Recurring Charges | | |
|---|---|---|---|---|---|---|
| | **Fee / Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** | **Fee / Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** |
| B | Unique Concession Fee (amount bid in hybrid beauty contest / auction and subsequently levied on incumbent) | Royal Decrees of 7th March 1995 and 24th October 1997 | € 223M (Proximus, Mobistar);<br><br>€198M (KPN Orange) | Spectrum Management Fee | Royal Decrees of 7th March 1995 and 24th October 1997 | € 25,000 per 2 x 200 kHz channel, payable annually on 31st December |
| DK | No once-off payments apply | | | Annual Frequency Charge. | Executive Order of December 2000 concerning NTA fees and charges in 2001 | € 1,398 per 200 kHz (NB not per duplex channel), payable annually on anniversary of licence issue |
| D | Frequency Fee | Frequency fee ordinance of 21st May 1997 | € 89,476 per 200 kHz channel | Frequency Use Contribution | Frequency use contribution ordinance of 13th Dec 2000 | €201,138 p.a. per licence, on anniversary of issue |
| EL | Licence fee (auction bid) | | Amount bid by licensee in auction or tender process. | Annual duties | EETT Decision 210/2/28-2-2001, Regulation for the assignment of individual radio frequencies under an individual licence status for the provision of public telecommunications services | Annual payments are set off against the initial licence fee. |
| E | No once-off charges apply | | | Annual spectrum charge | Article 66 of Law 13/2000. Spectrum Charge is calculated as $T = S \times B \times (C_1 * C_2 * C_3 * C_4 * C_5)$ PTA/km$^2$/kHz. Values for $C_1$, $C_2$, $C_3$, $C_4$ and $C_5$ ) are given in Art. 66. If the license is national the value of $S_{km^2}$ is 505,990 km$^2$ . | GSM900: €1,309 per kHz<br><br>GSM 1800: €1,267 per kHz.<br><br>Note: The draft Budget Law for 2002 foresees an average reduction of 65% of spectrum charges for GSM services |
| F | No once-off payments apply. | | | Spectrum Charge | Levied by ART under Article L.33.1 of the Posts & Telecommunications Code, to encourage efficient use of spectrum | € 304,893 per MHz (simplex), payable annually on 1st January |
| IRL | Spectrum Access Fee | Section 111 of the 1983 Telecommunications Act and the Licensing Regulations (S.I. 96 of 1998 - transposition of the EU | GSM900: Voluntary fee with cap of IR£10M, except for Eircell where fee based on bid by successful bidder in the second licence | Annual spectrum licence fee | Levied by statutory instrument (S.I. 442 of 1999) under the 1926 WT Act. | GSM 900: IR£20k per 2x200 kHz channel;<br>GSM 1800: IR£10k per 2x200 kHz channel for the first 24 channels, IR£15k per |

| | Once-off Charges | | | Recurring Charges | | |
|---|---|---|---|---|---|---|
| | **Fee / Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** | **Fee / Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** |
| | | Licensing Directive). | competition<br>GSM1800: Fixed fee based pro-rata on amount paid for GSM 900 spectrum. | | | 2x200 kHz for the second 24 channels and IR£20k per 2x200 kHz for the remaining channels.<br>Payable annually on anniversary of spectrum licence issue. |
| I | Concession fee (paid only by Omnitel)<br><br>Compensation to existing 1800 MHz spectrum users (Defence Ministry) | Ministerial Decision<br><br>Decree no. 113 of 25th March 1998 | Originally € 387M, but € 31M was subsequently refunded by TIM, hence net amount was € 356 M<br><br>Reported to be €231.4 million total, shared between all the GSM operators and payable over 5 years . Half of the cost is apportioned on the basis of the amount of spectrum assigned and half on the basis of the basis of the operators income. | Annual levy applicable to all licensed telecommunications operators for public services and networks (in place of spectrum charge) | Law of 23rd December 1998, Article 20 | Specified as a percentage of turnover, reducing year on year as follows: 1999, 3%; 2000, 2.7%; 2001, 2.5%; 2002, 2%; 2003, 1.5%. |
| L | No once-off payments apply. | | | Annual royalty for provision of frequencies, to cover costs of verification of frequencies | Grand-Ducal Regulation of 25 April 1997 on schedule of conditions for GSM and GSM/DCS1800 networks | € 12,395 per 2 x 200 kHz channel, payable annually |
| NL | No once-off payments apply. | | | Annual charge for monitoring / enforcement | RDR Charges Order 2001 (ref. RDR/619446.J Z). | € 8,973 per 2 x 1 MHz, payable annually on anniversary of licence issue. |
| A | Frequency usage fee: | §21 of the Telecommunications Law | Licence applicants are required to indicate the amount they are willing to pay. | Frequency Use Fee | §51 of the Telecommunications Law Determined by ordinance of the Federal Minister of Transport, Innovation and Technology in consultation with Minister of Finance | € 6,976 per 2 x 200 kHz channel, payable annually. |
| P | Spectrum Administrative Charge | Ministerial Order no. 667-A/2001 of 2/7/2001 | € 10 per base station, payable at time of commissioning | Spectrum Operational Charge | Ministerial Order no. 667-A/2001 of 2/7/2001 | € 68 per base station (for EIRP > 50 watts) plus €3.50 per mobile terminal, payable every six months. |
| FIN | No once-off payments apply. | | | Spectrum Fee | Decision of the Ministry of | € 1.896 x K1 x K2 x K3. |

| | Once-off Charges | | | Recurring Charges | | |
|---|---|---|---|---|---|---|
| | **Fee / Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** | **Fee / Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** |
| | | | | | Transport &Communications on the Fees of the Telecommunications Administration Centre (issued 22/12/99, amended 16/6/99, 28/12/00 and 14/2/01) | where K1=0.8 for GSM900 and 0.6 for GSM1800, K2=1 for national networks and K3=0.2 in billing years 1 and 2, 0.4 in year 3, 0.6 in year 4, 0.8 in year 5 and 1 thereafter |
| S | No once-off payments apply. | | | Transmitter Fee (to cover direct and indirect costs for spectrum management) | PTSFS 2000:13 | Annual charge of € 17.43 per base station transmitter |
| UK | No once-off payments apply. | | | Spectrum Licence Fee: | Statutory Instrument no. 1678 of 2000. | GSM900: € 229,935 per 2 x 200 kHz channel ; (GSM1800: € 178,838 per channel |

### *3.10.1.4 Level of GSM Administrative Fees and Spectrum Fees / Charges in EU Member States*

| | Network | Spectrum licensed (MHz) | | Administrative Fees (€) | | Spectrum Fees / Charges (€) | |
|---|---|---|---|---|---|---|---|
| | | **GSM 900** | **GSM 1800** | **Once-off** | **Recurring (p.a.)** | **Once-off** | **Recurring (p.a.)** |
| B | Belgacom (Proximus) | 2 x 12 | 2 x 15 [6] | 12,500 | 250,000 | 223,101,000 | 3,375,000 [5] |
| | Mobistar | 2 x 12 | 2 x 15 [6] | 12,500 | 250,000 | 223,101,000 | 3,375,000 [5] |
| | KPN Orange | 2 x 5 [1] | 2 x 22 [6] | 12,500 | 250,000 | 198,435,945 | 3,375,000 [5] |
| DK | TeleDanmark Mobil | 2 x 8.8 | 2 x 26.8 | 0 | 0 | 0 | 487,688 |
| | Sonofon | 2 x 8.8 | 2 x 19.6 | 0 | 0 | 0 | 397,032 |
| | Telia Denmark | 2 x 7.4 [2] | 2 x 14.4 | 0 | 0 | 0 | 304,764 |
| | Mobilix | 2 x 7.4 | 2 x 14.4 | 0 | 0 | 0 | 304,764 |
| D | T-Mobil | 2 x 12.4 | 2 x 5.0 | Info not available (fees currently subject to legal review) | 201,138 | 1,556,883 | 201,138 |
| | Mannesman | 2 x 12.4 | 2 x 5.4 | | 201,138 | 1,556,883 | 201,138 |
| | E-plus | 0 | 2 x 22.4 | | 201,138 | 2,004,253 | 201,138 |
| | Viag Interkom | 0 | 2 x 22.4 | | 201,138 | 2,004,253 | 201,138 |
| EL | Panafon GSM | 2 x 15 | 2 x 15 | 0 | Annual levy based on turnover (see note 1 to Table 2.7 for details). | 211,795,949 | 0 |
| | Telestet | 2 x 10 | 2 x 15 | 0 | | 123,188,297 | 0 |
| | Info-Quest | 0 | 2 x 10 | 0 | | 20,542,930 | 0 |
| | Cosmote | 0 | 2 x 25 | 0 | | 46,871,717 | 0 |

| | Network | Spectrum licensed (MHz) | | Administrative Fees (€) | | Spectrum Fees / Charges (€) | |
|---|---|---|---|---|---|---|---|
| | | GSM 900 | GSM 1800 | Once-off | Recurring (p.a.) | Once-off | Recurring (p.a.) |
| E | Telefonica Moviles | 2 x 12 | 2 x 15 | 0 | 0.15% of turnover | | 65,530,120 |
| | Airtel | 2 x 12 | 2 x 15 | 0 | 0.15% of turnover | | 65,530,120 |
| | Amena | 0 | 2 x 15 | 0 | 0.15% of turnover | | 34,036,145 |
| F | Itineris | 2 x 10.8 | 2 x 13.2 [3] | 304,898 | 152449 | 0 | 7,317,432 |
| | SFR | 2 x 10.8 | 2 x 13.2 [3] | 304,898 | 152449 | 0 | 7,317,432 |
| | Bouyges Telecom | 2 x 3.2 [4] | 2 x 23.2 | 304,898 | 152449 | 0 | 8,049,175 |
| IRL | Eircell | 2 x 7.2 | 2 x 14.4 | 12,500 | | 22,220,416 | 1,523,686 |
| | Esat Digifone | 2 x 7.2 | 2 x 14.4 | 12,500 | | 22,220,416 | 1,523,686 |
| | Meteor | 2 x 7.2 | 2 x 14.4 | 12,500 | | 22,220,416 | 1,523,686 |
| I | Telecom Italia Mobile | 2 x 10.2 | 2 x 9.6 | 56,810 | 61,975 | 57,850,000 | 0 |
| | Omnitel | 2 x 7.2 | 2 x 9.6 | 56,810 | 61,975 | 413,850,000 | 0 |
| | Wind | 2 x 5 | 2 x 14.4 | 56,810 | 61,975 | 57,850,000 | 0 |
| | Blu | 0 | 2 x 15.0 | 56,810 | 61,975 | 57,850,000 | 0 |
| L | P+T | 2 x 11.6 | 2 x 9.8 | 1,859,200 | 743,680 | 1,850,335 | 740,135 |
| | Millicom | 2 x 11.6 | 2 x 9.8 | 1,859,200 | 743,680 | 1,850,335 | 740,135 |
| NL | KPN Mobile | 2 x 12.2 | 2 x 17.6 | 363[7] | 356,670 | 143.0 M | 267,410 |
| | Libertel | 2 x 12.2 | 2 x 5.2 | 0 | 353,949 | 40.8 M | 156,139 |
| | Telfort | 2 x 5 | 2 x 17.4 | 0 | 353,949 | 268.0 M | 200,995 |
| | Dutchtone | 2 x 5 | 2 x 15 | 0 | 353,949 | 272.0 M | 179,460 |
| | Ben | 0 | 2 x 16.8 | 0 | 353,949 | 122.5 M | 150,746 |
| A | Mobilkom Austria | 2 x 8 | 2 x 15 | 5,087 | Annual levy on turnover of 0.1 - 0.2% | 288,000,000 | 732,159 |
| | Max Mobil | 2 x 8 | 2 x 8 | 5,087 | | 288,000,000 | 509,328 |
| | Connect Austria (One) | 0 | 2 x 28.8 | 7,267 | | 165,600,000 | 916,790 |
| | Tele.Ring | 0 | 2 x 14.6 | 7,267 | | 98,000,000 | 464,762 |
| P | TMN | 2 x 8 | 2 x 6 | 4,988 | 9,976 | Fee payable depends on number of base stations and subscribers | |
| | Telecel | 2 x 8 | 2 x 6 | 4,988 | 9,976 | | |
| | Optimus | 2 x 7.8 | 2 x 6 | 4,988 | 9,976 | | |
| FIN | Sonera | 2 x 13.6 | 2 x 11 | 0 | 0 | 0 | 2,651,366 |
| | Radiolinja | 2 x 10 | 2 x 8.2 | 0 | 0 | 0 | 1,959,706 |
| | Telia Finland | 0 | 2 x 8.2 | 0 | 0 | 0 | 149,253 |
| | Suomen 3G | 2 x 8.6 | 2 x 7.2 | 0 | 0 | 0 | 339,763 |
| | Elisa | 0 | 2 x 7.2 | 0 | 0 | 0 | 655,258 |
| S | Telia Mobitel | 2 x 7.2 | 2 x 15 | 10,893 | € 5,447 plus levy of 0.15% of | 0 | Fee payable depends on |
| | Comviq | 2 x 7.2 | 2 x 8.4 | 10,893 | | 0 | |

| | Network | Spectrum licensed (MHz) | | Administrative Fees (€) | | Spectrum Fees / Charges (€) | |
|---|---|---|---|---|---|---|---|
| | | GSM 900 | GSM 1800 | Once-off | Recurring (p.a.) | Once-off | Recurring (p.a.) |
| | Europolitan | 2 x 7.2 | 2 x 8.4 | 10,893 | turnover.7 | 0 | number of base stations |
| UK | BT Cellnet[16] | 2 x 16.8 | 2 x 5.8 | 40,000 | Annual levy of up to 0.08% of turnover. | 0 | 24,271,000 |
| | One2one | 0 | 2 x 30.0 | 40,000 | | 0 | 26,826,000 |
| | Orange | 0 | 2 x 30.0 | 40,000 | | 0 | 26,826,000 |
| | Vodafone | 2 x 16.8 | 2 x 5.8 | 40,000 | | 0 | 24,271,000 |

Notes: [1] Licensed but not currently available or charged for due to use by CT1 cordless phones
[2] 2 x 1.4 MHz not available until 2002
[3] Only in certain urban areas
[4] Only in rural areas
[5] This is a maximum figure, actual amount paid depends on amount of spectrum being used rather than amount of spectrum licensed.
[6] The spectrum indicated is the spectrum reserved for the respective operators. In practice not all that spectrum is in use for the time being. Only Mobistar currently uses the complete 2x 27 MHz
[7]Applies to operators with SMP

[16] Now renamed “mm02”

### 3.10.2 3G Mobile

#### *3.10.2.1 Background and Context*

The licensing and placing into service of 3G mobile services in EU Member States is governed by Decision 128/1999/EC of the European Parliament and of the Council of 14th December 1998, on the co-ordinated introduction of a 3G mobile and wireless communication system (UMTS) in the Community. This Decision, more commonly referred to as the UMTS Decision, requires Member States to "take all actions necessary to allow the co-ordinated and progressive introduction of 3G mobile services in their territories by 1st January 2002 at the latest and, in particular, to establish an authorisation system for 3G mobile services no later than 1st January 2000. At the time of writing, all Member States have established an authorisation system and all but two have issued 3G mobile licences. The table below summarises the current status of 3G mobile licensing in each Member State. Further details of the licensing procedures adopted in each Member State can be found in annex D.

**Table 3.13: Current Status of 3G Mobile Licensing in EU Member States**

| | Status of Licensing | No. of Licences | Licence Duration | Approach used |
|---|---|---|---|---|
| B | Complete but future of remaining band under study. | 4 offered, 3 awarded | 20 years | Auction |
| DK | Complete (September 2001) | 4 | 20 years | Auction |
| D | Complete (Aug 2000) | 6 | 20 years | Auction |
| EL | Complete (July 2001) | 4 offered, 3 awarded | 20 years | Auction |
| E | Complete (March 2000) | 4 | 30 years | Beauty Contest |
| F | Complete but further round likely | 4 offered, 2 awarded | 15 years [3] | Beauty Contest |
| IRL | Planned | 4 likely | 15 years[1] | Beauty Contest |
| I | Complete (October 2000) | 5 | 15 years | Hybrid Auction/Beauty Contest |
| L | Planned | 4 | TBD | Beauty Contest |
| NL | Complete (July 2000) | 5 | 16 years | Auction |
| A | Complete (November 2000) | 6 | 20 years | Auction |
| P | Complete (November 2000) | 4 | 15 years [2] | Beauty Contest |
| FIN | Complete (March 1999)<br>Åland licences granted in September 1999. | 4 | 20 years | Beauty Contest |
| S | Complete (December 2000) | 4 | 15 years | Beauty Contest |
| UK | Complete (April 2000) | 5 | 25 years | Auction |

Notes: [1] Applies to service licence. Spectrum licence is renewable annually but there is a presumption that such renewal will take place for as long as the spectrum is required to comply with the obligations of the service licence, and subject to the annual fee being paid when due.
[2] Applies to service licence. Spectrum licence is 5 years duration, but renewable until the service licence expires.
[3] At the time of writing, the French Government had announced that it intended to extend the licence duration to 20 years.

Sections 3.10.2.2 and 3.10.2.3 explain how administrative fees and spectrum fees / charges for 3G mobile services are determined in each Member State. Section

3.10.1.4 tabulates the level of fees and charges currently paid by each European 3G mobile licensee, where the information is available.

*3.10.2.2 Administrative Fees*

In general, administrative fees for 3G mobile services are determined on a similar basis to GSM, indeed most Member States apply the same network and/or service licensing regime to the two services. Some Member States (e.g. France) require a separate network and/or service licence for 3G mobile operators (though fees and conditions tend to be broadly the same), whereas others (e.g. UK) allow 3G services to be provided under an existing GSM mobile service licence. In some cases, additional administrative fees to cover the cost of running beauty contests, or payments for tender documents, are applied. The Netherlands applies an administrative fee to cover costs associated with issue of the spectrum licence but deducts a corresponding amount from the final auction bids. As these fees are all cost based, they would appear to be consistent with the requirements of the Licensing Directive.

The following specific national differences between administrative fees for GSM and 3G mobile licensing are noted:

**i) Belgium**

An auction candidacy fee of € 12,500 per applicant was applied, replacing the licence filing fee applied to the GSM operators. The annual management licence fee is set at € 250,000

**ii) Denmark**

A fee was charged by the NTA to cover costs involved in the organisation and implementation of the auction. The exact amount was to be determined on completion of the auction. Details were not available at the time of writing, but the initial estimate by the NTA prior to the auction was a total cost of € 13.4 million, to be split equally between the winning licensees.

**iii) Netherlands**

Upon submission of an application each applicant was required to make a non-refundable payment of € 9,076 as a contribution towards the costs involved in the application procedure. A refundable security deposit of € 40.8 M or € 45.4 M, depending upon the licence being bid for, was also required.

**iv) Portugal**

A once-off administrative fee of € 49,880 applies to licences issued following a beauty contest (mandated by Order 1230 of December 1999 by the Ministry of Social Equipment).

*3.10.2.3 Spectrum Fees / Charges*

Some Member States, notably those which opted for a comparative selection licence award procedure, have applied a similar approach to 3G mobile licence fees and spectrum fees / charges as they applied to GSM. There has, however, been a much wider adoption of auctions to allocate 3G licences (see Table 3.13). In general, where an auction has been held no further spectrum charge is applied. Exceptions to this are Belgium, Denmark and the Netherlands, where a per-MHz spectrum fee is levied to cover the annual cost of frequency monitoring and licence enforcement. The situation in each Member State is summarised in Table 3.15.

One interesting point which emerges from analysis of spectrum auction results is the relative value placed on paired and unpaired spectrum by bidders. In Austria and Germany, the auction process allowed bidders to bid separately for these two types of spectrum. The results are illuminating, especially in the case of Germany (see table below). Paired spectrum commanded bids up to 33 times as high (on a per - MHz basis) as unpaired spectrum, reflecting the greater emphasis by equipment vendors and standards bodies in developing standards for the paired spectrum, and the perceived greater utility of those bands. A similar situation arose in the UK (though less immediately obvious) where a licence comprising 2 x 15 MHz of paired spectrum attracted € 9.6Bn (€ 320 M per MHz), whereas licences comprising 2 x 10 MHz plus 5 MHz unpaired attracted only € 6.5 Bn (€ 260 M per MHz, or assuming the same value attached to the paired spectrum as for the 2 x 15 MHz licence, € 320 M per MHz for the paired spectrum and € 20 M per MHz for the unpaired spectrum). This difference in perceived value is not currently reflected in any of the annual spectrum charges applied by Member States.

**Table 3.14: German 3G mobile bids for paired and unpaired spectrum**

| Bidder | E-plus | Group 3G | Mannesm | Mobilkom | T-Mobil | Viag |
|---|---|---|---|---|---|---|
| Price for paired (€ M / MHz) | 419.5 | 420.5 | 421.0 | 418.5 | 424.0 | 422.5 |
| Price for unpaired (€ M / MHz) | 7.6 | 12.6 | 12.4 | 12.4 | 12.6 | - |

**Table 3.15 Legal basis and structure of 3G Mobile spectrum fees/charges in EU Member States**

| | Once-off Fees / Charges | | | Recurring Fees / Charges | | |
|---|---|---|---|---|---|---|
| | **Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** | **Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** |
| B | Auction Bid | Auction enabled by Royal Decree defining the specifications required and the procedure for licence award. As approved by the Belgian Council of Ministers on 15 September 2000 . | To be paid in full on award of licence | Variable spectrum fee | Royal Decree defining the specifications required and the procedure for licence award. As approved by the Belgian Council of Ministers on 15 September 2000 . | €125,000 per MHz of bandwidth in simplex or duplex mode |
| DK | Auction Bid | Act no. 1266 of 20th December 2000 on auction of licences for 3G mobile telephone networks. | Initial up-front payment of 25% of the amount bid, on licence award | Auction bid<br><br>Frequency use fee | Act no. 1266 of 20th December 2000 on auction of licences for 3G mobile telephone networks. | Ten annual deferred payments of total value 75% of the amount bid (see section 3.6.2.1).<br><br>Expected to be set at €228,000 per licence for 2002 |
| D | Auction Bid | Decision of the Presidential Chamber of 18th Feb 2000 on the definition and rules for the assignment of licences for UMTS / IMT- 2000 3G mobile telecommunications systems | Licence payments were due, in full, at the close of the auction. | Not applicable | Not applicable | Not applicable |
| EL | Auction Bid | EETT Decision 210/2/28-2-2001, Regulation for the assignment of individual radio frequencies under an individual licence status for the provision of public telecommunications services | See Section 3.6.2.3 | Annual duties | EETT Decision 210/2/28-2-2001, Regulation for the assignment of individual radio frequencies under an individual licence status for the provision of public telecommunications services | Annual payments are set off against the initial licence fee. |
| E | Once off spectrum charge | Ministerial Order no. 21883 of 10th November 1999 (Ministerio de Fomento) | € 129.22M per licence | Annual spectrum charge | Article 66 of Law 13/2000. Spectrum Charge is calculated as $T = S \times B \times (C_1 * C_2 * C_3 * C_4 * C_5)$ PTA/km$^2$/kHz. Values for $C_1$ , $C_2$ , $C_3$ , $C_4$ and $C_5$ ) are given in Art. 66. If the license is national the value of $S_{km^2}$ is 505,990 km$^2$ . | € 4,656 per kHz. Note: The draft Budget Law for 2002 foresees an average reduction of 65% of spectrum charges for 3G mobile services |
| F | Spectrum Charge (1st contribution to | Decision 00-835 of ART proposing to the Minister the procedures and | €619.25M, payable on 30 September 2001. | Balance of Spectrum Charge | Decision 00-835 of ART proposing to the Minister the | Instalments to be paid at regular intervals over |

| | Once-off Fees / Charges | | | Recurring Fees / Charges | | |
|---|---|---|---|---|---|---|
| | **Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** | **Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** |
| | payment of total spectrum charge of €4.95 Bn) | conditions of attribution of authorisations for the introduction in Metropolitan France of 3G mobile systems. | | | procedures and conditions of attribution of authorisations for the introduction in Metropolitan France of 3G mobile systems. | duration of licence - see section 3.6.2.2 for details. At the time of writing the French Government had announced plans to replace the deferred payments with a levy on future 3G turnover (level to be determined). |
| IRL | To be decided | | | To be decided | | |
| I | Auction Bid | Deliberation 410/99 of 22 December 1999 of the Autorità per le Garanzie nelle Comunicazioni, subsequently amended by Deliberation No.367/00/CONS of 14 June 2000. Auction procedures defined in Deliberation388/00/CONS | 5 licences offered, with reserve price of €2,065,827,896 per licence. Bank guarantee required for this amount required with application, plus deposit of €2,582,284. | No recurring payments | | |
| L | To be decided | | | To be decided | | |
| NL | Auction Bid | Ministerial Regulation no. DGPT/00/1834/NG, Regulation pertaining to the application for an IMT-2000 licence. | 5 licences offered, 2 comprising 2x15+5 MHz (lots A & B), 3 comprising 2x10+5 MHz (lots C, D & E). Reserve Prices: €45.4M (A & B), €40.8M (C, D & E). See Annex D.2.10.2 for details. | Annual enforcement and monitoring charge | RDR Charges Order, 2001. | € 7,859 per 2 x 1 MHz |
| A | Frequency usage fee | §21 of the Telecomms Law states that, to ensure the efficient use of spectrum, mobile radio licensees shall make a one-off or annual frequency usage fee. | Applicants for mobile licences must indicate the level of frequency usage fee they are willing to make. | There are no recurring spectrum fees or charges. | | |
| P | Spectrum Administrative Charge: | Ministerial Order no. 667-A/2001 of 2nd July 2001 | € 10 per base station, payable at time of commissioning | Spectrum Operational Charge: | Ministerial Order no. 667-A/2001 of 2/7/2001 | € 68 per base station (for EIRP > 50 watts) plus €3.50 per mobile terminal, payable every six months. |
| FIN | Not Applicable | Not Applicable | Not Applicable | Spectrum Fee | Decision of the Ministry of Transport &Communications on the Fees of the Telecommunications Ad- | € 1,896 x K1 x K2 x K3, where K1=0.8 for GSM900 and 0.6 for GSM1800, K2=1 for national networks and |

| | Once-off Fees / Charges | | | Recurring Fees / Charges | | |
|---|---|---|---|---|---|---|
| | **Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** | **Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** |
| | | | | | ministration Centre (issued 22/12/99, amended 16/6/99, 28/12/00 and 14/2/01) | K3=0.2 in billing years 1 and 2, 0.4 in year 3, 0.6 in year 4, 0.8 in year 5 and 1.0 thereafter |
| S | Not applicable | Not applicable | Not applicable | Transmitter Fee (to cover direct and indirect costs for spectrum 7management) | PTSFS 2000:13 | Annual charge of € 17.43 per base station transmitter |
| UK | Auction Bid | Wireless Telegraphy Act, 1998 | Either payment in full or deferred payments with interest (see Annex D.2.15.2 for details) | Not Applicable | Not Applicable | Not Applicable |

### *3.10.2.4 Level of 3G Mobile Fees and Charges in EU Member States*

| | **Network** | **Spectrum Licensed** | | **Administrative Fees (€)** | | **Spectrum Fees / Charges (€)** | |
|---|---|---|---|---|---|---|---|
| | | Paired | Unpaired | Once-off | Annual | Once-off | Annual |
| B | Belgacom (Proximus) | 2 x 15 | 5 | 12,500 | 250,000 | 150.2 M (auction) | 2,500,000 [5] |
| | Mobistar | 2 x 15 | 5 | 12,500 | 250,000 | 150.0 M (auction) | 2,500,000 [5] |
| | KPN Orange | 2 x 15 | 5 | 12,500 | 250,000 | 150.0 M (auction) | 2,500,000 [5] |
| DK | Hi3G Denmark | 2 x 15 | 5 | 3.350,000 | 0 | 31,830,000 [6] | 9,778,818 [7] |
| | TDC Denmark International | 2 x 15 | 5 | 3.350,000 | 0 | 31,830,000 [6] | 9,778,818 [7] |
| | Telia Mobile AB | 2 x 15 | 5 | 3.350,000 | 0 | 31,830,000 [6] | 9,778,818 [7] |
| | Orange A/S | 2 x 15 | 5 | 3.350,000 | 0 | 31,830,000 [6] | 9,778,818 [7] |
| D | T-Mobil | 2 x 10 | 5 | 0 | 0 | 4,370,000,000 | Cost based charge will apply from 3 years after licence issue. |
| | Mannesman | 2 x 10 | 5 | 0 | 0 | 4,340,000,000 | |
| | E-plus Hutchinson | 2 x 10 | 5 | 0 | 0 | 4,310,000,000 | |
| | Viag Interkom | 2 x 10 | 0 | 0 | 0 | 4,320,000,000 | |
| | Mobilcom Multimedia | 2 x 10 | 5 | 0 | 0 | 8,430,000,000 | |
| | Group 3G | 2 x 10 | 5 | 0 | 0 | 4,330,000,000 | |
| EL | Panafon | 2 x 20 | 5 | 0 | Levy will apply from 2005 (Table 2.7 for detail) | 176,376,199 | 0 |
| | Cosmote | 2 x 15 | 5 | 0 | | 161,411,701 | 0 |
| | Stet Hellas | 2 x 10 | 5 | 0 | | 146,735,169 | 0 |

| | Network | Spectrum Licensed | | Administrative Fees (€) | | Spectrum Fees / Charges (€) | |
|---|---|---|---|---|---|---|---|
| | | Paired | Unpaired | Once-off | Annual | Once-off | Annual |
| E | Telefonica Moviles | 2 x 15 | 5 | 0 | Annual levy of 0.15% of turnover | 129,220,000 | 162,980,000 |
| | Airtel | 2 x 15 | 5 | 0 | | 129,220,000 | 162,980,000 |
| | Amena | 2 x 15 | 5 | 0 | | 129,220,000 | 162,980,000 |
| | Xfera | 2 x 15 | 5 | 0 | | 129,220,000 | 162,980,000 |
| F | Itineris | 2 x 15 | 5 | 305,000 | 152,500 | 619,250,000 | 4,966 M, payable in stages over 15 years (see section 3.6.2.2 for details) [8] |
| | SFR | 2 x 15 | 5 | 305,000 | 152,500 | 619,250,000 | |
| IRL | Not yet licensed | | | | | | |
| I | Telecom Italia Mobile | 2 x 10 | 5 | 56,810 | 61,975 | 2,442,000,000 | 0 |
| | Omnitel | 2 x 10 | 5 | 56,810 | 61,975 | 2,448,000,000 | 0 |
| | Wind | 2 x 10 | 5 | 56,810 | 61,975 | 2,427,000,000 | 0 |
| | Ipse | 2 x 15 | 5 | 56,810 | 61,975 | 2,427,000,000 | 0 |
| | Andala (now renamed "H3G") | 2 x 15 | 5 | 56,810 | 61,975 | 2,417,000,000 | 0 |
| L | Not yet licensed | | | | | | |
| NL | KPN Mobile | 2 x 15 | 5 | 363[1] | 356,670 | 711,000,000) | 98,243 |
| | Libertel | 2 x 14.6 | 5.6 | 0 | 353,949 | 713,800,000 | 98,243 |
| | Telfort | 2 x 10 | 5 | 0 | 353,949 | 430,000,000 | 135,907 |
| | Dutchtone | 2 x 10 | 5 | 0 | 353,949 | 435,600,000 | 145,907 |
| | 3G-Blue (Ben) | 2 x 10 | 5 | 0 | 353,949 | 395,000,000 | 98,243 |
| A | Mobilkom Austria | 2 x 10 | 10 | 7,267 | Annual levy of 0.1 - 0.2% of turnover | 171,500,000 | 0 |
| | Max Mobil | 2 x 10 | 10 | 7,267 | | 170,800,000 | 0 |
| | Connect Austria (One) | 2 x 10 | 0 | 7,267 | | 119,900,000 | 0 |
| | Telefonica | 2 x 10 | 0 | 7,267 | | 117,700,000 | 0 |
| | TeleRing | 2 x 10 | 0 | 7,267 | | 113,400,000 | 0 |
| | Hutchison 3G | 2 x 10 | 5 | 7,267 | | 138,800,000 | 0 |
| P | TMN | 2 x 15 | 5 | 49,880 | 9,976 | 99,760,000 | Currently based on number of base stations and mobile terminals |
| | Telecel | 2 x 15 | 5 | 49,880 | 9,976 | 99,760,000 | |
| | Optimus | 2 x 15 | 5 | 49,880 | 9,976 | 99,760,000 | |
| | Oni-way | 2 x 15 | 5 | 49,880 | 9,976 | 99,760,000 | |
| FIN | Sonera [2] | 2 x 15 | 5 | 0 | 0 | 0 | 1,592,640 [4] |
| | Radiolinja [2] | 2 x 15 | 5 | 0 | 0 | 0 | 1,592,640 [4] |
| | Telia Finland [2] | 2 x 15 | 5 | 0 | 0 | 0 | 1,592,640 [4] |

| | Network | Spectrum Licensed | | Administrative Fees (€) | | Spectrum Fees / Charges (€) | |
|---|---|---|---|---|---|---|---|
| | | Paired | Unpaired | Once-off | Annual | Once-off | Annual |
| | Suomen 3G [2] | 2 x 15 | 5 | 0 | 0 | 0 | 1,592,640 [4] |
| | Ålands Mobiltelefon [3] | 2 x 15 | 5 | 0 | 0 | 0 | |
| | Tele1 Europe Ab [3] | 2 x 15 | 5 | 0 | 0 | 0 | |
| S | Europolitan | 2 x 15 | 5 | 10,893 | €5,447 plus 0.15% of turnover | 0 | €17.43 per annum per base station |
| | Tele2 | 2 x 15 | 5 | | | 0 | |
| | Hi3G Access | 2 x 15 | 5 | | | 0 | |
| | Orange Sverige | 2 x 15 | 5 | | | 0 | |
| UK | BT Cellnet | 2 x 10 | 5 | 0 | Annual levy of up to 0.08% of turnover | 6,500,000,000 | 0 |
| | One2one | 2 x 10 | 5 | 0 | | 6,452,000,000 | 0 |
| | Orange | 2 x 10 | 5 | 0 | | 6,468,000,000 | 0 |
| | Vodafone | 2 x 15 | 0 | 0 | | 9,613,000,000 | 0 |
| | Hutchison 3G | 2 x 15 | 5 | 62,800 | | 7,065,000,000 | 0 |

Notes: [1] Applies to operators with SMP
[2] Covers all of Finland except Åland
[3] Covers Åland only
[4] Subject to reduction in first five years - see section 3.6.3.1 for details
[5] Maximum amount payable, actual amount is based on spectrum actually in use.
[6] Initial 25% of auction bid
[7] 10 annual instalments each comprising 7.5% of auction bid, plus €228,000 annual spectrum fee
[8] At the time of writing the French Government had announced plans to replace deferred payments with a levy on future 3G turnover (level to be determined).

In all Member States except Finland, whether auctions or beauty contests have been used, these have been accompanied by obligations on licensees relating to roll out and coverage. The extent of these obligations, and the action that can be taken by the NRA if the obligations are not met, vary considerably within the EU, as indicated in Table 3.16. In general a minimum coverage obligation applies though this varies in extent and in whether it is specific to high speed services. In most cases the licence may be revoked if the obligation is not met, but some Member States (Belgium, Denmark, Spain, Austria and Portugal) may also apply financial penalties.

**Table 3.16: Coverage and Rollout obligations on 3G mobile operators in EU Member States**

| | Coverage and rollout obligations | Actions taken by NRA if obligations not met |
|---|---|---|
| B | 30% population after 3 yrs, 40% population after 4 yrs, 50% population after 5 yrs, 85% population after 6 yrs, may be reviewed by Government. | The Minister may, on BIPT's advice, impose financial penalties (fines) if coverage obligations are not met within a reasonable time |
| DK | 30% population coverage by end of 2004, 80% population coverage by end of 2008 | Penalties may be set by NTA in the event of failure to meet the minimum requirements of the licence or refusal to submit information. |
| D | 25% population by end 2003, 50% population by end 2005 | Licence may be revoked |
| EL | 25% population by December 2003, 50% by December 2006, at minimum 144 kbit/s for downlink and 64 kbit/s for uplink. | Infringement of licence obligations may result in recall, suspension or revocation of the licence. |
| E | Coverage for all Spanish cities with over 250,000 inhabitants by June 2002; 90% population by 2005 | There are financial guarantees associated with coverage and number of base stations etc. |
| F | 2 years after launch: 25% population coverage for voice, 20% for 144 kbit/s packet data;<br>8 years after launch: 80% population coverage for voice, 60% for 144 kbit/s packet data | No financial guarantees but licence may be revoked. |
| IRL | To be decided | |
| I | Regional Capitals within 30 months and provincial capitals within extra 30 months | |
| L | To be decided | |
| NL | By 1 Jan 2007, coverage at 144 kbit/s must be provided in built-up areas of all municipalities with over 25,000 inhabitants, on all main connecting arteries and through motorways to Belgium and Germany, and in and around the three main airports. This equates to roughly 60% of population. | No financial guarantees or penalties but licence may be revoked or altered if the licensee no longer meets the requirements set on it to be eligible for the licence. |
| A | 25% population by end 2003, 50% population by end 2005 | Financial penalties apply if coverage requirements are not fulfilled |
| P | Minimum 20% population after 1 yr, 40% after 3 yrs, 60% after 5 yrs, but each operator has committed to higher figures as part of the tender process - these are included in individual licences. | A lump sum is paid to ICP in the form of a bank guarantee (€2,493,989) which is paid back yearly during the first five years as the licensee meets its objectives. |
| FIN | No coverage obligation | No financial guarantees or penalties |
| S | 99.98% population coverage by 31st December 2003 (based on commitments made in licence applications) | |
| UK | 80% UK population by 31st December 2007 | No financial penalties but licence may be revoked |

### 3.10.3 Wireless Local Loop (WLL)

#### *3.10.3.1 Background and Context*

WLL services provide a radio based alternative to the established copper loop for provision of fixed PSTN access to business and residential users. In general the

existing copper loop is owned and operated by the incumbent fixed operator and although Member States are now required to mandate access to this medium for competing operators implementation has been limited in most cases. WLL provides a relatively low cost means to replicate the incumbent's infrastructure and hence to provide a rapid rollout of an alternative fixed access network.

The first European WLL network was licensed in the UK in 1992. Since then most Member States have proceeded to license one or more WLL operators, with the intention of providing a variety of national and regional services. Whilst interest initially focussed on simple replication of the incumbent's narrow band loop, the emphasis has now shifted to the provision of broadband access to cater for high speed data applications such as Internet access and video on demand, at data rates up to 2 MBit/s or beyond.

The table below summarises the current status of WLL licensing in each Member State. At the time of writing all Member States except Italy, the Netherlands and Sweden have licensed WLL networks and all three of the latter have plans to license the services in the near future. With the exception of Belgium, France, Finland and Luxembourg, NRAs have tended to differentiate between broadband and narrowband services. Broadband generally implies a potential data rate of 2 Mbits per second or above, whereas narrowband generally refers to voice services or data up to basic rate ISDN (144 kbit/s). Data rates between 144 kbit/s and 2 MBit/s are sometimes defined as wideband but may also sometimes be referred to as broadband and are in some cases being offered by WLL operators originally licensed as narrowband. Hence the distinction between the broadband and narrowband categories is becoming increasingly blurred and is probably inappropriate for future WLL licensing.

It is noted that, at the time of writing, unfavourable global market conditions were leading to delays in the rollout of WLL systems and had led to some operators withdrawing from the market.

Sections 3.10.3.2 and 3.10.3.3 explain how administrative fees and spectrum fees / charges for WLL services are determined in each Member State. Section 3.10.1.4 tabulates the level of fees and charges currently paid by each European WLL licensee, where the information is available. Note that spectrum charges, where applied, are generally significantly lower than for mobile networks, broadly reflecting the more limited revenue potential for WLL operators, who must compete not only with other WLL operators but also wire line operators, including the incumbent which generally retains the lion's share of fixed traffic in most Member States.

Note that whereas auctions have been widely adopted for licensing of 3G mobile networks, only three Member States (Greece, Austria and the UK) have applied this to WLL licensing. Where auctions have been held, amounts raised have been significantly less than for 3G licences, even though the amount of spectrum associated with WLL licences is greater, as the following table illustrates:

| | Amounts bid for 3G Mobile licences (€ M per licence) | Amounts bid for WLL licences (€ M per licence) |
|---|---|---|
| EL | 146.7 – 176.4 | 4.4 - 11.8 |
| A | 113.4 – 171.5 | 0.52 - 0.83 |
| UK | 6,531 – 9,660 | 0.24 - 22.1 |

The table graphically illustrates the much higher value placed on mobile spectrum by licensees and highlights the difficulties faced by NRAs when attempting to quantify the true economic value of a particular part of the radio spectrum.

### Table 3.17 Current Status of WLL Licensing in EU Member States

| | Current status of WLL licensing | Licensing Procedure | National Licences | | Regional or localised licences | | Future plans |
|---|---|---|---|---|---|---|---|
| | | | Narrowband | Broadband | Narrowband | Broadband | |
| B | Licences issued in Feb 2001 in 3.5 GHz, 10 GHz and 26 GHz bands | Beauty contest | 4 (no distinction between narrowband and broadband) | | 1 (no distinction between narrowband and broadband) | | Further licences planned in 28 GHz (November 2001) and 40 GHz bands |
| DK | 10-year licences issued in Dec 2000 in 3.5 GHz and 26 GHz bands. | Beauty contest | 3 | 4 | None | None | Further licences planned in 10 GHz and 28 GHz bands |
| D | Licences issued in 2.5 GHz, 3.5 GHz and 26 GHz bands | Beauty contest | None | None | 1,671 in total (breakdown by bandwidth not available) | | |
| EL | Licences issued in December 2000 | Auction | 3 | 5 | None | None | |
| E | 20-year licences issued in April 2000 in 3.5 GHz and 26 GHz bands | Beauty contest | 3 | 3 | None | None | |
| F | 15-year licences issued in August 2000 in 3.5 GHz and 26 GHz band. | Beauty contest | 2 (no distinction between narrowband and broadband | | None | 44 [1] | Further 3.5 GHz licence planned. |
| IRL | 10-year licences issued in 2000 in 3.5 and 26 GHz bands | Beauty contest | 3 | 4 | None | None | Further licences possible in 10 GHz, 26 GHz and 28 GHz bands |
| I | No licences yet issued | Auction proposed | None | None | None | None | Licences planned for 26 GHz and 28 GHz bands |
| L | Licences issued in 3.5 GHz and 26 GHz bands | Beauty contest | 5 (no distinction between narrowband and broadband) | | None | None | |
| NL | No licences yet issued | To be decided | None | None | None | None | To be decided |
| A | 10-year licences issued in February 2001 in 26 GHz band | Auction | None | 1 | None | 3 | To be decided |
| P | 15-year licences issued in December 1999 in 3.5 GHz, 26 GHz and 28 GHz bands | Beauty contest | 3 | 8 | None | None | None currently |
| FIN | 3.5 GHz, 10 GHz and 26 GHz bands are designated for WLL | First come, first served | None | None | 20 (no distinction between narrowband and broadband) | | Further regional licences available on a first come first served basis |
| S | No licences yet issued | Beauty contest | None | None | None | None | Licences planned in 3.5 GHz, 26 GHz and 28 GHz bands |
| UK | 15-year licence issued in 28 GHz band in November 2000. In 2 GHz, 2.4 GHz and 10 GHz bands, licences awarded at various stages since 1994, annually renewable subject to payment of annual fees and roll out obligations. | Auction (28 GHz); Beauty contest (others) | 4 | None | 5 | 16 | Further licences planned in 3.5 GHz, 10 GHz, 28 GHz and 40 GHz bands |

Notes: [1]: Aggregated among 5 operators.

#### *3.10.3.2 Administrative Fees*

Administrative fees for WLL services in most Member States reflect those applied more generally to fixed telecommunication networks and services, although there may be additional fees relating to participation in auctions or beauty contests. The situation pertaining to each Member State is summarised in Table 3.18. Like GSM most Member States apply both once-off and annual administrative fees, the exceptions being Greece and Spain which apply only annual fees, and Denmark and Finland which do not apply administrative fees at all (but do apply a cost-based spectrum fee). As with GSM and 3G mobile, some Member States apply a levy rather than a fixed fee. However, because of the significantly lower revenue expectations of WLL operators compared with mobile operators this is likely to result in less significant differences between Member States than for mobile networks (this point becomes more apparent in the case studies - see section 4.4)

#### *3.10.3.3 Spectrum Fees / Charges*

As with the licensing of 3G mobile services, both auctions and comparative selection procedures have been used for the award of WLL licences. However, unlike GSM and 3G mobile there is no fully harmonised approach to frequency allocation for WLL throughout the EU. Instead, a variety of frequency bands and channel plans have been adopted, leading to further disparity between the spectrum charges than is the case for GSM. The situation is further complicated by the fact that some countries have opted for national licences while others have favoured a regional approach (in some cases both approaches have been used). Hence the number of WLL licences issued ranges from 4 in Luxembourg to over 2,000 in Germany, although most of the latter have been acquired by a relatively small number of operators . Table 3.19 describes the legal basis and the method of calculation used by each Member State for setting WLL spectrum fees or charges.

Annual payments are the norm, except in Austria, Greece and the UK where auctions have been held. Note that auctions are much less common for WLL than 3G. Germany and Austria also apply once-off spectrum fees.

**Table 3.18 Legal basis and structure of WLL administrative fees in EU Member States**

| | Once-off Fees | | | Recurring Fees | | |
|---|---|---|---|---|---|---|
| | **Fee** | **Legal Basis** | **Basis of Calculation and Payment Terms** | **Fee** | **Legal Basis** | **Basis of Calculation and Payment Terms** |
| B | Application fee<br><br>Administrative fee | To cover costs of reviewing each application for a public voice telephony licence (does not apply where service licence already held)<br><br>For holders of public voice telephony licences | € 12,395, to be paid when application is submitted.<br><br>€ 8,676, payable when service commences | Annual management fee for public voice telephony licence | Article 13, § 1.1 of Royal Decree of 22nd June 1998. | € 17,352 for operators with SMP, € 8,676 for others |
| DK | No administrative fees apply | | | | | |
| D | Class 3 Network Licence fee | Telecommunication Licence Fee contribution ordinance of August 1996 | Based on the population of the coverage area relative to national population, subject to maximum of € 5,419,694. | No recurring administrative fees | | |
| EL | No once-off fees apply | | | Annual fee | | A levy of between 0.5% and 0.025% applies (see note 1 to Table 2.7 for details) |
| E | No initial administrative fee | | | Annual licence fee (levy) | Article 71 of General Telecommunications Law. To support the expenses of the CMT | Must not exceed 0.2% of gross income. Currently 0.15%. |
| F | Participation Fees (cover administration costs of beauty contest and licence issue) | Defined in Articles L.33-1 and L.34-1 of Posts & Telecommunications Code; Levels set in Article 45 of the Finance Law of 1987 (as amended) | L33-1: € 533,572<br>L34-1: € 76,224<br>Both payable in full on licence issue. Amount depends on geographic coverage of the licence. | Spectrum fee (for control of spectrum assignments and network licence obligations)<br><br>Licence Fee (for control of service licence obligations) | Article L.33-1 of the Posts & Telecommunications Code<br><br>Article L.34-1 of the Posts & Telecommunications Code | €533,571 for national operators , payable annually on 1st December<br><br>€19,056, payable annually on 1st December |
| IRL | Administrative Fee | Section 111 of the Telecommunications Act | Determined by dividing total cost of beauty contest by total no. of licences issued. Total cost for current licences was € 1.9 M, i.e. € 238,000 per licence. | Telecommunications Levy | Statutory Instrument no. 43 of 1998 (Levy Order) | 0.2% of turnover, payable annually, if turnover ≥ € 634,869. € 1,016 if turnover < € 634,869. |
| I | WLL not yet licensed | | | | | |
| L | Network Licence Royalty | Grand-Ducal Decree of 25th September 1998 | € 7,437 payable on licence issue | Annual royalty | Grand-Ducal Decree of 25th September 1998 | € 49,579 plus the following levy on turnover: Up to €12.39M turnover, 0.2%; |

| | Once-off Fees | | | Recurring Fees | | |
|---|---|---|---|---|---|---|
| | **Fee** | **Legal Basis** | **Basis of Calculation and Payment Terms** | **Fee** | **Legal Basis** | **Basis of Calculation and Payment Terms** |
| | | | | | | €12.4M - €24.79M, 0.25%; €24.8M - €124.95M, 0.3%; €124.96M or more, 0.35% |
| NL | WLL not yet licensed | | | | | |
| A | Service Licence Fee | §17 of the Telecommunications Law requires a fee to cover administration costs arising from granting the licence. | Determined by ordinance of the Federal Minister of Transport, Innovation and Technology in consultation with the Federal Minister of Finance. Paid in full on licence issue. Currently €7,267 | Telecommunications Levy: | §10 of the amended Telecommunications Law requires a Levy based on licensees' annual turnover and their share of the Austrian telecoms market. Covers the cost of the Regulator, in particular administration, supervision and implementation of the licence. | Prescribed by the NRA and is currently between 0.1 and 0.2 % of turnover |
| P | Initial service licence fee | Order 1230/99 of 31st December 1998, by the Ministry of Social Equipment | € 49,880, payable in full on licence issue. | Annual service licence fee | Order 1230/99 of 31st December 1998, by the Ministry of Social Equipment | € 9,976 payable annually on anniversary of licence issue. |
| FIN | No administrative fees apply | | | | | |
| S | Application fee (proposed - licences not yet issued) | NPTA Regulation with PTSFS 2000:13 | SKR 100,000 (€10,616) | Administrative fee (proposed – licences not yet issued) | NPTA Regulation with PTSFS 2000:12 | SKR 50,000 (€5,308) plus 0.15% of turnover, payable every six months. |
| UK | Service licence application fee | Telecommunications Act 1984 | National operators pay €64,800, local or regional operators pay €20,250, in full on receipt of licence | Service Licence renewal fee | Telecommunications Act 1984. Determined by Oftel, to cover costs of maintaining and enforcing service licence | All licensees with turnover of ≥ €8.1M and above pay an annual fee, set at a maximum 0.08% of turnover. Those with turnover < €8.1M pay €4,860 per year. New market entrants pay €4,860 for the first two years, regardless of turnover. |

**Table 3.19 Legal basis and method of determination of WLL spectrum fees / charges in EU Member States**

| | Once-off Fees / Charges | | | Recurring Fees / Charges | | |
|---|---|---|---|---|---|---|
| | **Fee / Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** | **Fee / Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** |
| B | No once-off payments apply | | | Annual royalty | Article 13 bis of Royal Decree of 22nd June 1998 | 3.5 GHz band: € 483 per 2 x 1 MHz per base station;<br>10 GHz band: € 322 per 2 x 1 MHz per base station;<br>26 GHz band: € 216 per 2 x 1 MHz per base station.<br>Payable each 31st January |
| DK | No once-off payments apply. | | | Annual frequency fee | Executive order of December 2000 concerning NTA's fees and charges in 2001. | € 6,998 per 10 MHz |
| D | Frequency Assignment Fee | Frequency Fee Regulation (FGebV) of 21 May 1997 | Within the range of €102 to €1,534 per base station - the actual amount depends on the cost involved. | Frequency Use Contribution | Frequency use Contribution Regulation (FbeitrV) of 13th December, 2000 | Payable from 3 years after licence issue, based on costs averaged over proceeding 3 years. Currently in the range €73 - €86 per base station. |
| EL | Initial licence fee (auction bid) | Individual Licence Regulation (EETT Decision 207/3 of 1-3-2001) | | Annual duties | EETT Decision 210/2/28-2-2001, Regulation for the assignment of individual radio frequencies under an individual licence status for the provision of public telecommunications services | Annual payments are set off against the initial licence fee. |
| E | No once-off payments apply. | | | Annual spectrum charge | Article 73 of General Telecommunications Law. Current charges specified in Article 66 of Law 13/2000 (table 2.2.3) | 3.5 GHz band: € 235,024 per 2 x 1 MHz;<br>26 GHz band: € 171,964 per 2 x 1 MHz<br>Payable annually |
| F | No once-off payments apply. | | | Spectrum Charge | Levied by ART under Article L.33.1 of the Posts & Telecommunications Code, to encourage efficient use of spectrum | € 31.8 M x (bandwidth / frequency) x (licensed coverage area / total area of metropolitan France), payable annually on 1st Jan. |

| | Once-off Fees / Charges | | | Recurring Fees / Charges | | |
|---|---|---|---|---|---|---|
| | **Fee / Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** | **Fee / Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** |
| IRL | No once-off payments apply. | | | Spectrum licence fee | S.I. no. 287 of 1999, Wireless Telegraphy (FWPMA) Regulations | € 1,905 per MHz from 2nd and subsequent annual renewal of WT licence. Reduction applies in first 2 years - see section 3.6.3. |
| I | WLL not yet licensed | | | | | |
| L | No once-off payments apply | | | Annual Royalties | Decision 00/34/ILT of 9th February 2000, on methods of assignment and royalties for WLL frequencies | 3.5 GHz band: € 1,007 per MHz<br>26 GHz band: € 2,014 per MHz |
| NL | WLL not yet licensed | | | | | |
| A | Frequency usage fee: | §21 of the Telecommunications Law | Licence applicants are required to indicate the amount they are willing to pay; this is then included into the licence decree. | Frequency Use Fee | §51 of the Telecommunications Law Determined by ordinance of the Federal Minister of Transport, Innovation and Technology in consultation with Minister of Finance | No payment has yet been made. |
| P | No once-off payments apply | | | Annual spectrum fee | ICP Administrative Rule 465-A/99 of 25th June 1999. | See Note [1] below. |
| FIN | No once-off payments apply | | | Spectrum Fee | Decision 1155/1998 of the MTC, as amended | €1,896 per 25 kHz x $K_1$ x $K_2$ where $K_1$ is 0.5 for 3.5 GHz and 10 GHz, 0.4 for 26 GHz; $K_2$ is an area coefficient equal to the proportion of the total national land area covered |
| S | No once-off payments apply | | | Transmitter Fee | PTSFS 2000:13 | € 54.47 annually per base station transmitter |
| UK | Auction Fee | Wireless Telegraphy Act 1998 | Applied to date to 28 GHz licences only. See section 3.10.3.4 for details of payments by individual operators | Spectrum Charge | Wireless Telegraphy Act 1998 and Statutory Instrument no. 2000 / 1678 | 2.45 GHz band: €121.50 per base station;<br>4 GHz band: €54,665 per MHz from 5th licence anniversary (where co-ordination with satellite earth stations required); €14,425 per MHz from 5th anniversary (where co-ordination with fixed links |

| | Once-off Fees / Charges | | | Recurring Fees / Charges | | |
|---|---|---|---|---|---|---|
| | **Fee / Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** | **Fee / Charge** | **Legal Basis** | **Basis of Calculation and Payment Terms** |
| | | | | | | required);<br>10 GHz band: €43,740 per MHz from 5th licence anniversary,<br>Lower 4GHz and 10 GHz fees apply in first 4 years - see section 3.6.3 for details.<br>No annual charges for 28 GHz licences let by auction. |

Notes: [1] Portuguese WLL spectrum fees, payable annually on anniversary of licence issue, are as follows:

3.5 and 26 GHz bands: € 304,260 x {1 - 0.45 ( $\Delta EB_A$ / $\Delta EB$) - 0.3 ($\Delta EB_B$ / $\Delta EB$)},

where $\Delta EB_A$ = number of additional base stations installed in zone A in previous year
$\Delta EB_B$ = number of additional base stations installed in zone B in previous year
$\Delta EB$ = total number of additional base stations installed in previous year
Zones A and B are defined in Administrative Rule no. 667-A/2001

28Hz band: € 611,020 (fixed).

### *3.10.3.4 Level of Wireless Local Loop Fees and Charges in EU Member States*

| | Operator | Number and type(s) of network | Spectrum Licensed | Administrative Fees (€) | | Spectrum Fees / Charges (€) | |
|---|---|---|---|---|---|---|---|
| | | | | **Once-off** | **Annual** | **Once-off** | **Annual** |
| B | Belgacom (incumbent) | 1 Regional | 2 x 56 MHz in 26 GHz band | 0[1] | 8,676 | No once-off payments apply | Annual charge based on number of base stations in each band (see Table 3.19 for details). |
| | Formus | 1 Regional | 2 x 22.5 MHz in 3.5 GHz band | 12,394 [1] | 8,676 | | |
| | Land Tel | 1 Regional | 2 x 56 MHz in 10 GHz band | 12,394 [1] | 8,676 | | |
| | Skybernet | 1 Regional | 2 x 22.5 MHz in 3.5 GHz band | 0 [1] | 8,676 | | |
| | Ministry of Equipment & Transport (Wallonia) | 1 Regional | 2 x 56 MHz in 26 GHz band | 0 [1] | 8,676 | | |
| DK | Formus | 1 Nat BB; 1 Nat NB | 2 x 26 MHz in 3.5 GHz band; 2 x 140 MHz in 26 GHz band | No administrative fees apply | | No once-off payments apply | 233,033 |
| | In2Loop (Tele2) | 1 Nat NB | 2 x 26 MHz in 3.5 GHz band | | | | 37,089 |
| | Sonofon | 1 Nat BB ; 1 Nat NB | 2 x 27 MHz in 3.5 GHz band; 2 x 140 MHz in 26 GHz band | | | | 233,033 |

| | Operator | Number and type(s) of network | Spectrum Licensed | Administrative Fees (€) | | Spectrum Fees / Charges (€) | |
|---|---|---|---|---|---|---|---|
| | | | | Once-off | Annual | Once-off | Annual |
| | Butler Networks A/S | 1 Nat BB | 2 x 140 MHz in 26 GHz band | | | | 195,944 |
| | Mediascape Comms A/S | 1 Nat BB | 2 x 112 MHz in 26 GHz band | | | | 156,755 |
| D | Associated Communications | 36 Regional | 26 GHz: 2x28 MHz | Up to €5,419,694, depending on population | 0 | Between € 102 and €1,534 , depending on costs associated with issuing licences | Cost based spectrum fee will apply from 3 years after licence issue. |
| | Broadnet | 42 Regional | 26 GHz: 2x28 MHz | | 0 | | |
| | Callino | 235 Regional | 26 GHz: 2x28 MHz | | 0 | | |
| | LandTel | 10 Regional | 26 GHz: 1x28 MHz | | 0 | | |
| | FirstMark | 134 Regional | 3.5GHz: 1x14 MHz; 26GHz: 2x28 MHz | | 0 | | |
| | K-Net | 1 Regional | 26 GHz: 2x28 MHz | | 0 | | |
| | Mannesman Arcor | 162 Regional | 3.5GHz: 1x14 MHz 26GHz: 1x28 MHz | | 0 | | |
| | Star One | 159 Regional | 3.5GHz: 1x14 MHz 26GHz: 2x28 MHz | | 0 | | |
| | Tesion | 21 Regional | 3.5GHz: 1x14 MHz 26GHz: 1x28 MHz (2x28 in Stuttgart) | | 0 | | |
| | Viag Interkom | 204 Regional | 3.5GHz: 1x14 MHz 26GHz: 2x28 MHz | | 0 | | |
| | Viaphone | 2 Regional | 26GHz: 2x28 MHz | | 0 | | |
| | Winstar | 2 Regional | 26GHz: 2x28 MHz | | 0 | | |
| | Baynet | 6 Regional | 26GHz: 2x28 MHz | | 0 | | |
| | Comin T | 1 Regional | 26GHz: 2x28 MHz | | 0 | | |
| | Hanse Tel | 5 Regional | 26GHz: 2x28 MHz | | 0 | | |
| | Highway One | 115 Regional | 26GHz: 2x28 MHz | | 0 | | |
| | Landover | 3 Regional | 26GHz: 2x28 MHz | | 0 | | |
| | PfalzKo | 2 Regional | 26GHz: 2x28 MHz | | 0 | | |
| | Tele2 | 2 Regional | 26GHz: 2x28 MHz | | 0 | | |
| | Arc Tel | 8 Regional | 26GHz: 2x28 MHz | | 0 | | |
| EL | Europrom (consortium) | 2 National | 2 x 28 MHz in 3.5 GHz band; 2 x 112 MHz in 26 GHz band | 0 | Annual levy based on turnover (see note 1 to Table 2.7 for details | 9,680,000 | 0 |
| | Panafon | 1 National | 2 x 56 MHz in 26 GHz band | 0 | | 8,130,000 | 0 |
| | DEH Telecom | 1 National | 2 x 112 MHz in 26 GHz band | 0 | | 8,830,000 | 0 |
| | Mediterranean Broadband Services | 1 National | 2 x 56 MHz in 26 GHz band | 0 | | 8,570,000 | 0 |

| | Operator | Number and type(s) of network | Spectrum Licensed | Administrative Fees (€) | | Spectrum Fees / Charges (€) | |
|---|---|---|---|---|---|---|---|
| | | | | Once-off | Annual | Once-off | Annual |
| | Quest Wireless (consortium) | 1 National | 2 x 21 MHz in 3.5 GHz band | 0 | | 4,400,000 | 0 |
| | OTE | 2 National | 2 x 28 MHz in 3.5 GHz band; 2 x 112 MHz in 26 GHz band | 0 | | 11,800,000 | 0 |
| E | FirstMark | 1 Nat NB | 2 x 20 MHz in 3.5 GHz band | 0 | Annual levy of 0.15% of turnover. | No once-off charges apply | 4,690,000 |
| | Broadnet | 1 Nat BB | 2 x 56 MHz in 26 GHz band | 0 | | | 9,630,000 |
| | Alo 2000 | 1 Nat NB | 2 x 20 MHz in 3.5 GHz band | 0 | | | 4,690,000 |
| | Abranet | 1 Nat NB | 2 x 20 MHz in 3.5 GHz band | 0 | | | 4,690,000 |
| | Banda 26 | 1 Nat BB | 2 x 56 MHz in 26 GHz band | 0 | | | 9,630,000 |
| | Sky Point | Nat BB | 2 x 56 MHz in 26 GHz band | 0 | | | 9,630,000 |
| F | First Mark | 1 National | 2 x 15 MHz in 3.5 GHz band 2 x 112 MHz in 26 GHz b and | 609,800 | 533,600 | No once-off charges apply | 548,800 |
| | Fortel | 1 National | 2 x 15 MHz in 3.5 GHz band 2 x 112 MHz in 26 GHz b and | 609,800 | 533,600 | | 548,800 |
| | BLR Services | 1 Reg BB | 2 x 15 MHz in 3.5 GHz band | 609,800 | 533,600 | | 548,800, scaled by coverage area as a proportion of Metropolitan France land area |
| | Broadnet | 1 Reg BB | 2 x 15 MHz in 3.5 GHz band | 609,800 | 533,600 | | |
| | Belgacom | 1 Reg BB | 2 x 15 MHz in 3.5 GHz band | 609,800 | 533,600 | | |
| | Landtel | 1 Reg BB | 2 x 15 MHz in 3.5 GHz band | 609,800 | 533,600 | | |
| | Altitude | 1 Reg BB | 2 x 15 MHz in 3.5 GHz band | 609,800 | 533,600 | | |
| IRL | Eircom | 1 Nat NB 1 Nat BB | 2 x 10 MHz in 2 GHz band 2 x 25 MHz in 3.5 GHz band 2 x 56 MHz in 26 GHz band | 1,905,000 | Levy (0.2% of turnover) | No once-off charges apply | 215,982 |
| | Chorus | 1 Nat NB 1 Nat BB | 2 x 10 MHz in 2 GHz band 2 x 25 MHz in 3.5 GHz band 2 x 56 MHz in 26 GHz band | 1,905,000 | | | 215,982 |
| | Esat | 1 Nat BB | 2 x 56 MHz in 26 GHz band | 1,905,000 | | | 149,321 |
| I | WLL not yet licensed | | | | | | |
| L | Formus | 1 National | Information not available | 7,437 | 49,579 plus 0.2% of turnover | 0 | Information not available |
| | FirstMark | 1 National | | 7,437 | 49,579 plus 0.2% of turnover | 0 | |
| | Cegecom | 1 National | | 7,437 | 49,579 plus 0.2% of turnover | 0 | |
| | BCE | 1 National | | 7,437 | 49,579 plus 0.2% of turnover | 0 | |
| | Tele2 | 1 National | | 7,437 | 49,579 plus 0.2% of turnover | 0 | |

| | Operator | Number and type(s) of network | Spectrum Licensed | Administrative Fees (€) | | Spectrum Fees / Charges (€) | |
|---|---|---|---|---|---|---|---|
| | | | | Once-off | Annual | Once-off | Annual |
| A | Star 21 | 1 Nat BB | 2 x 56 MHz in 26 GHz band | 0 | Levy of 0.1-0.2% of turnover. | € 523,240 | 0 |
| | Broadnet Austria | 3 Reg BB | 2 x 112 MHz in 26 GHz band | 0 | | € 828,470 | 0 |
| P | Onitelecom | 1 Nat BB; 1 Nat NB | 2 x 28 MHz in 3.5 GHz band; 2 x 56 MHz in 26 GHz band | 99,760 | 9,976 | 0 | Amount depends on number of base stations in pre-defined areas. Max payable is € 304,267 |
| | Novis | 1 Nat BB; 1 Nat NB | 2 x 28 MHz in 3.5 GHz band; 2 x 56 MHz in 26 GHz band | 99,760 | 9,976 | 0 | |
| | Maxitelsat | 1 Nat NB | 2 x 28 MHz in 3.5 GHz band | 49,880 | 9,976 | 0 | |
| | Jazztel | 1 Nat BB | 2 x 56 MHz in 26 GHz band | 49,880 | 9,976 | 0 | |
| | Eastecnica IV | 1 Nat BB | 2 x 56 MHz in 26 GHz band | 49,880 | 9,976 | 0 | |
| | Teleweb | 1 Nat BB | 2 x 56 MHz in 26 GHz band | 49,880 | 9,976 | 0 | |
| | Telecel | 1 Nat BB | 2 x 56 MHz in 26 GHz band | 49,880 | 9,976 | 0 | |
| | WTS | 1 Nat BB | 2 x 175 MHz in 28 GHz band | 49,880 | 9,976 | 0 | 611,020 |
| | Bragatel | 1 Nat BB | 2 x 175 MHz in 28 GHz band | 49,880 | 9,976 | 0 | 611,020 |
| FIN | Sonera | 3 Regional | Up to 56 MHz in 3.5 GHz band 168 MHz in 26 GHz band | 0 | 0 | 0 | Charge based on coverage area. |
| | Suomi Telecom | 3 Regional | Up to 56 MHz in 3.5 GHz band 60 MHz in 10.5 GHz band 224 MHz in 26 GHz band | 0 | 0 | 0 | |
| | Callahan Broadband | 2 Regional | Up to 38.5 MHz in 3.5 GHz band; 112 MHz in 26 GHz band | 0 | 0 | 0 | |
| | Tele2 | 2 Regional | 42 MHz in 3.5 GHz band 112 MHz in 26 GHz band | 0 | 0 | 0 | |
| | KPN Qwest | 1 Regional | 84 MHz in 26 GHz band | 0 | 0 | 0 | |
| | ART | 1 Regional | 112 MHz in 26 GHz band | 0 | 0 | 0 | |
| | Riihimäen Puhelin Oy | | 28 MHz in 3.5 GHz band | 0 | 0 | 0 | |
| | Oy KD-Soft Ab | | 34 MHz in 3.5 GHz band | 0 | 0 | 0 | |
| | Hämeen Puhelin Oy | | 60 MHz in 10 GHz band | 0 | 0 | 0 | |
| | Facilicom Finland Oy | | 60 MHz in 10 GHz band | 0 | 0 | 0 | |
| | FirstMark Finland Oy | | 60 MHz in 10 GHz band | 0 | 0 | 0 | |
| | Priority Wireless | 2 Regional | 38.5 MHz in 3.5 GHz band 112 MHz in 26 GHz band | 0 | 0 | 0 | |
| S | WLL not yet licensed | | | | | | |
| UK | Atlantic Telecom | 5 Reg HB[5] | 83.5 MHz in 2.4 GHz band [3] | 64,800 | All operators subject to | 0 | |
| | Tele2 | 1 Nat HB[5] | 2 x 84 MHz in 4 GHz band [4] | 64,800 | | 0 | 5,320,650 |

| | Operator | Number and type(s) of network | Spectrum Licensed | Administrative Fees (€) | | Spectrum Fees / Charges (€) | |
|---|---|---|---|---|---|---|---|
| | | | | Once-off | Annual | Once-off | Annual |
| | NTL | 1 Nat HB[5] | 2 x 30 MHz in 10 GHz band | Nil (already hold licence) | annual levy (up to 0.8%of turnover) | 0 | 2,612,903 |
| | CWC | 1 Nat HB[5] | 2 x 30 MHz in 10 GHz band | Nil (already hold licence) | | 0 | 2,612,903 |
| | Zipcom | 1 Reg NB | 2 x 15 MHz in 2 GHz band | 20,250 | | 0 | |
| | Energis | 6 Reg BB | 2 x 112 MHz in 28 GHz band | Nil (already hold licence) | | 22,097,000 | 0 |
| | Chorus | 1 Reg BB | 2 x 112 MHz in 28 GHz band | 20,250 | | 242,000 | 0 |
| | Norweb | 4 Reg BB | 2 x 112 MHz in 28 GHz band | Nil (already hold licence) | | 14,516,000 | 0 |
| | Faultbasic | 3 Reg BB | 2 x 112 MHz in 28 GHz band | 64,800 | | 17,000,000 | 0 |
| | Broadnet | 1 Reg BB | 2 x 112 MHz in 28 GHz band | 20,250 | | 7,450,000 | 0 |
| | EIrcom | 1 Reg BB | 2 x 112 MHz in 28 GHz band | 20,250 | | 242,000 | 0 |

Notes: [1]: No fee applies where a public voice telephony licence is already held. Higher fee includes administration fee plus additional licence application fee of € 12,395.
[2] NRA estimate if rollout requirements met.
[3] Spectrum shared with other licence exempt services
[4] Spectrum shared with fixed links and satellite earth station
[5] The UK has defined WLL in bandwidth terms as follows: Below 144kbit/s = Narrowband (NB), 384kbit/s - 2mbs = Higher bandwidth (HB), 2 - 10Mbit/s+ = Broadband (BB)

### 3.10.4 Fixed Links

#### *3.10.4.1 Background and Context*

The term "fixed links", as used in this Study, refers to point to point radio links used to relay voice, data or audio-visual material between two points. Such links are sometimes referred to as microwave links or radio relay systems and generally operate at frequencies above 3 GHz. Historically, fixed links were mainly used by incumbent network operators to carry trunk telephony traffic, and by broadcasters to link remote broadcast transmitters to studios.

Today, demand is driven mainly by the infrastructure requirements of mobile networks, where they are used to provide cost-effective links between base stations, controllers and switches. In the larger EU countries many thousands of links may be deployed in this way, mainly in higher frequency bands above 20 GHz. There has also been significant growth in many countries in the use of fixed links for private networks (e.g. by utilities) and for broadband access links to customer premises. Although their traditional deployment in incumbents' backbone networks is declining due to migration to fibre, fixed radio links continue to provide a speedy and cost-effective means for new market entrants to rollout service and have played an important role in facilitating competition in newly liberalised markets.

Growing demand for fixed links has led to increasing pressure on the available spectrum, prompting a number of Member States to introduce administrative pricing regimes (see section3.4.2) in an attempt to encourage operators to migrate either to other technologies or to use less congested frequency bands. Some, such as the UK and Spain, have already introduced such schemes, while others are in the process of doing so. There is also a trend away from the reservation of "block allocations" of spectrum for specific operators (typically the former monopoly carrier) in most of the countries where this approach is still used.

All Member States currently use a “first come, first served” approach to licensing fixed links and none have any current plans to change this approach.

#### *3.10.4.2 Fees and Charges Overview*

Unlike GSM, 3G mobile and WLL services, many fixed link operators do not require an individual network service licence. In general, for private users such as utility companies or broadcasters (i.e. not offering fixed link services directly to the public) a general authorisation, notification or registration is sufficient. Public network operators using fixed radio links to provide direct PSTN access to customers are required by most Member States to have an individual licence (see Table 2.1 for details), however where this does apply it is irrespective of the medium used and would be incurred regardless of whether radio frequencies were used or not.

Some Member States apply administrative fees rather than spectrum fees or charges for the use of fixed link spectrum, i.e. the payment does not depend upon the amount or type of spectrum resource consumed but is a flat fee per link or per licence. This is justified on the grounds that unlike mobile or WLL spectrum, fixed link spectrum has not historically been considered to be a scarce resource. However, growing demand for fixed links for applications such as mobile network infrastructure links is leading some of these Member States to consider the adoption of spectrum charges based on administrative pricing techniques (see Section 3.4.2) in the future to encourage more efficient use of fixed link spectrum.

Table 3.20 indicates which Member States are using, or planning to use administrative pricing, whether block allocations are used for specific operators, and the main parameters used in determining spectrum fees / charges for fixed links. Currently only Spain and the United Kingdom apply administrative pricing to fixed links, though a number of other Member States are considering this for the future (Denmark, Ireland, the Netherlands, Portugal and Finland). Most others apply spectrum fees that take account of the link bandwidth (exceptions are Germany, Finland and Sweden) and frequency band (all except Denmark, Germany, Ireland, Portugal, Finland and Sweden). These go some way towards meeting the objective of promoting optimum use of scarce resources, by relating the amount paid to the amount of scarce resource licensed[17].. Portugal and Italy charge on the basis of link length (Italy for private links only), which also takes some account of this objective but is unlikely to be as effective in promoting use of more abundant higher frequency band for shorter links.

It is noted that there is a strong similarity between the approach taken in France and that taken in Italy for public service fixed links, suggesting a common basis may have been used in both countries.

Where block allocations are available, these are sometimes a legacy from pre-liberalisation and restricted to former monopoly or duopoly providers, in other cases they are available to all licensees subject to spectrum availability.

Table 3.21 shows the number of fixed links in each Member State and, where available, the approximate revenue generated in administrative fees and spectrum fees / charges.

[17] Although many Member States apply spectrum fees that are nominally cost based, it could be argued that Article 11.2 of the Licensing Directive is not relevant, however since the costs are apportioned strictly on the basis of the spectrum resource licensed, and the amounts payable are often comparable to those where administrative pricing is deployed, it is reasonable to assume that the “optimal use” objective is a factor in setting individual fees.

**Table 3.20: Approach to setting fees and charges for fixed links in EU Member States**

| | B | DK | D | EL | E | F | IRL | I | L | NL | A | P | FIN | S | UK | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Administrative Pricing deployed | √ | | | | √ | | | | | | | | | | √ | 3 |
| Administrative Pricing planned | | √ | | | | | √ | | | | | √ | √ | | | 4 |
| Block Allocations available | [1] | | | | | [2] | | | | | | | | | [3] | 3 |
| Parameters used in setting charges: | | | | | | | | | | | | | | | | |
| Frequency Band | √ | | | √ | √ | √ | | √ | √ | √ | √ | | | √ | √ | 10 |
| Amount of Spectrum (Bandwidth) | √ | √ | | √ | √ | √ | √ | √ | √ | √ | √ | √ | | | √ | 12 |
| Hop Length | | | | | | | | √ | | | | √ | | | | 2 |
| Geographic Location | | | | | √ | | | | | | | | | | √ | 2 |
| Market Value of Spectrum | √ | | | | √ | | | | | | | | | | √ | 3 |
| Licensing / authorisation costs | | | √ | | | √ | √ | | | √ | √ | √ | √ | √ | | 8 |
| Frequency Management Costs | | | √ | | | √ | | | √ | √ | √ | √ | √ | √ | | 8 |
| Transmitter Power | | | | | | | | | | | √ | | | | | 1 |
| Geographic congestion | | | | | √ | | | | | | | | | | √ | 2 |
| Frequency Co-ordination | | | √ | | | | | | | | √ | | | | | 2 |

Notes: [1]: There are a number of block allocations to certain operators. This is then self managed, within the block However, BIPT still has the right to assign unused frequencies to other parties. Belgacom has block allocations but BIPT can introduce other operators' links where channels are available. Belgacom pays same fees as other operators.
[2]: Block allocations available to any licensee subject to spectrum availability and payment of fee, which depends on geographic area.
[3]: Block allocations to former incumbent (BT) and former duopoly carrier (Cable and Wireless), progressively being opened to other users.

**Table 3.21: Approximate number of fixed links and revenue generated by administrative fees and spectrum fees / charges in EU Member States (where provided by NRAs)**

| | No. of links | No. of links per 1M population | Approx. annual revenue (€) |
|---|---|---|---|
| B | 5,000 | 490 | 4,200,000 |
| DK | 2,500 | 470 | 1,940,000 |
| D | 40,600 | 495 | Not available |
| E | 17,000 | 435 | Not available |
| IRL | 3,600 | 970 | 3,800,000 |
| I | 3,000 | 53 | Not available |
| NL | 4,500 | 288 | 900,000 |
| A | 11,000 | 1,350 | 8,720,000 |
| P | 2,500 | 252 | 4,830,000 |
| FIN | 7,516 | 1,462 | 1,620,000 |
| UK | 25,647[1] | 442 | 30,323,000 |

[1]: links currently licensed by RA – further links operated by BT and Cable and Wireless in currently self-managed spectrum.

The following sections summarise the method used to determine administrative fees and / or spectrum fees / charges for fixed links in each Member State. Note that unless otherwise stated the spectrum fees / charges apply to both public and private fixed links.

### *3.10.4.3 Belgium*

A new Royal Decree was announced in June 2001, introducing administrative pricing for fixed links, with the objective of improving spectrum efficiency and providing lower fees in some cases to stimulate the development of the market. The BIPT expects this decree to be introduced by the end of 2001. The new spectrum

charges are based on the frequency band and the bandwidth assigned (i.e. lower fees for higher frequencies, higher fees for higher bandwidths). Annual spectrum charges in € are as follows:

| Frequency Band> | < 10 GHz | 10-20 GHz | 20-40 GHz | > 40 GHz |
|---|---|---|---|---|
| **Bandwidth (MHz)** | | | | |
| 1 | 1272 | 763 | 458 | 275 |
| 3.5 | 1332 | 799 | 480 | 288 |
| 7 | 1416 | 850 | 510 | 306 |
| 14 | 1585 | 950 | 570 | 342 |
| 28 | 1920 | 1152 | 691 | 415 |
| 56 | 2592 | 1555 | 933 | 560 |
| 112 | 3936 | 2362 | 1417 | 850 |

*3.10.4.4 Denmark*

Current spectrum charges for fixed links are specified in Executive Order no 1168 of 15 December 2000, on the National Telecom Agency's fees and charges in 2001 (section 3, 39 – 41), and are as follows:

Fixed radio link under 3 GHz, per MHz – DKK 3,263 (€ 437)

Fixed radio link over 3 GHz per 28 MHz – DKK 9,136 (€ 1,225)

Fixed radio link over 3 GHz per 28 MHz, nationwide (block allocation)– DKK 45,680 (€ 6,123)

Smaller or larger bandwidths are scaled pro-rata.

*3.10.4.5 Germany*

Operation of fixed radio links for provision of public telecommunications services require a Class 3 service licence in accordance with paragraph 6 of the Telecommunications Law. There are currently no spectrum fees or charges applied to fixed links, but administrative fees are applied to cover costs associated with frequency assignment and enforcement. There are two fees, namely an initial frequency assignment fee and an annual frequency use contribution. The frequency assignment fee is based on actual cost but is subject to upper and lower limits of €1,534 and €102 respectively, as defined in the Frequency Fee Regulation ordinance (FGebV) of 21st May 1997. The annual frequency use contribution is defined each year in the Frequency Use Contribution Regulation (FbeitrV, current version dated 13th December 2000) as a fixed amount per link. The current fee is € 73.63.

*3.10.4.6 Greece*

Spectrum charges are defined in Decision no. 210/3 of the President of the National Council for Telecommunications and Post Offices, "Regulations on fixing of frequency use charges and radio frequency assignment charges", issued on 1st March 2001. The charges for fixed links are as follows:

The **Annual frequency use charge** is calculated using the formula

RC = S1 x S2 x S3 x RRC x RW/RRW

where:

RC is the amount in € relating to annual radio-frequency use charges.

RRC is the cost of the reference radio-channel, currently €.150

RRW is the bandwidth of the reference radio channel, i.e. 1.75 MHz for frequencies between 2 GHz and 60 GHz.

. RW is the bandwidth of the radio channel used.

Coefficient S1 is given the following values:

| Frequency Band | Value |
|---|---|
| 9 kHz ≤ F ≤ 470 MHz | 2.0 |
| 470 MHz < F ≤ 960 MHz | 1.7 |
| 960 MHz < F ≤ 3000 MHz | 1.4 |
| 3 GHz < F ≤ 10 GHz | 1.1 |
| 10 GHz < F ≤ 17.7 GHz | 0.8 |
| 17.7 GHz < F ≤ 40 GHz | 0.6 |
| 40 GHz < F ≤ 60 GHz | 0.4 |

Coefficient S2 is the number of frequencies assigned to the licensee.

Coefficient S3 relates to the number of allocated radio frequencies in the same operating radio-frequency band (see Table S1), and it is given the following values:

| Number of radio frequencies | Value |
|---|---|
| 1 – 100 | 1 |
| 101 – 300 | 0.9 |
| 301 – 500 | 0.8 |
| 501 – 1000 | 0.7 |
| 1001 – 3000 | 0.6 |
| > 3000 | 0.4 |

In addition, a radio frequency concession charge (once-off payment), currently € 150, applies to each link licensed, to cover the cost of licensing.

*3.10.4.7 Spain*

Administrative pricing is applied to fixed links in Spain, which takes account of whether the link is operated in a congested area as well as the bandwidth, hop length and frequency band used. Different fees also apply to public and private users. Article 75 of the General Telecommunications Act of April1998 requires charges to take account specifically of the following five parameters:

i) degree of use and congestion in specific bands and geographic areas

ii) purpose for which the spectrum is used

iii) frequency band

iv) equipment and technology

v) economic value arising from the spectrum use.

Each of these parameters gives rise to a co-efficient, which is used to determine the charge for specific services and frequency bands. Thus annual spectrum charges in pesetas are determined using the algorithm

$$S \times N \times C_1 \times C_2 \times C_3 \times C_4 \times C_5$$

Where S = link length in km

N = bandwidth in kHz

$C_1$ , etc are coefficients corresponding to the above five parameters.

Currently the charges in € per MHz per km, using the coefficients defined in Article 66 of Law 13/2000, are as follows:

*Uncongested areas:*

| Frequency Band | Public Networks | Private Networks |
|---|---|---|
| 3 - 10 GHz | 14.88 | 5.07 |
| 10 - 24 GHz | 12.30 | 4.19 |
| 24 - 40 GHz | 10.30 | 3.50 |

*Congested areas:*

| **Frequency Band** | **Public Networks** | **Private Networks** |
|---|---|---|
| 3 - 10 GHz | 18.46 | 6.28 |
| 10 - 24 GHz | 15.37 | 5.23 |
| 24 - 40 GHz | 12.16 | 4.14 |

*3.10.4.8 France*

France licenses fixed links on both a block allocation basis and a per-link basis (block allocations are available to all licensees subject to spectrum availability; there are no special rights for the incumbent PTO). For block allocations, the spectrum charge is based on the bandwidth and centre frequency of the link, and on the extent of the geographic area to which the licence relates, relative to the entire metropolitan area of France (i.e. mainland France and Corsica). A fixed management charge also applies to each block allocation licence.

For per link licences, the annual spectrum charges for individual links are based on the frequency band and the bandwidth.

Current levels of fixed link fees and charges, as defined in Articles L.33-1 and L.34-1 of the Code of Telecommunications and Posts, and Article 45 of the Finance Law of 1987, as amended, are as follows:

*Block allocations*

Management fee, per licence: € 533,572 annually

Frequency charge: € 31,709,396 x (Bandwidth/Frequency) x (licence area/metropolitan area).

*Individual Links*

| Bandwidth | Frequency Band | | | |
|---|---|---|---|---|
| | 1 - 10 GHz | 10 - 20 GHz | 20 - 30 GHz | Above 30 GHz |
| Up to 25 kHz | 160 | 640 | 427 | 320 |
| Over 25 kHz, up to 125 kHz | 320 | | | |
| Over 125 kHz, up to 250 kHz | 640 | | | |
| Over 250kHz, up to 500 kHz | 960 | | | |
| Over 500 kHz, up to 1.75 MHz | 1,280 | | | |
| Over 1,75 MHz, up to 3,5 MHz | 1,601 | 960 | 640 | 427 |
| Over 3,5 MHz, up to7 MHz | 2,561 | 1,921 | 1,280 | 854 |
| Over 7 MHz, up to 14 MHz | 3,521 | 2,881 | 1,921 | 1,280 |
| Over 14 MHz , up to 28 MHz | 4,482 | 3,841 | 2,561 | 1,707 |
| Over 28 MHz, up to 56 MHz | 5,442 | 4,802 | 3,201 | 2,134 |
| Over 56 MHz | 6,402 | 5,762 | 3,841 | 2,561 |

For private users, a discount applies to the annual spectrum charge when multiple links are licensed, in accordance with the following table:

| Number of Links | Discount |
|---|---|
| The first 10 | Nil |
| 11th to 40th inclusive | 25% |
| 41st to 80th inclusive | 50% |
| 81st and beyond | 75% |

All the charges shown above relate to bi-directional links; the charge is reduced by 50% for uni-directional links. In addition, an annual frequency management fee of € 30.49 per link, regardless of its characteristics, is levied to cover administration costs.

*3.10.4.9 Ireland*

Fixed link spectrum fees are defined in Statutory Instrument No. 319 of 1992, Wireless Telegraphy (Radio Link Licence) Regulations, as follows:

For each link above 1 GHz:

- € 762 for a bandwidth between 50 kHz and 3.5 MHz
- € 952 for a bandwidth greater than 3.5 MHz.
- For each link below 1 GHz: € 571

All fees payable annually on anniversary of licence issue.

If connection to the PSTN is required, either a Basic Telecommunications Licence (€5,000 per 5 years) or a General Telecommunications Licence (€12,500 per 5 years) is required. The latter applies if provision of public voice telephony services and/or access to numbering resources is involved.

*3.10.4.10 Italy*

Separate fees and charges are defined for public and private networks. Administrative pricing is used for public networks and charges are defined in the decree of 5th February 1998 on telecommunications services using scarce

resources. The charges are based on the bandwidth and frequency band, following a very similar approach to that adopted in France. Current annual spectrum charges in € are as follows. The values shown are for bi-directional links, for unidirectional links the charge is reduced by 50%.

| Bandwidth | Frequency Band | | | |
|---|---|---|---|---|
| | Up to 10 GHz | 10 - 20 GHz | 20 - 30 GHz | Above 30 GHz |
| Up to 25 kHz | 155 | 646 | 439 | 336 |
| Over 25 kHz, up to 125 kHz | 336 | | | |
| Over 125 kHz, up to 250 kHz | 671 | | | |
| Over 250 kHz, up to 500 kHz | 981 | | | |
| Over 500 kHz, up to 1.75 MHz | 1,291 | | | |
| Over 1.75 MHz, up to 3.5 MHz | 1,627 | 981 | 646 | 439 |
| Over 3.5 MHz up to 7 MHz | 2,583 | 1,963 | 1,291 | 878 |
| Over 7 MHz, up to 14 MHz | 3,590 | 2,918 | 1,963 | 1,291 |
| Over 14 MHz, up to 28 MHz | 4,545 | 3,900 | 2,583 | 1,730 |
| Over 28 MHz, up to 56 MHz | 5,527 | 4,881 | 3,099 | 2,169 |
| Over 56 MHz | 6,508 | 5,863 | 3,900 | 2,583 |

As in France, a discount applies where multiple links are licensed, as follows:

| Number of Links | Discount |
|---|---|
| The first 10 | Nil |
| 11th to 40th inclusive | 25% |
| 41st to 80th inclusive | 50% |
| 81st and beyond | 75% |

A different approach is used for private networks, where the spectrum charge is based upon the length of the radio link and whether the link is uni-directional or bi-directional. These charges are defined in the "Determination of Canoni for the Concession of Radio Relay Links for Private Use", issued by the Ministry of Communications on 18th December 1981 and updated on 18th December 1996. The annual charge in € are as follows:

| Unidirectional Links | Link length | Bi-directional Links |
|---|---|---|
| 988 | Less than 1 km | 1,186 |
| 1,527 | Less than 15 km | 1,832 |
| 2,872 | Less than 30 km | 3,443 |
| 5,032 | Less than 60 km | 6,038 |
| 6,290 | Less than 120 km | 7,584 |
| 7,368 | Less than 240 km | 8,841 |
| 8,986 | Over 240 km | 10,784 |

Administrative fees are also applied to fixed links and depend on whether a general authorisation or individual licence is required. These fees are defined in the Decree of 5th February 1998.

For *general authorisations* (generally applicable to private users) the fees are:

Initial fee on licence issue : € 516 for services provided within one Italian Region; € 5,165 for services provided within more than one Italian Region.

Annual fee: € 516

For *individual licences* (required to provide public voice telephony) the fees are:

Initial fee on licence issue: National licence, € 56,810; in a territory of population over 200,000, €25,823; in a territory having population up to 200,000, €15,494.

Annual fee: National licence, € 61,975; in a territory of population over 200,000, € 25,823; in a territory having population up to 200,000, € 10,329.

### *3.10.4.11 Luxembourg*

Fees and charges for fixed links are specified in Grand-Ducal Regulation of the 25th September 1998, Annex 8, and are as follows. Annual charges are payable each year on 1st October.

| Frequency Band (F) | Bandwidth (B) | Charge per link (€) | |
|---|---|---|---|
| | | Initial | Annual |
| F <= 10 GHz | B < 14 MHz | 287 | 1,314 |
| | 14 MHz <= B < 56 MHz | 287 | 1,636 |
| | B >= 56 MHz | 287 | 2,305 |
| 10 GHz < F <= 20GHz | B < 14 MHz | 287 | 669 |
| | 14 MHz <= B < 56 MHz | 287 | 818 |
| | B >= 56 MHz | 287 | 1,165 |
| 20 GHz < F <= 30 GHz | B < 14 MHz | 182 | 397 |
| | 14 MHz <= B < 56 MHz | 182 | 496 |
| | B >= 56 MHz | 182 | 694 |
| F > 30 GHz | B < 14 MHz | 99 | 273 |
| | 14 MHz <= B < 56 MHz | 99 | 322 |
| | B >= 56 MHz | 99 | 471 |

### *3.10.4.12 Netherlands*

Spectrum fees for fixed links are specified in the RDR Charges Order 2001 and are as follows (in € per annum):

| Bandwidth | Frequency Band | | | |
|---|---|---|---|---|
| | < 12 GHz | 12 – 24.5 GHz | 24.5 – 39.5 GHz | > 39.5 GHz |
| < 10 MHz | 285 | 142 | 100 | 57 |
| 10 MHz – 25 MHz | 355 | 171 | 128 | 64 |
| 25 MHz – 50 MHz | 427 | 199 | 156 | 71 |
| 50 MHz – 150 MHz | 498 | 227 | 185 | 79 |
| > 150 MHz | - | 256 | 213 | 85 |

A once-off administration fee of € 523 is also applied to each link.

### *3.10.4.13 Austria*

Spectrum fees for fixed links are specified in the Telecommunication Fee Ordinance, Federal Law Gazette II No. 29/1998 as amended in Federal Law Gazette II No. 110/2001. An annual frequency utilisation fee is defined as a function of the transmitter EIRP and the bandwidth. Bandwidth is expressed in terms of "channel units", where a channel unit is defined as:

- 250 kHz in bands 960 – 2,690 MHz;

- 500 kHz in bands 2690 – 9,800 MHz;
- 750 kHz in bands 9800 – 15,350 MHz;
- 1 MHz, in bands 15,350 - 43,500 MHz and
- 10 MHz above 43500 MHz.

The annual fee in € per channel unit is currently as follows:

| Transmitter EIRP (W) | Bi-directional links | Unidirectional Links |
|---|---|---|
| Up to 1W | 44 | 26 |
| 1 – 6 W | 96 | 52 |
| 6 –25 W | 131 | 70 |
| 25 – 150 W | 270 | 140 |
| 150W – 1 kW | Not applicable | 270 |
| Over 1 kW | Not applicable | 532 |

A once-off frequency assignment fee also applies to each link as follows:

- with frequency co-ordination: € 196 per hop
- without frequency co-ordination: € 98 per hop

A once-off administrative fee of €5,087 applies where a public telecommunications service or leased line service is being provided.

*3.10.4.14 Portugal*

Spectrum fees and administrative fees for fixed links are specified in Ministerial Order no. 667-A/2001 of 2nd July 2001, and are as follows:

- *Once-off charges:* Licensing administrative fee, for single voice or data channel fixed links: € 10 per transmitter.
- Licensing administrative fee for microwave links: € 10 per transmitter.

*Recurring charges: payable every six months*

- Operating charge for unidirectional, single voice channel links:
  - Private systems: € 8 x $N_k$ ($N_k$ = length of link in km);
  - Public systems: € 3 x $N_k$
- Operating charge for bi-directional, single voice channel links:
  - Private systems: € 2 x (1 + 4$N_k$);
  - Public systems: € 1 x (1 + 4$N_k$).
- Operating charge for unidirectional microwave links:
  - Private systems: € 4 x $N_k$ x $N_m$ ($N_m$ = link bandwidth in MHz);
  - Public systems: € 1 x $N_k$ x $N_m$
- Operating charge for bi-directional microwave links:

- Private systems: € 8. x $N_k$ x $N_m$
- Public systems: € 3 x $N_k$ x $N_m$

Note: Minimum value of $N_k$ is 10 km.

*3.10.4.15 Finland*

Fees and charges for fixed links are specified in section 6 of Decision no. 1155/1998, as amended on 28th December 2000, of the Ministry of Transport and Communications on the Fees of the Telecommunications Administration Centre. The right to possess and use a fixed link radio transmitter is subject to an annual administrative fee of € 108 per transmitter. There is currently no spectrum charge for fixed links, although the NRA is considering the introduction of spectrum charges in the near future.

*3.10.4.16 Sweden*

Annual administrative fees for fixed links are defined in the Regulations of the National Post and Telecom Agency, references PTSFS 2000:12 and PTSFS 2000:13, as follows. There are currently no spectrum fees or charges.

| Frequency Band | Annual Administrative Fee |
|---|---|
| 3 - 10 GHz | € 87.15 per transmitter |
| Above 10 GHz | € 54.47 per transmitter |

*3.10.4.17 United Kingdom*

Current spectrum charges for fixed links are defined in S.I 2265 of 2001, the Wireless Telegraphy (Licence Charges) (Amendment) Regulations. An administrative pricing regime is in force, which bases fees upon the frequency band, bandwidth, efficiency of the link and whether the links are operating in a congested or uncongested area. The charges are as follows:

***Congested Areas***

| Frequency band | Limits of bandwidth per fixed link | Minimum data bit rate | Charge € |
|---|---|---|---|
| 3.600-4.200 GHz | Not more than 15 MHz | 51 Mbit/s | 1,410 |
| | More than 15 MHz but not more than 30 MHz | 51 Mbit/s<br>140 Mbit/s | 2,820<br>1,823 |
| | More than 30 MHz but not more than 90 MHz | 140 Mbit/s | 5,470 |
| 5.925-6.425 GHz | Not more than 15 MHz | 51 Mbit/s | 1,410 |
| | More than 15 MHz but not more than 30 MHz | 51 Mbit/s<br>140 Mbit/s | 2,820<br>1,823 |
| | More than 30 MHz but not more than 90 MHz | 140 Mbit/s | 5,470 |
| 7.425-7.900 GHz | Not more than 3.5 MHz | 8 Mbit/s | 681 |
| | More than 3.5 MHz but not more than 7 MHz | 8 Mbit/s<br>16 Mbit/s | 1,361<br>916 |
| | More than 7 MHz but not more than 14 MHz | 16 Mbits/s<br>34 Mbit/s | 1,831<br>1,410 |
| | More than 14 MHz but not more than 28 MHz | 34 Mbit/s<br>140 Mbit/s | 2,820<br>1,823 |
| | More than 28 MHz but not more than 56 MHz | 140 Mbit/s | 3,647 |
| 12.750-13.250 GHz<br>14.250-14.500 GHz | Not more than 1.75 MHz | 2 Mbit/s | 454 |
| | More than 1.75 MHz but not more than 3.5 MHz | 4 Mbit/s<br>8 Mbit/s | 908<br>681 |
| | More than 3.5 MHz but not more than 7 MHz | 8 Mbit/s<br>16 Mbit/s | 1,361<br>916 |
| | More than 7 MHz but not more than 14 MHz | 16 Mbit/s<br>34 Mbit/s | 1,831<br>1,410 |
| | More than 14 MHz but not more than 28 MHz | 34 Mbit/s<br>140 Mbit/s | 2,820<br>1,823 |
| | More than 28 MHz but not more than 56 MHz | 140 Mbit/s | 3,647 |
| All bands specified above | Any bandwidth in relation to an analogue link | Not applicable | 1,823 |

***Non-Congested Areas***

| Frequency band | Limits of bandwidth per fixed link | Charge € |
|---|---|---|
| 1.350-1.690 GHz | Not more than 500 kHz | 421 |
| | More than 500 kHz but not more than 1 MHz | 616 |
| | More than 1 MHz but not more than 2 MHz | 810 |
| 1.700-1.900 GHz | More than 50 kHz | 616 |
| 3.600-4.200 GHz | Not more than 15 MHz | 908 |
| | More than 15 MHz but not more than 30 MHz | 1,175 |
| | More than 30 MHz but not more than 90 MHz | 3,525 |
| 5.925-6.425 GHz | Not more than 15 MHz | 908 |
| | More than 15 MHz but not more than 30 MHz | 1,175 |
| | More than 30 MHz but not more than 90 MHz | 3,525 |
| 6.425-7.125 GHz | Not more than 20 MHz | 1,037 |
| | More than 20 MHz but not more than 40 MHz | 1,337 |
| 7.425-7.900 GHz<br>12.750-13.250 GHz and<br>14.250-14.500 GHz | Not more than 3.5 MHz | 438 |
| | More than 3.5 MHz but not more than 7 MHz | 592 |
| | More than 7 MHz but not more than 14 MHz | 908 |
| | More than 14 MHz but not more than 28 MHz | 1,175 |
| | More than 28 MHz but not more than 56 MHz | 1,767 |
| 17.300-17.700 GHz | Not more than 14 MHz | 1,167 |
| | More than 14 MHz but not more than 100 MHz | 1,499 |
| | More than 100 MHz but not more than 200 M Hz | 1,669 |
| | More than 200 MHz but not more than 300 MHz | 1,872 |
| | More than 300 MHz | 2,075 |
| 21.200-23.600 GHz<br>24.500-26.500 GHz and<br>27.500-29.500 GHz | Not more than 3.5 MHz | 389 |
| | More than 3.5 MHz but not more 7 MHz | 519 |
| | More than 7 MHz but not more than 14 MHz | 794 |
| | More than 14 MHz but not more than 28 MHz | 1,029 |
| | More than 28 MHz but not more than 56 MHz | 1,548 |
| 31.000-31.800 GHz | Not more than 56 MHz | 1,167 |

| Frequency band | Limits of bandwidth per fixed link | Charge € |
|---|---|---|
| | More than 56 MHz but not more than 140 MHz | 1,434 |
| | More than 140 MHz but not more than 250 MHz | 1,669 |
| | More than 250 MHz but not more than 280 MHz | 1,872 |
| 37.000-39.500 GHz | Not more than 3.5 MHz | 308 |
| | More than 3.5 MHz but not more than 7 MHz | 405 |
| | More than 7 MHz but not more than 14 MHz | 632 |
| | More than 14 MHz but not more than 28 MHz | 810 |
| | More than 28 MHz but not more than 56 MHz | 1,216 |
| 48.500-50.200 GHz | Not more than 28 MHz | 357 |
| 51.400-52.660 GHz | Not more than 56 MHz | 357 |
| 55.780-57.000 GHz | Not more than 56 MHz | 357 |

### 3.10.5 Satellite Earth Stations

#### *3.10.5.1 Background and Context*

There are two principal types of satellite earth station considered by this report, namely VSATs (Very Small Aperture Terminals) and larger earth stations used for applications such as uplink feeds to broadcast satellites or for intercontinental telephony or data traffic. Transportable earth stations, such as those used for satellite news gathering, and mobile satellite services, do not fall within the scope of this study.

VSAT networks generally consist of a hub terminal through which a number of smaller terminals (the VSATs) communicate, although these smaller terminals may sometimes be receive-only. It is also possible to implement mesh networks whereby the VSAT terminals communicate with each other without the support of a hub terminal. It is possible to co-ordinate VSATs and therefore they can use bands shared by terrestrial fixed services, but the preference is for unshared bands which allow for greater flexibility and avoid the need for co-ordination of individual terminals. This enables a more light-handed licensing regime to be applied.

Larger earth stations are co-ordinated both with each other and with terrestrial fixed services, with which they usually share spectrum. Often several stations, which may be communicating with several satellites, operate from a single location, known as a Teleport.

Satellite operators charge on the basis of transponder usage (bandwidth, power and time).These costs are high and to some extent prevent congestion being more than it might otherwise be. Hence it can be argued that a form of administrative pricing is already deployed by the satellite operator. In this case the scarce resource becomes the transponder capacity, which is a function of spectrum and the availability of orbital slots, rather than spectrum alone.

For a given frequency allocation to a satellite service (for example the 250 MHz of exclusive spectrum at 14.00 - 14.25 GHz) the total amount of bandwidth actually available is determined by the number of satellites in orbit carrying transponders

operating across the frequency allocation, the geographic coverage of those satellites and the performance of the antennas on the ground.

There is a potential conflict between efficient utilisation of the orbit / spectrum resource and commercial imperatives of the market place. There is nearly always a desire to use the smallest and cheapest ground terminals, particularly when mass markets are concerned. It might be argued that small terminals can best be achieved by using the highest frequencies, for example Ka-band, whereby directivity would not be sacrificed. However, propagation degradations become significant and the technology is not mature enough to allow for commodity pricing. It is therefore generally the case that the providers of systems based on small cheap terminals target the lower frequency bands where congestion is at its worst.

*3.10.5.2 Fees and Charges Overview*

Only Spain currently applies administrative pricing to satellite earth stations, although the UK plans to introduce this in October 2001 (see section 3.11.1.15 for details). Some Member States do take account of bandwidth or frequency band, and all include the number of transmitters as a parameter. As noted above, administrative pricing of spectrum may be considered less important than in the case of fixed links as finite satellite capacity also leads to a form of congestion charging. Table 3.22 summarises the main parameters used by each Member State to determine spectrum fees / charges for satellite earth stations and indicates whether separate provision is made for VSAT systems.

**Table 3.22: Approach to setting fees and charges for Satellite Earth Stations in EU Member States**

| | B | DK | D | EL | E | F | IRL | I | L | NL | A | P | FIN | S | UK | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Transmitters | √ | √ | √ | √ | √ | √ | √ | √ | [1] | √ | √ | √ | √ | √ | [2] | 14 |
| Frequency Band | | | | √ | √ | | √ | | | √ | | √ | | √ | | 6 |
| Amount of Spectrum (Bandwidth) | √ | [1] | | √ | √ | | [1] | √ | | √ | | √ | | | [1] | 6 |
| Licensing / authorisation costs | √ | √ | √ | | | | | √ | | √ | √ | √ | √ | √ | | 8 |
| Frequency Management Costs | √ | √ | √ | | | | | | | √ | √ | √ | √ | √ | | 8 |
| Transmitter EIRP | | | | | | | [1] | | | | | | | | | 1 |
| Transmitter Power | | | | | | | | | | | √ | | | | | 1 |
| No of satellites accessed | | | | | √ | | √ | | | | | | | | | 2 |
| Antenna type | | | | | | | | | | | | | | √ | | 1 |
| Frequency Co-ordination | √ | [1] | | | | | | √ | | | √ | | √ | | | 4 |
| Special provision for VSATs | [4] | √ | | | | √ | [3] | √ | | | | √ | | | √ | 5 |

Notes: [1]: Excluding VSATs operating in exclusive band.
[2]: VSATs only
[3]: When in exclusive VSAT frequency band
[4]: Licence exemption for VSATs operating in exclusive 14 - 14.25 GHz band planned

**Table 3.23: Number of satellite earth stations and revenue generated by administrative fees and spectrum fees / charges (where provided by NRA)**

| | No. of VSATs | | No. of other permanent earth stations | Approx. annual revenue (€) | |
|---|---|---|---|---|---|
| | Hubs | Terminals | | VSATs | Others |
| DK | 0 | 168 | 25 | 4,200 | 17,500 |
| E | 25 | 25,000 | 200 | Not available | Not available |
| F | Not available | Not available | 55 | Not available | 137,000 |
| IRL | 1 | 117 | 27 | 9,520 | 16,507 |
| NL | 50 | 600 | 35 | 26,000 | 5,200 |
| A | 1 | 500 | 10 | 160,000 | 31,300 |
| P | 1 | 47 | 22 | 5,000 | 466,000 |
| FIN | 0 | 20 | 15 | 135 | 1,680 |
| UK | Not available | Not available | 399 | 445,000 | 4,200,000 |

The following sections summarise the method used to determine administrative fees and / or spectrum fees / charges for permanent satellite earth stations in each Member State.

*3.10.5.3 Belgium*

Fees and charges are specified in Articles 12 - 14 of the Royal Decree of 16th April 1998, relating to satellite earth stations, as follows:

Any request for authorisation requires payment of a royalty to cover the cost of dealing with the request. This royalty is a once-off payment on delivery of the authorisation of € 744.

If the authorisation is for a subject to frequency co-ordination with terrestrial radiocommunication systems, an additional once-off royalty of € 992 is payable to cover the co-ordination costs.

Receive only earth stations require a declaration to the BIPT, which must be carried out at the latest four weeks before the station is brought into service, and payment of a once-off royalty of € 124.

All earth stations are currently subject to an annual royalty, which is dependent on the number of licensed channels and their bandwidth, as follows:

- € 50 per channel for bandwidth $\leq$ 0.2 MHz;
- € 496 per channel for bandwidth > 0.2 MHz and $\leq$ 2 MHz;
- € 2,231 per channel for bandwidth > 2 MHz $\leq$ 18 MHz;
- € 4,462 per channel for bandwidth > 18 MHz.

These amounts were defined in the Decree and are increased each year in line with the Belgian consumer price index. For 2001, this means the amounts are increased by a factor of 6.77%.

*3.10.5.4 Denmark*

Spectrum fees for permanent satellite earth stations are defined in Executive Order no 1168 of 15 December 2000 on the National Telecom Agency's fees and charges in 2001 (section 3, 52 – 55), as follows:

- VSAT terminals: € 22 per station plus € 24 usage fee per licence.
- Others: frequency bands over 3 GHz: €1,225 per 28 MHz per station plus € 24 usage fee per licence; frequency bands under 3 GHz: € 437 per 28 MHz plus €24 usage fee per licence.

*3.10.5.5 Germany*

Operation of satellite earth stations for provision of public telecommunications services require a Class 2 service licence in accordance with paragraph 6 of the Telecommunications Law. There are currently no spectrum fees or charges applied to earth stations, but administrative charges are applied to cover costs associated with frequency assignment and enforcement. There are two fees, namely an initial frequency assignment fee and an annual frequency use contribution. The frequency assignment fee is currently €36.81, as defined in the Frequency Fee Regulation ordinance (FGebV) of 21st May 1997. The annual frequency use contribution is based on cost but set between € 61.36 and € 76.69, as defined in the Frequency Use Contribution Regulation (FbeitrV, 13th December 2000).

*3.10.5.6 Greece*

Spectrum charges are defined in Decision no. 210/3 of the President of the National Council for Telecommunications and Post Offices, "Regulations on fixing of frequency use charges and radio frequency assignment charges", issued on 1st March 2001. The charges for satellite earth stations are as follows.

An annual charge is payable in accordance with the following table:

| Bandwidth (RW) | Charge per station (€ per annum) |
|---|---|
| ≤ 0.2 MHz | 250 |
| 0.2 MHz < RW ≤ 1 MHz | 700 |
| 1 MHz < RW ≤ 2 MHz | 1,000 |
| 2 MHz < RW ≤ 5 MHz | 2,000 |
| 5 MHz < RW ≤ 9 MHz | 2,500 |
| 9 MHz < RW ≤ 18 MHz | 4,500 |
| 18 MHz < RW ≤ 36 MHz | 6,000 |
| 36 MHz < RW ≤ 72 MHz | 10,000 |
| RW > 72 MHz | 18,000 |

These charges apply to stations that transmit in the frequency band 14,00 - 14,50 GHz. Charges are multiplied by 1.5 for stations that transmit in frequency bands 3600 - 4200 MHz and 5725 - 7075 MHz and by 0.7 for stations that transmit in other permissible frequency bands.

*3.10.5.7 Spain*

Administrative pricing is applied to satellite earth stations in Spain, in a similar manner to fixed links (see section 3.10.4.7 for details). In determining the charge, it is assumed that the coverage area is the entire Spanish territory, i.e. 505,990 $km^2$ .

Currently the charges in € per MHz, using the co-efficients defined in Article 66 of Law 13/2000, are as follows:

| Frequency Band | Public Networks | Private Networks |
|---|---|---|
| Less than 3 GHz | 1,365 | 1,092 |
| 3 - 10 GHz | 1,260 | 1,008 |
| 10 - 15 GHz | 1,065 | 889 |
| Over 15 GHz | 981 | 785 |

*3.10.5.8 France*

Fees for satellite earth stations are defined in the Decree of December 27th, 1996 on taxes relating to authorisations for independent networks and in Article 45 of the Finance Law for 1987, as modified. Current management fees are as follows:

- VSAT category 1 (up to 5 stations): € 457 for unidirectional networks, € 457 plus € 76 per station for bi-directional networks.
- VSAT category 1 (more than 5 stations): € 1,525 for unidirectional networks, € 1,525 plus € 76 per station for bi-directional networks.

For public satellite networks a once-off filing fee of € 38,112 and an annual management fee of € 19,056 apply.

*3.10.5.9 Italy*

Fees and charges for satellite earth stations are defined in Decree 28 of March 1997 (Official Gazette no. 93 of the 27th April 1997), "Determination of the contributions and the canoni for services via satellite" (as amended). The fees and charges are as follows:

- An initial contribution (administrative fee) of € 516 to cover the costs associated with the preliminary investigation of the network licence application, where no frequency co-ordination is involved. If co-ordination is required, the initial contribution is increased to € 2,066.
- An initial contribution of € 516 to cover costs associated with the issuing of the service licence
- An annual contribution to cover costs associated with control and verification of the licences, as follows:
  - For a VSAT network with up to 10 stations: € 2,066
  - For a VSAT network with 11 - 100 stations: € 5,165
  - For a VSAT network with over 100 stations: € 10,330

- An annual canone (spectrum charge), as follows:
  - For bandwidth less than 100 kHz: € 1,033 per licensed system
  - For bandwidth 100 kHz but less than 1 MHz: € 5,165 per licensed system
  - For bandwidth 1 MHz but less than 10 MHz: € 10,329 per licensed system
  - For bandwidth 10 MHz or above: € 20,658 per licensed system
  - For each VSAT terminal (fixed and mobile): € 103

*3.10.5.10 Ireland*

Fees and charges for satellite earth stations are defined in two statutory instruments, namely S.I. 18 of 2001, which relates to teleport installations with three or more earth stations, and S.I. 261 of 2000, which relates to other types of permanent satellite earth station, including VSATs.

For teleport facilities, the following fees and charges apply:

**Co-ordination fees**

An initial, non-refundable co-ordination fee of € 100,000 (£78,756.40) is payable on application for a licence. For each additional earth station which it is desired to add to the teleport facility subsequent to the initial grant of the licence, a further fee of €2,000 is payable on application. For each additional space station to which it is desired for one or more of the earth stations, comprising the teleport facility, to communicate with, a further co-ordination fee of €2,000 is payable, in respect of each earth station, on application.

**Operation Fees**

An initial operation fee, calculated on the basis of each individual earth station comprising the teleport, is payable on the issue of the licence. An annual operation fee is payable on the first and subsequent anniversary of licence issue. The amounts payable depends on the bandwidth of the radio spectrum used by each of the earth stations and is set out in the following table:

| Bandwidth of Radio Spectrum Used | Initial Fee € | Annual Fee € |
|---|---|---|
| Less than 500kHz | 50,000 | 10,000 |
| 500kHz to <2MHz | 62,500 | 12,500 |
| 2MHz to <11MHz | 75,000 | 15,000 |
| 11MHz to <40MHz | 100,000 | 20,000 |
| 40MHz to 80MHz | 125,000 | 25,000 |

Annual fees for VSATs operating to a single satellite in the 12.5-12.75 GHz and 14.0-14.25 GHz bands are €100 per earth station for up to ten, and €25 per earth station above ten. Fees for other satellite earth stations depend on the frequency band and bandwidth and are as follows:

| **Frequency Band 3 - 10 GHz** | | | | |
|---|---|---|---|---|
| | EIRP (dBW) | | | |
| Bandwidth | < 50 | 50 - 75 | > 75 | Receiving stations |
| < 500 kHz | 1000 | 1250 | 1500 | 1500 |
| 500 kHz - <2 MHz | 1250 | 1500 | 1750 | 1750 |
| 2 MHz - <11 MHz | 1500 | 1750 | 2000 | 2000 |
| 11 MHz - <40 MHz | 1750 | 2000 | 2250 | 2250 |
| 40 MHz - 80 MHz | 2000 | 2250 | 2500 | 2500 |

| **Frequency Band 10 - 15 GHz** | | | | |
|---|---|---|---|---|
| | EIRP (dBW) | | | |
| Bandwidth | < 50 | 50 - 75 | > 75 | Receiving stations |
| < 500 kHz | 500 | 750 | 1000 | 1000 |
| 500 kHz - <2 MHz | 750 | 1000 | 1250 | 1250 |
| 2 MHz - <11 MHz | 1000 | 1250 | 1500 | 1500 |
| 11 MHz - <40 MHz | 1250 | 1500 | 1750 | 1750 |
| 40 MHz - 80 MHz | 1500 | 1750 | 2000 | 2000 |

| **Frequency Band above 15 GHz** | | | | |
|---|---|---|---|---|
| | EIRP (dBW) | | | |
| Bandwidth | < 50 | 50 - 75 | > 75 | Receiving stations |
| < 500 kHz | 125 | 250 | 500 | 500 |
| 500 kHz - <2 MHz | 250 | 500 | 750 | 750 |
| 2 MHz - <11 MHz | 500 | 750 | 1000 | 1000 |
| 11 MHz - <40 MHz | 750 | 1000 | 1250 | 1250 |
| 40 MHz - 80 MHz | 1000 | 1250 | 1500 | 1500 |

#### *3.10.5.11 Luxembourg*

Administrative fees for satellite earth stations are specified in Grand-Ducal Regulation of the 25th September 1998, Annex 8, and are as follows:

VSATs: An initial payment of € 6,445 per licence and an annual payment of € 2,975, regardless of the number of stations.

Other types of permanent earth station: An initial payment of € 24,789 per licence and an annual payment of € 12,395 per transmitter.

Annual payments are due on the month which follows the anniversary of the declaration to the NRA (ILR).

#### *3.10.5.12 Netherlands*

Fees and charges for satellite earth stations are defined in the annual RDR Charges Order (2001 version ref. RDR/619446.J Z), and are as follows for all types of transmitting permanent earth station:

Once-off administration charge: € 512 per licence

| | |
|---|---|
| Annual charge for monitoring: | € 17.70 per transmitter for bandwidth < 2 MHz |
| | € 88.94 per transmitter for bandwidth 2 MHz - 18 MHz |
| | € 444.70 per transmitter for bandwidth above 18 MHz |

Once-off charge for international frequency co-ordination (where required):

€ 888.05 per station

*3.10.5.13 Austria*

Fees and charges are defined in the Telecommunication Fee Ordinance and are as follows, for all permanent satellite earth stations:

**Administrative fee (one-off):** €98.11 without frequency co-ordination, €1,962.17 with frequency co-ordination

**Spectrum Fee (annual):**

Transmitter Power < 1 watt, €174.41 per transmitter

Transmitter Power 1 – 6 watts, €436.04 per transmitter

Transmitter Power 6 – 30 watts, €610.45 per transmitter

Transmitter Power 30 – 150 watts, €1,308.11 per transmitter

Transmitter Power 150 – 1000 watts, €3,924.33 per transmitter

Transmitter Power > 1000 watts, €7,848.67 per transmitter

*3.10.5.14 Portugal*

Spectrum fees and administrative fees for satellite earth stations are specified in Ministerial Order no.667-A/2001 of 2nd July 2001, and are as follows:

**One -off Administrative charge:**

For all earth stations: €10 per transmitter

**Recurring Operating charges (payable every six months):**

Permanent satellite earth station, not involving image transmission, with bandwidth up to 3 MHz:

Private systems: €4,537 per MHz

Public systems: €2,763 per MHz .

Permanent satellite earth station with shared TDMA carrier, not involving image transmission, with bandwidth up to 3 MHz:

Private systems: €203 per MHz

Public systems: €123 per MHz

Permanent satellite earth station with typical bandwidth 6 - 36 MHz and other applications involving image transmission:

Private systems: €2,268 per MHz

Public systems: €1,381 per MHz

**VSATs (terminals and hub stations):**

Bandwidth < 200 kHz:

Private systems: € 50 per station

Public systems: € 30 per station

Bandwidth 200 kHz - 2 MHz:

Private Systems: €127 per station

Public Systems: €77 per station

Bandwidth 2 MHz - 18 MHz:

Private Systems: € 1,271 per station

Public Systems: € 775 per station

Bandwidth > 18 MHz:

Private systems: € 7,631 per station

Public systems: € 4,649 per station

*3.10.5.15 Finland*

Fees for satellite earth stations are specified in section 6 of Decision no. 1155/1998, as amended on 14th February 2001, of the Ministry of Transport and Communications on the Fees of the Telecommunications Administration Centre. The right to possess and use a fixed satellite earth station transmitter that does not require frequency co-ordination is subject to an annual administrative fee of € 72 per transmitter. Where frequency co-ordination is required, the fee is increased to € 178. There is currently no spectrum charge for satellite earth stations.

*3.10.5.16 Sweden*

Defined in the Regulations of the National Post and Telecom Agency, references PTSFS 2000:12 and PTSFS 2000:13, as follows.

Large earth stations in the 10 - 19 GHz bands: € 544.70 per transmitter

Other earth stations in the 10 - 19 GHz bands: € 326.80 per transmitter

Earth stations in other bands: € 1,634 per transmitter

*3.10.5.17 United Kingdom*

Current fees and charges for satellite earth stations are defined in S.I. 1774 of 1999,and are as follows:

**Permanent Earth Stations:**

Class I (less than 100 kHz aggregated bandwidth).: € 1,620 per annum

Class II ( bandwidth between 100KHz and 2MHz): € 8,100 per annum

Class III (bandwidth greater than 2MHz): € 16,200 per annum

Note that a new approach is to be introduced from October 2001, see section 3.11.1.15 for details. Under the new approach, all Permanent Earth Stations on a site will be included in a single fee calculation for that site (defined as the area within a circle or a radius of 500 metres centred on a point defined by the licensee).

**VSATs:**

1-20 terminals: € 3,240

21-100 terminals: € 9,720

101-300 terminals: € 19,440

301-500 terminals, € 32,400

501-1000 terminals, € 64,800

Transportable Earth Stations: € 13,770

Mobile Satellite Earth Stations and receive only stations are licence exempt.

## 3.11 Planned future developments for licence fees and charges for radiocommunication services in Member States

A number of Member States are undertaking, or planning to undertake, changes to their licensing and fee regimes for telecommunications services using spectrum. This is partly to improve compliance with EU legislation such as the Licensing Directive, but also in some cases to provide greater incentives to use scarce spectrum resources in an efficient manner. Typically this involves charging fees which reflect the amount of spectrum resource being used, in terms of the amount of bandwidth, the geographic area, or both. The situation in individual Member States is addressed in the following sections.

*3.11.1.1 Belgium*

Belgium has recently published details of a new approach to setting spectrum charges for fixed links, due to take effect in January 2002. As a result the average charge will fall by approximately 50 %. Modifications to WLL charges are planned to bring these back into line with the fixed link charges.

Belgium is also planning changes to the satellite licensing regime which will remove the need for individual authorisations for VSAT stations, except where frequency co-ordination is involved.

*3.11.1.2 Denmark*

No changes planned currently.

*3.11.1.3 Germany*

The Government is currently reviewing regulations but no immediate changes are planned.

*3.11.1.4 Greece*

No plans for immediate changes have been notified.

*3.11.1.5 Spain*

The draft Budget Law for 2002 foresees an average reduction of 65% of the spectrum charges for GSM and 3G mobile services. It also foresees an average reduction of 92% of the spectrum charges for WLL networks.

*3.11.1.6 France*

The French regulatory bodies are working together to simplify existing fees and charges and to base them on sound technical and economic principles. In particular, it is planned over the next 2 - 3 years to establish a general base fee for all spectrum users, both public and private, to promote efficient spectrum use.

A new Decree is planned (by end of 2001) which will apply spectrum charging to satellite earth stations, based on the number of stations, frequency band and bandwidth used.

The matter of spectrum trading is under scrutiny but no political decision has yet been taken on how this might be approached.

*3.11.1.7 Italy*

The Ministry of Communications is planning to revise charges for both public and private networks, to bring these more into line with one another. This is expected to lead to reductions in charges for private networks and the introduction of bandwidth based spectrum charges for public mobile network operators which, like other licensed telecommunications operators, are currently subject to an annual levy on turnover, but do not pay any separate spectrum fee or charge.

*3.11.1.8 Ireland*

A review of wireless telegraphy legislation, which may include a review of spectrum fees and charges, is planned in the near future.

*3.11.1.9 Luxembourg*

No plans for immediate changes have been notified.

*3.11.1.10 Netherlands*

An expected change in the Telecommunications Act will allow for administrative pricing where the licence fee alone does not reflect the value of the spectrum. This administrative fee will only apply to licences issued after the change in the law is adopted. This fee will be a percentage of profit or turnover and will be in addition to existing cost based fees. The justification for introducing the new fee is enhancement of spectrum efficiency.

*3.11.1.11 Austria*

No changes planned at present.

*3.11.1.12 Portugal*

All policies related to the spectrum licensing are in the process of being reviewed. It is expected that the revision will be completed by the end of summer 2001. All new regulations and fees will be made available at the ICP web site and via the OJEC. Revisions will be made to the setting of frequency charges, to increase the efficiency of spectrum usage while ensuring that the market value of the spectrum is achieved. ICP has been conducting studies and examining the policies adopted by other Member States in this regard. The revisions will be introduced on a phased basis and will involve changing from "per station" charging to "per MHz". One of the primary revisions will be the introduction of the location based charges, reflecting local levels of spectrum congestion.

A cost allocation process is being developed which will allow more precise allocation of costs to specific services.

*3.11.1.13 Finland*

Finland is planning to introduce spectrum charges for fixed links in the near future.

*3.11.1.14 Sweden*

No changes currently planned.

*3.11.1.15 United Kingdom*

The introduction of administrative pricing, covering Permanent Earth Stations and Transportable Earth stations, was implemented during 2001, in October and July respectively. This will be further reviewed after the first year of implementation. The approach adopted, as detailed in S.I. 2265 of 2001, is as follows::

The annual spectrum charge will be determined by using the following algorithm:

$$\sqrt{}\ (433.4 \times \sum_{ijk}(P_{ijk} \times BW_{ijk} \times MOD_{ijk})$$

where "i" means the number of Earth Station terminals on a site;

"j" means the number of satellites;

"k" means the number of transmission paths;

"$BW_{ijk}$" means Transmit Authorised bandwidth (in MHz);

"$MOD_{ijk}$" means modifier value as specified in the table set out below, and

"$P_{ijk}$" means Transmit Peak power (in Watts).

The modifier value for permanent earth stations is defined as follows:

| Frequency Band (MHz) | Exclusivity | Modifier Value |
|---|---|---|
| 5850-5925 | Shared | 1 |
| 5925-6425 | Shared | 1 |
| 6425-7075 | Shared | 1 |
| 12500-12750 | No Fixed Links | 0.5 |
| 12750-13250 | Shared | 1 |
| 13750-14000 | No Fixed Links | 0.5 |
| 14000-14250 | No Fixed Links | 0.5 |
| 14250-14500 | Shared | 1 |
| 17300-17700 | No Fixed Links | 0.5 |
| 17700-18100 | Shared | 1 |
| 18100-18400 | Shared | 1 |
| 27500-29500 | Shared | 1 |
| 29500-30000 | No Fixed Links | 0.5 |

The modifier value for transportable stations is defined as follows:

| Frequency Band (MHz) | Exclusivity | Modifier Value |
|---|---|---|
| 14000-14250 | No Fixed links | 0.5 |
| 14250-14500 | Shared | 1 |

# 4 CASE STUDIES

## 4.1 Introduction

The purpose of the case studies is to enable the level of fees and charges applied in each Member State to be compared objectively, by applying them to a series of standard "reference networks" for each of the five telecommunication services covered by the Study. Each reference network is defined in sufficient detail to permit a realistic comparison of the total annual payment of fees and charges that would apply in each Member State. These are expressed on a per subscriber basis in the case of GSM, 3G mobile and WLL services, and on a per system basis in the case of fixed links and satellite earth stations.

To determine an effective total annual cost, initial one-off payments have been amortised over the duration of the licence in the case of GSM, 3G mobile and WLL services, and over a 10-year period in the case of fixed link and satellite earth station services (the latter being typical of the equipment replacement cycle applicable to such systems). A finance charge of 5% per annum and an inflation rate of 3% per annum have been assumed when amortising the initial payments. It has also been assumed in the initial comparisons that all initial payments are due on licence issue and that any annual fees are paid in full throughout. The effect of special payment arrangements applied by certain Member States, such as deferred payments or escalating annual fees are addressed separately in section 3.6.

Results are presented graphically in this Section, for ease of comparison. Tabular results, indicating the levels of individual fees and charges under each national licensing regime, are presented in Annex E.

## 4.2 GSM

### 4.2.1 Reference Network

A reference GSM network can be defined in terms of the infrastructure deployed (mobile switches, base station controllers and base station transceivers) and a quantity of spectrum, which may include parts of the GSM 900[18] and/or GSM 1800[19] bands. In most Member States, the sum paid in spectrum fees or charges by GSM operators is based on the amount of spectrum assigned to the licensee rather than the amount of physical network infrastructure, however two Member States ( Portugal and Sweden) include the number of base stations and/or subscriber terminals in the fee calculation.

18 880 - 915 MHz (mobile transmit) paired with 925 - 960 MHz (base transmit)

19 1710 - 1785 MHz (mobile transmit) paired with 1805 - 1880 MHz (base transmit)

Within the EU there are three distinct types of GSM network, namely those using only GSM 900 spectrum, those using only GSM 1800 spectrum and hybrid networks comprising spectrum in both frequency bands. In some Member States the spectrum charge for GSM 1800 spectrum is lower than that for GSM 900 spectrum, reflecting the more limited coverage per base station at the higher frequency and the consequent increase in infrastructure costs. Conversely, GSM 1800 networks have generally been assigned more spectrum, partly to offset their coverage disadvantage but also reflecting the greater spectrum availability in the 1800 MHz band. In the case studies we have therefore modelled each of these three types of network (900, 1800 and dual band), with spectrum assignments typical of those currently found in EU Member States (see Table 4.1).

As already noted, some Member States base fees or charges on the number of base stations and/or mobile terminals connected to the GSM network. Some also apply an annual levy based on the operator's turnover. It is necessary therefore to include within the reference network definition an assumption about the number of subscribers and the level of financial turnover of the network. We have determined these figures by assuming the following:

- a market penetration of 60% throughout the EU;
- the presence of four competing operators in each Member State, each with a 25% share of the market.
- average revenue per user (ARPU) of 10% below the values reported in the Commission's 6th implementation report[20] (i.e. €25.20 per month for personal use, €80.10 per month for business use). This reflects the increasing trend towards pre-pay tariffs with lower ARPU values.
- a subscriber base which is 75% personal users, 25% business users, consistent with the current typical market profile within the EU.

By applying the above parameters to each Member State, taking account of the actual population of the Member State, the number of subscribers, annual turnover and effective annual cost of fees and charges per subscriber can be deduced, for the assumed level of penetration and market share.

We have assumed the number of base stations for the GSM 900 (single band) case to be one per 2000 subscribers, based on typical levels in current European GSM networks; we have assumed that the GSM 1800 network has twice the number of base stations (reflecting the reduced coverage at the higher frequency) and that the dual band network has 50% more than the GSM 900 network. The network parameters used in the case studies are listed in Table 4.1

20 Sixth Report on the Implementation of the Telecommunications Regulatory Package (COM (2000) 814) 7 December 2000; Annex 1, Mobile Services chapter, Section 6, Charts 14 and 15 (Average mobile monthly expenditure - personal and business profiles)

**Table 4.1 Network parameters for GSM case studies**

| Case Study | GSM900 spectrum | GSM 1800 spectrum | Base Stations |
|---|---|---|---|
| 1A | 2 x 15 MHz | 0 | 1 per 2,000 subs |
| 1B | 0 | 2 x 25 MHz | 1 per 1,000 subs |
| 1C | 2 x 10 MHz | 2 x 15 MHz | 1 per 1,333 subs |

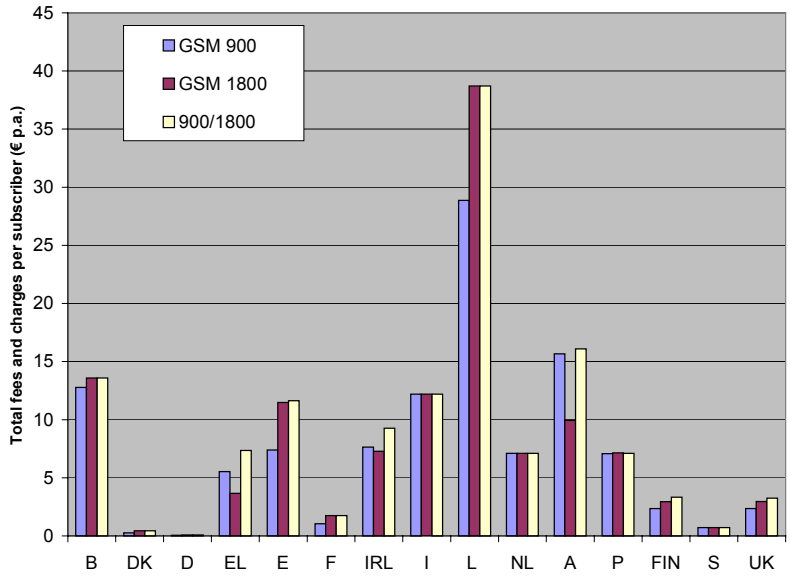
In those countries where auctions have been held, we have normalised the amount paid by dividing the sum of the total amount bid by the number of new licences auctioned and dividing this by four. This reflects our view that there is an effective market value for the total amount of spectrum available and that this value amounts to the total amount bid at auction, normalised to the number of licences (four) assumed in the case study.

All once-off payments have been amortised over the life of the licence assuming a 5% finance charge and a 3% inflation rate, enabling an equivalent annualised rate to be determined. This is then added to any annual fee or charge levied by the NRA to provide a total effective annual payment, which is then divided by the number of subscribers.

### 4.2.2 Results

To make a more meaningful comparison of the impact of fees and charges on network operators, it is necessary to normalise the actual amount paid to take account of the population in individual Member States. In the following figures, payments are shown on a per-subscriber basis, taking account of the market penetration assumption of 60% throughout the EU.

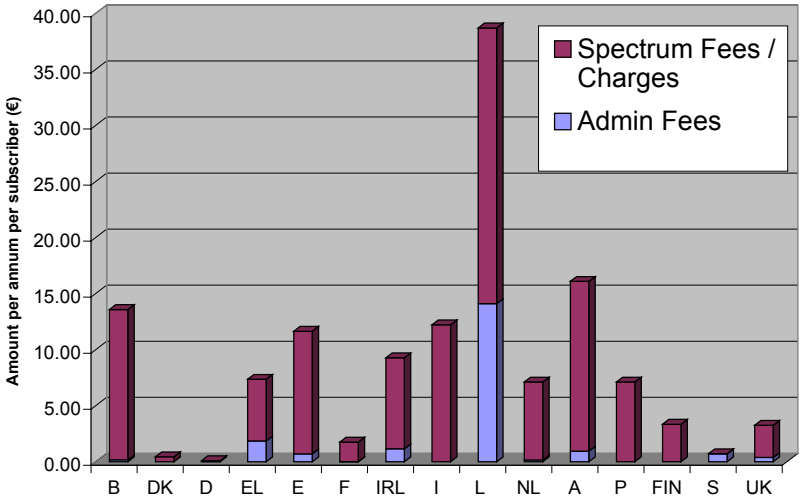
**Figure 4.1: Comparison of total effective annual payment (€) in fees and charges for each of the three GSM case studies in each Member State**




Two factors are immediately apparent from the figure, namely that there are very significant differences even in the normalised level of fees and charges applied to

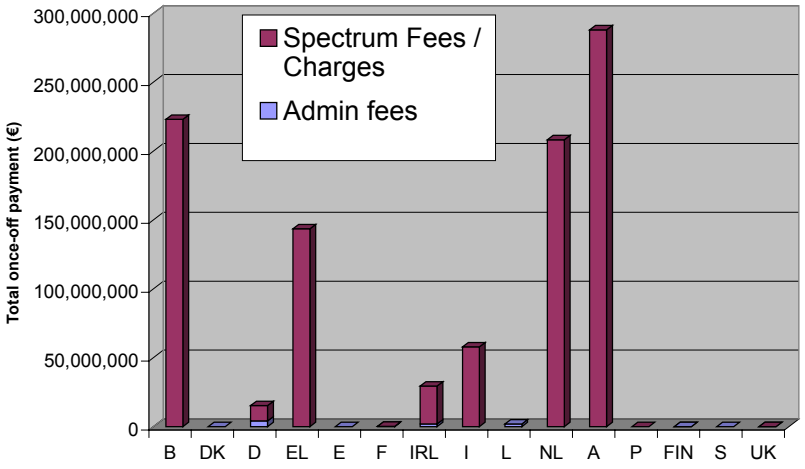
GSM networks in different Member States, and there are also significant differences in the extent to which such fees reflect the amount of spectrum licensed and/or the frequency band in which the licensee operates. In all countries, the spectrum charge tends to dominate the total amount, as can be seen below. Note that in the case of Italy, although there is currently no spectrum charge, we have included the annual levy (currently 2.5% of turnover) in this category as it is an above-cost payment which dominates the total amount paid by the operators. We have assumed that the compensation payment to the Defence Forces would apply only where GSM 1800 spectrum is licensed. Finally, the above result does not take account of the €356 million concession payment applied to Omnitel, but not to the other three Italian operators. The effect of including this once-off payment is to increase the effective annual payment for a dual band network from €12.21 per subscriber to €15.46 per subscriber, an increase of 27%. Note also that, at the time of writing the Spanish Government's draft Budget Law for 2002 foresaw an average reduction of 65% of the spectrum charges for both GSM and 3G mobile services in Spain.

**Figure 4.2 Administrative Fees and Spectrum Fees / Charges (€ per annum per subscriber) for GSM Case Study 1C (GSM 900/1800 Network)**



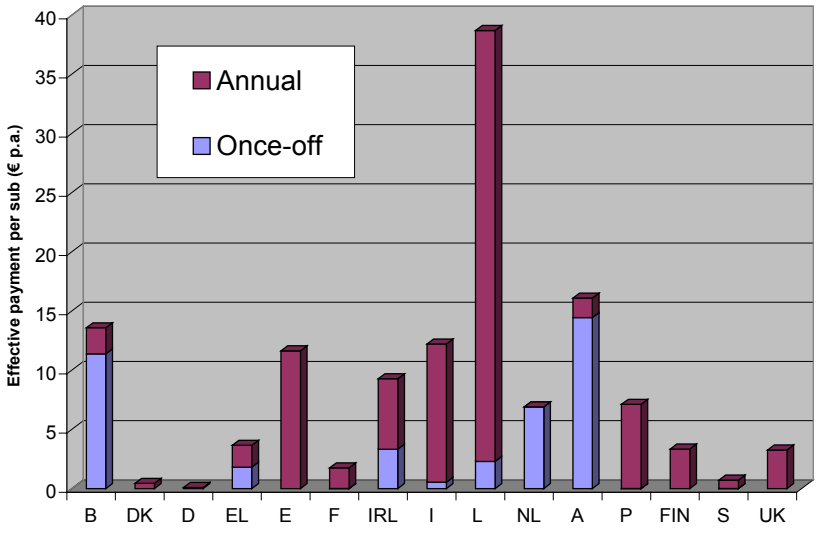

A significant factor for new market entrants is the proportion of fees and charges that are required "up front", prior to commencing service. These are highlighted in Figure 4.3, from which it can be seen that relatively few Member States have applied a significant up-front fee to GSM operators. Once again, the Italian levy has been included in the spectrum charges category, on the grounds that it is not cost-based.

**Figure 4.3 Total Once-off Administrative Fees and Spectrum Fees / Charges (€) for GSM Case Study 1C (GSM 900/1800 Network)**




The relative contribution of once-off payments and annual payments to the total effective annual cost is illustrated below:

**Figure 4.4 Relative Contribution of Once-off and recurring payments to the total effective annual payment, for Case Study 1C (GSM 900 / 1800 Network)**




It can be seen that where a sizeable once-off payment applies, this tends to dominate the total cost, even when amortised over the duration of the licence. However, the total payment involved is relatively independent of the split between up-front and annual payments.

### 4.2.3 Commentary

There are three principal approaches to applying fees and charges to GSM networks, namely:

- all payments are cost-based (though not generally apportioned directly to individual licensees)
- above-cost annual charges for spectrum, usually charged on a per unit bandwidth basis and sometimes taking account of the frequency band, number of base stations or number of mobiles (sometimes these may be spectrum fees derived by apportioning total NRA costs, but not directly related to the costs associated with licensing GSM spectrum)
- an above-cost initial fee, which usually takes the form of a bid at auction or as an element of a comparative evaluation (beauty contest) process.

The latter two cases are essentially a reflection of the scarcity of the spectrum. The application of an annual fee based on the amount of spectrum ensures that the amount paid reflects the amount of spectrum resource assigned, which in theory should encourage efficient utilisation of the spectrum. However, in practice, this argument only holds fully if the marginal spectrum charge is comparable to the additional investment in infrastructure that would be required if less spectrum were held.

With the exception of Luxembourg, which is atypical because of the unusually low population, the total annual spectrum charge does not exceed € 15 per subscriber in any Member State. Infrastructure costs vary significantly for GSM networks, depending for example upon when the network was launched and the nature of the terrain over which the service is provided and the availability of suitable sites. However the following parameters are believed to be typical for European GSM networks:

- base station cost (capital): € 50,000
- equivalent annual cost (10% p.a. depreciation): € 5,000
- site rental cost (annual): €5,000
- maintenance and running costs: € 5,000

**Total approximate annual cost: € 15,000**

Applying this to a network having 10 million subscribers and with 10,000 base stations (typical of a larger EU country such as France, Germany or the UK) and assuming that a doubling in the amount of spectrum would result in a 50% reduction in the number of base stations, one can make an approximate estimate of the relative magnitude of the additional spectrum charge and the infrastructure saving that would result from a doubling in the amount of licensed spectrum. A reduction of 5,000 base stations would result in a saving of € 75 M per annum, hence an

increased spectrum charge of this order, i.e. € 7.50 per subscriber, would represent an appropriate reflection of the marginal economic value of the GSM spectrum.

This is of course a rather simplistic evaluation; in particular, constraints on network planning such as site availability mean that there is unlikely to be a one-to-one correlation between amount of spectrum and number of base stations. However the implication is that the current level of annual spectrum fees / charges in countries such as Spain, Finland, the Netherlands or Ireland are broadly reflective of the value of the spectrum, if this is measured in terms of the additional infrastructure that would be required to achieve the same capacity with less spectrum.

It is interesting also to consider the UK case, where annual spectrum charges are determined on the basis of the "least cost alternative" - in this case additional infrastructure. The resultant annual charge of approximately € 3 per subscriber is rather lower than the figure suggested above but this may be a more realistic reflection of the trade-off between spectrum and infrastructure. Note that the figure in Spain, which also applied administrative pricing, is higher than the UK, however this could in part reflect the more dispersed population which is likely to increase the marginal cost of network rollout.

The application of an up-front fee where this is determined by the applicant should reflect the perceived market value of the spectrum, in terms of the added value that it will deliver to the licensee, at the time of licence issue. This perceived value should take account of the amount of spectrum, and thus should serve to promote its efficient use. Whilst there is a counter argument that excessive expenditure on licence fees and charges could detract from infrastructure investment and lead to less efficient spectrum utilisation, there is no substantive evidence to date that payment of high up-front charges for GSM licences has resulted in lower infrastructure investment, or that user tariffs and competition are adversely affected as a result of higher fees or charges. For example, Italy and Sweden have respectively one of the highest and lowest levels of payments, yet both are generally acknowledged to be among the more competitive and developed European GSM markets.

The level of administrative fees appears to be most dependent on whether a levy is applied by the NRA. However, in general even where a levy is applied the administrative fee is small by comparison with the spectrum charge, hence at their current levels levies do not account for a major proportion of mobile operators' total costs.

## 4.3 3G Mobile (IMT-2000 / UMTS)

### 4.3.1 Reference Network and Assumptions

Most EU countries have adopted the approach to UMTS spectrum packaging recommended by the UMTS Forum, i.e. 2 x 15 MHz paired plus 5 MHz unpaired. We have therefore assumed this arrangement for the 3G mobile case study (Case

Study 2). In those countries where auctions have been held and more than four operators have been licensed, we have normalised the amount paid by dividing the total amount bid for all the licences by four. This reflects our view that there is likely to be an effective market value in each Member State at any time for the total amount of spectrum available and that the current value of this amounts to the total amount bid at auction.

As with the GSM case studies, it has been necessary to make certain economic assumptions about the 3G network, relating to the subscriber base, ARPU and turnover. Our subscriber and ARPU assumptions reflect those in a recent UMTS Forum report[21] and are as follows:

- 28% market penetration for 3G mobiles services (based on UMTS Forum estimate for 2010)
- ARPU €27 / month for 3G mobile services (= €324 per annum)
- Market share per operator 25% (based on four operators with equal share)

Turnover per network for each Member State is determined by applying the above figures to the national population of the Member State. To support the higher data rates associated with 3G mobile services, it is assumed that four times the number of base stations will be required per subscriber (i.e. one base station per 250 subscribers), compared to a GSM 1800 network.

All once-off payments have been amortised over the life of the licence assuming a 5% finance charge and a 3% inflation rate, enabling an equivalent annualised rate to be determined. This is then added to any annual fee or charge levied by the NRA to provide a total effective annual payment, which is then divided by the number of subscribers.

### 4.3.2 Results

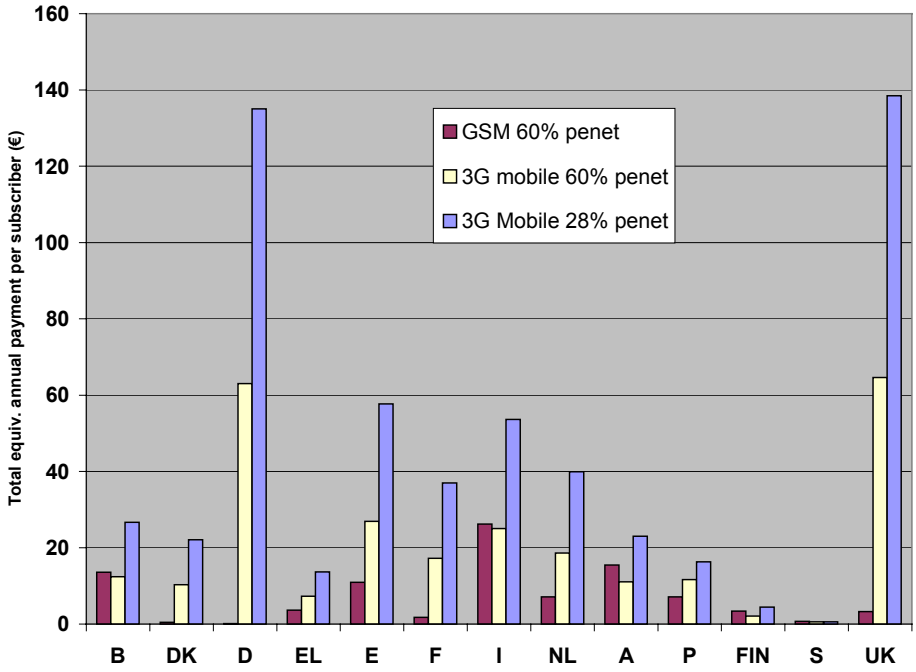
The total effective annual payment for 3G mobile licences for the reference case study network is shown in Figure 4.5, along with the corresponding value for the GSM reference network used in case study 1C. Although the case study was carried out with an assumed penetration of 28%, in line with recent UMTS Forum estimates, the figure also shows the figure that would apply if the current GSM penetration level (60%) were to be replicated for 3G. It can be seen that in every Member State a higher fee is incurred for the 3G network if the lower penetration is assumed. However if the more optimistic penetration level is assumed the per-

[21] "The UMTS Third Generation Market - Phase II: Structuring the Service Revenue Opportunities, Including Worldwide and Regional Forecasts for Mobile Internet Access, Multimedia Messaging Service for Business, Location-Based Services, Rich Voice and Simple Voice", published by the UMTS Forum, April 2001

subscriber payment is actually lower for 3G mobile in some countries ( Belgium, Austria, Portugal and Finland). Interestingly, two of these adopted an auction approach and two a beauty contest approach. Note that the following figures do not include Luxembourg and Ireland, where at the time of writing the 3G mobile licensing process had not been completed.

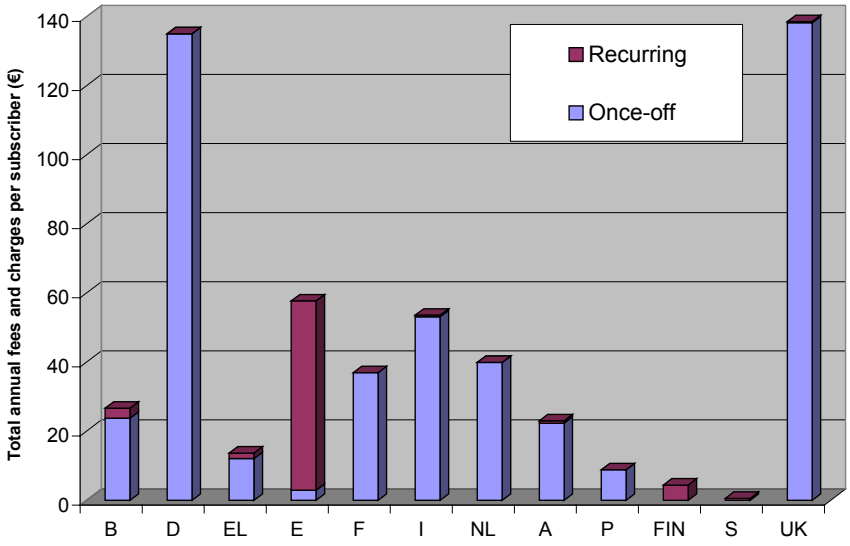
The assumed level of annual spectrum charges for both GSM and 3G mobile services in Spain is based on the 2001 budget. However we note that at the time of writing the draft Budget Law for 2002 foresaw an average reduction of 65% of the spectrum charges for both GSM and 3G mobile services in Spain. For France, the case study has been based on spectrum charge in force at the time the first two licences were awarded. Note however that at the time of writing the French Government had proposed to reduce the total spectrum charge to €619,250,000, and to replace remaining payments with a levy on 3G operators' turnover. The level of the levy is yet to be determined. In Italy, although licensed PTOs are currently subject to a levy on turnover, this is expected to be discontinued in 2003. Since in our view it currently seems unlikely that commercial 3G mobile services will be launched before 2003, we have not included this levy in our case study projection for Italy.

**Figure 4.5: Effective annual payment of fees and charges for reference 3G mobile network (with 28% and 60% penetration) and reference dual-band GSM network (with 60% penetration)**



The significance of the initial payment, whether by way of auction bid or licence fee, is shown below:

**Figure 4.6: Comparison of once-off and recurring payments (in terms of equivalent effective annual payments) for reference 3G mobile networks (€ per annum per subscriber, assuming 28% penetration)**




### 4.3.3 Commentary

The most significant point that arises from this case study is the generally higher charges which apply to 3G services relative to GSM. Note however that the impact of these charges does depend very much on the assumed level of penetration. It is currently unclear whether 3G services are likely to achieve the levels of mass-market penetration achieved by GSM, hence our application of two penetration levels, one based on recent relatively conservative estimates from the UMTS Forum and the other based on current GSM penetration.

It is interesting to compare the level of spectrum fees / charges with the likely cost of rolling out a UMTS network. In the UK, estimates of network rollout cost range from €3 Bn to € 8Bn. Taking an average of these figures (€ 5.5 Bn), and assuming a 60% market penetration and equal market share for the five UK licensees, this implies an infrastructure cost per subscriber of €790, which amortised over 20 years represents an equivalent annual payment of € 48.31. This is similar in magnitude to the spectrum charge (€ 63 per annum equivalent), however it should be borne in mind that this cost relates to the total infrastructure investment and not just that which relates to the air interface. The infrastructure cost saving which would result from acquisition of more spectrum is likely to be significantly less since a large

proportion of the 3G infrastructure investment relates to the core network which is relatively independent of the amount of spectrum.

Perhaps of more significance is to compare these annual figures with ARPU estimates for 3G. The UMTS forum recently suggested a figure of € 324 per annum per subscriber, in which case the annualised spectrum charge would amount to 20% of the annual ARPU. Although this is much higher than for current GSM networks, it suggests that there should still be scope for a reasonable margin to be derived from the offer of 3G services.

## 4.4 Wireless Local Loop (WLL)

### 4.4.1 Reference Networks

For WLL networks, there are two main factors affecting the level of administrative fees and spectrum fees / charges, namely whether the WLL service is broadband or narrowband (this typically determines the frequency band and amount of spectrum required), and whether it is regional or national. As with GSM, some Member States base WLL spectrum fees on the amount of infrastructure (base stations) as well as or instead of the amount of spectrum. It is therefore necessary to make an assumption about the number of base stations that will be required, which in turn requires an assumption to be made about the number of subscribers and the typical usage pattern. Because some Member States apply a levy based on turnover, it is also necessary to make an assumption about the number of subscribers and ARPU.

We have assumed the following for the case studies:

- two national networks (one narrow band and one broad band) and one regional network (broadband), each with a 5% share of the total fixed telecommunications market,
- ARPU of € 500 per year (narrow band) and €2,000 per year (broadband).
- 70% population penetration for fixed telephone lines (narrow band) and 20% for broadband (NB this relates to all fixed lines, i.e. not just WLL but including wireline services)
- infrastructure density of one base station per 100 subscribers has been assumed in all cases.

These assumptions are by necessity speculative, given the relatively undeveloped state of the European WLL market, however we believe they are sufficiently realistic to enable a meaningful comparison of fees and charges for WLL networks under different charging regimes to be made. It should be noted that, given the current uncertainty as to how the WLL market will develop, the comparative results (between Member States) are of more significance than the absolute values arising from the assumptions made.

We have chosen three reference networks for the case studies, with the parameters listed in Table 4.2. The spectrum assignments are typical of those awarded to current European WLL licensees.

**Table 4.2 Network parameters for WLL case studies**

| Case Study | Network Type | Spectrum | Population Coverage |
|---|---|---|---|
| 3A | Narrowband | 2 x 15 MHz @ 3.5 GHz | National |
| 3B | Broadband | 2 x 56 MHz @ 26 GHz | National |
| 3C | Broadband | 2 x 56 MHz @ 26 GHz | Regional (1 million) |

### 4.4.2 Results

As with GSM and 3G mobile, there is again a significant variation in the level of fees and charges applied to WLL networks, as the following figures illustrate. Note that the case study results which follow relate only to those Member States that have licensed the type of network concerned (for example some have only licensed national networks, hence a regional licence case study would not be meaningful in those cases). The assumed level of annual spectrum charges for WLL services in Spain is based on the 2001 budget. However we note that at the time of writing the draft Budget Law for 2002 foresaw an average reduction of 92% of the spectrum charges for WLL services in Spain.

**Figure 4.7: Comparison of fees and charges (€ per subscriber per annum) for reference narrow band national WLL network in EU Member States (case study 3A)**

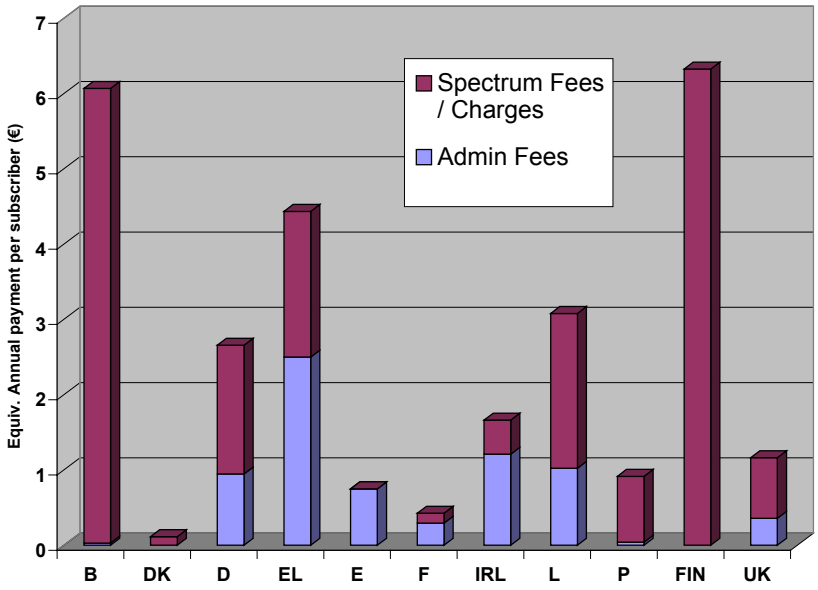



**Figure 4.8: Comparison of fees and charges (€ per subscriber per annum) for broadband national WLL network in EU Member States (case study 3B)**

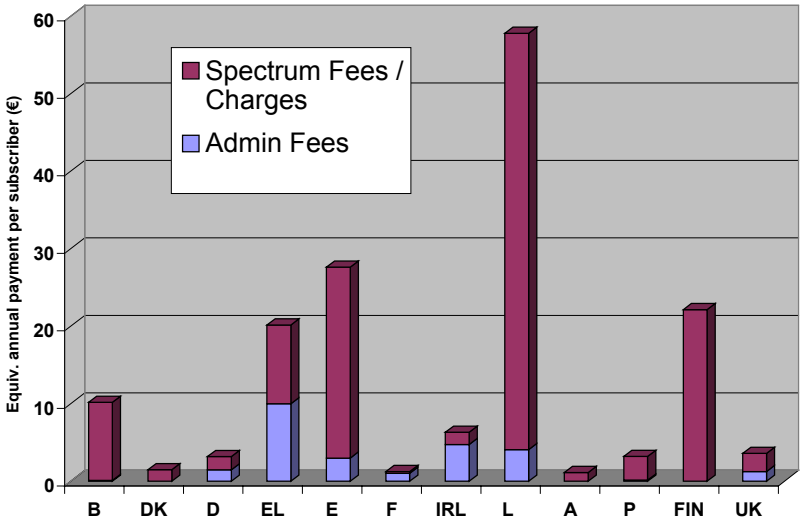
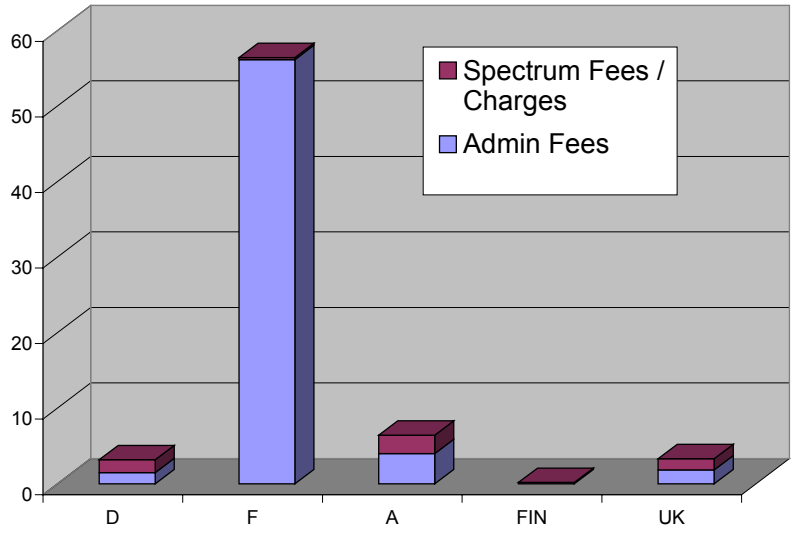


**Figure 4.9: Comparison of fees and charges (€ per subscriber per annum) for broadband regional WLL network in EU Member States (case study 3C)**




Only five Member States have licensed regional WLL networks. Note that in France the cost is dominated by the relatively high fixed administrative fee, which applies regardless of whether the network is national or regional. In Finland and Germany the fees and charges take account of the area of population covered by the licence and are consequently lower. In the UK and Austria, auctions were held and the fees should in principle reflect the market worth of the spectrum, although in practice the amounts raised were close to the reserve prices set.

### 4.4.3 Commentary

In general, actual fees and charges paid by WLL networks are lower than for their mobile counterparts (see section 4.7 for a detailed inter-service comparison). However, when the lower subscriber numbers are taken into account, payments per subscriber become comparable, and in some cases higher than those applied to GSM and 3G mobile. These values are, of course, very dependent on the assumptions made regarding penetration and revenue per subscriber, hence in the current uncertain market climate they should be treated with caution. Nevertheless, the wide disparity between fees and charges in Member States should be a cause for concern if WLL is to be successfully promoted as a competitive alternative to the incumbent's copper loop. Application of high fixed administrative fees, particularly for smaller regional networks, could run counter to this objective, as could the application of excessive spectrum charges which do not take account of the likely economic return on using the spectrum or the level of congestion in the bands concerned (it is noted that in a number of countries where WLL licences have been offered not all of these have been taken up). It is interesting to note that in those countries where auctions have been held, WLL spectrum charges are low by EU standards, as they also are (with the exception of the Spanish broadband

licences[22].) in the two countries where administrative pricing is applied (Spain and the UK). . This probably reflects the relatively small size of the WLL market, relative to mobile, which results in a lower economic value for the spectrum. Costs associated with WLL licensing are likely to be similar to those associated with mobile licensing, leading to potentially higher costs per subscriber because of the smaller market size and, in some Member States, the larger number of licences involved. The UK has used administrative pricing for some WLL licences and auctions for others.

## 4.5 Point-to-Point Fixed Links

### 4.5.1 Reference Networks

Unlike GSM , 3G mobile and WLL networks, where spectrum is assigned exclusively to a licensee within a specified territory, terrestrial fixed links are often licensed individually and are required to share spectrum with other licensees. Where this is the case, it is more appropriate to compare the amount paid on a per-link basis rather than the per subscriber basis applied to the previous case studies. The amount paid per link is in many Member States a function of the bandwidth, frequency band and / or other characteristic of the link.

To facilitate comparison between Member States we have performed comparisons between the fees and charges that would be applied by each Member State for the following cases:

**Case Study 4A:** a single link of 28 MHz bandwidth, but with four variants of hop length and frequency band, namely:

i) 50 km, 4 GHz

ii) 20 km, 13 GHz

iii) 10 km, 23 GHz

iv) 5 km, 38 GHz

This enables us to assess the extent to which the spectrum charging principles support the objective of promoting spectrum efficiency by encouraging the use of the highest frequency band consistent with the hop length (i.e. by charging lower fees for higher frequency bands).

**Case Study 4B:** a single link of 50 km length, operating in the 4 GHz band, but with four variants of bandwidth, namely 7, 14, 28 and 56 MHz. This enables us to assess whether the charging principles support spectrum efficiency by applying a charge which reflects the amount of bandwidth consumed by the link.

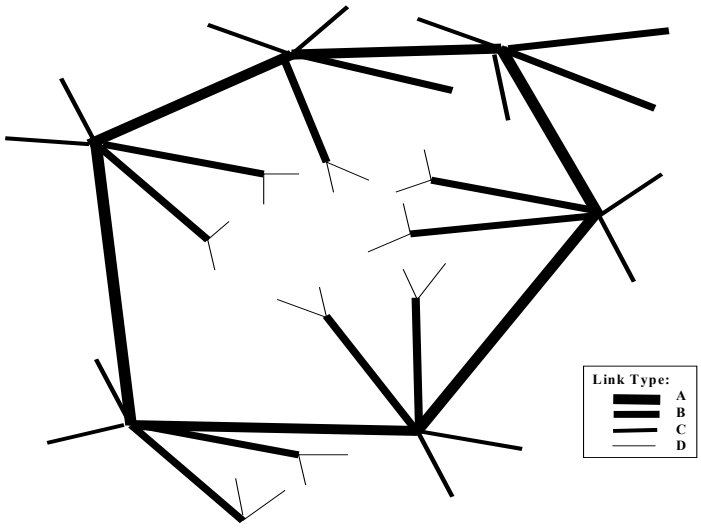
[22] Spectrum charges for Spanish WLL licences are set to be reduced by an average of 92% in the 2002 budget.

**Case Study 4C:** a hypothetical network of links of varying bandwidth, hop length and frequency bands, based on the examples used in case study 4A. Such a network might be deployed by a medium sized utility company, broadcaster or public telecommunications network. Two variants are considered, namely a self-provided network and a PTN. The hypothetical network comprises an SDH ring carrying 155 Mbit/s data traffic, with six nodes each providing 20 access links, varying in capacity and hop length. The link parameters are specified in Table 4.3 and a schematic of the network is shown in Figure 4.10.

**Table 4.3: Technical Characteristics of fixed links used in case study 4.3**

| Link Type | Description | No of links | Data Rate | Bandwidth | Hop length | Frequency Band |
|---|---|---|---|---|---|---|
| i | Backbone STM-1 link between access nodes | 6 | 155 Mbit/s | 28 MHz | 50 km | 4 GHz |
| ii | High capacity medium haul access link | 12 | 34 Mbit/s | 28 MHz | 20 km | 13 GHz |
| iii | High capacity short haul access link | 12 | 34 Mbit/s | 28 MHz | 10 km | 23 GHz |
| iv | Medium capacity very short haul access link | 12 | 34 Mbit/s | 28 MHz | 5 km | 38 GHz |

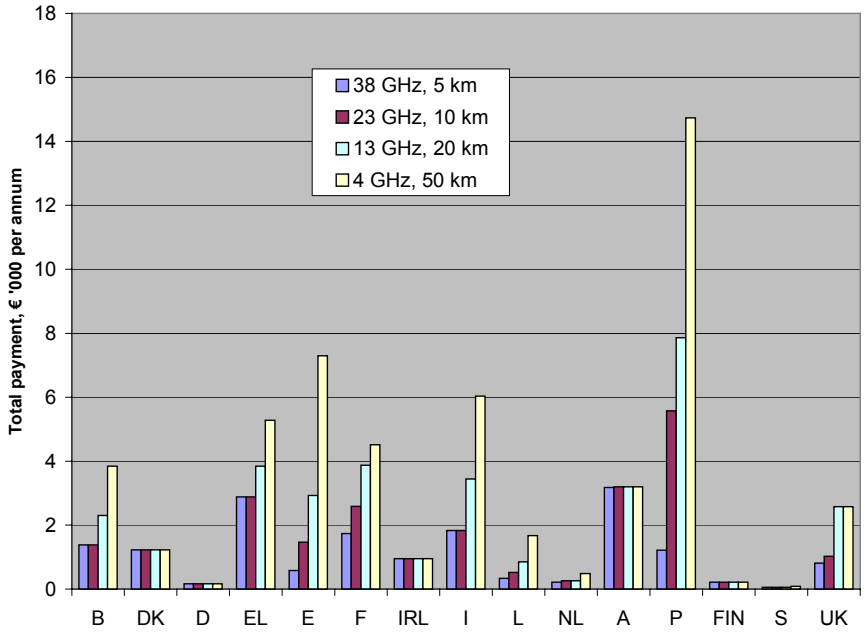
**Figure 4.10: Schematic of fixed link network for case study 4C**




### 4.5.2 Results

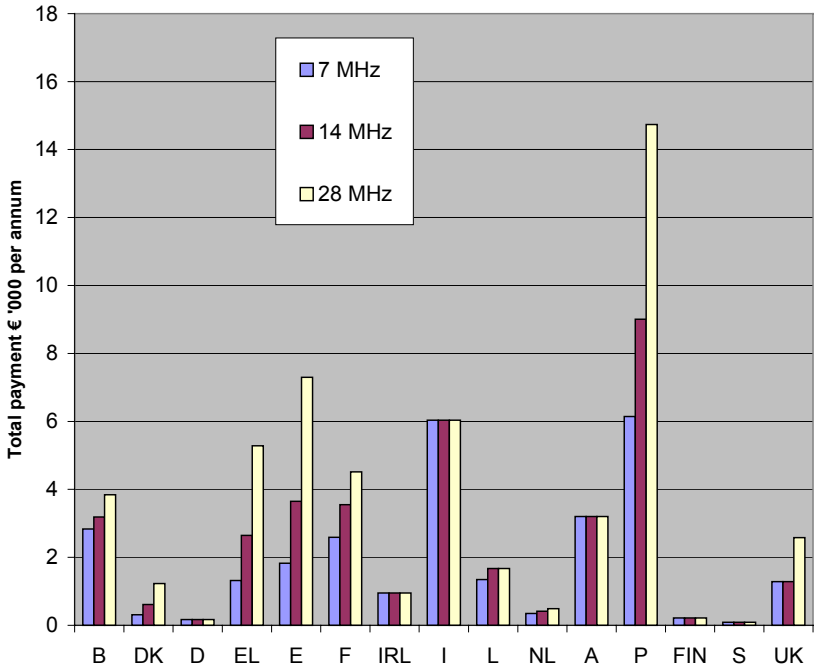
The following graphs show the relation between the fees and charges paid by fixed link operators and the link characteristics, i.e. bandwidth, frequency band and whether the link network is public or private.

**Figure 4.11: Comparison of Fixed Link spectrum fees and charges by frequency band and link length in EU Member States (single 28 MHz, 34 MBit/s link, € per annum - case study 4A)**



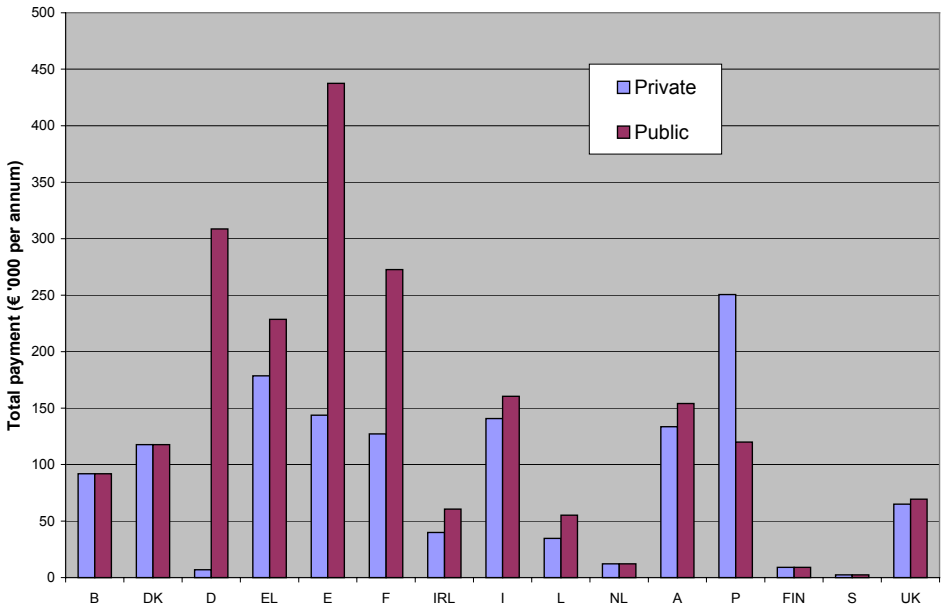

The relationship between frequency band and spectrum fees / charges in most Member States is clearly illustrated in the diagram. Payments are greater for the lower frequency bands, reflecting the greater congestion and scarcity in these bands. In most countries where frequency dependent charges are applied, these are of a similar order of magnitude. Note that this is regardless of whether the charges are based on administrative pricing (B, E, UK) or cost-based, implying that the apportionment of overall NRA costs to fixed link licensing may be somewhat greater than the actual costs associated with that service (it seems unlikely in any case that the actual annual cost associated with a single fixed link would amount to thousands of euro per annum). At the charge levels applied by most Member States, the levels are probably sufficient to encourage licence applicants to use the highest available frequency band. Note however that narrower band links will attract a substantially lower charge in most Member States, as the following diagram shows.

**Figure 4.12: Comparison of Fixed Link spectrum fees and charges by bandwidth in EU Member States (34 MBit/s, 4 GHz frequency band - case study 4B)**




Again, the relation between bandwidth and spectrum charge in most Member States is clearly apparent. At the charge levels applied in most Member States, the differential is probably sufficient to have some bearing on the licensee's choice of technology (some fixed link equipment can accommodate a given data transmission rate in less bandwidth but are likely to be more expensive, hence this would need to be offset by the saving in the spectrum charge).

**Figure 4.13: Comparison of fees and charges for public and private fixed link networks in EU Member States (case study 4C)**




This result shows that public networks typically command higher payments. This generally reflects the imposition of additional administrative fees associated with the service licence. Although in some cases (e.g. Italy, Portugal and Spain) different spectrum fees / charges apply to private and public networks. In Portugal this has the effect of reducing the total payment for public networks.

### 4.5.3 Commentary

The results show that in the majority of Member States (Belgium, Greece, Spain, France, Luxembourg, Netherlands, Portugal and the UK) spectrum fees / charges for fixed links depend on both frequency band and bandwidth. This is in principle a sound approach, in that the charge reflects the amount of the resource consumed and its scarcity value (frequency re-use is greater at higher frequencies and there is generally more bandwidth available, hence the spectrum resource is less scarce than in lower bands). However it should also be noted that this approach is only really valid when there is a reasonable likelihood of scarcity arising in a particular geographic region. Application of significantly above-cost charges in areas where there is not a scarcity may be counterproductive as it may deter the provision of telecommunication services in remote areas where alternative non-radio platforms are unlikely to be viable. Currently only Spain and the UK differentiate between congested and uncongested areas.

In Italy, the spectrum fee for private links is currently based on the link length, whereas public link fees are based on frequency band, however there are plans to bring the two into line in the future (both based on bandwidth). In Denmark, the fee

depends on bandwidth but not frequency band, whereas in other Member States the fee is independent of either of these parameters (Ireland does apply a lower fee where the bandwidth is less than 3.5 MHz, but few if any fixed links for use in telecommunication networks would come into this category).

Figure 4.13, shows that, with the exception of Portugal, higher charges generally apply for public networks, reflecting the greater revenue potential associated with these services.

Absolute charges for fixed links vary significantly, from a few hundred euros per annum in some Member States, to over € 10,000 per annum for long haul links in Portugal. Other costs associated with running fixed link networks also vary significantly, depending for example on frequency band, bandwidth and site acquisition and rental costs. Currently, the typical equipment cost (based on manufacturers' estimates) for a fixed link in the 13 GHz band is around €70,000, and we estimate a typical annual site rental of € 12,500. Assuming an annual maintenance cost of 10% of the capital value, a 10 % straight line depreciation and a 10% discount rate, this implies an effective annual cost approaching €20,000 per annum for a long haul, broadband (155 Mbit/s) link. Hence the charges applied in many Member States amount to a significant proportion of the total running costs of the links concerned. Whilst this is likely to encourage efficient use and the migration to alternative platforms where this is feasible, it could also have the effect of deterring service provision in remote areas where radio can provide the only viable solution. This highlights the importance of differentiating between congested and non-congested areas if above-cost fees are going to be applied.

Finally, it is interesting to note that the charges applied in Spain are appreciably higher than those in the UK, despite both being nominally intended to reflect the market value of the spectrum. This highlights the difficulties inherent in valuing radio spectrum, even for similar applications in similar frequency bands. We note that the Spanish Government is currently proposing a reduction in spectrum charges for mobile networks. Although no similar reduction is currently planned for fixed links, all charges are subject to ongoing, periodic review.

## 4.6 Permanent Satellite Earth Stations

### 4.6.1 Reference Networks

There are three factors which most commonly affect the level of fees and charges for satellite earth stations within Member States, namely the type of earth station (e.g. VSAT, teleport, TV uplink), bandwidth and the type of operator (private user or PTO). We have therefore conducted five specific case studies addressing various combinations of these parameters, namely:

- **Case Study 5A:** Typical Narrowband Permanent Earth Station for private use. Frequency band 4 / 6 GHz (C-band), Bandwidth 19.2 kHz, EIRP 65 dBW, input to antenna 15.2 dBW, frequency co-ordination required.

- **Case Study 5B:** Private TV uplink. Frequency band 14.25- 14.5 GHz (shared with fixed links) , Bandwidth 20 MHz, EIRP 76 dBW, input to antenna 20 dBW, frequency co-ordination required.
- **Case Study 5C:** PTO operated Teleport installation comprising five stations each pointing to a different satellite. €10M p.a. turnover. Frequency band 4 / 6 GHz, Bandwidth 34 MHz, EIRP 84 dBW, input to antenna 30 dBW, frequency co-ordination required.
- **Case Study 5D:** PTO operated VSAT Network: Single hub station, 30 terminals. Turnover € 1M. Frequency band 11 / 14 GHz (exclusive portion), Bandwidth 150 kHz, EIRP 43 dBW, input to antenna 0 dBW, frequency co-ordination required for hub but not for terminals.
- **Case Study 5E:** Private VSAT Network: Single hub station, 30 terminals. Frequency band 12.5 -12.75 / 14.0 - 14.25 GHz (exclusive). 3 bandwidth options considered, namely 150 kHz, 1.5 MHz and 20 MHz, EIRP 43 dBW (150 kHz), 53 dBW (1.5 MHz), 64.2 dBW (20 MHz) input to antenna 0 dBW, (150 kHz), 10 dBW (1.5 MHz), 21.2 dBW (20 MHz), frequency co-ordination required for hub but not for terminals.
- **Case Study 5F:** Private VSAT network comprising single hub station and 30 receive only stations. Frequency bands 12.5 - 12.75 / 14.0 - 14.25 GHz (exclusive), Bandwidth 20 MHz, EIRP 64.2 dBW, input to antenna 20 dBW, frequency co-ordination required for hub but not for terminals.

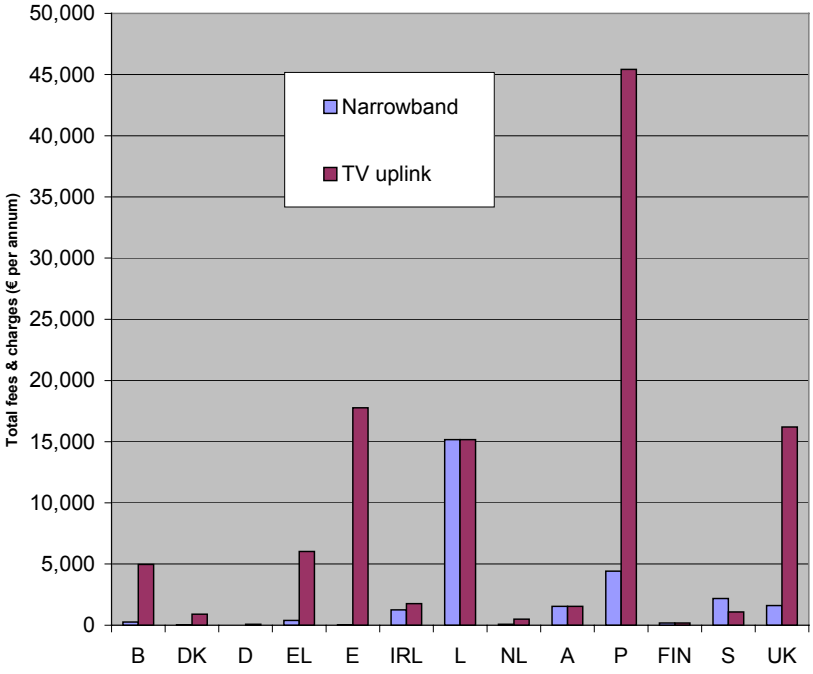
Case studies 5A and 5B enable a comparison to be made between a single narrow band earth station and a single broadband station, illustrating the extent to which bandwidth influences fees and charges in each Member State. 5C enables the fees and charges associated with a large, multi-dish facility, such as might be operated by a national PTO, to be compared between Member States. We note that one Member State (Ireland) has recently introduced specific regulations relating to Teleports, with dedicated fees for such installations. Case studies 5D and 5E enable VSAT fees and charges to be compared between Member States, and also a comparison to be made between fees for public and private systems. Finally, case study 5F enables a comparison to be made between a VSAT system operating in the exclusive VSAT band but with no transmitting terminal stations, and a TV uplink with similar technical characteristics operating in spectrum which is shared with terrestrial fixed links.

Where possible, the technical characteristics have been chosen to be consistent with those used in a recent study conducted by the Radio Regulatory Working Group of the European Radiocommunications Committee, into fees and charges for satellite systems. This will enable a comparison to be made between the results from the two studies.

### 4.6.2 Results

The following diagrams compare the level of fees and charges (effective annual payment in € per annum) that would apply in each Member State for each of the fixed link case studies. Note that information on satellite services other than VSATs was not available in the case of France and Italy.

**Figure 4.14 Comparison of Total Fees and Charges (€ per annum) for Case Studies 5A (Narrow Band C-band earth station) and 5B (Ku-band TV uplink) in EU Member States**




As would be expected, in most countries the TV uplink attracts a significantly higher charge than the narrow band system. As with the previous case studies, there is a significant variation within the EU in the levels of fees applied to these systems. This is also apparent in the case of large teleport installations and VSATs, as the figures below illustrate. The principal differentiator in these cases tends to be whether spectrum fees / charges relating to bandwidth apply and, in the case of VSATs, whether fees and charges apply per network or per terminal.

**Figure 4.15 Comparison of Total Fees and Charges (€ per annum) for 5-station teleport installation operated by PTO (case study 5C)**

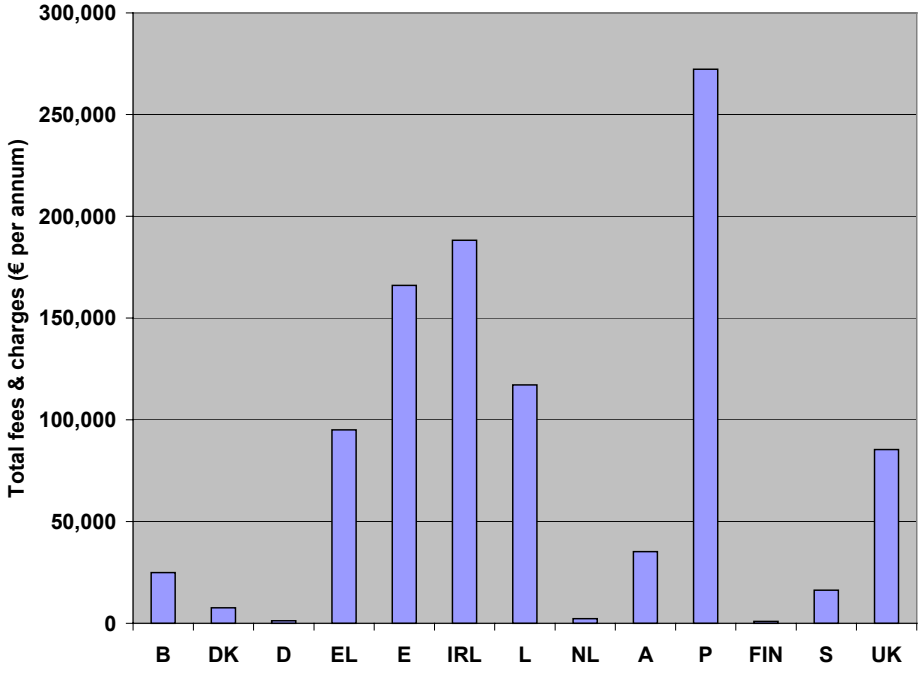
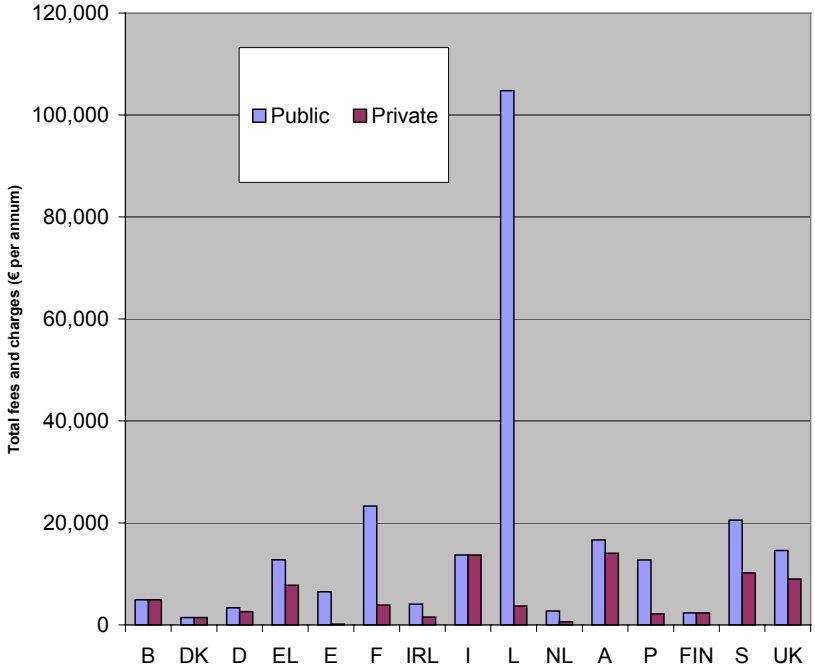
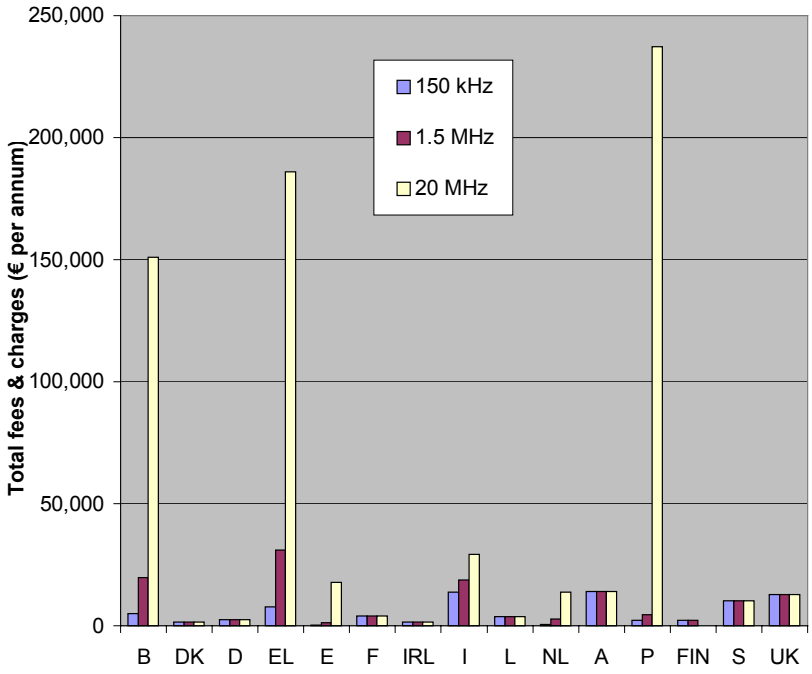



**Figure 4.16 Comparison of Fees and Charges (€ per annum) for Case Studies 4D and 4E (Public and Private VSAT networks) in EU Member States**



As with fixed links, public systems tend to command higher fees and charges than private systems. The difference is more pronounced due to the relatively low levels of VSAT spectrum fees / charges, compared to the telecommunication service licence fees.

**Figure 4.17: VSAT fees and charges in EU Member States as a function of bandwidth (private system)**

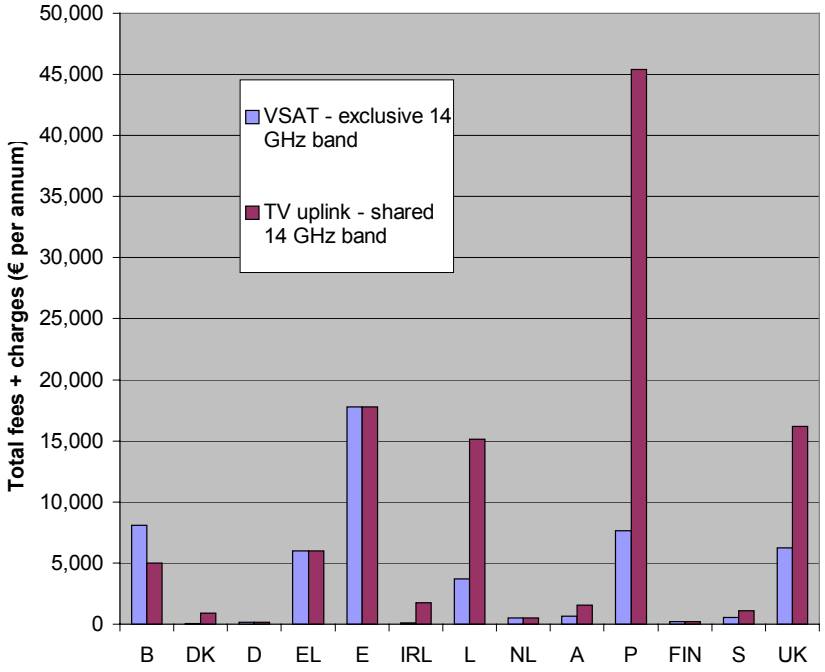



Compared with fixed links, rather fewer Member States apply spectrum fees / charges based on bandwidth. Note in particular the large differentials between fees / charges for broadband VSAT systems.

Finally, Figure 4.18 compares the total fees and charges for a 20 MHz TV uplink operating in the shared portion of the 14 GHz band, with an identical VSAT systems comprising a hub but no transmitting terminals (30 receive-only terminals are assumed).

It can be seen that in most Member States, operation in the exclusive band attracts a substantially lower payment. The exception is Belgium, which currently levies a fee for receive only earth stations, however a new general authorisation regime is planned for VSATs in the exclusive band which will substantially reduce the fees and charges applied.

**Figure 4.18: Comparison of fees and charges for VSAT and TV uplink in 14 GHz band, with similar technical characteristics (VSAT in exclusive band, TV uplink in shared band)[23].**




### 4.6.3 Commentary

In general, fees and charges for satellite earth stations are modest compared with other services addressed by this study. This partly reflects the shared nature of satellite spectrum and the fact that capacity is a function of satellite transponder capacity as well as spectrum availability. Greece and Portugal in particular apply significantly higher charges for broadband VSAT systems, however since most VSAT systems are relatively narrow band this is unlikely to affect many users.

Satellite earth stations are relatively expensive installations (typically hundreds of thousands of euros for hub stations) and are also subject to significant bandwidth related charges for access to satellite transponder capacity. Hence the level of charges, with the exception of those applied in some Member States for broadband (20 MHz) installations is generally not likely to be a significant element of overall running costs. Several Member States (Luxembourg, Austria, Portugal, Sweden and the UK) apply lower charges in the exclusive VSAT band, reflecting the fact that use of this band by satellite systems does not affect other potential users and hence has a lower opportunity cost associated with it. In Belgium, the current policy of

[23] Note: information on fees and charges for non-VSAT earth stations was not available in the cases of France and Italy

applying a fee to VSAT receive-only stations results in a higher fee in the exclusive band, however there are plans to introduce a new licensing regime, based on general authorisations, in the near future which will reverse this situation.

## 4.7 Comparison between services

It is interesting to compare the fees and charges applied to the different services covered by the study. There are two ways in which this can be done, namely by comparing the cost per subscriber (for the mobile and WLL networks) and the cost per MHz. The following table compares the total average payments per annum in each Member State for the five services, based on the case studies:

| | GSM 900 (2 x 15 MHz) | | 3G Mobile (2 x 15 MHz + 5 MHz) | | WLL (2 x 56 MHz, 26 GHz) | | Fixed Link (4 GHz, 28 MHz) | Satellite (VSAT, 1.5 MHz b/w, hub + 30 terminals) |
|---|---|---|---|---|---|---|---|---|
| | € / sub | € / MHz | € / sub | € / MHz | € / sub | € / MHz | € / MHz | € / MHz |
| B | 12.77 | 649,347 | 12.44 | 723,174 | 10.18 | 9,246 | 68.57 | 1,631 |
| DK | 0.13 | 3,500 | | | 1.48 | 700 | 21.88 | 475 |
| D | 0.07 | 28,723 | 63.00 | 14,773,716 | 1.50 | 10,970 | 2.95 | 862 |
| EL | 5.54 | 294,199 | 7.25 | 440,206 | 20.15 | 19,109 | 94.29 | 10,339 |
| E | 7.39 | 1,445,603 | 26.93 | 4,514,091 | 27.62 | 96,458 | 130.30 | 445 |
| F | 1.06 | 310,596 | 17.24 | 8,663,087 | 1.26 | 6,605 | 80.57 | 1,294 |
| IRL | 7.65 | 138,163 | | | 6.32 | 2,036 | 17.00 | 508 |
| I | 26.18 | 7,439,246 | 25.01 | 4,873,629 | | | 107.80 | 6,290 |
| L | 28.86 | 60,600 | | | 57.79 | 2,167 | 29.78 | 1,231 |
| NL | 7.11 | 556,516 | 18.62 | 999,210 | | | 8.66 | 939 |
| A | 15.42 | 626,648 | 11.08 | 257,391 | 1.13 | 823 | 57.15 | 4,688 |
| P | 4.26 | 211,284 | 4.12 | 175,408 | 3.20 | 2,840 | 263.12 | 1,504 |
| FIN | 2.36 | 60,682 | 2.07 | 45,512 | 22.14 | 10,159 | 3.84 | 783 |
| S | 0.71 | 31,676 | 0.56 | 21,300 | | | 1.55 | 3,398 |
| UK | 2.37 | 682,545 | 64.65 | 12,768,042 | 3.60 | 18,516 | 46.00 | 3,000 |

The following figures show graphically the per-bandwidth and per-subscriber payments for the three types of public network:

**Figure 4.19: Comparison of total per-MHz charge for GSM, 3G Mobile and WLL networks**

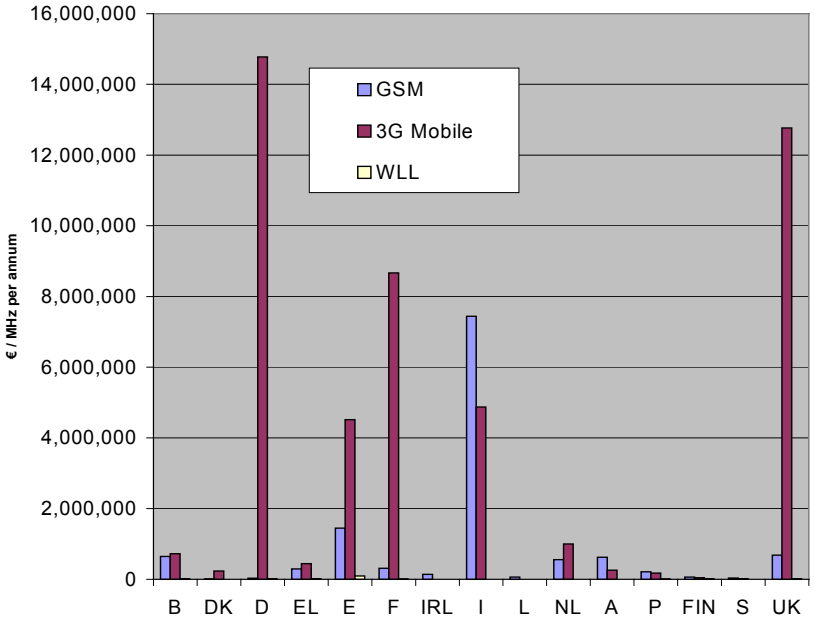
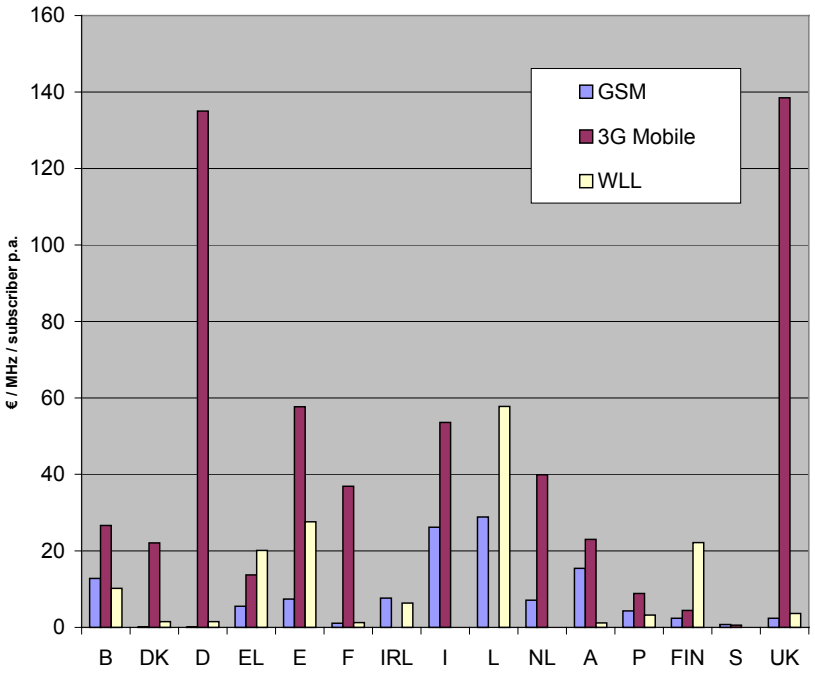



**Figure 4.20: Comparison of per-subscriber charge for GSM, 3G Mobile and WLL networks**

Note: the following assumptions have been made about market share and penetration: GSM: 60% penetration, 25% share; 3G mobile, 28% penetration, 25% share; WLL: 70% overall fixed line penetration, 5% share for WLL operator




It can be seen that on a simple, per MHz basis the cost of WLL spectrum is far lower than for mobile spectrum. However when account is taken of the larger spectrum

assignment and the much lower anticipated subscriber base, the WLL payments are comparable, and in some cases higher than those for the mobile services. Note that in Finland, the actual charges paid may be significantly lower in practice because licences are awarded only on a regional basis, and charges are scaled pro-rata to the area covered, whereas the data above assumes national coverage over the whole territory.

Note in particular the significantly higher value most Member States attach to mobile spectrum. Whilst this would be expected where market mechanisms have been adopted, it is perhaps more surprising where both fees and charges are notionally cost-based. Note also that in most Member States, VSAT fees are lower than WLL fees, reflecting the non-exclusive nature of the frequency assignments.

Although there are significant differences between the levels of charges for the services, there is in general a consistency towards how the charges are set. For mobile and WLL charges, the amounts generally take account of the bandwidth licensed (with the exception of Italy, Portugal and Sweden, and those countries where auctions have been held). There is less consistency with fixed link and satellite earth stations, where some Member States (Germany, Finland, Sweden) apply only administrative fees which take no account of the spectrum resource used and with consequently very low fees, particularly for broadband fixed links.

The generally lower fees applied to WLL is in our opinion justified by the very different competitive environment in which these services operate. Whereas all mobile services must use radio spectrum, and are generally at liberty to set tariffs in line with what the market will tolerate, WLL operators must compete against established fixed line incumbents who may also be subject to price caps set by the regulator and hence have much less flexibility in setting tariffs as well as having much more limited market share prospects. Indeed, when account is taken of the relatively low projected subscriber bases of the WLL networks, even the present fees may be considered excessive in some Member States (see figure 4.21).

Our conclusion is that while in general there is merit in ensuring that all spectrum fees / charges take account of the amount of spectrum licensed and its physical properties, it is also important to take account of the nature of the services that will be provided, including the availability of alternative platforms and the desirability of promoting competition / market entry. This would support the application of lower charges in the case of WLL.

For fixed links and satellite services, the key issue is whether scarcity is likely to arise in the bands and/or geographic areas concerned. Where there is a likelihood of scarcity, we would encourage the adoption of charging schemes based on bandwidth and frequency (as is already the case in most Member States), although we feel that the situation is less straightforward in the case of satellite services because of the additional dimension of orbital resources. Hence we believe that further study may be appropriate into the most effective way to manage satellite capacity, taking account of both spectrum and orbital constraints.

# 5 CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Overview

This study has undertaken a detailed examination of the current levels of administrative fees and spectrum fees / charges for telecommunications services using radio spectrum, and the approaches to setting these fees and charges, across the European Union. A core objective of the study was to examine the different elements taken into account by Member States' administrations in designing licensing / authorisation regimes and levels of fees for network services involving the use of frequencies, in order to cover costs and to reflect the value of spectrum.

The study has found that most Member States apply spectrum fees / charges in a manner which takes some account of the amount of the spectrum resource licensed, most commonly by defining the fees or charges as a function of bandwidth. This approach is broadly consistent with the objective in the Licensing Directive and the proposed new Authorisation Directive to promote efficient use of scarce resources such as radio spectrum, although the extent to which this objective is met in practice is dependent upon the absolute level of charges relative to the additional costs that would be incurred by not having access to the spectrum concerned. All Member States claim to set administrative fees on the basis of their costs, in accordance with Article 11.1 of the Licensing Directive, however in general the fees associated with individual licences do not appear to relate directly to the costs associated with those licences. Instead, total NRA costs are generally apportioned to the various licensees, in some cases (where levies are applied) on the basis of their turnover and in other cases based on other criteria. In most cases there appears to be little or no information about how these costs are apportioned.

There are significant variations in the terminology used by NRAs in respect of fees and charges, the national licensing regimes for telecommunications services using radio spectrum, and the approaches to setting fees and charges, as well as the actual level of fees and charges applied. Some of this inevitably results from linguistic differences and the translation process, for example the French term "redevance", which is commonly interpreted literally as a rent or royalty, is generally regarded to correspond to the term "charge" in the context of telecommunications regulation. However the extent of inconsistency is such that we feel confusion could arise to potential licence applicants and measures to improve consistency would be helpful.

Each of these issues is considered in more detail in the following sections, with recommendations as appropriate. To aid understanding of the chapter as a whole, terminology is addressed first.

## 5.2 Terminology

It became clear during the study that there is significant inconsistency in the terminology used for fees and charges in different Member States. There appears

to be no clear definition or common understanding of the terms 'administrative fees' and 'spectrum charges' in many Member States, and terms such as administrative charges have been found in national texts. This creates potential for confusion and can make it difficult in some cases to identify which payments relate to the use of a scarce resource (spectrum) and which relate to recovery of administrative costs. The following table summarises the terms most widely used in each Member State to describe administrative fees and spectrum fees / charges, as they are defined in the introductory chapter of this study. For convenience, those definitions are repeated below:

- *Administrative Fees* are fees intended to cover the costs of examining an application for a licence, granting the relevant authorisation and verifying compliance with the terms and conditions set once the service or network is operational. Under the terms of the Licensing Directive (Article 11), Member States are required to ensure that such fees seek only to cover the administrative costs incurred in the issue, management, control and enforcement of applicable individual licences. In the case of General Authorisations, Article 6 of the Licensing Directive requires fees to cover only the administrative costs associated with the authorisation scheme but does not require costs to be apportioned to individual applicants.
- *Spectrum Charges* are charges which reflect the need to ensure the optimal use of scarce resources. Article 11 of the Licensing Directive makes specific provision for Member States to levy such charges on a non-discriminatory basis, taking into particular account the need to foster the development of innovative services and competition.

For the purposes of the study we have defined a third category of payment, namely a *spectrum fee* which, whilst being based on the amount and type of radio spectrum that is licensed, is fixed by reference to the NRA's overall costs. We have treated these spectrum fees separately from other administrative fees, partly because of their direct correlation with the amount of spectrum used (and hence their role in promoting optimal use of scarce spectrum resources) and partly because in general they do not appear to bear any obvious correlation with the costs relating to the specific licence or service category concerned. We have found that the level of such spectrum fees, particularly for fixed links and WLL services, is often comparable to the level of spectrum charges (whether determined by administrative pricing or by auction) applied in other Member States

**Table 5.1 Examples of terminology used in individual Member States in relation to fees and charges for telecommunications services using spectrum**

| Member State | Terminology used | |
|---|---|---|
| | Administrative Fees | Spectrum Fees / Charges |
| B | Filing Fee, Management Fee | Unique Concession Fee, Spectrum Management Fee |
| DK | Not applicable | Annual frequency charge |
| D | Licence Fee, Contribution | Spectrum Fee |
| EL | Annual Duties | Licence Fee |

| | | |
|---|---|---|
| E | Rate by gross income | Spectrum charge |
| F | Tax | Royalty |
| IRL | Administrative Fee, Licence Fee | Spectrum Access Fee, Spectrum Licence Fee |
| I | Contribution | Contribution[24] |
| L | Royalty | Royalty |
| NL | Administrative Fee | Annual charge for monitoring |
| A | Licence Fee, Annual Levy | Spectrum Licence Fee, Frequency Use Fee |
| P | Administrative Fee, Licence Fee, General Administrative Charge | Spectrum Operational Charge |
| FIN | Annual Spectrum Fee | Annual Spectrum Fee |
| S | Application Fee, Administrative Fee | Transmitter Fee |
| UK | Service Licence Fee | Spectrum Licence Fee |

We also note that in the new Authorisation Directive the definitions of fees and charges are reversed from those in the Licensing Directive, in that Article 12 of the draft new Directive refers to a*dministrative charges* and Article 13 refers to *fees* for rights of use of radio spectrum.

We recommended that the Commission and Member States attempt to harmonise definitions in respect of terms associated with national fees and charges regimes, to aid transparency of national charging regimes. There may also be a case for clarifying the difference between administrative fees that purely reflect the costs associated with specific licences or licence categories, and spectrum fees which apportion the total NRA costs to individual licences on the basis of the amount of spectrum (and/or the type of spectrum) licensed.

We note that the new Authorisation Directive rationalises terminology to some extent, for example by referring only to general authorisations and individual “rights of use”, and no longer using the term "licence". Hence we would expect a more consistent approach to licensing regimes and to terminology to be adopted by Member States in due course as they transpose the new Directive into their national legislation.

The next section considers the type of licensing regimes that operate within Member States.

## 5.3 Licensing Regimes

In all Member States, the licensing of electronic communications remains under the aegis of the Government; in some States responsibility resides within a Government Department, whilst in other States responsibility for all or part of the licensing process has been delegated to a wholly Government controlled subsidiary body, such as the UK Radiocommunications Agency. Typically one organisation takes responsibility for licensing service provision aspects, whilst the sister organisation takes responsibility for specific system aspects, such as use of radio frequencies.

[24] In Italy, the “Contribution” takes the form of a levy on turnover, which is applied to all licensed PTOs, rather than a spectrum charge *per se*. However, as the levy is not based on the NRA’s costs and is the dominant factor in determining the total payments by GSM licensees we have treated it as a spectrum charge for the purposes of the case studies.

Close co-operation and good communication between such organisations is essential if the licensing process is to be straightforward and transparent to the licensee.

Transparency is to some extent dependent upon the volume of information that each NRA places in the public domain (commonly now on a web-site). Most NRAs offer extensive information, including details of fees and charges and their national frequency allocation tables (FATs), on their web sites, requiring the licensee to have only minimal contact with officers of the NRA. However, this is not always the case. For example Germany and Greece have not yet published their FATs and in the case of Greece fees and charges information is only available via the national Official Gazette. The process of obtaining information can also be made more difficult where information is spread over two or more organisations' web sites and we would encourage NRAs to develop integrated information portals relating to licensing and spectrum issues. There would seem to be a good case for further harmonisation in the type of information provided by NRAs in relation to fees and charges, and the manner in which this information is presented, perhaps building upon the existing ETO Licensing Database initiative[25].

One area where there appears to be a deficiency in all Member States is with regard to costs and how these are apportioned to specific administrative or spectrum fees. We note that the Netherlands has established a cost model which is available for public inspection, but this currently requires a visit to the NRA's headquarters. In other Member States, details of cost apportionment to specific services do not appear to be available at all. We recommend that, as far as possible, NRAs be encouraged to make this information publicly available, and that the information be regularly updated. We note in this regard that the proposed new Authorisations Directive requires that where national regulatory authorities impose administrative charges, they must publish a yearly overview of their administrative costs and the charges collected (Article 12.2).

With regard to the licensing process itself, the study has identified a number of different approaches taken by EU Member States to the licensing of radiocommunication services using spectrum. Some countries have recently introduced new legislation as part of the liberalisation process, which establishes a single licensing regime for networks, services and spectrum. Thus in Belgium, Greece, Spain, France, Luxembourg and Finland, the right to use spectrum is embodied in the network licence for public telecommunication networks, although there may still be a need for a separate spectrum licence or authorisation in the case of non-public networks. Ireland, Austria, Sweden and the UK require separate service and spectrum licences for public telecommunication networks, but only a

[25] The ETO provides an on-line licensing database, which provides information in a standard format relating to licensing regimes and procedures in those NRAs, which participate. The database can be accessed on the web at www.eto.dk

spectrum licence for private networks. Denmark currently requires a licence to establish and operate mobile communications networks (though no fee is payable for this and there are plans to discontinue the requirement) and to use frequencies for such networks. The Netherlands does not require any individual licensing for networks or services but a radio spectrum licence is required.

Regardless of the licensing regime applied, all Member States apply administrative fees of some description, in some cases for spectrum licences and in some cases for network / service licences. The latter only apply to public telecommunications networks, but where administrative fees are applied for spectrum licences they generally apply to all service categories.

In those countries that do not apply administrative fees for spectrum licensing, relevant costs are recovered either by means of spectrum fees or administrative pricing, the latter producing a surplus over actual costs. For spectrum fees, all the NRA's relevant costs are recovered from all the licensees, but the amount recovered from individual licensees is a function of the amount and type of spectrum resource that is licensed.

Whilst there may be administrative benefits in an integrated licensing regime combining networks, services and spectrum, from the evidence gathered for the study there does not seem to be any significant bearing on the overall level of fees and charges. However we do feel that there would be merit in greater clarity and consistency in the licensing requirements for networks, services and spectrum. We also consider that there would be transparency benefits in clearly identifying spectrum "rights of use" as defined in the new Directive, by separating spectrum licensing from the authorisation of services or networks. In this way charges relating to scarce resources could be clearly distinguished from administrative fees relating to service or network authorisations. This process is likely to be assisted by the approach adopted in the draft new EU regulatory framework, under which the provision of electronic communications services and networks may only be subject to general authorisations, except (where necessary) for rights of use for radio frequencies and numbers.

## 5.4 Approaches to setting administrative fees

### 5.4.1 The Principle

Although all Member States claim to set administrative fees on a cost basis, there are two significantly different approaches to how this is done in practice. The first is to set a fixed fee, broadly reflecting the costs associated with the licence or licence category. This fee may be either a once-off fee to cover the costs of preparing and issuing the licence, or an annual fee to cover the ongoing costs associated with maintenance and enforcement of the licence. In practice both once-off and annual fees are usually applied. The second is to apply a levy each year based on the

licensee's turnover. The cumulative revenue from the levy is intended to cover the ongoing costs of the NRA associated with the licensing process. Note that in most Member States administrative fees are applied only to public telecommunications networks and that this is always the case where a levy is applied.

Where a levy is applied, this can result in the revenue derived from a particular licence or licence category significantly exceeding, or in some cases being significantly less than, the actual costs associated with that licence or licence category. However, if the total revenue raised in this way is based on the NRA's total costs then this can support the objective of promoting market entry and enhancing competition, by reducing the fees payable by smaller operators or service providers and by those in the early stages of network rollout.

### 5.4.2 The issues

Our main concern regarding administrative fees is the lack of clarity in many Member States regarding how these fees are set. In some cases (e.g. Germany and Ireland), costs for specific processes such as beauty contests are passed directly to licensees, however in most cases costs are notionally apportioned to a broad category of licences with little or no explanation of how this is done. Some NRAs have attempted to improve transparency, e.g. the Netherlands has developed a detailed cost model which can be inspected by licensees at the RDR's premises. Most NRAs which apply levies have provision to vary the percentage applied in line with variations in the total NRA costs (this requirement is included within the current draft text of the Authorisation Directive). However, in other cases arbitrary increases are applied which do not always appear to bear any direct relation to the costs incurred (e.g. in France administrative fees are doubled where beauty contests are involved).

In general, we would recommend that where specific costs can be determined, such as those associated with beauty contests or frequency co-ordination, these be identified and applied separately from other, indirect costs which cannot be directly related to specific licence categories. However, we recognise that there may be occasions when other objectives, such as the desire to promote competition and encourage new entrants into the market, justify a more judicious or selective approach to cost apportionment. Hence we would not recommend the mandating of any specific approach to cost apportionment for fee setting, but would encourage NRAs to provide greater detail of their costs and how these are apportioned in broad terms.

The issue of indirect costs also requires addressing. It is apparent that a regulator will incur a number of indirect costs (e.g. participation in international standards or regulatory fora) if a high quality spectrum management process has been established. It is believed that the costs incurred in such activities as described in section 3.2.4. could be recovered from the licensing process and that regulatory mechanisms should reflect this requirement.

We would re-iterate the conclusion of a recent ETO Study for the EU[26], which recommended that NRAs acquire a detailed knowledge of the costs they incur for licensing, frequency management and numbering. We would further recommend that NRAs publish details of their cost accounting methods to enable greater transparency in the setting of cost-based fees for specific individual licences or licence categories. However, as previously noted the apportionment of indirect costs to specific licence categories is a complex issue and one that is likely to merit further study in the future. This is particularly important in the context of Article 12.2 of the proposed new Authorisation Directive, which requires national regulatory authorities to publish a yearly overview of their administrative costs and of the total sum of the charges collected, and make appropriate adjustments accordingly.

### 5.4.3 Levies

A number of Member States (Greece, Spain, Ireland, Italy, Austria, Sweden and the UK) apply levies to telecommunications operators, based on the operators' turnover. In Italy, a levy is applied to all licensed telecommunications operators, including GSM operators (who do not pay a separate spectrum charge), which greatly exceeds administrative costs, whereas in other countries the levy (which is also applied to all licensed telecommunication operators) is intended only to cover the NRAs' costs. Hence the Italian levy is significantly higher (currently 2.5% per annum but reducing progressively by 0.5% each year) than the levies applied elsewhere (between 0.08 and 0.5%). As far as levies designed to cover administrative costs (which apply elsewhere) are concerned, whether applied to a category of licensees or to all licensed operators, such a mechanism appears in practice to be a reasonable way to distribute administrative costs. In particular, it reduces the burden on new entrant operators in their start-up phase and while developing innovative services at low penetration rates.

The application of levies is not specifically addressed by the current Licensing Directive, but is referred to in the Council's common position on the proposed new Authorisation Directive, recital 31 of which states that:

> *"Systems for administrative charges should not distort competition or create barriers for entry into the market. With a general authorisation system it will no longer be possible to attribute administrative costs and hence charges to individual undertakings except for the granting of rights to use numbers, radio frequencies and for rights to install facilities. Any applicable administrative charges should be in line with the principles of a general authorisation system. An example of a fair, simple and transparent alternative for these charge attribution criteria could be a turn-over related distribution key. Where administrative charges are very low, flat rate charges, or charges combining a flat rate basis with a turn-over related element could also be appropriate..*

[26] "Fees for Licensing Telecommunications Services and Networks", October 1999

It should be noted that while levies already represent current practice in certain Member States, they are expected to be even more appropriate in an environment where general authorisations become the norm, since it will not be possible in such circumstances to apportion costs directly on the basis of costs associated with individual licences. However it will be important to ensure that there is provision to adjust the rate of the levy to reflect changes in the NRA's cost base and the total revenue of the licensed telecommunications operators.

## 5.5 Approaches to setting spectrum fees and charges

### 5.5.1 The principle

Spectrum fees and charges come in a variety of forms, with different forms being more or less popular for licensing different applications. 3G licenses are by far the most common subject for auction, whilst both GSM and WLL licences have more commonly been issued following beauty contests, with only Greece, Austria and the UK adopting auctions. Fixed links and satellite earth stations are generally licensed on a first come first served basis and are subject either to administrative pricing, cost-based spectrum charges or administrative fees. The difference between administrative fees and what we have defined in this study as “spectrum fees” is perhaps rather subtle, since both are nominally based on costs. However, because spectrum fees link the amount paid to the bandwidth and/or frequency band, for some links and earth stations the payment can be many times more than the likely costs associated with the individual licence. In our view such an approach has more in common with administratively set spectrum charges than with purely cost-based administrative fees. There would also seem to be a strong link between the concept of charging on a per-bandwidth basis and the promotion of optimal use of scarce resources, which the Licensing Directive deems to be a function of spectrum charges. Furthermore, it is interesting to note (see figures 4.12 and 4.13) that the level of charges for fixed links and satellite earth stations in Member States using cost-based charging is generally comparable to those using administrative pricing, presumably as a result of the approach to apportionment of the overall NRA costs (although as already noted there is generally little or no information on how this is done).

In general, our view is that efficiency, in the sense of maximisation of transmission capacity, can be encouraged by applying charges that take account of the bandwidth and the frequency band which is being used. The following table summarises which Member States take these factors into account when setting charges, and for which services. It can be seen that all Member States, except Denmark and Germany, take frequency band into account for at least some of the services, and all except Sweden take bandwidth into account for at least some of the services. However, there is little consistency in how these parameters are applied to each service.

| Member State | Services charged according to bandwidth | Services charged according to frequency band |
|---|---|---|
| B | All | WLL, Fixed Links |
| DK | All | None |
| D | GSM | None |
| EL | Fixed Links, Satellite | Fixed Links, Satellite |
| E | All | All |
| F | GSM, WLL, Fixed Links | GSM, WLL, Fixed Links |
| IRL | All | GSM, Satellite |
| I | Fixed Links, Satellite | Fixed Links |
| L | GSM, WLL, Fixed Links | WLL, Fixed Links |
| NL | All | Fixed Links, Satellite |
| A | GSM, Fixed Links | Fixed Links |
| P | Fixed Links, Satellite | Satellite |
| FIN | GSM, 3G mobile, WLL | GSM, 3G mobile, WLL |
| S | None | Fixed Links, Satellite |
| UK | GSM, WLL, Fixed Links, Satellite | GSM, WLL, Fixed Links, Satellite (from Oct 2001) |

Only Spain currently takes both bandwidth and frequency into account for all services. In some Member States (Germany, Greece, Austria and the UK), services for which licences have been auctioned do not generally attract further spectrum charges (this also applies in France where a beauty contest was held) and this explains the absence of those services from the table. In Portugal and Sweden, mobile networks are charged on the basis of the number of base stations rather than bandwidth, although we note that Portugal is planning to move away from this in favour of a bandwidth - based charge. Italy also has plans to phase out its current turnover-based levy on licensed telecommunications operators, which is expected to lead to the introduction of a spectrum charge for GSM operators.

### 5.5.2 Scarcity

The Licensing Directive and (in a more limited way) the new Authorisation Directive both make reference to the term "scarce resources", with reference to radio spectrum. However, there is no clear definition of what constitutes a scarcity of spectrum. Our view is that scarcity becomes a factor when there is a realistic probability that at some point in the foreseeable future demand for spectrum in a particular frequency band and in a particular geographic area may exceed supply. However, we recognise that other factors may also influence an NRA's approach, for example where the allocation of spectrum to a particular service reduces the spectrum available to other services, there may be a case for applying a higher charge to reflect the opportunity cost associated with the allocation.

It is noted that the proposed new Authorisation Directive appears to place less emphasis on scarcity than the current Licensing Directive, in that there is no specific reference to scarce resources in the substantive text, although this is perhaps implicit in Article 5's reference to "efficient use of resources". Scarcity is referred to in recitals 11 and 22 of the proposed new Directive, which state that:

*(11) "…rights of use should not be restricted except where this is unavoidable in view of the scarcity of radio frequencies and the need to ensure the efficient use thereof. "*

*(22) Where the demand for radio frequencies in a specific range exceeds their availability, appropriate and transparent procedures should be followed for the assignment of such frequencies in order to avoid any discrimination and optimise use of those scarce resources.*

### 5.5.3 The Issues

It can be argued that efficient use of spectrum can be achieved by means other than spectrum charging. For example, limiting the amount of spectrum available for a service, or making additional spectrum available only on a "demonstrable need" basis, perhaps based on achieving a certain traffic level with the initial spectrum allocation, may be just as effective. It must also be remembered that the spectrum charge is only likely to make a contribution towards efficiency when the level of the charge becomes comparable to the cost that would be incurred by foregoing the spectrum. This cost is likely to comprise two main elements, namely the cost of additional infrastructure to enable to compensate for the smaller spectrum holding (by using this spectrum more intensively than would be necessary if more spectrum were available), and the potential loss of revenue resulting from any reduction in network capacity .

Administrative pricing, as used in Spain and the UK takes account of these costs in determining an appropriate spectrum charge, for example in the UK spectrum charges are based on the least cost alternative to additional spectrum for each of the various services. It is interesting to note that, where cost-based spectrum fees are applied rather than administratively set spectrum charges, the actual levels are often similar. This suggests that the apportionment of costs on the basis of the spectrum resource could have a similar impact on spectrum utilisation to administrative pricing, depending upon how these costs are apportioned. It is arguable that where cost-based spectrum fees are apportioned such that some users pay significantly more than the costs associated with their licences, this is itself a form of administrative pricing and the boundary between fees and charges is thus blurred to some extent.

The role of spectrum charging as an incentive towards efficient spectrum use varies between services, as the next paragraphs illustrate.

### 5.5.4 Mobile

The case study results indicate that for GSM, with the exception of three Member States (Denmark, Germany and Sweden) charges appear to have been set at a level comparable with the least cost alternative (see section 4.2.3) and are therefore in principle apt to promote efficiency as defined in this study. There is however a wide variation between Member States in the actual level of fees paid, even when

normalised to take account of different national populations. Our case study indicates that the total equivalent annual payment for a typical GSM operator (based on a dual band network with 2 x 10 MHz of GSM 900 spectrum and 2 x 15 MHz of GSM 1800 MHz spectrum, with once-off costs amortised over the life of the licence) varies between € 382,000 in Denmark and € 104million in Italy (if one includes the levy on the turnover of licensed operators), though the latter is likely to fall in coming years as the current 2.5% levy is progressively reduced. When normalised on a population basis, the total annual payment per capita varies between €0.56 in Sweden and €38 in Luxembourg (the figure for Germany is currently even lower at €0.09 per subscriber but that is due to delay in agreeing the amount of the initial licence fee to be paid by the operators). The total annual payment for an operator with such a GSM network in every Member State would amount currently to € 303 million.

For 3G mobile, spectrum charges are in general significantly higher, reflecting the large sums paid at auction in some Member States (see section 4.7)

It is clear from the study that there is an enormous variation in the level of fees and charges, even when these are normalised on a per subscriber basis. In part this reflects the variation in policies between NRAs, faced with the realisation in recent years of the potentially huge economic value associated with radio spectrum. Contrast the approach used by Sweden to 3G licensing with the recent adoption by other NRAs of market based allocation methods (auctions) which resulted in a sharp increase in the total revenue gained from licensing spectrum.

According to our 3G mobile case study, equivalent annual payments for a network comprising 2 x 15 MHz of paired spectrum and 5 MHz of unpaired spectrum vary between € 745,000 in Sweden and € 517 million in Germany. Normalising these on the basis of population yields a range of €0.56 per capita (Sweden) to €64 in the UK. It is probably too early to say whether the generally higher charges for 3G mobile will be reflected by correspondingly higher infrastructure costs and increased revenues for the operators.

#### *5.5.4.1 Approach to 3G mobile licensing*

Current approaches applied to 3G mobile licensing have also highlighted that when market based allocation methods (auctions) are adopted, the value attached by market players to radio spectrum may be different at different points in time and in different geographic markets. In practice, the value of radio spectrum is likely to be determined by expectations of the services that it can provide and the amount that users are willing to pay for those services. Such a value can be quantified with reasonable confidence in the case of familiar services such as voice telephony (e.g. by analysing historic data or conducting willingness to pay surveys). For services which do not yet exist, such as those which may be delivered over 3G mobile networks, there is much greater uncertainty and this is reflected by the wide range

of the amounts raised at auctions for similar 3G mobile licence packages in different Member States.

Auctions can therefore highlight the differences in perceived value between different spectrum assignments intended for the same application. A good case in point is the difference between paired and unpaired 3G mobile spectrum. In the German auction, bidders were prepared to pay 33 times more for paired spectrum than for unpaired, reflecting Industry expectations that the paired spectrum would have greater utility and would also be the first spectrum to be addressed by equipment vendors. Of course, the relative values of these spectrum types could change in the future as and when equipment becomes available and 3G mobile services are launched, and it is possible that the prices paid at auction may greatly over or under estimate its ultimate economic value. In the meantime it is interesting to note that none of the Member States applying pre-determined spectrum charges have distinguished between paired and unpaired spectrum.

It is worth remarking that the use of auctions implies a specific interpretation of the Licensing Directive's objective to promote the efficient use of scarce resources in that it is assumed that those who are prepared to bid the greatest amount for the spectrum are those who will make the most efficient use of it. In this study we have defined efficiency as "the conveyance of the maximum amount of voice, data or other traffic within a given geographic area and with a given amount of spectrum" (see section 3.1). However, a licensee may regard efficiency more in economic terms, i.e. maximising the profit that can be generated as a result of using the spectrum. In a truly competitive market, these two definitions should be mutually compatible, since by maximising the traffic capacity more revenue can be generated and hence more profit. But in a monopolistic or oligopolistic environment there is a danger that profit could be maximised by reducing costs and maintaining high tariffs, rather than maximising network capacity.

#### *5.5.4.2 The impact of beauty contests*

Because beauty contests typically involve judging applicants on the basis of their proposed service offering, e.g. roll out and coverage commitments, it can be argued that lower spectrum charges in such cases may be offset by the higher infrastructure costs relating to such commitments. Providing the means exist to enforce the licence commitments, this approach would appear still to be compatible with the objective of promoting efficient use. In the case of beauty contests, the Licensing Directive's objective to promote the efficient use of scarce resources may be interpreted more broadly than a simple maximisation of transmission capacity in the available spectrum, for example taking account of social or economic considerations.

### 5.5.5 WLL

WLL fees and charges also show a wide variation, and their impact is likely to be even more uncertain given the current immature state of the WLL market. According to our case study, the total equivalent annual payments for a broadband WLL network comprising 2 x 56 MHz in the 26 GHz band varies between € 78,000 in Denmark and €10.8 million in Spain. Interestingly, one of the lowest amounts arises in Austria (€92,000), one of the three Member States to use an auction for the licensing process, confirming that this approach does not necessarily lead to higher charges. The total annual payment per capita varies from €1.13 in Austria to €58 in Luxembourg.

It is difficult to judge the appropriateness of WLL spectrum charge levels when few networks have yet commenced service. However, when account is taken of the much lower penetration levels that are likely given the competition from wireline networks, the levels per subscriber indicated by the case studies (section 2.4.3) appear to be comparable to those for GSM and hence likely to strike a reasonable balance between promotion of efficiency and promotion of competition (by not placing an undue burden on new operators).

### 5.5.6 Fixed Links

As with mobile and WLL services, there is a wide variation in fee and charge levels around the EU, with the total annual equivalent payment for a 28 MHz link operating in the 4 GHz band ranging from €87 in Sweden to over €14,000 in Portugal (assuming a 50 km link length). However, most Member States take bandwidth and/or frequency band into account in setting charges, and the case study results (section 4.6.3) show that, with the exception of Germany, Finland and Sweden the spectrum charge is broadly set at a level which is likely to make up a significant proportion of the total annual running costs of fixed links. Whilst this is consistent with the “least cost alternative” principle and the Licensing Directive objective to promote optimal use of scarce resources, it should be remembered that, unlike national mobile or WLL licences with exclusive spectrum assignments, scarcity of spectrum for fixed links is not universal.

Because of the physical properties of the various fixed link frequency bands, the uneven geographic distribution of demand for fixed link services, and the fact that most fixed link bands are shared on a first come, first served basis between many users, scarcity only arises in specific areas and frequency bands. Hence both of these factors should ideally be taken into account when setting spectrum charges if the objective is to apply charges only where scarcity is a factor. Whilst the majority of Member States take account of the frequency band, only two (Spain and the UK) currently take geographic location into account, by defining congested and non-congested areas. Failure to take this into account could have the effect of deterring service provision in remote areas where radio can provide the only viable solution, by imposing additional costs on the operators, It is also questionable whether the

application of above-cost charges for fixed links in regions and/or frequency bands where there is no scarcity is compatible with the Licensing Directive.

In several member states spectrum fees are applied to fixed links, where these are apportioned on the basis of the bandwidth and/or frequency licensed, but with reference to the overall costs of the NRA. In general, the level of such spectrum fees is comparable to the spectrum charges applied by other Member States who apply administrative pricing, implying that fees set in such a manner may have a similar effect on spectrum utilisation to administratively set charges. This finding also suggests that whilst the total revenue generated from such spectrum fees may be set at a level consistent with NRA costs, the fees applied to individual fixed links may in some cases be very much higher than the actual costs associated with licensing those links, especially where large bandwidths and/or low frequency bands are involved. Conversely fees for narrow band / high frequency systems may be lower than the actual licensing costs. Apportionment of costs in this manner could arguably be considered to be a form of administrative pricing, albeit constrained in that total fee revenue from all services cannot exceed the total NRA costs.

### 5.5.7 Satellite earth stations

Satellite earth station fees and charges also vary considerably around the EU. For example, total equivalent annual payments for a narrowband (150 kHz) VSAT system comprising a hub and 30 transmitting terminal stations vary from €133 in Spain to €14,000 in Austria. A similar spread arises in the case of Broadband systems (20 MHz), though as one would expect the absolute values are somewhat higher, ranging from €1,425 in Denmark to €237,000 in Portugal.

Satellite earth stations are relatively expensive installations (typically around €100,000 for a VSAT hub station and € 5,000 - €10,000 for each terminal) and are also subject to significant bandwidth related charges for access to satellite transponder capacity (between €2 and €9 million per year for broadband systems[27]). Hence the level of charges for these stations, with the possible exception of those applied in some Member States for broadband (20 MHz) installations does not generally seem to be a significant element of overall capital and running costs. Spectrum charges for satellite services need to be considered alongside other costs related to scarce resources, notably the transponder capacity, and we recommend that further study be conducted into this aspect of costs for satellite earth station operators, and their impact on promoting optimal use of the scarce resources.

### 5.5.8 Comparison between services

As well as the wide variation between fee and charge levels in individual Member States, there is also significant difference in the levels applied to individual services

[27] Source: Satellite Today 2000 survey of Fixed Satellite Services Regional Leasing Rates.

within Member States. It is interesting, for example, to compare the total amounts that an operator would have to pay in licence fees and charges to operate typical GSM, 3G mobile and WLL networks in all Member States. Based on our case study results, the total amount payable to operate a dual-band GSM network in all fifteen Member States would be € 322 million per annum. For 3G mobile, this figure increases to €1.82 billion per annum, and this figure does not include Luxembourg or Ireland where licences have not been let at the time of writing. For WLL, the figure is just €20.1 million per annum (again this figure excludes those Member States - Italy, the Netherlands and Sweden - that have not yet licensed WLL).

Although there are significant differences between the levels of charges for the services, there is in general a consistency towards how the charges are set. For mobile and WLL charges, the amounts generally take account of the bandwidth licensed (with the exception of Italy, Portugal and Sweden, and those countries where auctions have been held, though in the latter case it can be argued that bandwidth would be a key factor in determining the amount bid). There is less consistency with fixed link and satellite earth stations, where some Member States (Germany, Finland, Sweden) apply only administrative fees which take no account of the spectrum resource used and with consequently very low fees, particularly for broadband fixed links.

The generally lower fees applied to WLL is in our opinion justified by the very different competitive environment in which these services operate. Whereas all mobile services must use radio spectrum, and are generally at liberty to set tariffs in line with what the market will tolerate, WLL operators must compete against established fixed line incumbents who may also be subject to price caps set by the regulator and hence have much less flexibility in setting tariffs as well as having much more limited market share prospects.

Our conclusion is that while in general there is merit in ensuring that all spectrum charges take account of the amount of spectrum licensed and its physical properties, it is also important to take account of the nature of the services that will be provided, including the availability of alternative platforms and the desirability of promoting competition / market entry. This would for example support the application of lower charges in the case of WLL, but the situation is less clear in the case of 3G mobile where there may be significant overlap between the services offered and those offered by evolved GSM technologies such as GPRS or EDGE.

In the case of fixed links and satellite earth stations, where licences are let on a “first come, first served” basis, administrative pricing provides a means to encourage users to adopt frequency bands which are not congested by reducing the associated charges, and conversely applying additional charges to deter inefficient use of scarce frequency bands. These issues may also be pertinent to mobile services as well in some instances, e.g. the distinction between the GSM 1800 and GSM 900 bands, and can also be applied to other services such as Private Mobile Radio (PMR), which are outside the scope of this study.

A key issue for fixed links and satellites is whether scarcity is likely to arise in the bands and/or geographic areas concerned. Where there is a likelihood of scarcity, we would encourage the adoption of charging schemes based on bandwidth and frequency (as is already the case in most Member States), although we feel that the situation is less straightforward in the case of satellite services because of the additional dimension of orbital resources. Hence we believe that further study may be appropriate into the most effective way to manage satellite capacity, taking account of both spectrum and orbital constraints.

Currently only Spain and the UK apply administrative pricing to all services, although we note that a number of other countries (Ireland, the Netherlands, Portugal and Finland) are considering the introduction of administrative pricing in the future. Where administrative pricing is deployed, there may be a case for considering "positive discrimination" in the form of below-cost fees and charges in areas where it is socially or economically desirable to encourage service provision. The application of administrative pricing is itself a complex issue and one that probably merits further study at a European level.

## 5.6 Summary of Findings and Key Recommendations

The study has highlighted that there are considerable variations of process and practice amongst Member States in the setting of fees and charges related to spectrum. These include:

- a wide variation both in the levels of fees and charges for telecommunications services using spectrum and the manner in which they are determined
- a significant degree of inconsistency in the licensing process, both organisational and procedural, creating a potential barrier to entry for new licensees, and an overhead for existing users wishing to operate across the Community
- a wide range of terminology used by NRAs to refer to specific fees and charges. This may lead to confusion on the part of licensees and affects transparency in that it becomes difficult to make meaningful comparisons between charging regimes in different Member States.
- a lack of clarity regarding how costs are apportioned to specific licensees or licence categories, although all Member States claim to be operating a cost recovery regime consistent with the current Licensing Directive.
- in the case of fixed links in particular, a blurring of the distinction between cost-based spectrum fees and administratively set spectrum charges, depending on how overall costs are apportioned to individual licences. Where spectrum fees are set with reference to NRA costs the amounts are often comparable to administratively set spectrum charges applied in other Member States. Where large bandwidths and/or low frequency bands are involved, such fees are likely to be significantly greater than the costs associated with the licences concerned,

implying that an element of administrative pricing is being factored in to the cost apportionment process.

- Different licence allocation methods adopted, especially for mobile services, may imply different approaches to meeting the objective of promoting efficient use of spectrum contained in the Licensing Directive.

Our key recommendations emerging from the study are as follows:

i) The Commission and Member States should endeavour to harmonise definitions in respect of terms associated with national fees and charges regimes, to aid transparency, along with the availability of information on spectrum fees and charges published by NRAs This is an objective recognised in the draft Spectrum Decision. The current One Stop Shop facility developed by the ETO could provide a useful framework for making such information available on a structured and harmonised basis for all Member States. We would also recommend further harmonisation of the type of information provided on fees and charges by NRAs, perhaps modelled on the existing ETO Licensing Database.

ii) We consider that there would be transparency benefits in clearly identifying rights of use for spectrum within the meaning of the new Authorisation Directive, by separating individual rights to use spectrum from service or network authorisations, thus enabling charges relating to scarce resources to be clearly distinguished from cost-based fees relating to service or network licences. We note that this should be achieved, at least partially, by implementation of the new Framework and Authorisation Directives, which require services and networks to be subject only to general authorisations, with access to spectrum being addressed by individual rights of use.

iii) In general, where specific costs can be identified, such as those associated with beauty contests or frequency co-ordination, these be identified and applied separately from other, indirect costs which cannot be directly related to specific licence categories.

iv) NRAs should endeavour to provide greater detail of their costs and how these are apportioned.

v) Above-cost charging should in general be applied only to geographic areas and frequency bands where there is a reasonable likelihood of congestion arising in the foreseeable future.

vi) Where administrative pricing is deployed, consider the use of "positive discrimination" in the form of below-cost fees and charges in areas where it is socially or economically desirable to encourage service provision.

Further study is recommended in relation to the following issues:

a) The management of satellite capacity, in terms of spectrum and orbital characteristics, particularly in the context of spectrum charges applied to shared frequency bands.

b) Comparison of the relative merits of administrative pricing and administrative rules (e.g. link length policies) in the promotion of spectrum efficiency.

c) Apportionment of indirect costs to individual rights of use and general authorisations.

# A ANNEX A: GLOSSARY

| | |
|---|---|
| **Administrative Fees** | Fees set at a level calculated to recover the costs of the administrative procedures concerned |
| **Administrative Pricing** | Setting spectrum charges which take account of the economic value associated with radio spectrum |
| **ARPU** | Average Revenue per User |
| **Auction** | Process whereby licences are assigned to those applicants offering the most money. |
| **Beauty Contest** | Process whereby licences are assigned to the "best qualified" among those applicants who meet the minimum criteria set by the NRA. Economic criteria are not taken into consideration (applicants do not bid a price). The NRA sets a standard price which may be cost-based or may take account of the economic value of the frequencies assigned. |
| **Beauty Contest with economic criteria** | Process whereby licences are assigned to those applicants who offer the best combination of money, plan and qualifications |
| **Comparative Evaluation** | Alternative term for Beauty Contest |
| **Erlang** | A dimensionless unit of the average traffic intensity (occupancy) of a telecommunications channel during a period of time, usually a busy hour |
| **FAT** | Frequency Allocation Table |
| **First come, first served** | Process whereby spectrum is assigned in order of application, until it is full. In order to contain demand, it is usual to apply rules ("need" criteria) on who may receive assignment, for what uses, and what bandwidth is appropriate for specific uses. The NRA may set a standard price which may be cost-based or may take account of the economic value of the frequencies assigned. This approach is used where spectrum is not scarce and there is no competition for licences. This category includes cases where a mobile licence is assigned to a subsidiary of the incumbent because the latter hold the concession for telecommunications services. |
| **FWA** | Fixed wireless access, alternative term for wireless local loop |
| **FWPMA** | Fixed wireless point-to-multipoint access, alternative term for FWA |
| **GSM** | Global System for Mobile Communications |
| **Hop** | Single point to point link connecting two fixed locations |

| | |
|---|---|
| **IMT-2000** | International Mobile Telecommunications 2000, a family of standards for 3rd generation mobile telecommunications based on ITU Recommendation M-687. |
| **Incumbent Operator** | Telecommunications organisation granted special and exclusive rights by Member States (as defined by the Services Directive[28]) or public operator which enjoyed a de facto monopoly before liberalisation |
| **ITU** | International Telecommunications Union |
| **ITU-R** | ITU Radiocommunications Sector |
| **Licensing Directive** | Directive 97/13/EC of the European Parliament and of the Council of 10th April 1997 on a common framework for general authorisations and individual licences in the field of telecommunications services (OJ ref. L 117, 7.5.1997, page 15) |
| **Local loop** | Connection between a telephone exchange and the subscriber's telephone |
| **Network licence** | Individual authorisation or licence pertaining to the installation and/or operation of a public telecommunication network. |
| **Network operators** | Operators that install, manage and operate their own wire or wireless telecommunications transmission network to provide public telephony services or public network services. |
| **Network services** | The conveyance of calls, messages and signals over a telecommunications network, including any necessary switching; may be interconnection services, which are provided to other network operators, or basic retail network services which are provided to end-users or service providers. |
| **NRA** | National Regulatory Authority |
| **PSTN** | Public Switched Telephone Network |
| **PTN (Public Telecommunications Network)** | A telecommunications network used in whole or in part for the provision of publicly available telecommunications services. |
| **Re-farming** | The re-allocation of radio spectrum (in particular the re-allocation of radio spectrum currently licensed for use with equipment complying with GSM standards to allow the use of equipment complying with a third generation standard. |
| **Service Licence** | Individual authorisation or licence to provide public |

[28] Commission Directive 90/388/EEC of 28 June 1990 on competition in the markets for telecommunications services (OJ L192/10, 24.07.90)

| | |
|---|---|
| | telecommunications services |
| **SDH** | Synchronous Digital Hierarchy (a standard relating to the transmission of broadband digital signals across telecommunication networks) |
| **SI** | Statutory Instrument |
| **SMP** | Significant Market Power |
| **Spectrum Charges** | Charges for the right to use radio spectrum, which reflect the need to ensure the optimal use of scarce resources |
| **Spectrum Fees** | Fees for the right to use radio spectrum, which are set with reference to NRA costs but whose level depends on the bandwidth and/or frequency band to which the right of use relates |
| **Spectrum Licence** | Individual authorisation or licence to use specific radio frequencies assigned or allocated by the NRA |
| **UMTS** | Universal Mobile Telecommunications System: a 3rd generation mobile and wireless communication system capable of supporting in particular innovative multimedia services beyond the capability of 2nd generation services such as GSM and capable of combining the use of terrestrial and satellite components. Member of the IMT-2000 family of 3rd generation mobile standards. |
| **UMTS Decision** | Decision 128/1999/EC of the European Parliament and Council of 14th December 1998, on the co-ordinated introduction of a 3rd generation mobile and wireless communication system (UMTS) in the Community (OJ ref. L 17, 22.1.1999, page 1) |
| **VSAT** | Very Small Aperture Terminal, a technology capable offering two-way internet access. *Conformance to ETSI standard?* |
| **Wireless Local Loop (WLL)** | A wireless connection between a telephone exchange and a subscriber's telephone or data terminal. |

# B ANNEX B: NATIONAL REGULATORY REGIMES FOR TELECOMMUNICATIONS SERVICES USING RADIO SPECTRUM

The following information has been obtained either directly from the NRA concerned or from public sources of information, including NRA web sites and the ETO licensing database.

## B.1 Belgium

The national regulatory authority for telecommunications is the Belgian Institute for Postal Services and Telecommunications (BIPT), established by statute in 1991. BIPT is responsible for the following functions:

- strategic (providing advice regarding post and telecommunications sector policies);
- regulatory (drafting of Belgian regulations and transposition into Belgian law of European directives);
- operational (management of licences, control of equipment and frequencies, unbundling and numbering);
- mediation between operators and monitoring.

BIPT's Frequency Management Service (FMS) is responsible for the daily application and co-ordination of frequencies and long-term policy on frequency plans and frequency readjustments. The FMS works to ensure the correct application of the various international agreements signed by Belgium concerning the use of the electromagnetic spectrum. It also co-ordinates frequencies for satellite links and radio relay links.

The Minister of Communications and Infrastructure is the Head and legal representative of IBPT/BIPT, although its day-to-day management is delegated to a Managing Director. All formal decisions are taken by the Minister, who is answerable to the Belgian Parliament, on the basis of proposals drawn up by IBPT/BIPT.

## B.2 Denmark

In principle all telecommunications licensing in Denmark is handled by the Minister of Research under the guidance of the Ministry of Research and Telestyrelsen (the National Telecommunications Agency – NTA). In practice, most executive powers regarding telecommunications have been delegated to the NTA. Thus the NTA administers and issues all radio licences.

Denmark does not require any individual licence/authorisation requirements or notification procedures to operate public fixed telecommunications networks. Operators apply only for numbers. A licence is currently required for the establishment and operation of mobile communications networks as well as for the

use of frequencies, however no fees are charged for the network licence and there are plans to discontinue this requirement.

## B.3 Germany

The Regulatory Authority for Telecommunications and Post (RegTP) is the higher federal authority responsible for telecommunications regulation, and falls within the scope of the Federal Ministry of Economics and Technology. This structure was created under the Telecommunications Act of 1st August 1996, superseding the Federal Ministry of Posts and Telecommunications. RegTP is responsible for promoting the development of the postal and telecommunications markets through liberalisation and deregulation.

The levels of fees and charges are set by the Minister for Economics and Technology, based on the recommendation of RegTP and in consultation with the Federal Ministry of the Interior, the Federal Ministry of Finance, the Federal Ministry of Justice and the Federal Ministry of Economics.

Users of radio spectrum are required to make an annual contribution to cover RegTP's expenditure on the planning and updating of frequency usage including the necessary measurements, tests and compatibility studies to ensure effective, interference-free frequency usage. This contribution excludes costs for which a fee has already been levied. Contribution rates shall be such that staff costs and other expenditure associated with the official acts are covered. The shares in the overall costs are allocated, as far as possible on a market-related basis, to individual frequency allocations. Within these allocations the contribution is apportioned based on the number and, if applicable, the bandwidth of the frequencies used as well as the number of transmitters operated.

## B.4 Greece

Under the existing laws, the Ministry of Transport and Communications (MTC) is responsible for the allocation and management of the frequency spectrum, including monitoring and interference management. MTC is also responsible for developing Greek telecommunications policy, market supervision, introducing legislation and promoting standardisation. The Ministry Department responsible for telecommunications issues is the General Secretariat for Communications.

However, recently a new law has been adopted transferring licensing powers from the MTC to the National Telecommunications and Post Commission (EETT). Parliament is shortly expected to pass a new Telecommunications Act consolidating the existing rather dispersed laws and regulations and transferring the remaining regulatory powers to the EETT, exercised so far by the MTC. The latter will retain responsibility for drafting legislation and setting policy objectives. Spectrum management and frequency allocation, exercised at present by the MTC will be transferred to the EETT.

EETT is the National Regulatory Authority, which supervises and regulates the telecommunications as well as the postal services market. EETT's institutional purpose is to promote the development of the two sectors, to ensure the proper operation of the relevant market in the context of sound competition and to provide for the protection of the interests of the end-users. EETT is an independent self-funded decision-making body.

Established in 1992 by Act 2075 under the name The National Telecommunications Commission (EET), EET actually commenced its operation in summer 1995. It was primarily responsible for the supervision of the liberalised telecommunications market. Moreover, since the adoption of Act 2668/98, which provides for the organisation and operation of the postal services sector, EET was entrusted with the supervision and regulation of the postal services market and was renamed as National Telecommunications and Post Commission (EETT).

EETT is a nine-member body, selected by the Parliament's Chairmen Committee and appointed by the Minister of Transportation and Communications. EETT members enjoy absolute independence in the performance of their duties. Under the new Law, EETT will be responsible for, among other things:

- market supervision
- assigning individual radio frequencies, on the basis of MTC's relevant allocation and management plan
- to submit proposals to MTC on issues of national telecommunications policy and legislation
- to supervise the observance, by the parties concerned (telecommunications enterprises, etc.), of the provisions and rules pertaining to the use of radio frequencies, quality of service, competition, tariffs (to ensure that they are appropriate and fair), protection of users' rights and the equal treatment of telecommunications enterprises (including service providers) and users
- to impose administrative fines and/or penalties when the rules governing the exercise of telecommunications activities are violated

## B.5 Spain

Since March 2000, the Ministry of Economic Affairs has been responsible for tariffs and for supervision of the Telecommunications Market Commission (Comisión del Mercado de las Telecomunicaciones - CMT), while the State Secretariat of Telecommunications and the Information Society (SETSI), which forms part of the Ministry of Science and Technology, is responsible for regulation, spectrum management, activities relating to the information society, external relations and supervision of telecommunications operators. SETSI is also responsible for policy making and issuing licences. SETSI deals with applications for radio spectrum licences.

CMT is an independent regulatory body which arbitrates in disputes between network operators and service providers, advises the SETSI on tariffs and regulatory proposals, promotes competition and deals with applications for telecommunications service licences.

## B.6 France

There is a three-tier regulatory structure in France:

The Ministry of Economics, Finance and Industry, Directorate General for Industry, Information Technology and Posts has general regulatory powers including the formal issuing of public licences and supervision of the activities of the incumbent operator (France Telecom). The Ministry is responsible for determining frequency fees.

The Telecommunications Regulatory Authority (ART**)** is responsible for national regulatory matters including licensing and competition. The ART is also responsible for the attribution of frequency bands to the telecommunications users and for the technical condition for use of these bands.

The National Frequency Agency (ANFR) is responsible for planning, managing and monitoring the use of the radio spectrum by both public and private users. It is also responsible for representing France within international fora such as ITU and CEPT.

## B.7 Ireland

The Office of the Director of Telecommunications Regulation (ODTR) is the independent regulator and national regulatory authority in Ireland. ODTR is responsible for licensing the use of apparatus for all radio applications except those used by the military. It is also responsible for issuing and enforcing telecommunications service licences. The Department of Public Enterprise (DPE) is responsible for telecommunications regulatory policy and policy issues relating to the Radio Frequency Spectrum.

## B.8 Italy

The Italian Communications Authority (AGCOM) , established in July 1997, is responsible for, among other things:

- defining licensing procedures
- awarding licences
- frequency planning
- advising the Ministry in the assignment process.
- The Ministry of Communications is responsible for assigning the allocated frequencies to the operators. The General Directorate for Planning and Frequency Management within the Ministry is responsible for spectrum planning for telecommunications.

## B.9 Luxembourg

The Luxembourg Institute of Regulation (ILR) is the NRA responsible for supervising the telecommunications market. It reports directly to the Communications Minister although it is administratively and financially independent. Its responsibilities include:

- Monitoring the telecommunications sector, ensuring access to networks and services for all and aiding interconnection between networks.
- Issuing of licences and management of licensed services.
- Consumer protection.
- Advising the Minister of Communications.
- Management of scarce resources including frequency spectrum and numbering.

The Ministry has general regulatory power for communications and is responsible for preparing government policy on telecommunications affairs as well as the final granting of licences, after analysis of the applications by ILR. The ILR was formerly known as the Luxembourg Institute of Telecommunications until recent legislation added responsibility for the Gas and Electricity utilities to its remit.

## B.10 Netherlands

The Netherlands Radiocommunications Agency (RDR), an agency of the Ministry of Transport, Public Works and Water Management, is responsible for implementing government policy on spectrum related matters. Its main tasks include frequency management, standardisation of radio equipment and enforcing national frequency arrangements.

The Ministry of Transport, Public Works and Water Management Directorate General for Posts and Telecommunications, which is responsible for determining spectrum policy.

Ministry of Culture and Science is responsible for regulating the broadcast industry and managing beauty contests in accordance with DGTP. This Ministry is also involved in spectrum auctions, but in case of auctioning spectrum for the radio- and television-industry, the Ministry of Transport Public Works and Water Management is than responsible for running the auction process in accordance with the Ministry of Culture and Science (the other way round)

**Note:** From July 2001 RDR became part of the Transport and Water Management Inspectorate, grouping together five departments involved with inspection.

## B.11 Austria

The following organisations are involved with authorising telecommunications services using radio spectrum and the operation of radio stations in Austria:

**Rundfunk und Telekom Regulierungs-GmbH (RTR GmbH, formerly Telekom Control)** RTR GmbH is a limited liability company whose shares are owned by the state. RTR GmbH is responsible for all regulatory functions that are not fulfilled by Telekom-Control Commission (like numbering, disputes with end-users).

**Telekom-Control Commission (TKK)** Responsible for granting, withdrawal and revocation of licences, approval of general terms and conditions and tariffs of companies with significant market power, determination of the financial compensation for universal service providers to be paid from the universal service fund, determination of the telecommunications service providers to be classified as having significant market power, determination of the interconnection conditions in case of dispute, decisions in connection with violations of bans on cross-subsidising,

The TKK consists of three members appointed by the Federal Government. The chairman of TKK shall belong to the judiciary. As to other two members of TKK, one shall have technological and the other legal and economic expertise. The law forbids that certain persons be a member of TKK, in particular persons "who have a close legal or actual relationship with anyone who makes use of an activity of TKK.

**Regional Telecommunications Authorities (Fernmeldebüro):** Deal with authorisations for operating radio equipment, also monitoring of frequencies and investigation of interference.

**Federal Ministry for Transport, Innovation and Technology (Sektion IV Oberste Post- und Fermeldebehörde):** Supreme Telecommunications Authority, prepares laws and issues ordinances regarding licensing of radiocommunication services in Austria. Responsibilities include: Definition of general policy regarding telecommunications, establishment of regulations regarding telecommunications matters, issuing of basic instructions regarding the activities of the regulatory authority, preparation of the frequency utilisation plan and the frequency allocation plan, issues regulations concerning placing on the market, free circulation and use of telecommunication equipment.

**Büro für Funkanlagen und Telekommunikationsendeinrichtungen:** In the future, this bureau will deal with placing on the market, free circulation and use of telecommunication equipment according to Directive 1999/5. A respective law will enter into force during 2001.

**Frequency Office (Frequenzbüro)** deals with international and national frequency co-ordination.

## B.12 Portugal

The Ministry of Social Equipment is responsible for preparing the governmental policy on telecommunications affairs. The Portuguese Communications Institute-(ICP) is the regulatory body of the telecommunications sector under the Ministry of Social Equipment. ICP's responsibilities include:

- providing support to the Government in the supervision and planning of the telecommunication sector
- management of the radio spectrum
- establishment of a table of frequency allocations and national regulations
- assignment of frequencies
- granting and supervision of licences and authorisations, except when a beauty contest is involved, in which case the Minister is responsible for granting the licences

The Ministry of Social Infrastructure is responsible for setting spectrum charges.

## B.13 Finland

The **Telecommunications Administration Centre (FICORA)** is an agency under the Ministry of Transport and Communications (MTC) with responsibility for radio, telecommunications and postal administration and television fee management. FICORA is responsible for issuing frequency licences and is the body in charge of the frequency management and control of the use of frequencies. The unit inside FICORA dealing with these issues is the Radio Administration Unit, whose responsibilities include:.

- Planning of radio frequency usage
- Issuing licenses needed for possession and use of radio equipment. The license procedure (Radio Act 517/1988) is used only if the results of the operational frequency planning give reasons for establishing individual technical license provisions
- Assignment of frequencies
- Resolving radio interference problems
- Competence examinations and certificates for radio communication
- Monitoring the use of the spectrum
- Establishment of the table of national frequency allocations

The Communications Administration Department (CAD) of the MTC also has responsibilities related to licences, however these tasks have decreased in recent years as a result of deregulation. Licences are granted, for example, for the construction of mobile telecommunications networks, for radio and television broadcasting.

The Telecommunications Unit, which is part of the CAD, is the authority in charge of granting the licences

## B.14 Sweden

Post och Telestyrelsen (National Post and Telecom Agency) is responsible for functions allocated to it by the Telecommunications Act (1993:597) and Radiocommunication Law (1993:599)

Näringsdepartementet (Ministry of Industry, Employment and Communications). Responsibility in the government for legislation, policy objectives and competition regarding postal services, radio communications and telecommunications lies with the Ministry. The Ministry monitors both national and international developments in the area of telecommunications, especially within the area of legislation. The government aims to support the effective use of radio communications and other uses of radio frequencies.

Sweden administers a cost recovery system for licensing and charging for radio equipment and spectrum management. The Swedish view is that any licensee or any other undertaking in a licensing procedure - which uses the resources of the administrative authority and thereby causes costs to it shall be charged an appropriate charge/fee enabling the administrative authority to recover its costs for granting the claimed resources.

According to the Swedish view an appropriate charge/fee must be cost based rather than cost-orientated. The charge/fee should however be determined in such a way that it not only enables the administrative authority to recover directly attributable costs caused by a certain inquiry or application, but also for the administrative authority to recover other necessary unattributable costs. Such other costs may be the cost incurred for having technical expertise and know-how within the administration, the costs for regulatory obligations or the costs for supervisory obligations etc. The reasoning behind this is that the duties carried out by the administrative authority must be considered to be for the benefit of any licensee. Each licensee or applicant shall therefore be obliged to carry a reasonable share of the total costs of the administration for fulfilling any duty required by the terms of its mandate.

## B.15 United Kingdom

The Radiocommunications Agency (RA) is responsible for assigning frequencies and spectrum licences under the 1949 and 1998 Wireless Telegraphy Acts and is also responsible for setting spectrum charges for radiocommunication services. The RA is an executive agency of the Department of Trade and Industry (DTI), and is self-financed by revenue from its licensing and enforcement functions. It is headed by a Chief Executive who reports to the Minister for Small Businesses and E-Commerce.

The DTI Communications and Information Industries Directorate (CII) is responsible for issuing telecommunications service licences under the 1984 Telecommunications Act. The Office of Telecommunications (Oftel) is the

independent telecommunications regulator, responsible for enforcing telecommunications service licence conditions under the 1984 Act.

A recent Government white paper, “A New Future for Communications” has proposed the creation of a new regulator, an Office of Communications (Ofcom), which among other things will incorporate the functions of the above three bodies.

# C SUMMARY OF NATIONAL LEGISLATION RELATING TO TELECOMMUNICATIONS AND RADIO SPECTRUM LICENSING REGIMES

## C.1 Belgium

The **Act of 21 March 1991 concerning the reform of certain public companies (The 1991 Act)** distinguishes between the requirements for the provision of telecommunications services, for the establishment and operation of telecommunications networks and for mobile networks and services. For *voice telephony services* (fixed or mobile), Article 87 of the 1991 Act requires an individual licence to be granted by the Minister on the proposal of BIPT. The conditions and procedure are established by the Royal Decrees of 22 June 1998 defining the specifications for voice telephony services and the procedure for issuing individual licences. Provision of leased lines requires notification stipulating the conditions under which the service can be exploited, in accordance with the Royal Decree of 4 October 1999 fixing the conditions for operating a leased lines service, in particular by operators with a dominant market position. All other telecommunications *services*, except mobile services, are subject to prior notification to the BIPT by means of a registered letter at least four weeks prior to the start of the commercial operation of the service (Article 90 of the 1991 Act). Art. 89 covers mobile networks, Art. 92 bis covers fixed networks.

**Royal Decree of 22 June 1998** (amended by the Royal Decree of 27 June 2000): determines the conditions for setting up and operating public telecommunications *networks*. Under Belgian Law, a public telecommunications network is operated with the purpose of providing telecommunications services to the public. These services may be provided by the infrastructure operator itself or by a third party. The construction and exploitation of public telecommunication networks requires an individual licence, granted by the Minister, on the proposal of BIPT. A non-public telecommunications network is exclusively used for running non-public telecommunication services e.g. dedicated to closed user groups or private users. The construction and exploitation of non-public telecommunication networks is free, on condition that at least four weeks prior to the start of commercial operation of the service, a notification is made to BIPT.

**Ministerial Decree of 3 August 1999:** Specifies the practical details of notification and transfer of non-public telecommunications networks.

**Royal Decree of 16 July 1998:** specifies conditions for establishing and operating non-public telecommunications networks.

The establishment and operation of a mobile telecommunications network and the provision of mobile telephony services and paging services offered to the public are subject to the grant of an individual licence by the King. As for other mobile

telecommunication services offered to the public**,** the provision of such services requires licensing by the Minister based on a proposal by BIPT.

**Act of 30 July 1979 on radio communications**: establishes the general condition for the provision of radio communications. The Act was implemented by the Royal Decree of 15 October 1979 and the Ministerial Decree of 19 October 1979 concerning private radio communications. Specific decrees on spectrum charges are issued under this Act. Private fixed links or satellite earth stations require authorisation and a frequency assignment from BIPT but are not subject to individual licensing.

## C.2 Denmark

The statutory foundation of the present regulation of allocations of radio frequencies is **Act (No. 394) of 10 June 1997 on Radio Communications and Assignment of Radio Frequencies** (the Act on Frequencies) as amended by Act No.1011 of 23 December 1998, Act No. 1096 of 29 December1999 and by Act No. 232 of 5 April 2000. Allocations of mobile licences are regulated by Act No. 468 of 12 June 1996 on Public Mobile Communications (the mobile act), as amended by Act No. 396 of 10 June 1997, Act No. 1096 of 29 December 1999 and Act No. 418 of 31 May 2000. Provision was made for the holding of an auction for 3G mobile licences in Denmark under Act no. 1266 of 20th December 2000.

According to the Act on Frequencies, spectrum fees shall reflect license holders' use of spectrum. Therefore fees shall be charged that reflect exclusive or shared use, the bandwidth used and geographical coverage. The basis of the calculation of fees is the cost of administration and of other services provided by the National Telecom Agency to the telecommunications sector in the field of radiocommunications. This amount is approved by parliament yearly and is divided over the licence holders according to their spectrum use. Denmark applies a cost based system with differentiation based on certain models for the different services, although, when setting the fees also political considerations may play a role.

One of the aims of the Act is that users be given access to a wide, varied and inexpensive range of telecommunication services. Spectrum management principles that may increase the price of service to end-users are therefore generally inconsistent with Danish policy.

In areas where demand exceeds supply, and where the first-come-first-served principle cannot therefore be applied, the Act provides for the following frequency administrative methods: public tendering, administrative redistribution, requirements for changeover to more frequency effective methods of utilisation or technologies, requirements for reduced usage, and administrative withdrawal.

## C.3 Germany

The **Telecommunications Act of 25th July 1996** defines the regulatory framework for telecommunications and established the NRA, RegTP.

Part 7 of the Telecommunications Act (§§ 44 – 49) defines requirements for a national frequency plan, individual frequency assignments and the fees and charges that must be paid.

Current fees for services using radio spectrum are defined in the Ordinance concerning the Contributions for Frequency usage of 19 November 1996 and the Frequency Fee Ordinance of 3 June 1997.

## C.4 Greece

The new **Telecommunications Act 2867/2000**, defines the NRA's (EETT) supervising and regulatory roles. The Act's objective is to ensure the proper operation and development of telecommunications, by providing for the protection of the end-users, the provision of Universal Service as well as the protection of personal data. EETT has issued a General Authorisation regulation and an Individual Licence regulation (EETT Decisions 207/2 and 207/3 respectively of 1st March 2001) which are currently available only in Greek.

Texts of laws and decrees are published in the Greek official journal.

## C.5 Spain

**1998 General Telecommunications Act** (Law 11/1998 of 24th April) introduced steps to liberalise the Spanish telecommunications market, and incorporated the national transposition various related EU Directives, including the Licensing Directive. The Act established a system of general authorisations and individual licences for telecommunications services and the operation of telecommunication networks and also updated the regime for managing the radio spectrum. The Act makes provision for administrative fees to be levied for general authorisations and individual licences, and for spectrum charges to be levied on an administrative pricing basis, taking account of the following factors:

- the degree of use and congestion in different frequency bands and geographic areas
- the purpose for which the spectrum is used and any public service obligations
- frequency band
- equipment and technology used
- the economic value derived from use of the spectrum.

The Ordinance of 22 September 1998 defined specific requirements for radio spectrum licensing. Current fees and charges for the use of radio spectrum at the time of writing were defined in Article 66 of Law 13/2000 and available on the SETSI web site. These are, however, subject to change in subsequent years. The draft Budget Law for 2002 foresees an average reduction of 65% of the spectrum reservation charges for the GSM mobile telephony services and the third generation mobile services (3G). It also foresees an average reduction of 92% of the spectrum

reservation charges for operators have been licensed to provide fixed wireless access.

Technical requirements for satellite services are specified in Royal Decree 136 of 1997.

## C.6 France

The **Telecommunications Act of 26 July 1996** set up the regulatory framework for telecommunications and the legal basis for the establishment of two agencies, ART and ANFR, which are in charge of telecommunications regulatory affairs and frequency management respectively. Royalties (annual fees) are defined in Articles L.33-1, L.33-2 and L.34-1 of the Posts and Telecommunications Code.

Administrative fee levels for telecommunications licences issued under these articles are defined in **Article 45 of the Finance Law for 1987 (as amended under Finance Law for 2001).**

Royalties relating to the use of frequencies are defined in Articles 1 and 1(a) of the Decree of 3rd February 1993, as amended by the Decree of 6th June 2000.

## C.7 Ireland

Use of the radio spectrum is governed by the **Wireless Telegraphy Acts 1926 – 1988**, and related secondary legislation which relate to the licensing or exemption from licensing of specific radiocommunications apparatus. The **Telecommunications Act 1983** governs licensing of telecommunications services and empowers Director of Telecommunications Regulation to grant licences. The **European Communities (Telecommunications Licences) Regulations, 1998** transpose the EU Licensing Directive into Irish national law.

The principal statutory instruments relating to the services covered in this Study and to fees and charges in particular include:

- S.I. 319 of 1992: Wireless Telegraphy (Radio Link Licence) Regulations. Define licence conditions and fees for terrestrial radio links.
- S.I. 43 of 1998: Telecommunications Miscellaneous Provisions Act, 1996 (Section 6) Levy Order, 1998. Provides for the payment of a levy on providers of Telecommunication Services on a quarterly basis. Subsequently amended by S.I. 229 of 1998.
- S.I.107 of 1999: Exemption of DCS 1800 Mobile Terminals Order, 1999: Exempts DCS 1800 mobile terminals from licensing requirements
- S.I. 287 of 1999: Wireless Telegraphy (Fixed Wireless Point to Multi-point Access Licence) Regulations, 1999.
- S.I. No. 442 of 1999: Wireless Telegraphy (GSM and TACS Mobile Telephony Licence) Regulations, 1999.

- S.I. 261 of 2000: Wireless Telegraphy (Fixed Satellite Earth Stations) Regulations, 2000. provide for the issuing of annual and short term Licences for satellite earth stations, of the Fixed Satellite Service (as set out by the ITU), operating to satellites in the geostationary orbit, in frequencies above 3 GHz which do not comprise a Teleport facility.
- S.I. 273 of 2000: Exemption of certain Fixed Satellite Receiving Earth Stations Order, 2000. Exempts certain transportable fixed satellite receiving earth stations from the requirement to be licensed under the Wireless Telegraphy Act, 1926. Also to exempt fixed satellite receiving earth stations with antenna sizes less than 3.8m in the bands 10.7 to 11.7 GHz and 12.5 to 12.75 GHz, and less than 7.3m in the band 3.4 to 4.2 GHz, from the requirement to be licensed under the Wireless Telegraphy Act, 1926.
- S.I. 18 of 2001 Wireless Telegraphy (Teleport Facility) Regulations, 2001: provide for the issuing of Licences for Teleport facilities which comprise of three or more satellite earth stations of the Fixed Satellite Service (as set out by the ITU) operating to satellites in the geostationary orbit, in frequencies above 3 GHz.

## C.8 Italy

**Law no. 249 of 31st July 1997** provided for the Creation of the telecommunications NRA (AGCOM) and made provisions on telecommunications and broadcasting systems. Fees and charges for specific services are addressed by various Decrees, as follows:

- The annual levy on telecommunications operators is defined in Article 20 of the Law of 23rd December 1998 (no.448).
- Decree of 25th November 1997 on Provision for the granting of individual licences in the telecommunications sector.
- 3G mobile licensing procedures are defined in Deliberation no. 388/00/CONS.
- Decree of 5th February 1998 on Determination of contributions for individual licences and authorisations for public telecommunications services, defines fees for individual telecommunications licences and spectrum charges for public fixed link networks.
- Decree of 18th December 1996 defines charges for private fixed links.
- Decree of 28th March 1997 on Determination of contributions (fees) and canoni (charges) for services via satellite, as amended by Decree of 22nd January 1998.

## C.9 Luxembourg

**Primary Legislation**

- Law of March 21 1997 on Telecommunications

- Law of December 211998 concerning the budget of the receipts and national expenditure for 1999 and modifying the paragraph (1) of article 14 of the Law of March 211997 on Telecommunications

**Secondary Legislation**

- Grand-Ducal Regulation of 25 April 1997 fixing the schedule of conditions for the establishment and the exploitation of GSM and DCS 1800 networks.
- Grand-Ducal Regulation of 22 December 1997 fixing the schedule of conditions for the establishment and the exploitation of fixed telecommunications networks and services
- Grand-Ducal Regulation of 17 March 1998 modifying the Grand-Ducal Regulation of 25 April 1997 fixing the minimal conditions of the schedule of conditions for the establishment and the exploitation of GSM and DCS 1800 networks.
- Grand-Ducal Regulation of 2 July 1998 fixing the schedule of conditions for the exploitation of telephony services.
- Grand-Ducal Regulation of 2 July 1998 fixing the criteria and procedures of licensing of telecommunications on request of the applicant.
- Grand-Ducal Regulation of 25 September 1998 fixing the amounts and types of payment of royalties for establishment and the exploitation of telecommunications networks and/or services.
- Grand-Ducal Regulation of 28 January 1999 fixing the conditions of use of parts of the radio spectrum.
- Grand-Ducal Regulation of 23 February 2001 modifying Grand-Ducal Regulation of 2 July 1998 fixing the criteria and the procedures of licensing of telecommunications on request of the applicant.
- Grand-Ducal Regulation of bearing 18 April 2001 modifying the following Grand-Ducal Regulations:
    - 22 December 1997 fixing the conditions of the schedule of conditions for the establishment and the exploitation of fixed networks of telecommunications and services of telephony,
    - 22 December 1997 fixing the conditions of the schedule of conditions for the establishment and the exploitation of fixed telecommunications networks and
    - 2 July 1998 fixing the conditions of the schedule of conditions for the exploitation of services of telephony.

## C.10 Netherlands

**Telecommunications Act, 1998 (T Act):** Under the T Act a licence is required for the use of frequencies and must be requested from the State Secretary of

Transport, Public Works and Water Management. Operators of public telecommunications networks, leased lines or broadcasting networks are obliged to register with the independent regulator (OPTA) and registration fees are payable, but no individual licence or authorisation is required.

**Frequency Decree:** Requires an Auction or Competitive Selection Process for assigning frequencies for "business use" (i.e. public services such as GSM, UMTS and WLL). An auction is preferred unless an economic or social case can be made for comparative selection, but in both cases requires spectrum scarcity as a pre-condition.

**RDR Charges Order**: decree issued annually by the State Secretary for Transport and Public Works, which defines spectrum charges for each service category. Current (2001) decree is no. RDR/619446.J Z.

## C.11 Austria

The **Federal Telecommunications Law (TKG)** of 1 August 1997 provides a regulatory framework and legal basis for the establishment of the independent regulator, TKK and RTR GmbH (formerly TKC GmbH). The Telecommunications Law distinguishes between granting of authorisations for importation, sale, ownership, installation and operation of radio equipment and granting of Konzessions for the provision of telecommunication services using radio equipment. The purpose of the Telecommunications Law is to promote competition in telecommunications and its scope includes the efficient and interference-free use of available frequencies.

On 1 June 2000 an amendment of the Law entered into force providing, inter alia, the basis for the third generation mobile licensing procedure. The frequency allocation procedure is now governed by § 49a TKG. Further major legislative measures entered into force on 1st April 2001, providing for a further revision of the Telecommunications Law and a complete reorganisation of the regulatory authorities, establishing a single Communications Commission, Komm Austria, which is responsible, inter alia, for the granting of licences for broadcasting services.

Administrative fees and spectrum charges are defined in **the Telecommunications Fee Ordnance**, Federal Law Gazette II No. 29/1998, as amended in Federal Law Gazette II No. 110/2001.

## C.12 Portugal

Decree-Law 188/81, of 2 July (Article 7), created the Portuguese Communications Institute (ICP) in 1981, however ICP did not become active until November 1989, upon the passing of Decree-Law 283/89, of 23 August.

The first Telecommunications Act (Law no. 88/89, of 11 September 1989) defines State competencies in the telecommunications sector, establishing the dissociation between regulation and operation, but does not specifically mention ICP.

With the approval of the new Telecommunications Act (Law no. 91/97, of 1 August 1997) ICP was legally defined for the first time as the NRA for the telecommunications sector.

Decree-Law 381-A/97 of 30 December 1997 defines regulations for the activities of public telecommunications network operator and service provides, determining which activities are subjected to licensing / registration.

Current spectrum fees are defined in Ministerial Order No. 667-A/2000 of 2nd July 2001.

## C.13 Finland

**Telecommunications Market Act (396/1997)** set up the legal framework for telecommunications and the legal basis for activities of the Ministry of Transport and Communications and Telecommunications Administration Centre (FICORA).

The **Radio Act (517/1988)** governs radio equipment and its possession and use as well as the protection of radiocommunications from interference.

The **Telecommunications Markets Decree (424/1997)** defines requirement for individual licensing where radio spectrum is used.

The **Radio Decree (869/1992)** defines the procedure for applying for spectrum licences and the scope of licensing or licence exemption under the Radio Act

Decision of the Ministry of Transport and Communications on the Fees of the Telecommunications Administration Centre 22.12.19/1155 including amendments 16.6.1999/761, 15.12.1999/1186, 28.12.2000/1273 and 14.2.2001, defines fees and charges for specific services.

## C.14 Sweden

The Telecommunications Act 1993:597 with later amendments

The Radiocommunications Act 1993:559 with later amendments

The Radiocommunications Decree 1993:600

Regulations of the National Post and Telecom Agency (PTSFS).

The Telecommunications Act of 17 June 1993 and the Radio-communications Act of 10 June 1993 set up the regulatory framework for telecommunications and the legal basis for the establishment of the National Post and Telecom Agency (NPTA), an agency in charge of telecommunications regulatory affairs and frequency management.

## C.15 United Kingdom

The Wireless Telegraphy Acts, 1949 and1998 govern the licensing of radio spectrum in the UK. The 1998 Act made specific provision for administrative pricing and auctions to be used in connection with spectrum licensing, breaking the link between the fees under the Wireless Telegraphy Act 1949 and the NRA's costs.

This had confined licence fees to a level that reflected the costs involved in awarding and administering the licence..

Administrative fees and licence exemption regulations are defined by Statutory Instruments under the WT Acts. The current fees and charges for telecommunications services using spectrum are defined in S.I. No. 2265 of 2001

The Wireless Telegraphy (Third Generation Licences) Regulations 1999 S.I. introduced two key regulations, the first permitting a Notice to be created that detailed the procedure for the auction and the second finalising the frequencies to be associated with each 3G mobile licence.

# D ANNEX D: APPROACH TO LICENSING SPECIFIC SERVICES IN INDIVIDUAL MEMBER STATES

## D.1 Introduction

The following sections review the approach taken to licensing the specific services addressed by this report in each Member State. In most Member States, large fixed or mobile public telecommunication networks such as GSM, 3G mobile and WLL are subject to individual service and / or network licensing, whereas terrestrial fixed links and satellite earth stations are typically covered by general authorisations (although an individual spectrum licence is usually required). This difference in approach is reflected in the structure of this section, which considers firstly the approach in Member States to licensing GSM, 3G mobile and WLL, then considers separately the approach to licensing or authorising fixed links and satellite earth stations.

## D.2 Approach to licensing GSM, 3G and WLL services

Most Member States apply a similar approach to the licensing of these three services, although there has been a significantly greater use of auctions in the case of 3G mobile. With the exception of WLL services in Finland, which are licensed on a first come, first served basis, these services are always subject to a competitive tendering process, in the form of a beauty contest, auction, or hybrid of the two. The following sections summarise the general principles applied to licensing these three services in each Member State, followed by a detailed account of the 3G mobile licensing process where this has taken place.

### D.2.1 Belgium

#### *D.2.1.1 General Principles*

The construction and operation of public telecommunication networks (fixed or mobile) requires an individual licence, under Article 89 of the 1991 Act. An individual authorisation is required to operate radiocommunications equipment and a frequency assignment must be obtained from BIPT. GSM and WLL networks were awarded by beauty contest, 3G mobile by auction.

#### *D.2.1.2 Approach to 3G mobile licensing*

Belgium auctioned four 3G mobile licences in February 2001, but only three bidders (the existing Belgian GSM operators) participated in the auction. The licences offered were equal in spectrum (2 x 15 MHz paired plus 5 MHz unpaired) and of 20 years duration. The auction comprised a simultaneous multiple-round ascending format, similar to the auctions held previously in Germany and Britain.

The pre-qualifications to participate included guarantees from potential bidders that they had the financial support to pay for a licence should they win one. Deposits of € 75 million towards the final bid, and a further € 12,500 for the cost of reviewing the bids, were required.

A reserve price of € 150 million was set for each licence. February 8th was set as the deadline for submissions by parties interested in taking part in the auction and the auction itself was set to commence on March 7th.

Although Telefonica and Suez Lyonnaise were reported to have been considering a joint bid and Vivendi had also been cited as a potential entrant, in the event only the three incumbent bidders participated, namely Proximus (Belgacom Mobile), Mobistar and KPN Mobile. In view of the limited number of bidders, the start date for the auction was brought forward to 27th February.

After receiving a single bid from each operator during the hour-long round, BIPT sold licences to Mobistar and KPN Orange at the reserve price of € 150 million each. It sold the third licence to Proximus for €150.2 million.

### D.2.2 Denmark

#### *D.2.2.1 General Principles*

Denmark does not require any individual licence/authorisation requirements or notification procedures to operate public networks except currently for mobile communications networks. Operators apply only for numbers. An individual spectrum licence is required for frequency use in connection with the installation, activation and use of certain radio equipment, including mobile networks. GSM and WLL networks were awarded by beauty contest, 3G mobile by auction.

#### *D.2.2.2 Approach to 3G mobile licensing*

Provision was made for the holding of an auction for 3G mobile licences in Denmark under Act no. 1266 of 20th December 2000. The approach chosen was a sealed-bid auction comprising four stages, namely registration, pre-qualification, opening of the bids and issuing of the licences.

In stage 1, bidders were required to submit registrations, including a registration form, their bid(s) and payment of the deposit. A bidder could only submit one registration, but each was permitted one or more binding bids, the highest of which counted. In stage 2, The NTA decided on whether a registration could be accepted or not, and notified the bidders accordingly. Bidders associated with other bidders by virtue of cross-shareholdings of 20% or more, but not possessing confidential information in relation to other bidders or not having agreements to finance or assist other bidders, were given a period of time to remove the association or seek a derogation.

In stage 3, the NTA opened all of the bids submitted by bidders whose registrations had been accepted and established the order of the bids that were eligible to win a licence. The four highest bidders were awarded Licences at the price of the fourth highest winning bid. Finally, in stage 4, bidders were required to pay the up-front element (25%) of the licence price and provide a 3-year bank or insurance company guarantee in relation to the next 3 deferred instalments by a specified date. Once bidders had met these requirements the Licences would be issued. The Licences

were allocated according to the preferences expressed by bidders in their registrations, with the highest bidder being allocated a licence first and so on. A reserve price of €67 million per licence was set.

There were five bidders for the four licences offered. The successful bidders were:

- Hi3G Denmark ApS
- (Licence II): TDC Mobile International A/S
- (Licence III): Telia Mobile AB
- (Licence IV): Orange A/S

The total price paid by each successful bidder (equal to the fourth highest bid) was €127,344,235. The NRA has not released details of individual bids.

### D.2.3 Germany

#### *D.2.3.1 General Principles*

Mobile networks require a class 1 telecommunications licence and a frequency assignment. WLL networks require a class 3 telecommunications licence and a frequency assignment. GSM and WLL licences were awarded by beauty contest, 3G mobile by auction.

#### *D.2.3.2 Approach to 3G mobile licensing*

In Germany, 3G mobile licences were bid for, and initially awarded, on the basis of "abstract spectrum", i.e. each licence comprised a number of packages of 2 x 5MHz paired spectrum, but the precise frequency of the spectrum was not initially decided. Each licensee was required to hold a minimum of two packages (i.e. a total of 2 x 10 MHz paired spectrum) and a maximum of three (i.e. a total of 2 x 15MHz of paired spectrum). This approach was intended to offer greater flexibility, allowing the market to decide whether the 2 x 10MHz or 2 x 15MHz licences were preferable. The licences were valid for 20 years.

Germany did not introduce a specific regulation to permit new entrants to the market, however by restricting each licensee to a maximum of 2 x 15MHz packages, it was confident that equal opportunities and workable competition would be ensured.

**Auction procedure**

The German auction comprised three elements:

- Pre-qualification
- Stage 1 auction: for a set of 12 blocks of spectrum (paired FDD)
- Stage 2 auction: for a set of 5 blocks of spectrum (unpaired TDD)

In the pre-qualification phase, any company wishing to bid had first to demonstrate its eligibility. This required:

- Submission of a qualification notice, providing basic commercial information

- Payment of a deposit of €10.226 million
- Participation in a tutorial concerning the rules and running of the auction
- Submission of a declaration to abide by the rules of the auction
- Submission of a bank guarantee

The required bank guarantee varied according to the intention of the bidders. The sums involved were as follows:

- € 204 million for a licence carrying a package of 2 x 10 MHz paired spectrum in stage 1
- **€** 306 million for a licence carrying a package of 2 x 15 MHz paired spectrum in stage 1
- € 52 million for each exercised bidding right for unpaired spectrum in Stage 2
- € 102 million for a bidding right for paired spectrum in Stage 2 (note – this option was not required as all paired spectrum was licensed during Stage 1).

Applications for participation in the auction were required by the end of April 2000. At the close of the pre-qualification phase seven applications had been received and accepted. The companies were:

- T-Mobil (Deutsche Telecom's mobile subsidiary)
- Mannesmann (Vodafone)
- MobilCom / France Telecom
- Viag Interkom
- Debitel (Swisscom)
- Group 3G (Sonera / Telefonica)
- E-plus Hutchinson (E-Plus Mobilfunk / Hutchinson Whampoa)

These seven groups then took part in the Stage 1 auction, which started on 31st July 2000.

The Stage 1 auction was a simultaneous multiple round auction, based upon electronically submitted bids which required the physical presence of a representative of the bidding organisation in a closed room at the Regulatory Authority's Offices. Each room was equipped with a fax and a telephone allowing communication with the auctioneer and the company's nominated Decision Maker only.

At the start of each round, each bidder was notified of the highest bid made for each frequency block, together with the name of the bidder. All bidders were then able to submit bids greater than the minimum bid increment for a given frequency block (based on a percentage of the highest bid then held for that block). The auctioneer at the start of each round determined the minimum bid increment. During early rounds the increment was set at 10%, however during later rounds this was reduced

to 5%. Stage 1 drew to a close when no further valid bids were received, after a total of 173 rounds. The results are detailed in a following section.

Stage 2 was also a simultaneous multiple round auction. Only companies having participated successfully in Stage 1 were permitted to bid in Stage 2. Viag Interkom did not participate in the Stage 2 auction.

**Auction results**

The Stage 1 auction was completed on 17th of August 2000, following 14 days and 173 rounds of bidding. Of the seven companies participating in the auction only one, Debitel, was unsuccessful. The remaining six companies/consortia each secured 2 x 10 MHz spectrum blocks. The companies, together with the price paid, are shown in the table below:

| Successful Company / Consortia | Price (€ million) |
|---|---|
| E-plus Hutchinson (E-Plus Mobilfunk / Hutchinson) | 8,394 |
| Group 3G (Sonera / Telefonica) | 8,409 |
| Mannesmann (backed by Vodafone) | 8,423 |
| MobilCom / France Telecom | 8,370 |
| T-Mobil (Deutsche Telecom's mobile subsidiary) | 8,478 |
| Viag Interkom | 8,445 |

These companies/consortia were permitted to take part in the second phase for the unpaired 1 x 5 MHz spectrum blocks. The second stage took 9 rounds to complete and raised €287 million. In total therefore the German auction raised €50,806 million. E-Plus, MobilCom Multimedia, T-Mobil, Mannesmann Mobilfunk and Group 3G were each awarded a further block of unpaired spectrum, ranging in price from €37.6 million to €62.7 million.

Licence payments were due, in full, at the close of the auction. The value of the deposit made at the start of the auction was deducted from the payment required. No alternative payment methods were offered.

### D.2.4 Greece

#### *D.2.4.1 General Principles*

Greek legislation defines two types of telecommunication licences, namely General or Individual Licences. Individual Licences are issued whenever rights of way are required for the deployment of the telecommunication infrastructure and whenever the provision of services requires the use of scarce resources. Licences for the provision of mobile services of 3G (UMTS) and 2G (GSM/DCS) are therefore classed as Individual Licences. Auctions have been used for all three services.

#### *D.2.4.2 3G Licensing Process*

Greece held an auction for four 3G mobile licences, along with four 2G (GSM) licences, in July 2001. The process consisted of a series of sealed-bid auctions,

with the 3G licences offered first (phase 1) and the 2G licences following as a separate process (phase 2).

Prospective participants were required to deliver two sealed envelopes, the first envelope containing the application to enter the auction, a bank guarantee for €1.47M and a series of documents regarding ownership and control issues, technical adequacy and financial feasibility. The second envelope contained the bid for the first phase (3G licensing process) and a bank guarantee equal to 25% of the amount of the bid. Registration was mandatory at this stage even if the participant did not intend to bids in the first phase. In that case, instead of a bid, they had to submit a declaration of their intention not to bid in the first stage, enclosed in the second sealed envelope.

Participants were able to submit multiple envelopes that differed only in the amount of the bid, and the appropriate bank guarantee. Only the largest bid by a particular Participant would be taken into account during the Auction. All pre-qualified applicants were subsequently notified by EETT accordingly.

The 3G auction process consisted of three phases. In the first phase spectrum segments of 2 x10 MHz of paired plus 5 MHz of unpaired were allocated. In the second phase, participants were given the opportunity to obtain additional spectrum segments (of approximately 5 MHz of paired spectrum). The third phase concerned the allocation of the individual spectrum segments to individual licensees within the 3G mobile frequency band.

The auction for the award of 3G licenses was completed on July 13th. The results were as follows:

| Bandwidth | Winner | Winning Bid |
|---|---|---|
| 1. 2X20 MHz paired and 5 MHz unpaired | PANAFON S.A. | € 176.376.199 |
| 2. 2X15 MHz paired and 5 MHz unpaired | COSMOTE S.A. | € 161.411.701 |
| 3. 2X10 MHz paired and 5 MHz unpaired | STET HELLAS S.A. | € 146.735.169 |

The payment arrangements consisted of two components, namely an up-front payment to be paid within 20 days of completion of the licensing process and a series of deferred payments. The up-front payment was defined as follows:

- 40% of the value of the bid in the event of four licences being awarded
- 70% in the case of three licences being awarded
- 100% in the case of two licences being awarded.

The second component is a deferred payment to be paid in equal annual instalments starting in year 2005 at no interest. This was defined as:

- 60% of the value of the in the event of four licences being issued, to be paid in four annual instalments
- 30% in the case of three licences being awarded, to be paid in three annual instalments.

There is also a requirement for an annual payment of 2 % of turnover from 3G services or an equivalent percentage of a correlate measure, which will be paid on an annual basis from 2005.

### D.2.5 Spain

#### *D.2.5.1 General Principles*

An individual licence is required for the establishment and operation or public telecommunication networks, for the provision of public telephony services and for provision of telecommunication services that use radio spectrum. Service licences are processed and issued by the independent regulator, whereas spectrum licences are processed and issued by the Ministry of Science and Technology. Where there is a scarcity of spectrum, as in the case of GSM, 3G mobile and WLL services, licences are awarded under beauty contest procedures.

#### *5.6.1.1 Approach to 3G mobile licensing*

Four licences were awarded by beauty contest in March 2001. Four groups of selection criteria were involved, each scoring up to 100 points, namely:

Group 1: Technical (I): Legal compliance and acknowledgement of minimum requirements to hold a licence; Coverage, Spectrum Efficiency, Network design and engineering including number of base stations.

Group 2: Technical (II): Environmental plans, Quality of service, Network security and confidentiality, Interconnection with other public networks, Management of Information Systems and Network management, International roaming and network capacity.

Group 3: Business plan and economic information: Business plan, prices structure, services, capital investment plans, etc; Commercial strategy;

Financial and business information and technical experience

Group 4: Applicant's Commitment to the national economy: Creation of employment, direct and indirect; Direct and indirect contributions to the national technological and industrial development.

Three licences were awarded to the three existing Spanish GSM operators (Telefonica, Airtel and Amena) and the fourth to Xfera, a consortium including Sonera, Vivendi and Orange. The initial fee paid for the licences was € 130.7 million. Shortly after the completion of the beauty contest, the Spanish Government announced that it intended to raise the annual spectrum charge for 3G mobile services from €5 million to €150 million from 2001. These charges were confirmed in the 2001 Budget Law. The draft Budget Law for 2002 foresees an average reduction of 65% in the spectrum charges for GSM and 3G mobile services and an average reduction of 92% in the spectrum charges for WLL services.

### D.2.6 France

#### *D.2.6.1 General Principles*

Individual network and service licences are required for public mobile telecommunication networks. The Telecommunications Act of 1996 defines when the number of licences awarded may be limited. Under article L.33-1 V of the posts and telecommunications code, the number of licences may be limited owing to technical restrictions due to the scarcity of frequencies. In such cases, the telecommunications Minister publishes the arrangements and conditions for issuing licences, on the advice of the telecommunications regulatory authority (ART). Beauty contests have been used for all three services.

#### *D.2.6.2 Approach to 3G mobile licensing*

France used a beauty contest to award its 3G mobile licences The selection criteria applied in the beauty contest , along with the weighting (marks out of a total of 500) were as follows:

| **Projected launch date and coverage at that date** | **15** |
|---|---|
| Services offered | 50 |
| Relations with service providers | 30 |
| Relations with subscribers and users of the services | 15 |
| Tariffs | 15 |
| Network dimensioning to deliver anticipated services and user demand | 15 |
| Schedule of network rollout (expressed as percentage of population, explaining in detail the types of service and turnover. | 100 |
| Service quality | 15 |
| Approach to optimising frequency utilisation | 15 |
| Capacity for international roaming | 15 |
| Actions foreseen to preserve the environment | 15 |
| Employment: qualitative and quantitative aspects | 25 |
| Business plan | 75 |
| Coherence and credibility | 100 |

The spectrum charge applied was set following the outcome of the 3G mobile auctions held in the UK and Germany, and took account of the higher than anticipated sums paid for licences in these auctions. A once-off payment of €4,955 million per licence was proposed, however provisions were made to spread the bulk of this payment over the duration of the licences (see section 3.6.2.2 of the main report for further details). In the event, only two applicants participated in the beauty contest, namely France Telecom and SFR. Both were awarded licences. At the time of writing, the French Government had announced that the total spectrum charge would be reduced to € 619.25, combined with a levy on future 3G turnover (level to be determined). It was also intended that a further round of licensing would be held as soon as possible.

### D.2.7 Ireland

#### *D.2.7.1 General Principles*

Mobile telephony operators require two licences: a service licence and a radio licence for the equipment and spectrum used (under the 1926 Wireless Telegraphy

Act). WLL operators also require both a service licence and a radio licence for the equipment and spectrum used. Both broadband and narrowband licences have been issued by the ODTR with broadband aimed at larger businesses and narrowband at the smaller business and residential market. Beauty contests have been used for GSM and WLL, and is proposed for 3G mobile.

*D.2.7.2 Approach to 3G mobile licensing*

At the time of writing, the exact procedure for licensing 3G mobile licences had yet to be confirmed, however the licensing framework was defined in December 2000, and involves offering two distinct 3G mobile licence classes, one of which supports the potential for certain types of mobile virtual network operator (MVNO), thus facilitating increased competition at the service level.

Four licences are planned, of equal 3G mobile spectrum. Additional spectrum will be offered to new market entrants (subject to certain requirements) in order to level the playing field with incumbent operators who have an inherent advantage in rolling out new networks. Applicants will be pre-qualified on the basis of a high level of financial/ technical strength and management expertise to ensure strong competition. Applicants will be able to bid for both types of licence but will be required to indicate a preference should they be highly ranked for both categories. Applications will be evaluated on a series of criteria including coverage, roll out, performance guarantees, fees and promotion of competition.

There will be one “Class A” licence, which includes a high coverage and roll-out requirement. Bids will be evaluated in terms of willingness and terms for facilitating MVNOs as well as additional coverage, rollout etc. This licence will involve the potential for award of additional 900MHz spectrum subject to a demonstrable need for those willing to facilitate MVNOs. There will be three “class B” licences with lower coverage requirements.

**D.2.8 Italy**

*D.2.8.1 General Principles*

An individual network licence is necessary for the installation and provision of public telecommunications networks, especially those using radio frequencies. Where voice telephony is provided to the public and frequencies are needed, the assignment of frequencies is included in the individual network licence for voice telephony. An individual licence has a duration of no more than 15 years, to be defined in the licence itself. The licence is renewable and can be transferred to third parties only after the approval of the NRA. Beauty contests have been used for GSM licensing and a hybrid auction / beauty contest for 3G mobile. The approach to be taken for WLL has not yet been decided.

*D.2.8.2 Approach to 3G mobile licensing*

According to the Decree of 19th September 1997, public mobile licences must be awarded through a public tender procedure, determined by the Committee of Ministries, headed by the Prime Minister. This has led to a two-step procedure combining elements of beauty contest and auction. In the case of 3G mobile, five licences were offered in October 2000. The licences are valid for 15 years, from 1 January 2002.

Eight organisations applied to enter the tender process, namely:

- Telecom Italia Mobile (TIM)
- Omnitel (Vodafone)
- Wind (France Telecom)
- Blu (British Telecom)
- Ipse 2000 (Telefonica and Sonera)
- Andala (Hutchinson Whampoa, Tiscali and CIR)
- Anthill
- Tu Mobile

The Italian government has opted for a hybrid licensing approach, including both a beauty contest (competitive assessment) and an auction. The process includes three phases:

- Pre-qualification
- Beauty contest
- Auction

The initial pre-qualification phase required submission of initial financial information, detailing the ownership and structure of each bidder, together with basic technical information demonstrating the track-record of the bidder in providing telecommunication services.

Applicants providing this information to the satisfaction of the Italian government, were permitted on 2 September 2000, to progress to the evaluation phase of the process on:

- payment of a deposit of €2.5 Billion
- provision of a bank guarantee in the sum of €2 Billion

Seven out of eight applicants were permitted to move to the next phase.

The second phase of the process involved a detailed assessment of the technical and commercial capabilities of the potential bidders.

During this phase, potential bidders were required to provide details of both technical and commercial characteristics. However, the evaluation did not seek to

rank the applicants, rather to ensure that any company entering the auction phase has a genuinely viable commercial and technical plan upon which to develop a 3G service.

Technical information to be provided included:

- territorial data base that will be used for network planning
- traffic data forecasting mechanisms
- service quality objectives
- methodology to be used for forecasting electromagnetic fields
- network planning methodologies and associated software tools
- structure of the planned network at 31 December 2006
- supporting plan of network evolution between 2002 to 2006
- specification of technical standards from the IMT 2000 family that will be used
- how resources will be shared with other operators
- environmental and health impact analyses
- national and international roaming capabilities
- intentions regarding interoperability with 2G networks
- network security measures
- social support measures (access to emergency services, impaired user support)
- roll-out obligations

Commercial information includes:

- details of market studies undertaken
- details of market forecasts including analysis of results
- definition of market objectives
- characteristics of the offered services (including innovation)
- customer service approach
- codes of conduct and quality of service obligations they will accept
- commercial structure
- staffing requirements and capabilities
- investment issues including investment in infrastructure

All submissions were required by 11 September 2000. Prior to moving forward to the auction phase, the successful applicants were required to participate in an auction training event.

Of the eight applicants, seven were permitted to move forward for comparative evaluation. The seven successful entrants were: TIM, Omnitel, Wind, Blue, Ipse 2000, Tu Mobile and Andala. Anthill was disqualified on the grounds that the Italian Government was unable completely to identify all of the consortium members, and that none of the parties involved in the company could demonstrate the necessary three years of experience in telecommunications.

Following the comparative evaluation process, Tu Mobile was disqualified having failed to submit documentation on time. Thus six companies were left to move on to the main auction phase. The auction started on 19th October 2000. A reserve price of €2 Billion was set for each licence. The minimum increment per round was set at 200 billion Lire for the first ten rounds.

The Italian auction was suspended on Friday 20 October 2000 at the request of Blu. The consortium had on going difficulties with regard to the percentage shareholding of BT (21% as of 20/10/00) and Autostrada (32% as of 20/10/00) with BT unwilling to increase its holding in Blu, largely due to its debt 'mountain'. The Italian auction resumed on Monday 23rd October at 07.30 GMT, but Blue dropped out of the bidding 20 minutes later, effectively bringing the auction to a close after just 10 rounds of bidding.

At the close, the position was as follows:

| Applicant | Amount bid (€ million) |
|---|---|
| Omnitel | 2,448 |
| IPSE 2000 | 2,443 |
| Wind | 2,427 |
| Andala (later renamed "H3G") | 2,427 |
| Telecom Italia Mobile | 2,417 |
| Total | 12,162 |

Successful bidders were offered two payment options. The first was to pay the licence fee in full, the second was to pay the minimum fee of €2 billion followed by a set of 10 further payments, each attracting interest. The licences were to be awarded within 60 days of the end of the auction, subject to receipt of payment, and were awarded on 7 November 2000.

### D.2.9 Luxembourg

#### *D.2.9.1 General Principles*

An **Individual licence** (in accordance with article 7 of the Telecommunications Act 1997) is required by:

- Operators of public telecommunication networks and related services which include the provision of fixed lines and telephony services
- Operators of public telecommunication networks and related services which include the provision of fixed lines (excluding telephony services)
- Providers of telephony services (excluding the provision of fixed lines)

- Providers of mobile phone services
- Providers of radio messaging services

Licences are granted by the Minister of Communications on the basis of case analysis by ILT (beauty contest).

At the time of writing, the approach to licensing 3G mobile networks in Luxembourg had not been confirmed.

### D.2.10 Netherlands

#### *D.2.10.1 General Principles*

Under the Netherlands Telecommunications Act licences are only required for the use of frequencies and numbers. To operate public telecommunications networks, simple registration is sufficient. This registration is done with the OPTA (the National Regulatory Authority). Registration is mandatory but it is not a prerequisite to carry out telecommunications activities. However, to conduct business in one or more categories for which a registration is mandatory, without being registered-, is in conflict with article 2.1 TA and is punishable as an economic offence under article 1 of the Economic Offence Act. Auctions have been used for GSM and 3G mobile; a beauty contest is being considered for WLL.

#### *D.2.10.2 Approach to 3G mobile licensing*

To operate a 3G system in the Netherlands a company must, in accordance with the Telecommunications Act (Telecommunicatiewet), hold a licence issued by the Minister of Transport, Public Works and Water Management.

In determining the approach towards 3G licences the Dutch Authorities were bound by the Netherlands Frequencies Decree. This prescribes that frequencies for commercial use must be assigned either by auction or comparative bidding. Furthermore, it is assumed that an auction approach will always be used to assign these frequencies unless the social, cultural or economic interests of the Netherlands suggests that use of a 'beauty contest' will be more beneficial for the country.

In the case of 3G mobile licences it was evident that significant demand existed for the scarce 3G spectrum, and so by default an auction should be held, as prescribed by the Telecommunications Act and the Frequencies Decree. It was intended that the 3G auction would build on the experience that the Dutch had gained during their earlier auctioning of DCS1800.

A phase of public consultation took place with an auction being the agreed format. It was however further agreed that if fewer applications were received than the number of licences available, the licences would be awarded without an auction.

The 3G licences are valid for a period of 15 years, from 1 January 2002, that is until 31st December 2016. In principle, at this date the licence reverts to the Government.

In the Netherlands five licences were offered for tender, as detailed in the following table. No provision was made to reserve a licence for a new comer, thus the incumbents were able to bid for all of the five licences.

The following spectrum was available with each of the five licences offered:

| Licence | Paired spectrum | Unpaired spectrum |
|---|---|---|
| A,B | 2 x 15 MHz | 5 MHz |
| C, D, E | 2 x 10 MHz | 5 MHz |

Each licence includes an obligation that, by 1 January 2007, the licensee must have achieved coverage:

- within the built-up area of all municipalities having a population of 25,000 or more,
- on all main connecting routes between these municipalities (including road, rail and canal)
- along motorways to Germany and Belgium
- around Schipol, Beek and Zestienhoven airports.

No licensee is permitted to hold more than one licence, nor to have interests in more than once licence through participation in one or more consortia.

All licences are for national coverage, though special conditions can arise at national borders where co-ordination with national neighbours is required.

**Auction procedure**

Initially eight companies expressed an intention to bid for a licence as detailed in the following list – with majority owners indicated in brackets:

- Libertel (Vodafone)
- Telfort (British Telecom)
- KPN (former Dutch national carrier)
- Dutchtone (France Telecom)
- 3G Blue (Deutsche Telecom)
- Hutchinson 3G Netherlands
- NTL
- Versa Tel (independent)

Hutchinson and NTL withdrew very shortly before the auction started, leaving six bidders for five licences.

In accordance with the Frequency Decree (Frequentiebesluit), the Dutch 3G licences were allocated by auction. A simultaneous, multi-round approach was used. However the auction ended in a controversial fashion. Rather than simply bidding until one competitor withdrew, it is alleged that the auction ended when

VersaTel received a threat from Telfort. It is claimed that Telfort wrote to VersaTel indicating that it would sue both the company and the Directors of the Amsterdam based new comer, if VersaTel entered a bid that was beyond its means. VersaTel immediately appealed to the Ministry of Transport Public Works and Water Management, however the Ministry refused to become involved in the dispute. VersaTel then withdrew from the auction, leaving just five bidders for five licences and therefore ending the auction.

The auction closed after 305 rounds.

**Auction results**

The Netherlands 3G auction saw five licences assigned to the five bidders. The successful bidders, together with the fee paid, is illustrated in the following table:

| Licence | Company | Cost (€ million) |
|---|---|---|
| A | Libertel B.V. | 713.8 |
| B | KPN Mobile Netherlands B.V[29]. | 711.1 |
| C | Dutchtone Multimedia B.V. | 435.6 |
| D | Telfort Holding B.V. | 430.0 |
| E | 3G Blue B.V. | 395.0 |

### D.2.11 Austria

#### *D.2.11.1 General Principles*

Individual Konzession covers service provision. Individual radio spectrum authorisation is required.

The obligation to hold a Konzession is set out in section 14 of the Telecommunications Act (TKG). A Konzession is needed to offer any of the following services:

- mobile voice telephony and other public mobile radio services by means of a self-operated mobile communications network
- public voice telephony by means of a self-operated fixed telecommunications network
- public provision of leased lines by means of a self-operated fixed telecommunications network.

Auctions have been used for all three services.

#### *D.2.11.2 3G Mobile Licensing Process*

Mobile radio Konzessions are issued through auction according to section 15 of the Act.

The 3G mobile licence award procedure comprised two stages, i.e. pre-qualification and the auction itself. In the pre-qualification stage the basic eligibility of all

[29] Note: NTT DoCoMo has a 15% stake in KPN Mobile.

applicants was assessed against the required technical and economic prerequisites. These included the business plans of the bidders, the technical roll-out plans, the legal and financial situation as well as the ownership structure.

The Telekom-Control Commission decided not to specify the number of licences itself but to leave this decision to the market.

The second phase was an open, simultaneous, multiple round auction comprising two stages. In the first stage 12 frequency packages of 2 x 5 MHz each were put up for auction as a basic amount of spectrum. To obtain a licence the bidders had to acquire at least two frequency packages but may not bid for more than three packages in the first stage. Thus four to six licences were possible.

The successful bidders of the first stage could then bid for a total additional spectrum of 25 MHz (5 packages of 5 MHz each) in the unpaired IMT-2000 band as well as any packages in the paired bands which may have not been sold during the first stage.

All standards of the IMT-2000 family were permitted. The licence area comprises the federal territory of the Republic of Austria; the licence duration has been fixed for 20 years as of licence award. Coverage obligations to an extent quite common internationally (including contractual penalty) will be imposed on the licensees. 25 % coverage of the population has to be achieved by the end of 2003 and 50 % coverage by the end of 2005, with carrier services of at least 144 kbits/sec having to be provided. The tender document was accompanied by a draft of the Licence and Frequency Allocation Document which contained, among other things, provisions on coverage obligations, infrastructure, national roaming and network access

To participate in the auction, bidders were required to submit a minimum bid for each frequency package applied for. For a frequency package (2 x 5 MHz) in the paired band the minimum bid was € 50.87 M. The minimum bid for a package (1x5 MHz) in the unpaired range was € 25.44. All minimum bids had to be secured by a bank guarantee of the same amount.

There were six applicants at the pre-qualification stage, namely Connect Austria Gesellschaft für Telekommunikation GmbH, Hutchison 3G Austria GmbH, Mannesmann 3G Mobilfunk GmbH, Max.mobil Telekommunikation Service GmbH, Mobilkom Austria Aktiengesellschaft and 3G Mobile Telecommunications GmbH (Telefonica). Although the number of frequency packages applied for in the first stage of the procedure exceeded the 12 available, all six ultimately acquired a licence.

The auction concluded on 3rd November 2000 and the results for stage 1 were as follows:

| Package | Bidder | Amount bid (€ M) |
|---|---|---|
| 1 | Mobilkom | 64 |
| 2 | max.mobil. | 63 |
| 3 | max.mobil. | 57 |
| 4 | Mannesmann 3G | 56 |

| | | |
|---|---|---|
| 5 | Mobilkom | 57 |
| 6 | Mannesmann 3G | 57 |
| 7 | Connect | 57 |
| 8 | Hutchison 3G | 57 |
| 9 | Connect | 63 |
| 10 | Hutchison 3G | 57 |
| 11 | 3G Mobile GmbH | 59 |
| 12 | 3G Mobile GmbH | 59 |
| | Total | 704 |

IN stage II of the auction, max.mobil and Mobilkom were allocated two packages each from the unpaired range and Hutchison 3G received one package.
The table below gives an overview of the successful bidders and the packages for which they received licenses:

| Bidder | Paired frequency packages | Unpaired frequency packages |
|---|---|---|
| Connect Austria | 2 | None |
| Hutchison | 2 | 1 |
| Mannesmann | 2 | None |
| max.mobil. | 2 | 2 |
| Mobilkom Austria AG | 2 | 2 |
| 3G Mobile Telecommunications | 2 | None |

Revenues from Stage II totalled € 127.32 M; added to the licence fees from Stage I, this made a total of € 831.6 M revenue from the auction.

The original minimum bid for each frequency package had to be paid by the licensees within 7 days of receiving the official licensing decisions. For a package in the unpaired range, a payment of € 50.87 M had to be made within two weeks; the corresponding amount in the paired range was € 25.44 M. Licensees were required to pay the remainder of the licence fee within six weeks of receiving the official decision. Payments were made to the Republic of Austria, and the account was managed by the Federal Ministry of Innovation, Technology and Transport. In the event of failure to pay the licence fee on time or in its entirety, the license would have been considered void.

### D.2.12 Portugal

#### *D.2.12.1 General Principles*

An individual licence must be obtained to provide services requiring the granting of radio frequencies as so identified in the national frequency plan. A separate individual licence must also be obtained to provide public voice telephony services, to set up and operate public telecommunications networks. Beauty contests have been used for all three services.

#### *5.6.1.2 3G Mobile Licensing Process*

3G mobile licences in Portugal were awarded by Beauty Contest. The price was set at € 100 million per licence, and there were seven bidders for the four equal licences of 2 x 15 MHz plus 5 MHz that were offered. There were five appraisal criteria, namely:

i) Contribution to the Development of the Information Society

ii) Contribution to Implementing Conditions of Real Competition

iii) Quality of the Technical Plan

iv) Quality of the Economic and Financial Plan, and

v) Contribution to the Development of Sustained Economic Activity.

The first of these criteria concerning the promotion of development and of access to the information society had a weighting of 50% of the total. The aim was to ensure the best possible relationship between the maximum coverage provided by the network and the lowest cost of the service. Dependent on this criterion are factors such as promotion of access to and info-inclusion both through economically accessible prices and through the provision of special conditions for lower-income citizens and those having special need, as well as for institutions of proven social merit, such as schools and libraries.

The beauty contest concluded in November 2000. There were seven applicants. The four licences were awarded to the three incumbent GSM operators (TMN, Telecel and Optimus) plus a new entrant, ONI-WAY, a consortium led by the Portuguese Electricity utility.

### D.2.13 Finland

#### *D.2.13.1 General Principles*

An individual service licence, granted by the Ministry of Transport and Communications, is required by providers of public mobile networks. In addition, providers of public mobile networks need a licence for frequencies from FICORA. Beauty contests have been used for GSM and 3G mobile services; a first come, first served approach is used for WLL.

#### *5.6.1.3 3G Mobile Licensing Process*

Finland was the first country in Europe to licence 3G mobile networks. On 15th December 1998, the Ministry of Transport and Communications announced a beauty contest, which was divided into two stages. Applicants were required to register at the Ministry by 15th January 1999 and to submit the final licence applications to the Ministry by 15th February 1999.

At the first stage, 15 applicants registered. Two of these (Telenordia Oy and Vodafone Group International Limited) withdrew their applications during the second stage. By the end of the second stage, however, there were still 15 applicants, as two of the 43 regional telephone companies (Tampereen Puhelin Oyj and Keski-Suomen Puhelin Oyj) that had applied for the licence in a joint name submitted their final application in their individual company's names.

The granting of a licence was based on judicial discretion. According to § 7.3 of the Telecommunications Market Act, a licence must be granted if it is evident that:

i) the applicant has sufficient financial resources to fulfil the obligations of a telecommunications network company;

ii) the applicant will follow the rules and regulations concerning telecommunications, and

iii) radio frequencies for the applied activities are available.

If, due to the lack of radio frequencies, a licence can only be granted to some of the applicants, it shall, in accordance with § 7.4 of the Telecommunications Market Act, be granted to those applicants whose operations will best promote the objectives of the law referred to in § 1 of the Telecommunications Market Act. In such cases, the applicants shall be assessed according to their ability to promote the efficiency of the country's telecommunications market in such a way that encourages the user's opportunities to use telecommunications, i.e. the extent to which they:

i) meet the users' reasonable demands of telecommunications;

ii) compete with each other;

iii) are technically highly developed;

iv) are of high quality;

v) are safe and reliable; and

are inexpensive.

In accordance with subparagraph 40 in § 27 of the provincial autonomy law of the Åland Islands, a state authority may only grant the licence for general telecommunications business in the province with the consent of the Provincial Government of the Åland Islands. Consequently, applications would not be handled in this connection, in so far as they are related to the province of Åland.

The beauty contest concluded in March 1999 (the first in the EU to do so). The four successful applicants were the three incumbents (Sonera, Radiolinja and Telia), and a new entrant, Suomen 3G.Two separate regional licences were subsequently awarded in the Åland region, to Ålands Mobiltelefon and Tele1 Europe AB. There were no initial fees or charges for the licences, but an annual spectrum charge of €1,592,640, reduced during the first four years (see section 3.6.3.1 of the main report) applies. The charge for the Åland licences is scaled pro-rata to the land area covered.

### D.2.14 Sweden

#### *D.2.14.1 General Principles*

Individual licences are required by providers of public telecommunications networks or telephony service to a fixed termination point, and providers of mobile telecommunications service or network capacity, if the activity is of an extent which is considerable with regard to area covered, the number of users or other comparable circumstances. NPTA processes all notifications and issues individual

licences. Beauty contests have been used for GSM and 3G mobile and is planned for WLL.

*5.6.1.4 3G Mobile Licensing Process*

A beauty contest for four equal 3G mobile licences (2 x 15 MHz plus 5 MHz) was held by the National Post and Telecom Agency in Autumn 2000. The contest was in two phases. The first phase examined the applicants' financial and technical competence, requiring applicants to demonstrate that they had the capacity to fulfil the obligations to which their applications referred and sufficient capital to build the network. They also had to describer their technical, business and market plans, together with investment and financial information. There was no comparative evaluation in this first phase.

Those who met the requirements of the first phase proceeded to the second phase, which involved a comparative evaluation of the applicants' commitments relating to rate of development and coverage, both from a geographic and population viewpoint. Licences were awarded to those who guaranteed the best coverage and rate of rollout.

There were ten applicants for the four licences. The four successful applicants were Europolitan, Tele2, Hi3G Access and Orange.

**D.2.15 United Kingdom**

*D.2.15.1 General Principles*

For GSM and 3G mobile services, an individual “Public Mobile Operator” spectrum licence is required for each network. This specifies frequencies and radio equipment standards that must be used. An individual “Public Telecommunications Operator” service licence is also required; this enables provision of a wide range of fixed and mobile services, and a single licence can cover both GSM and 3G mobile networks.

For WLL, an individual “Fixed Wireless Access” spectrum licence is required for each network – specifies radio frequencies and equipment standards that must be used. An individual “Public Telecommunications Operator” service licence is also required; this enables provision of a wide range of fixed and mobile services.

Beauty contests were used for GSM and early WLL licences; auctions were used for 3G mobile and more recent WLL licences.

*D.2.15.2 3G Mobile licensing process*

Five WT Act licences were offered for auction within the UK. In order to balance the interests of the existing carriers with new entrants, four of the licences were subject to open competition (Licences B to E), with one being reserved for a new entrant (Licence A). The spectrum allocated to each licence was as follows illustrated in the following table:

| Licence | Paired spectrum | Unpaired spectrum |
|---|---|---|
| A | 2 x 15 MHz | 5 MHz |
| B | 2 x 15 MHz | Nil |
| C, D, E | 2 x 10 MHz | 5 MHz |

Licence A was reserved for a new market entrant. Each WT Act Licence is valid from the date of award to the 31st December 2021. Any bidder not already holding a T Act Licence was also required to apply for such a Licence (valid for 25 years, costing £40,000 on award, plus an annual fee based on company turnover).

Each licence includes an obligation to roll-out services to achieve 80% UK population coverage by December 2007. Failure to meet this obligation can result in the licence being revoked.

The licences were awarded though a 3 part, auction process, as detailed in the next section.

**Auction procedure**

The UK auction was designed with three elements;

- A pre-qualification process
- A first phase of auction activity
- A second, main, phase of auction activity

**Entry criteria: "Pre-qualification process"**

Bidders in the UK auction were not required to undergo technical evaluation of their system nor to provide details of the service which they intended to provide. They were however required to:

- Provide a deposit of £50,000,000
- Complete and submit an application form providing details concerning the company's group structure, latest accounts and Directors
- Submit a Standards Election Notice declaring the technology that they proposed to use should they be awarded a licence.
- Submit a Bidder Compliance Certificate declaring that the company was legally able to bid for a licence and that it would comply with the auction rules

This information was used to determine whether each of the applicants was a "fit and proper person" to hold a WT Act Licence. Three pre-qualification tests were used:

**Application requirements**

A check was made to ensure that all of the documents detailed above were fully completed and that the deposit was made by an agreed date

**Ownership restrictions:** A detailed set of ownership rules were developed to ensure that each bidder was independent of all other bidders at all stages of the

auction. This rule was activated by the Vodafone purchase of Mannesmann at the time of the auction (see next section).

**General power of exclusion**

The Secretary of State held the power to exclude any potential bidder should their inclusion have been considered to be prejudicial to British interests, or if the company was not considered fit and proper to hold a licence.

**First phase**

A first phase of the auction was designed to prevent Associated Bidders (i.e. bidders with a high degree of common ownership) entering the auction. There were no such Associated Bidders (but see later comments regarding Vodafone) and so the auction consisted of a second phase only.

Had the phase been used it would have comprised a multi-round, sequential auction, with each Bidder seeking the right to enter the main auction, by competing against any other Bidder with whom it was deemed to have an Association.

**Second (Main) phase**

The main auction was a multi-round, simultaneous auction. Within each round, each bidder was permitted to make an offer for only one of the five licences. The highest bid received for a licence during any round was deemed the "Current Price" for that licence. At the close of each round all bidders were informed of the Current Price for each of the five licences.

The holders of the Current Price for each of the five licences were then ineligible to bid in the next round. Remaining eligible bidders were then able to choose to:

- Bid on any one of the five licences (or four licences in the case of the existing 2G carriers)
- Withdraw from the auction (which was a non-reversible decision)
- Exercise one of three waivers, allowing the bidder to remain silent during a round, without withdrawing from the auction.

The auction continued until only Current Price holders remained. Prior to start of the auction it had been anticipated that the auction would be complete within a few tens of rounds (20 – 40 rounds perhaps). In practice this proved to be a substantial underestimate, as detailed in the next section.

**Auction results**

The auction started on 6th March 2000 and ended on 27th April 2000 after 150 rounds. Thirteen bidders took part in the auction. The winners of each of the 5 licences that were available are shown in the table below:

| Licence | Company | Cost (GBP) |
|---|---|---|
| A | TIW UMTS (UK) Limited | 4,384,700,000 |
| B | Vodafone Limited | 5,964,000,000 |

| | | |
|---|---|---|
| C | BT (3G) Limited | 4,030,100,000 |
| D | One2One PC Limited | 4,003,600,000 |
| E | Orange 3G Limited | 4,095,000,000 |
| | **TOTAL** | **22,477,400,000** |

The 8 unsuccessful companies which successfully pre-qualified but withdrew at some point during the auction were:

- 3G(UK) Limited
- Crescent Wireless Limited
- Epsilon Tele.Com PLC
- NTL Mobile Limited
- One.Tel Global Wireless Limited
- SpectrumCo Limited
- Telefonica UK Limited
- Worldcom Wireless (UK) Limited

With the auction completed, the successful companies were in a position to be awarded a WT Act Licence, upon payment of the Licence fee and confirmation that their status had not changed, thereby making the company ineligible to hold a WT Act Licence. This caused two interesting problems.

During the initial stages of the auction process Vodafone had started a take-over of Mannesmann, a German company, also the owner of UK based Orange plc, a bidder in the UK 3G auction. This caused a potential difficulty as it potentially led to a situation of Associated Bidders. It was agreed that the auction could continue on condition that Vodafone would dispose of Orange within 180 days of the end of the auction, the period allowed in the auction rules for resolving any difficulties. The issue was resolved when Vodafone sold Orange to France Telecom at the end of May 2000.

**Payment approach**

Each licensee had a choice of payment method. The first option was to pay the total fee in a single instalment on the Licence Issue Date.

The second option was to pay 50% on the Licence Issue Date and then five further instalments, falling on the $6^{th}$, $7^{th}$, $8^{th}$, $9^{th}$ and $10^{th}$ anniversaries of the issue date. The instalments are calculated as follows:

$$I_n = R / 5 \times 1.0865^n$$

Where:

$I_n$ = the instalment falling due on the nth anniversary of the date of grant of the Licence

R = Licence Fee less the Initial Licence Fee (i.e. 50% of the licence fee)

n = the number of completed years after the grant of the licence

The Licensee can elect at any point to pay the remainder of the Licence in full. If the Licence is revoked or surrendered all outstanding instalments, together with any interest owing, is immediately payable in full.

In practice all licensees opted for payment of the full fee.

## D.3 Approach to licensing fixed links and satellite earth stations

### D.3.1 Belgium

An individual authorisation is required to operate radiocommunications equipment and a frequency assignment must be obtained from BIPT.

Provision of leased lines requires notification to BIPT under the Royal Decree of 4 October 1999, in particular by operators with a dominant market position. All other telecommunications services are subject to a prior notification to BIPT by means of a registered letter at least four weeks prior to the start of the commercial operation of the service, under Article 90 of the 1991 Act.

### D.3.2 Denmark

Individual licence for frequency use in connection with the installation, activation and use of certain radio equipment., including fixed links and transmitting satellite earth stations. Licences are typically issued for 5 years, although if they are valid for more than 5 years then licence terms may be changed with one year's notice.

In accordance with Section 38 of the Radiocommunications Act, licence fees paid by individual frequency licence holders are fixed annually in the Finance Act. The fees are set at a level that recovers Telestyrelsen's costs. The amount paid by a licensee comprises a fixed charge per licence and a spectrum charge that depends on:

- the bandwidth assigned
- whether coverage is national or not. National frequency use is charged at five times the fee of a single transmitter position i.e. an average re-use factor of 5 is assumed
- the frequencies used. Frequencies above 3 GHz attract one tenth the charge set for use of frequencies below 3 GHz.

### D.3.3 Germany

For public fixed link networks, a class 3 telecommunications licence is required. A frequency assignment is required for all fixed links but no individual licence is required for private links, which are covered by a general authorisation published in the RegTP official journal. For public satellite systems, a class 2 telecommunications licence is required. A frequency assignment is required for all transmitting satellite terminals, but no individual licence for private systems.

### D.3.4 Greece

For all services other than voice telephony (as defined in Commission Directive 338/90), telex, mobile radio telephony and paging services, the following registration (general authorisation) process applies:

Organisations wishing to provide telecommunications services will have to submit to the NTC a declaration (see attached form), accompanied by information on the service to be provided (see also point 5). The NTC endorses the registration or replies to the applicant in writing on the grounds for a possible refusal (mainly incompleteness of the data presented). In the absence of a reply by the NTC within 3 months, the declaration is considered to be de facto endorsed (Min. Decision No 74631, OJ No 634/18.07.1995). Details of the information to be provided and a pro-forma declaration text is available via the ETO OSS facility.

The service provider has to have a representative legally registered in Greece. No further restrictions are imposed, other than to comply with the applicable law.

### D.3.5 Spain

An individual spectrum licence is required for all fixed link networks and transmitting satellite earth stations. VSAT licences exclude basic telephony, sound and TV broadcasting. A type B1 (public fixed telephony with network) licence is also required where service is provided to third parties. No service licence is required for self-provided systems

### D.3.6 France

An individual telecommunications licence is required for public services. A general licences for private services. ANFR licenses private radio networks as defined by article L33-2 of the law no. 96-959 from July 26th, 1996 of the Telecommunications Regulations and by the articles 2 and 3 (article 3 A-e excepted) of the decree dated February 3rd, 1993 modified by the decrees of July 20th, 1995, December 6th, 1996, December 27th, 1996 and November 26th, 1997. Licence holders pay a management licence and a frequency allocation licence. Payments are calculated according to the type of link and the scale fixed by the modified decree from February 3rd, 1993 (see sections 3.10.4.8 and 3.10.5.8 for details of current charges).

### D.3.7 Ireland

An individual WT Act licence must be held for each fixed link, teleport installation or VSAT network. A service licence is also required if access to the PSTN is involved. There are two types of service licence, namely a basic telecommunications licence and a general telecommunications licence. The basic licence permits the holder to operate a telecommunications network or provide a telecommunications service, but not voice telephony or access to numbering resources. A general licence permits the holder to provide telecommunications networks and services involving the

provision of voice telephony or any other network or service which requires the allocation to users of numbers from the national numbering scheme.

### D.3.8 Italy

There are 3 types of fixed voice telephony licence, namely for voice telephony services, network installation and provision, and network installation for the sole purpose of voice telephony provision. Public packet and circuit-switched data services as well as leased lines or simple resale of capacity must be authorised by the Ministry of Post and Telecommunications. To provide voice services to Closed User Groups, service providers must present an application form for a licence to the Ministry of Communications.

### D.3.9 Luxembourg

An individual licence (in accordance with article 7 of the Telecommunications Act 1997) is required by:

- Operators of public telecommunication networks and related services which include the provision of fixed lines and telephony services
- Operators of public telecommunication networks and related services which include the provision of fixed lines (excluding telephony services)
- Providers of telephony services (excluding the provision of fixed lines).

Frequencies must be assigned by the NRA and are subject to once-off and annual charges (royalties). An individual spectrum licence is not required.

### D.3.10 The Netherlands

An individual spectrum licence is required from the Radiocommunications Agency (RDR) for operation of fixed links (except for links in the 58 GHz band which is licence exempt). There is no requirement for a service licence.

For the use frequencies for by Satellite Earth Stations (SES), a licence from the RDR is required. No licence is required for receive-only terminals or mobile satellite terminals. The licence can be applied for by the actual user of the SES or by a network provider. The licence will be issued for the provision of permitted satellite services by means of a satellite earth station. There are 3 categories of licences, namely:

- SG10 VSAT networks (including a HUB station in the Netherlands)
- SG20 One-way up links (data, broadcasting)
- SG30 SNG installations

The Netherlands is implementing the ERC Decisions concerning the exemption from individual licensing of VSATs. Implementation is expected during 2001.

### D.3.11 Austria

An individual radio spectrum authorisation is required for all systems. Public voice telephony and leased lines require an individual Konzession) granted by TKK, to cover both the spectrum assignment and service. Provision of other telecommunications services requires only notification to RTR GmbH. Closed user group systems are not regarded as telecommunication services and no service licensing regime applies.

### D.3.12 Portugal

An individual licence must be obtained to provide services requiring the granting of radio frequencies as so identified in the national frequency plan.. A separate individual licence must also be obtained to provide public voice telephony services, to set up and operate public telecommunications networks. No service or network licence is required for private use (fixed links and satellite).

### D.3.13 Finland

Under the TMA an individual licence is required only for provision of public mobile communication network (due to need for frequencies). For provision of public fixed telephone network or telecommunication services on it simple notifications (registration) is sufficient. Fixed radio links and VSATs are exempt from notification but require a spectrum licence from FICORA

For fixed links, a licence is needed for each radio relay link transmitter. Based on an interference check, FICORA defines the technical requirements for use, for example the frequency and polarisation of the radio relay link transmitter, by which the radio relay link can operate without harmful interference. In addition, requirements can be put on the antennas to be used and on the transmitter power in order to ensure effective use of the frequencies. Frequency bands below 10.7 GHz are intended for hop lengths of more than 20 km.

For transmitting satellite earth stations, a licence issued by FICORA is required, according to the Radio Act. There is a licence fee of FIM 430 (€ 72.32) for a station which needs not be co-ordinated internationally, or FIM 1060 (€ 178.28) for a station co-ordinated in accordance with the international Radio Regulations.

No licence is required for installing and using a receive-only earth station in Finland. No fees are collected for such terminals, unless frequency co-ordination is required.

### D.3.14 Sweden

Notification to the NRA is required for the following:

- providers of telephony services to a fixed termination point.
- providers of mobile telecommunications services.
- providers of network capacity

Providers of other telecommunications services requiring allocation of capacity from the numbering plan for telephony under Section 21 of the Act of 1993.

A licence is required for the use and ownership of radio transmitters.

### D.3.15 United Kingdom

Within the UK any company offering public communications services must hold a licence that is awarded under Section 7 of the Telecommunications Act 1984 (a T Act licence). Such licences are normally valid for a period of 25 years. In broad terms, the T Act licence covers general telecommunications issues such as interconnection, numbering, adherence to standards, market power, fair trade etc. Different types of T Act licence are awarded to different types of operator. In the case of mobile communications a Mobile Public Telecommunications Operator T Act licence (MPTO T Act licence) is required. T Act licence is awarded by the Department of Trade and Industry.

Any company wishing to deploy a radio communication system within the UK must hold a Wireless Telegraphy Act (WT Act) Licence. This licence addresses technical issues (permitted power levels, out of block emissions and relevant performance standards) together with coverage and roll-out obligations. A WT Act Licence is awarded by the Radiocommunications Agency.

# E ANNEX E: DETAILED CASE STUDY RESULTS

## E.1 GSM

**Table E1.1: Fees and charges for reference 900 MHz network**

| | Administrative Fees | | | Spectrum Charges | | | |
|---|---|---|---|---|---|---|---|
| | Once-off | Annual | Total equiv. Annual | Once-off | Annual | Total equiv. Annual | Total fees and charges per annum |
| B | 13,049 | 257,029 | 258,045 | 223,104,172 | 1,859,175 | 19,222,363 | 19,480,407 |
| DK | 0 | 0 | 0 | 0 | 210,000 | 210,000 | 210,000 |
| D | 4,090,335 | 201,138 | 451,289 | 6,710,700 | 0 | 410,404 | 861,694 |
| EL | 0 | 2,934,703 | 2,934,703 | 96,330,826 | 0 | 5,891,277 | 8,825,980 |
| E | 0 | 4,109,483 | 4,109,483 | 0 | 39,258,600 | 39,258,600 | 43,368,083 |
| F | 304,898 | 152,449 | 171,096 | 0 | 9,146,790 | 9,146,790 | 9,317,886 |
| IRL | 1,904,610 | 505,761 | 622,241 | 26,458,000 | 1,904,550 | 3,522,634 | 4,144,875 |
| I | 56,810 | 61,975 | 66,396 | 57,850,000 | 99,523,538 | 104,025,741 | 104,092,137 |
| L | 1,859,200 | 743,680 | 888,373 | 0 | 929,625 | 929,625 | 1,817,998 |
| NL | 0 | 353,949 | 353,949 | 208,247,114 | 134,595 | 16,341,525 | 16,695,474 |
| A | 7,267 | 1,139,013 | 1,139,457 | 288,053,000 | 348,828 | 17,965,204 | 19,104,662 |
| P | 50,379 | 9,976 | 13,897 | 7,448 | 10,527,786 | 10,528,366 | 10,542,262 |
| FIN | 0 | 0 | 0 | 0 | 1,820,467 | 1,820,467 | 1,820,467 |
| S | 10,893 | 937,462 | 938,675 | 0 | 11,595 | 11,595 | 950,270 |
| UK | 64,000 | 3,227,904 | 3,231,182 | 0 | 17,245,161 | 17,245,161 | 20,476,343 |

**Table E.1.2: Fees and charges for reference 1800 MHz GSM network**

| | Administrative Fees | | | Spectrum Charges | | | |
|---|---|---|---|---|---|---|---|
| | Once-off | Annual | Total equiv. Annual | Once-off | Annual | Total equiv. Annual | Total fees and charges per annum |
| B | 13,049 | 257,029 | 258,045 | 223,104,172 | 3,098,625 | 20,461,813 | 20,719,857 |
| DK | 0 | 0 | 0 | 0 | 350,000 | 350,000 | 350,000 |
| D | 4,090,335 | 201,138 | 451,289 | 11,184,500 | 0 | 684,007 | 1,135,297 |
| EL | 0 | 2,934,703 | 2,934,703 | 47,316,714 | 0 | 2,893,735 | 5,828,438 |
| E | 0 | 4,109,483 | 4,109,483 | | 63,315,616 | 63,315,616 | 67,425,099 |
| F | 304,898 | 152,449 | 171,096 | 0 | 15,244,900 | 15,244,900 | 15,415,996 |
| IRL | 1,904,610 | 505,761 | 622,241 | 9,917,000 | 2,717,197 | 3,323,688 | 3,945,929 |
| I | 56,810 | 61,975 | 66,396 | 57,850,000 | 99,523,538 | 104,025,741 | 104,092,137 |
| L | 1,859,200 | 743,680 | 888,373 | 0 | 1,549,375 | 1,549,375 | 2,437,748 |
| NL | 0 | 353,949 | 353,949 | 208,247,114 | 134,595 | 16,341,525 | 16,695,474 |
| A | 7,267 | 1,139,013 | 1,139,457 | 165,610,000 | 872,070 | 11,000,234 | 12,139,692 |
| P | 50,379 | 9,976 | 13,897 | 14,895 | 10,629,072 | 10,630,231 | 10,644,128 |
| FIN | 0 | 0 | 0 | 0 | 2,275,584 | 2,275,584 | 2,275,584 |
| S | 10,893 | 937,462 | 938,675 | 0 | 23,191 | 23,191 | 961,866 |
| UK | 64,000 | 3,227,904 | 3,231,182 | 0 | 22,354,839 | 22,354,839 | 25,586,021 |

**Table E.1.3: Fees and charges for reference 900 / 1800 MHz GSM network**

| | Administrative Fees | | | Spectrum Charges | | | |
|---|---|---|---|---|---|---|---|
| | Once-off | Annual | Total equiv. Annual | Once-off | Annual | Total equiv. Annual | Total fees and charges per annum |
| B | 13,049 | 257,029 | 258,045 | 223,104,172 | 3,098,625 | 20,461,813 | 20,719,857 |
| DK | 0 | 0 | 0 | 0 | 350,000 | 350,000 | 350,000 |
| D | 4,090,335 | 201,138 | 451,289 | 11,184,500 | 0 | 684,007 | 1,135,297 |
| EL | 0 | 2,934,703 | 2,934,703 | 143,646,000 | 0 | 8,784,918 | 11,719,621 |
| E | 0 | 4,109,483 | 4,109,483 | 0 | 64,161,768 | 64,161,768 | 68,271,251 |
| F | 304,898 | 152,449 | 171,096 | 0 | 15,244,900 | 15,244,900 | 15,415,996 |
| IRL | 1,904,610 | 505,761 | 622,241 | 27,556,000 | 2,717,197 | 4,402,432 | 5,024,672 |
| I | 56,810 | 61,975 | 66,396 | 57,850,000 | 99,523,538 | 104,025,741 | 104,092,137 |
| L | 1,859,200 | 743,680 | 888,373 | 0 | 1,549,375 | 1,549,375 | 2,437,748 |
| NL | 0 | 353,949 | 353,949 | 208,247,114 | 134,595 | 16,341,525 | 16,695,474 |
| A | 7,267 | 1,139,013 | 1,139,457 | 288,053,000 | 872,070 | 18,488,446 | 19,627,904 |
| P | 50,379 | 9,976 | 13,897 | 11,174 | 10,578,467 | 10,579,337 | 10,593,233 |
| FIN | 0 | 0 | 0 | 0 | 2,578,995 | 2,578,995 | 2,578,995 |
| S | 10,893 | 937,462 | 938,675 | 0 | 17,397 | 17,397 | 956,072 |
| UK | 64,000 | 3,227,904 | 3,231,182 | 0 | 24,909,677 | 24,909,677 | 28,140,860 |

## E.2 3G Mobile

**Table E.3.2.1. Fees and charges for reference 3G mobile network (€), assuming 28 % penetration**

| Member State | Admin Fees | | | Spectrum Charges | | | TOTAL FEES + CHARGES (annual equivalent |
|---|---|---|---|---|---|---|---|
| | Once Off | Annual | Total Annual equivalent | Once Off | Recurring | Total Annual equivalent | |
| B | 12,882 | 250,000 | 250,788 | 368,893,333 | 2,500,000 | 25,060,306 | 25,311,093 |
| DK | 3,350,000 | 0 | 204,875 | 127,320,000 | 228,000 | 8,014,473 | 8,219,348 |
| D | 0 | | 0 | 8,455,000,000 | 0 | 517,080,052 | 517,080,052 |
| EL | 0 | 1,605,744 | 1,605,744 | 195,666,667 | 0 | 11,966,331 | 13,572,075 |
| E | 0 | | 0 | 129,217,602 | 162,976,452 | 170,878,976 | 170,878,976 |
| F | 304,898 | 182,939 | 201,586 | 4,954,590,000 | 0 | 303,006,464 | 303,208,050 |
| I | 0 | 1,601,016 | 1,601,016 | 2,763,000,000 | 0 | 168,976,012 | 170,577,028 |
| NL | 0 | 0 | 0 | 571,848,000 | 0 | 34,972,347 | 34,972,347 |
| A | 7,267 | 245,851 | 246,296 | 138,683,333 | 0 | 8,481,418 | 8,727,713 |
| P | 49,880 | 9,976 | 13,026 | 99,760,000 | 5,243,834 | 11,344,829 | 11,357,855 |
| FIN | 0 | 0 | 0 | 0 | 1,592,909 | 1,592,909 | 1,592,909 |
| S | 10,893 | 307,204 | 307,871 | 0 | 43,289 | 43,289 | 351,160 |
| UK | 64,000 | 1,045,094 | 1,049,008 | 7,290,000,000 | 0 | 445,832,475 | 446,881,483 |

**Table E.3.2.2. Fees and charges for reference 3G mobile network (€), assuming 60 % penetration**

| Member State | Admin Fees | | | Spectrum Charges | | | TOTAL FEES + CHARGES (annual equivalent) |
|---|---|---|---|---|---|---|---|
| | Once-off | Annual | Total Annual Equivalent | Once-off | Annual | Total Annual Equivalent | |
| B | 12,882 | 250,000 | 250,788 | 368,893,333 | 2,500,000 | 25,060,306 | 25,311,093 |
| DK | 3,350,000 | 0 | 204,875 | 127,320,000 | 228,000 | 8,014,473 | 8,219,348 |
| D | 0 | 0 | 0 | 8,455,000,000 | 0 | 517,080,052 | 517,080,052 |
| EL | 0 | 3,440,880 | 3,440,880 | 195,666,667 | 0 | 11,966,331 | 15,407,211 |
| E | 0 | 0 | 0 | 129,217,602 | 162,976,452 | 170,878,976 | 170,878,976 |
| F | 304,898 | 182,939 | 201,586 | 4,954,590,000 | 0 | 303,006,464 | 303,208,050 |
| I | | 1,601,016 | 1,601,016 | 2,763,000,000 | 0 | 168,976,012 | 170,577,028 |
| NL | 0 | 0 | 0 | 571,848,000 | 0 | 34,972,347 | 34,972,347 |
| A | 7,267 | 526,824 | 527,268 | 138,683,333 | 0 | 8,481,418 | 9,008,686 |
| P | 49,880 | 9,976 | 13,026 | 99,760,000 | 11,236,788 | 17,337,782 | 17,350,809 |
| FIN | 0 | 0 | 0 | 0 | 1,592,909 | 1,592,909 | 1,592,909 |
| S | 10,893 | 652,070 | 652,736 | 0 | 92,762 | 92,762 | 745,499 |
| UK | 64,000 | 1,045,094 | 1,049,008 | 7,290,000,000 | 0 | 445,832,475 | 446,881,483 |

## E.3 WLL

**Table E.3.3.1. Fees and charges for reference WLL networks (€)**

| Member State | Admin Fees | | | Spectrum Charges | | | TOTAL FEES + CHARGES (annual equivalent) |
|---|---|---|---|---|---|---|---|
| | Once-off | Annual | Total Annual equivalent | Once-off | Annual | Total Annual equivalent | |
| **National Narrowband Network** | | | | | | | |
| B | 21,071 | 9,135 | 10,424 | 0 | 2,149,350 | 2,149,350 | 2,159,774 |
| DK | 0 | 24 | 24 | 0 | 20,995 | 20,995 | 21,019 |
| D | 5,419,614 | 2,114,985 | 2,718,332 | 23,496,641 | 2,297,960 | 4,913,759 | 7,632,091 |
| EL | 0 | 929,250 | 929,250 | 6,456,000 | 0 | 718,724 | 1,647,974 |
| E | 0 | 1,026,638 | 1,026,638 | 0 | 0 | 0 | 1,026,638 |
| F | 609,796 | 552,627 | 600,085 | 0 | 272,571 | 272,571 | 872,656 |
| IRL | 238,076 | 126,350 | 152,854 | 0 | 57,138 | 57,138 | 209,992 |
| L | 7,437 | 14,700 | 15,032 | 0 | 30,210 | 30,210 | 45,242 |
| P | 50,000 | 9,975 | 13,866 | 0 | 304,267 | 304,267 | 318,133 |
| FIN | 0 | 0 | 0 | 0 | 1,137,792 | 1,137,792 | 1,137,792 |
| UK | 40,000 | 720,000 | 722,446 | 0 | 1,619,712 | 1,619,712 | 2,342,158 |
| **National Broadband Network** | | | | | | | |
| B | 21,071 | 9,135 | 10,424 | 0 | 1,025,136 | 1,025,136 | 1,035,560 |
| DK | 0 | 24 | 24 | 0 | 78,380 | 78,380 | 78,404 |
| D | 5,419,614 | 604,281 | 1,207,628 | 6,713,326 | 656,560 | 1,403,931 | 2,611,559 |
| EL | 0 | 1,062,000 | 1,062,000 | 9,685,000 | 0 | 1,078,197 | 2,140,197 |
| E | 0 | 1,173,300 | 1,173,300 | 0 | 9,629,984 | 9,629,984 | 10,803,284 |
| F | 609,796 | 552,627 | 600,085 | 0 | 139,671 | 139,671 | 739,755 |
| IRL | 238,076 | 144,400 | 170,904 | 0 | 57,138 | 57,138 | 228,042 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| L | 7,437 | 16,800 | 17,132 | 0 | 225,568 | 225,568 | 242,700 |
| A | 0 | 0 | 0 | 828,470 | | 92,231 | 92,231 |
| P | 50,000 | 9,975 | 13,866 | 0 | 304,267 | 304,267 | 318,133 |
| FIN | 0 | 0 | 0 | 0 | 1,137,792 | 1,137,792 | 1,137,792 |
| UK | 40,000 | 720,000 | 722,446 | 22,097,000 | 0 | 1,351,380 | 2,073,826 |
| **Regional Broadband Network** | | | | | | | |
| D | 66,037 | 7,363 | 14,715 | 0 | 0 | 0 | 14,715 |
| F | 114,336 | 552,627 | 561,525 | 0 | 2,553 | 2,553 | 564,079 |
| A | | 40,000 | 40,000 | 218,019 | 0 | 24,271 | 64,271 |
| FIN | 0 | 0 | 0 | 0 | 1,800 | 1,800 | 1,800 |
| UK | 40,000 | 16,000 | 18,446 | 241,935 | 0 | 14,796 | 33,242 |

## E.4 Fixed Links

**Table E.3.4.1. Fees and charges for reference fixed link networks (€)**

| | Admin Fees | | | Spectrum Charges | | | TOTAL FEES + CHARGES (annual equivalent) |
|---|---|---|---|---|---|---|---|
| Member State | Once-off | Annual | Equivalent fee per annum | Amount | Amount | Equivalent charge per annum | |
| **Private Network: 6x 155 Mbit/s, 50km links; 12x 34MBit/s, 20km links; 12x 34Mbit/s, 10km links; 12x 34MBit/s, 5km links** | | | | | | | |
| B | 0 | 0 | 0 | 0 | 91,927 | 91,927 | 91,927 |
| DK | 0 | | 0 | 0 | 117,600 | 117,600 | 117,600 |
| D | 34,356 | 3,092 | 6,917 | 0 | 0 | 0 | 6,917 |
| EL | 0 | 0 | 0 | 0 | 178,560 | 178,560 | 178,560 |
| E | 0 | 0 | 0 | 0 | 143,816 | 143,816 | 143,816 |
| F | | 1,281 | 1,281 | 0 | 125,917 | 125,917 | 127,198 |
| IRL | 0 | 0 | 0 | 0 | 39,984 | 39,984 | 39,984 |
| I | 0 | 0 | 0 | | 140,838 | 140,838 | 140,838 |
| L | 620 | 124 | 193 | 8,538 | 33,462 | 34,413 | 34,606 |
| NL | 21,955 | 0 | 2,444 | 0 | 9,630 | 9,630 | 12,074 |
| A | 8,241 | 0 | 917 | 0 | 132,594 | 132,594 | 133,511 |
| P | 840 | 0 | 94 | 0 | 228,480 | 228,480 | 228,574 |
| FIN | 0 | 9,042 | 9,042 | 0 | 0 | 0 | 9,042 |
| S | 0 | 2,484 | 2,484 | 0 | 0 | 0 | 2,484 |
| UK | 0 | 0 | 0 | 0 | 65,008 | 65,008 | 65,008 |
| **Public Network (PTO): 6x 155 Mbit/s, 50km links; 12x 34MBit/s, 20km links; 12x 34MBit/s, 10km links; 12x 34MBit/s, 5km links; Annual turnover €10M** | | | | | | | |
| B | 0 | 0 | 0 | 0 | 91,927 | 91,927 | 91,927 |
| DK | 0 | 0 | 0 | 0 | 117,600 | 117,600 | 117,600 |
| D | 2,744,714 | 3,092 | 308,651 | 0 | 0 | 0 | 308,651 |
| EL | | 50,000 | 50,000 | 0 | 178,560 | 178,560 | 228,560 |
| E | 0 | 15,000 | 15,000 | 0 | 422,462 | 422,462 | 437,462 |
| F | 266,786 | 133,393 | 163,093 | 0 | 109,488 | 109,488 | 272,581 |
| IRL | 5,000 | 20,000 | 20,557 | 0 | 39,984 | 39,984 | 60,541 |
| I | 25,823 | 25,823 | 28,698 | | 131,688 | 131,688 | 160,386 |
| L | 7,437 | 20,000 | 20,828 | 8,538 | 33,462 | 34,413 | 55,240 |
| NL | 21,955 | | 2,444 | | 9,630 | 9,630 | 12,074 |
| A | 5,087 | 20,000 | 20,566 | 8,241 | 132,594 | 133,511 | 154,078 |
| P | 10,175 | 9,976 | 11,109 | 0 | 85,680 | 85,680 | 96,789 |

| | Admin Fees | | | Spectrum Charges | | | TOTAL FEES + CHARGES (annual equivalent) |
|---|---|---|---|---|---|---|---|
| Member State | Once-off | Annual | Equivalent fee per annum | Amount | Amount | Equivalent charge per annum | |
| FIN | 0 | 9,042 | 9,042 | 0 | 0 | 0 | 9,042 |
| S | 0 | 2,484 | 2,484 | 0 | 0 | 0 | 2,484 |
| UK | 12,500 | 3,000 | 4,392 | 0 | 65,008 | 65,008 | 69,400 |
| **Single 38 GHz / 28 MHz link, congested area, 5 km length, private** | | | | | | | |
| B | 0 | 0 | 0 | 0 | 1,382 | 1,382 | 1,382 |
| DK | 0 | 0 | 0 | 0 | 1,225 | 1,225 | 1,225 |
| D | 818 | 74 | 165 | 0 | 9 | 0 | 165 |
| EL | 0 | 0 | 0 | 0 | 2,880 | 2,880 | 2,880 |
| E | 0 | 0 | 0 | 0 | 580 | 580 | 580 |
| F | | 30 | 30 | 0 | 1,707 | 1,707 | 1,737 |
| IRL | 0 | 0 | 0 | 0 | 952 | 952 | 952 |
| I | 0 | 0 | 0 | 0 | 1,832 | 1,832 | 1,832 |
| L | 0 | 0 | 0 | 99 | 322 | 333 | 333 |
| NL | 523 | 0 | 58 | 0 | 156 | 156 | 214 |
| A | 196 | 0 | 22 | 0 | 3,157 | 3,157 | 3,179 |
| P | 20 | | 2 | 0 | 1,120 | 1,120 | 1,122 |
| FIN | 0 | 215 | 215 | 0 | 9 | 0 | 215 |
| S | 0 | 54 | 54 | 0 | | 0 | 54 |
| UK | 0 | 0 | 0 | 0 | 810 | 810 | 810 |
| **Single 23 GHz / 28 MHz link, congested area, 10 km length, private** | | | | | | | |
| B | 0 | 0 | 0 | 0 | 1,382 | 1,382 | 1,382 |
| DK | 0 | | 0 | 0 | 1,225 | 1,225 | 1,225 |
| D | 818 | 74 | 165 | 0 | 0 | 0 | 165 |
| EL | 0 | 0 | 0 | 0 | 2,880 | 2,880 | 2,880 |
| E | 0 | 0 | 0 | 0 | 1,466 | 1,466 | 1,466 |
| F | | 30 | 30 | 0 | 2,561 | 2,561 | 2,591 |
| IRL | 0 | 0 | 0 | 0 | 952 | 952 | 952 |
| I | | | 0 | | 1,832 | 1,832 | 1,832 |
| L | 0 | 0 | 0 | 182 | 496 | 516 | 516 |
| NL | 523 | 0 | 58 | 0 | 199 | 199 | 257 |
| A | 196 | 0 | 22 | 196 | 3,157 | 3,179 | 3,201 |
| P | 20 | 0 | 2 | 0 | 2,240 | 2,240 | 2,242 |
| FIN | 0 | 215 | 215 | 0 | 0 | 0 | 215 |
| S | 0 | 54 | 54 | 0 | 0 | 0 | 54 |
| UK | 0 | 0 | 0 | 0 | 1,029 | 1,029 | 1,029 |
| **Single 13 GHz / 28 MHz link, congested area, 20 km length, private** | | | | | | | |
| B | 0 | 0 | 0 | 0 | 2,304 | 2,304 | 2,304 |
| DK | 0 | 0 | 0 | 0 | 1,225 | 1,225 | 1,225 |
| D | 818 | 74 | 165 | 0 | | 0 | 165 |
| EL | 0 | 0 | 0 | 0 | 3,840 | 3,840 | 3,840 |
| E | 0 | 0 | 0 | 0 | 2,931 | 2,931 | 2,931 |
| F | | 30 | 30 | 0 | 3,842 | 3,842 | 3,872 |
| IRL | 0 | 0 | 0 | 0 | 952 | 952 | 952 |
| I | 0 | 0 | 0 | 0 | 3,443 | 3,443 | 3,443 |

| | Admin Fees | | | Spectrum Charges | | | TOTAL FEES + CHARGES (annual equivalent) |
|---|---|---|---|---|---|---|---|
| Member State | Once-off | Annual | Equivalent fee per annum | Amount | Amount | Equivalent charge per annum | |
| L | 0 | 0 | 0 | 287 | 818 | 850 | 850 |
| NL | 523 | 0 | 58 | 0 | 199 | 199 | 257 |
| A | 196 | 0 | 22 | 196 | 3,157 | 3,179 | 3,201 |
| P | 20 | 0 | 2 | 0 | 4,480 | 4,480 | 4,482 |
| FIN | 0 | 215 | 215 | 0 | 0 | 0 | 215 |
| S | 0 | 54 | 54 | 0 | 0 | 0 | 54 |
| UK | 0 | 0 | 0 | 0 | 2,576 | 2,576 | 2,576 |
| **Single 4 GHz / 28 MHz link, 50 km length, congested, private** | | | | | | | |
| B | 0 | 0 | 0 | 0 | 3,840 | 3,840 | 3,840 |
| DK | 0 | 0 | 0 | 0 | 1,225 | 1,225 | 1,225 |
| D | 818 | 74 | 165 | 0 | | 0 | 165 |
| EL | 0 | 0 | 0 | 0 | 5,280 | 5,280 | 5,280 |
| E | 0 | 0 | 0 | 0 | 7,297 | 7,297 | 7,297 |
| F | | 30 | 30 | 0 | 4,482 | 4,482 | 4,512 |
| IRL | 0 | 0 | 0 | 0 | 952 | 952 | 952 |
| I | 0 | 0 | 0 | 0 | 6,037 | 6,037 | 6,037 |
| L | 0 | 0 | 0 | 287 | 1,636 | 1,668 | 1,668 |
| NL | 523 | 0 | 58 | 0 | 427 | 427 | 485 |
| A | 196 | 0 | 22 | 196 | 3,157 | 3,179 | 3,201 |
| P | 20 | 0 | 2 | 0 | 11,200 | 11,200 | 11,202 |
| FIN | 0 | 215 | 215 | 0 | 0 | 0 | 215 |
| S | 0 | 87 | 87 | 0 | 00 | 0 | 87 |
| UK | 0 | 0 | 0 | 0 | 2,576 | 2,576 | 2,576 |
| **Single 4 GHz / 14 MHz link, 50 km length, congested area, private** | | | | | | | |
| B | 0 | 0 | 0 | 0 | 3,186 | 3,186 | 3,186 |
| DK | 0 | | 0 | 0 | 613 | 613 | 613 |
| D | 818 | 74 | 165 | 0 | 0 | 0 | 165 |
| EL | 0 | 0 | 0 | 0 | 2,640 | 2,640 | 2,640 |
| E | 0 | 0 | 0 | 0 | 3,649 | 3,649 | 3,649 |
| F | 0 | 30 | 30 | 0 | 3,522 | 3,522 | 3,552 |
| IRL | 0 | 0 | 0 | 0 | 952 | 952 | 952 |
| I | 0 | 0 | 0 | 0 | 6,037 | 6,037 | 6,037 |
| L | 0 | 0 | 0 | 287 | 1,636 | 1,668 | 1,668 |
| NL | 523 | 0 | 58 | 0 | 355 | 355 | 413 |
| A | 196 | 0 | 22 | 196 | 3,157 | 3,179 | 3,201 |
| P | 20 | 0 | 2 | 0 | 5,600 | 5,600 | 5,602 |
| FIN | 0 | 215 | 215 | 0 | 0 | 0 | 215 |
| S | 0 | 87 | 87 | 0 | 0 | 0 | 87 |
| UK | 0 | 0 | 0 | 0 | 1,288 | 1,288 | 1,288 |
| **Single 4 GHz / 7 MHz link, 50 km length, congested area, private** | | | | | | | |
| B | 0 | 0 | 0 | 0 | 2,832 | 2,832 | 2,832 |
| DK | 0 | 0 | 0 | 0 | 306 | 306 | 306 |
| D | 818 | 74 | 165 | 0 | 0 | 0 | 165 |
| EL | 0 | 0 | 0 | 0 | 1,320 | 1,320 | 1,320 |

| | Admin Fees | | | Spectrum Charges | | | TOTAL FEES + CHARGES (annual equivalent) |
|---|---|---|---|---|---|---|---|
| Member State | Once-off | Annual | Equivalent fee per annum | Amount | Amount | Equivalent charge per annum | |
| E | 0 | 0 | 0 | 0 | 1,824 | 1,824 | 1,824 |
| F | 0 | 30 | 30 | 0 | 2,561 | 2,561 | 2,591 |
| IRL | 0 | 0 | 0 | 0 | 952 | 952 | 952 |
| I | 0 | 0 | 0 | 0 | 6,037 | 6,037 | 6,037 |
| L | 0 | 0 | 0 | 287 | 1,314 | 1,346 | 1,346 |
| NL | 523 | 0 | 58 | 0 | 285 | 285 | 343 |
| A | 196 | 0 | 22 | 196 | 3,157 | 3,179 | 3,201 |
| P | 20 | 0 | 2 | 0 | 2,800 | 2,800 | 2,802 |
| FIN | 0 | 215 | 215 | 0 | 0 | 0 | 215 |
| S | 0 | 87 | 87 | 0 | 0 | 0 | 87 |
| UK | 0 | 0 | 0 | 0 | 1,288 | 1,288 | 1,288 |

## E.5 Satellite Earth Stations

**Table E.3.5.1. Fees and charges for reference satellite earth stations (€)**

| Member State | Admin Fees | | | Spectrum Charges | | | TOTAL FEES + CHARGES (annual equivalent) |
|---|---|---|---|---|---|---|---|
| | Once-off | Annual | Total annual equivalent | Once-off | Annual | Total annual equivalent | |
| **Typical Narrowband Permanent Earth Station. Private use, frequency band 4 / 6 GHz, bandwidth 19.2 kHz, EIRP 65 dBW, input to antenna 15.2 dBW, frequency co-ordination required** | | | | | | | |
| B | 1,855 | 0 | 207 | 0 | 53 | 53 | 260 |
| DK | 0 | 0 | 0 | 0 | 24 | 24 | 24 |
| D | 0 | 0 | | 37 | 77 | 81 | 81 |
| EL | 150 | 0 | 17 | 0 | 375 | 375 | 392 |
| E | 0 | 0 | 0 | | 19 | 19 | 19 |
| IRL | 0 | 0 | 0 | 0 | 1,250 | 1,250 | 1,250 |
| L | 0 | 0 | | 24,789 | 12,395 | 15,155 | 15,155 |
| NL | 0 | 0 | 0 | 512 | 18 | 75 | 75 |
| A | 0 | 0 | 0 | 1,962 | 1,308 | 1,526 | 1,526 |
| P | 0 | 0 | 0 | 517 | 4,357 | 4,415 | 4,415 |
| FIN | 0 | | 0 | 0 | 178 | 178 | 178 |
| S | 0 | 1,634 | 1,634 | 0 | 536 | 536 | 2,170 |
| UK | 0 | 0 | 0 | 0 | 1,602 | 1,602 | 1,602 |
| **Private TV uplink: 20 MHz bandwidth, to a single satellite, operated by private company (broadcaster) for its own benefit: Freq band 14 - 14.5 GHz, Bandwidth 20 MHz, EIRP 76 dBW, Input to antenna 20 dBW, Frequency co-ordination required.** | | | | | | | |
| B | 1,855 | 0 | 207 | 0 | 4,768 | 4,768 | 4,975 |
| DK | 0 | 0 | 0 | 0 | 899 | 899 | 899 |
| D | 37 | 77 | 81 | 37 | 77 | 81 | 162 |
| EL | 150 | 0 | 17 | 0 | 6,000 | 6,000 | 6,017 |
| E | 0 | 0 | 0 | 0 | 17,774 | 17,774 | 17,774 |
| IRL | 0 | 0 | 0 | 0 | 1,750 | 1,750 | 1,750 |
| L | 0 | 0 | 0 | 24,789 | 12,395 | 15,155 | 15,155 |
| NL | 0 | 0 | 0 | 512 | 445 | 502 | 502 |
| A | 0 | 0 | 0 | 1,962 | 1,308 | 1,526 | 1,526 |
| P | 0 | 0 | 0 | 517 | 45,360 | 45,418 | 45,418 |

| Member State | Admin Fees | | | Spectrum Charges | | | TOTAL FEES + CHARGES (annual equivalent) |
|---|---|---|---|---|---|---|---|
| | Once-off | Annual | Total annual equivalent | Once-off | Annual | Total annual equivalent | |
| FIN | 0 | 0 | 0 | 0 | 178 | 178 | 178 |
| S | 0 | 545 | 545 | 0 | 536 | 536 | 1,081 |
| UK | 0 | 0 | 0 | 0 | 16,200 | 16,200 | 16,200 |
| **PTO operated Teleport installation comprising five stations of 34 MHz bandwidth, pointing to five satellites (pwr characteristics as per ERC RR example system C): €10M p.a. turnover, Freq band 4 / 6 GHz, Bandwidth 34 MHz, EIRP 84 dBW, Input to antenna 30 dBW, Frequency co-ordination required.** | | | | | | | |
| B | 9,274 | 0 | 1,032 | 0 | 23,838 | 23,838 | 24,870 |
| DK | 0 | 0 | 0 | | 7,556 | 7,556 | 7,556 |
| D | 7,665 | 0 | 853 | 185 | 385 | 406 | 1,259 |
| EL | 150 | 50,000 | 50,017 | 0 | 45,000 | 45,000 | 95,017 |
| E | 0 | 15,000 | 15,000 | 0 | 151,081 | 151,081 | 166,081 |
| IRL | 5,000 | 20,000 | 20,557 | 608,000 | 100,000 | 167,687 | 188,243 |
| L | 7,437 | 51,579 | 52,407 | 24,789 | 61,975 | 64,735 | 117,142 |
| NL | 0 | 0 | 0 | 512 | 2,225 | 2,282 | 2,282 |
| A | 5,087 | 20,000 | 20,566 | 9,810 | 13,517 | 14,609 | 35,175 |
| P | 9,976 | 9,976 | 11,087 | 2,585 | 260,950 | 261,238 | 272,324 |
| FIN | 0 | 891 | 891 | 0 | 0 | 0 | 891 |
| S | 0 | 8,170 | 8,170 | 0 | 8,047 | 8,047 | 16,217 |
| UK | 12,500 | 3,000 | 4,392 | | 81,000 | 81,000 | 85,392 |
| **PTO operated VSAT Network: Single hub station, 30 terminals. Turnover € 1M, Freq band 11 / 14 GHz, Bandwidth 150 kHz, EIRP 43 dBW, Input to antenna 0 dBW, Frequency co-ordination required for hub but not for terminals** | | | | | | | |
| B | 29,679 | 0 | 3,304 | 0 | 1,589 | 1,589 | 4,893 |
| DK | 0 | 0 | 0 | 0 | 1,425 | 1,425 | 1,425 |
| D | 7,665 | 0 | 853 | 1,141 | 2,377 | 2,504 | 3,357 |
| EL | 150 | 5,000 | 5,017 | 0 | 7,750 | 7,750 | 12,767 |
| E | 60 | 1,500 | 1,507 | 0 | 4,975 | 4,975 | 6,482 |
| F | 38,112 | 19,056 | 23,299 | 0 | 0 | 0 | 23,299 |
| IRL | 5,000 | 2,000 | 2,557 | 0 | 1,525 | 1,525 | 4,082 |
| I | 2,582 | 5,165 | 5,452 | 0 | 8,255 | 8,255 | 13,707 |
| L | 7,437 | 51,579 | 52,407 | 6,445 | 2,975 | 52,407 | 104,814 |
| NL | 363 | 2,042 | 2,082 | 512 | 549 | 606 | 2,688 |
| A | 5,087 | 2,000 | 2,566 | 4,905 | 13,517 | 14,063 | 16,629 |
| P | 9,976 | 9,976 | 11,087 | 5,161 | 1,068 | 1,643 | 12,729 |
| FIN | 0 | 0 | 0 | 0 | 2,348 | 2,348 | 2,348 |
| S | 0 | 10,349 | 10,349 | 0 | 10,193 | 10,193 | 20,542 |
| UK | 0 | 4,860 | 4,860 | 0 | 9,720 | 9,720 | 14,580 |
| **Private VSAT Network: Single hub station, 30 terminals. Freq band 11 / 14 GHz, Bandwidth 150 kHz, EIRP 43 dBW, Input to antenna 0 dBW, Frequency co-ordination required for hub but not for terminals.** | | | | | | | |
| | | | | | | | |
| B | 29,679 | 0 | 3,304 | 0 | 1,589 | 1,589 | 4,893 |
| DK | 0 | 0 | 0 | 0 | 1,425 | 1,425 | 1,425 |
| D | 37 | 77 | 81 | 1,141 | 2,377 | 2,504 | 2,585 |
| EL | 150 | 0 | 17 | 0 | 7,750 | 7,750 | 7,767 |
| E | 0 | 0 | 0 | 0 | 133 | 133 | 133 |
| F | 0 | 3,881 | 3,881 | 0 | | 0 | 3,881 |
| IRL | 0 | 0 | 0 | 0 | 1,525 | 1,525 | 1,525 |

| Member State | Admin Fees | | | Spectrum Charges | | | TOTAL FEES + CHARGES (annual equivalent) |
|---|---|---|---|---|---|---|---|
| | Once-off | Annual | Total annual equivalent | Once-off | Annual | Total annual equivalent | |
| I | 2,582 | 5,165 | 5,452 | 0 | 8,255 | 8,255 | 13,707 |
| L | 0 | 0 | 0 | 6,445 | 2,975 | 3,692 | 3,692 |
| NL | 0 | 0 | 0 | 512 | 549 | 606 | 606 |
| A | 0 | 0 | 0 | 4,905 | 13,517 | 14,063 | 14,063 |
| P | 0 | 0 | 0 | 5,161 | 1,577 | 2,152 | 2,152 |
| FIN | 0 | 0 | 0 | 0 | 2,348 | 2,348 | 2,348 |
| S | 0 | 0 | 0 | 0 | 10,193 | 10,193 | 10,193 |
| UK | 0 | 3,000 | 3,000 | 0 | 6,000 | 6,000 | 9,000 |
| **Private VSAT Network: Single hub station, 30 terminals. Freq band 11 / 14 GHz, Bandwidth 1.5 MHz, EIRP 43 dBW, Input to antenna 0 dBW, Frequency co-ordination required for hub but not for terminals.** | | | | | | | |
| | | | 0 | | | 0 | |
| B | 29,679 | 0 | 3,304 | 0 | 1,589 | 1,589 | 4,893 |
| DK | 0 | 0 | 0 | 0 | 1,425 | 1,425 | 1,425 |
| D | 37 | 77 | 81 | 1,141 | 2,377 | 2,504 | 2,585 |
| EL | 150 | 0 | 17 | 0 | 31,000 | 31,000 | 31,017 |
| E | 0 | | 0 | 0 | 1,334 | 1,334 | 1,334 |
| F | 0 | 3,881 | 3,881 | 0 | | 0 | 3,881 |
| IRL | 0 | | 0 | 0 | 1,525 | 1,525 | 1,525 |
| I | 2,582 | 5,165 | 5,452 | 0 | 13,419 | 13,419 | 18,871 |
| L | 0 | 0 | 0 | 6,445 | 2,975 | 3,692 | 3,692 |
| NL | 0 | 0 | 0 | 512 | 2,759 | 2,816 | 2,816 |
| O | 0 | 0 | 0 | 4,905 | 13,517 | 14,063 | 14,063 |
| P | 0 | 0 | 0 | 5,161 | 3,937 | 4,512 | 4,512 |
| FIN | 0 | 0 | 0 | 0 | 2,348 | 2,348 | 2,348 |
| S | 0 | 0 | 0 | 0 | 10,193 | 10,193 | 10,193 |
| UK | | 3,000 | 3,000 | 0 | 6,000 | 6,000 | 9,000 |
| **Private VSAT Network: Single hub station, 30 terminal stations. Freq band 11 / 14 GHz, Bandwidth 20 MHz, EIRP 43 dBW, Input to antenna 0 dBW, Frequency co-ordination required for hub but not for terminals.** | | | | | | | |
| | | | | | | | |
| B | 29,679 | 0 | 3,304 | 0 | 1,589 | 1,589 | 4,893 |
| DK | 0 | 0 | 0 | 0 | 1,425 | 1,425 | 1,425 |
| D | 37 | 77 | 81 | 1,141 | 2,377 | 2,504 | 2,585 |
| EL | 150 | | 17 | 0 | 186,000 | 186,000 | 186,017 |
| E | 0 | 0 | 0 | 0 | 17,780 | 17,780 | 17,780 |
| F | | 3,881 | 3,881 | 0 | | 0 | 3,881 |
| IRL | 0 | 0 | 0 | 0 | 1,525 | 1,525 | 1,525 |
| I | 2,582 | 5,165 | 5,452 | 0 | 23,748 | 23,748 | 29,200 |
| L | 0 | 0 | 0 | 6,445 | 2,975 | 3,692 | 3,692 |
| NL | 0 | 0 | 0 | 512 | 13,795 | 13,852 | 13,852 |
| A | 0 | 0 | 0 | 4,905 | 13,517 | 14,063 | 14,063 |
| P | 0 | 0 | 0 | 5,161 | 236,592 | 237,167 | 237,167 |
| FIN | 0 | 0 | 0 | 0 | 2,348 | 2,348 | #REF! |
| S | 0 | 0 | 0 | 0 | 10,193 | 10,193 | 10,193 |
| UK | 0 | 3,000 | 3,000 | 0 | 6,000 | 6,000 | 9,000 |

# F ANNEX F: NRA QUESTIONNAIRE

The following is a summary of the information requested in the questionnaire sent to each NRA:

**1 GENERAL INFORMATION**

1.1 Organisations responsible for the granting of radio frequencies and related licences, and for setting administrative fees or spectrum charges

1.1.1 Please state all national organisations with responsibilities for these functions, providing a brief description of the role of each organisation, its relation to the other organisations involved and the status of the organisation (e.g Government Department, Independent Regulator, Private Company)

1.1.2 Please provide any available information regarding the costs incurred by these organisations in carrying out these functions. Please provide details, where possible identifying costs specifically relating to the licensing of networks using radio spectrum and other related costs such as spectrum management. Where these details differ for each service (GSM, UMTS, fixed links, satellite earth stations or wireless local loop), please provide details for each service category.

1.2 Licensing Requirements

1.2.1 Please state the national licensing requirements for public telecommunications network operators ( i.e. operators of networks used, in whole or in part, for the provision of publicly available telecommunication services). In particular, please state:

 whether an individual licence is required or whether general authorisations, class licences or registration is sufficient in some cases, to enable a public telecommunications network operator (PTNO) to install the network, to use frequencies and to provide services

 whether separate licences/authorisations/registration are required to install the network, to use frequencies and to provide services

1.2.2 Please specify whether radio spectrum licences relate to the spectrum itself, the use or installation of specific network apparatus or a combination of the two.

1.2.3 Is any of the revenue generated by spectrum charges allocated to specific activities (e.g spectrum management, research and development). If so, please provide details.

1.2.4 Is any of the revenue generated by spectrum charges or administrative fees allocated to the “re-farming” or relocation of existing spectrum users? If so, please provide details.

1.2.5 Please provide details of any recent historical developments relating to administrative fees or spectrum charges, e.g. introduction of new fees or charges, or changes to the basis for determining fees or charges.

1.2.6 Please provide details of any relevant national legislation relating to licensing of spectrum using telecommunications services.

1.2.7 Are there any “change of control” rules which might prevent or influence any change of ownership of a licensed Public Telecommunications Network Operator or other licensed radiocommunication service? If so, please provide details.

1.2.8 In the event that an operator's licence is revoked, are any of the administrative fees or spectrum charges that have been paid returned to the operator? If so, please give details

1.2.9 In the event that an operator ceases trading or becomes insolvent, are any of the administrative fees or spectrum charges that have been paid returned to the operator? If so, please give details.

1.3 Planned future developments for licence fees and regulatory approach to radiocommunication services

1.3.1 Please state details of any planned future modifications to the approach to setting administrative or frequency based fees for services using spectrum, or to the broader regulatory approach to radiocommunications services.

1.3.2 Are there any plans to introduce any form of spectrum trading (other than straightforward change of licensee ownership) in the future? If so, please provide details.

**2 FEES AND CHARGES FOR GSM MOBILE TELEPHONY SERVICES**

2.1 What procedure is or has been used for awarding GSM 900 and / or GSM 1800 licences?

2.2 Does your administration have any plans to introduce GSM or an equivalent second generation mobile telephony service in any frequency band other than the GSM 900 or GSM 1800 bands? If so, please provide details, including the frequency band concerned and the proposed approach to licensing (e.g. whether spectrum will be granted to existing GSM licensees or subject to auction / beauty contest), and the proposed fees and charges.

2.3 What parameters are taken into account in determining administrative fees and spectrum charges for GSM services?

2.4 NRA objectives in setting administrative fees and spectrum charges:

Please indicate the importance of the following objectives in setting administrative fees and spectrum charge levels for GSM networks. Please use a scale of 1 to 5, where:

1 = not important at all

2 = slightly important

3 = of average importance

4 = very important

5 = the most important consideration

Recovery of administrative costs

Promotion of spectrum efficiency

Promotion of competition between networks

Simplicity and transparency

Reflecting the market value of the radio spectrum

Raising revenue for Government

Geographical coverage

Other factors (please specify)

2.5 Please state any planned changes to GSM administrative fees or spectrum charges, including any plans to “re-farm” GSM spectrum for UMTS / IMT-2000 services.

2.6 Are fees and charges for all GSM operators determined on the same basis?

If you have answered no, please provide details of the differences between how fees and charges are determined for different operators

2.7 Please provide the following information for each GSM licensee:

Licensee Name, Date of Service Licence issue, Duration of Service Licence, Date of Spectrum Licence issue, Duration of Spectrum Licence

Are there any special conditions applying to this licensee that do not apply to any other licensees? If so please provide details

Are there any financial guarantees or penalties associated with licence conditions or service obligations? If so please provide details

At the time of spectrum assignment, was the mobile operator wholly or partly owned by an incumbent operator

If partly owned, please specify percentage shareholding of incumbent operator

Please state current ownership of the operator, including shareholdings (%)

Please state current GSM 900 spectrum (e.g. 2 x 10 MHz) assigned to the operator (in MHz)

Please state current GSM 1800 spectrum (e.g. 2 x 10 MHz) assigned to the operator (in MHz)

Current geographic coverage, Current population coverage, Licence coverage obligation, Approx number of base stations

2.7.1 Please specify any one-off administrative fees applied to each GSM operator:

2.7.2 Please specify any recurring administrative fees applied to each GSM operator:

2.7.3 Please specify any one off spectrum charges applied to each GSM operator:

2.7.4 Please specify any recurring spectrum charges incurred by each GSM operator:

**3 FEES AND CHARGES FOR TELECOMMUNICATIONS SERVICES USING SPECTRUM : UMTS / IMT-2000 (3RD GENERATION MOBILE)**

3.1 What procedure is used for selecting UMTS / IMT-2000 licensees?

3.2 Where a beauty contest is or has been used, please specify the selection criteria, in particular any aspects relating to access obligations to the licensee’s mobile network.

3.3 What parameters are taken into account in determining administrative fees and spectrum charges for UMTS / IMT-2000 services:

Frequency band (e.g. paired / unpaired), Bandwidth, No. of base stations, Market value of spectrum, Operator financial performance (turnover, profit etc – please specify), Administrative costs of licensing, Administrative costs of frequency management, Other parameters (please specify):

3.4 Please state any planned future changes to 3G mobile spectrum licence fees

3.5 Are there any plans at this stage to license further frequencies for 3rd generation mobile services, beyond the spectrum identified in ERC Decision ERC/DEC(99)25? If so, please provide details.

3.6 Are fees and charges for all IMT-2000/UMTS operators determined on the same basis?

If you have answered no, please provide details of the differences between how fees and charges are determined for different operators

3.7 Please provide the following information for each UMTS / IMT-2000 operator (as for GSM):

**4 FEES AND CHARGES FOR TELECOMMUNICATIONS SERVICES USING SPECTRUM : POINT TO POINT LINKS (RADIO RELAY)**

4.1 Which of the following types of user may apply to the licensing authority for a licence to operate point to point links? (please tick appropriate boxes)

Public Telecommunications Operator, Broadcaster, Government Department (military), Government Department (civil), Public Safety Organisation (e.g. police), Utilities (e.g. electricity, water), Private companies

4.2 Are specific frequency bands set aside for any of the above types of user ? (if so, please provide details)

4.3 Do any exclusive rights or conditions relating to radio spectrum access for terrestrial fixed links apply to the incumbent public telecommunications operator (e.g. exclusive or self-managed spectrum)? If so, please provide details.

4.4 Is the same approach to licensing, administrative fees and/or spectrum charges applied to all types of user?

4.5 What procedure is used for licensing point to point links ?

Block allocations of radio spectrum to individual users or groups of users , First come first served, A combination of these two approaches

4.6 What is the total number of fixed links licensed by your administration?

4.7 What is the total revenue from fixed link administrative fees and spectrum charges?

4.8 Which of the following parameters are used to determine the administrative fees and spectrum charges for point to point link licences? (please tick all that apply):

Type(s) of user, Number of transmitters, Frequency band, Link Bandwidth, Spectrum Efficiency (e.g. Mbit/s per MHz), Technology (analogue / digital) , Link length, Geographic location, Link availability (grade of service), Transmitter Power or EIRP, Transmitter Height, Administrative costs of licensing, Administrative costs of frequency management, Other parameters (please specify):

4.9 NRA objectives in setting administrative fees and spectrum charges for fixed links: as for GSM

4.10 Current administrative fees and spectrum charges for point to point links

4.10.1 Using a separate sheet, please specify for each frequency band and each type of link the current administrative fees and/or spectrum charges levels applied to point to point links. Note: if this

information is already available in an NRA publication or on the world wide web, please provide a copy of this information with your response. Please include the following in your response:

4.10.1.1 Details of all administrative fees and spectrum charges applying to fixed link operators, their purpose and how they are determined, clearly stating where these are based on any of the parameters listed in section 5.8 above and any formula which is used to calculate the fees and charges.

4.10.1.2 Please provide details of the payment schedule applying to fixed link fees and charges, indicating clearly where these differ between types of link or types of user.

4.10.1.3 Please state the legislative basis of any fixed link fees or charges.

4.10.2 Are any types of fixed link exempt from licensing (i.e. no administrative fee or spectrum charge applies)? If so please provide details

4.11 Please state any planned future changes to fixed link spectrum fees

**5 FEES AND CHARGES FOR TELECOMMUNICATIONS SERVICES USING SPECTRUM : SATELLITE EARTH STATIONS**

5.1 What types of satellite earth station are licensed? Please provide details

5.2 Are any receive-only stations licensed? If so, please give details.

5.3 Which of the following types of user may apply to the licensing authority for a licence to operate satellite earth stations? As for fixed links

5.4 Are specific frequency bands set aside for any of the above types of user ? (if so, please provide details

5.5 Do any exclusive rights or conditions relating to radio spectrum access for permanent satellite earth stations apply to the incumbent public telecommunications operator (e.g. exclusive or self-managed spectrum)? If so, please provide details.

5.6 Are different approaches to licensing, administrative fees and/or spectrum charges applied to different types of earth station?

Note: if you have answered Yes to this question, please complete the following sections separately for each type of user for which a particular licensing approach, fee or charging basis applies.

5.7 What procedure is used for licensing satellite earth stations? As for fixed links

5.8 Please state the total number of permanent earth stations licensed by your administration (excluding VSATs)

5.9 Please state the total number of licensed VSAT hub and terminal stations

5.10 Please state the total administrative fee and spectrum charge revenue from permanent earth stations (excluding VSATs

5.11 Please state the total administrative fee and spectrum charge revenue from VSATs

5.12 Which of the following parameters are used to determine the administrative fee and spectrum charge levels for satellite earth station licences:

Type of earth station, Number of terminals, Frequency band, Link Bandwidth, Technology (analogue / digital), Spectrum Efficiency (e.g. Mbit/s per MHz), Geographic location, Type of licensee (e.g. public or private sector), Transmitter Power, Transmitter EIRP, Antenna type, No. of satellites the earth station can access, Receive only terminal characteristics, Co-ordination requirements with other radiocommunication services, Administrative costs of licensing, Administrative costs of frequency management, Other parameters (please specify):

5.13 NRA objectives in setting administrative fees and spectrum charges as for GSM

5.14 Current fee levels for satellite earth stations

5.14.1 Please specify for each frequency band and each type of earth station the current administrative fees and spectrum charges applied to satellite earth stations. Note: if this information is already available in an NRA publication or the world wide web, please provide a copy of this information with your response.

5.14.2 Please include within your response details of all administrative fees and spectrum charges applying to earth station operators, their purpose and how they are determined, clearly stating where these are based on any of the parameters listed in section 5.8 above and any formula which is used to calculate the fee for individual earth stations:

5.14.3 Please indicate if any types of satellite earth station are exempt from licensing (i.e. no fee applies)

5.14.4 Please state any planned future changes to satellite earth station spectrum fees.

**6. FEES AND CHARGES FOR TELECOMMUNICATIONS SERVICES USING SPECTRUM : WLL**

6.1.1 Please state the number of national and WLL networks currently licensed:

6.1.2 Are WLL licences differentiated between broadband and narrowband services?

6.1.3 What procedure is or has been used for awarding WLL licences?

6.2 What parameters are taken into account in determining administrative fees and spectrum charges for WLL services:

Administrative Fees Spectrum Charges

Frequency band, Bandwidth, Type of service (e.g. PSTN, ISDN, etc, Geographic area served, Population served, No. of base stations, Market value of spectrum, Operator financial performance (turnover, profit etc – please specify), Administrative costs of licensing, Administrative costs of frequency management, Other parameters (please specify):

6.3 NRA objectives in setting administrative fees and spectrum charges: as for GSM

6.4 Are fees and charges for all WLL operators determined on the same basis?

6.5 Please provide the following information for each WLL operator (note: where an operator holds multiple regional licences these may be aggregated for response purposes):

Operator Name, Broadband or Narrowband licence, National or Regional licence(s), Date of Service Licence issue, Duration of Service Licence, Date of Spectrum Licence issue, Duration of Spectrum Licence

Are there any special conditions applying to this licensee that do not apply to any other licensees? If so please provide details

Are there any financial guarantees or penalties associated with licence conditions or service obligations? If so please provide details

At the time of spectrum assignment, was the mobile operator wholly or partly owned by an incumbent operator

If partly owned, please specify percentage shareholding of incumbent operator

Please state current ownership of the operator, including shareholdings (%)

Please state current spectrum assigned to the operator in each frequency band

Licence coverage area, Current population coverage, Licence coverage obligation, Approx number of base stations

6.5.1 Please specify any one-off administrative fees applied to each WLL operator:

6.5.2 Please specify any recurring administrative fees applied to each WLL operator:

6.5.3 Please specify any one off spectrum charges applied to each WLL operator:

Please specify any recurring spectrum charges incurred by each WLL operator:

6.6 Please state any planned changes to WLL administrative fees or spectrum charges