



8. Radio Spectrum Management Operations

8.1. Introduction

A common element across all wireless communications applications is the usage of radio frequencies. Every individual application, as well as every individual network associated with an application, shall normally use different frequencies from those used by other networks operating in the same geographical area, in order to avoid interference in the operation of the networks.

Management and monitoring of the radio spectrum comprise all administrative and technical procedures, in order to ensure the appropriate and efficient use of the radio spectrum and, by extension, the operation of wireless networks free of harmful interference.

The entry of new operators in the telecommunications market has led to a large increase in the number of wireless communications networks and, consequently, to the number of frequencies used. In parallel, a large number of maritime, air navigation, armed and security forces networks are in continuous operation, contributing to the protection of human life and to public security. As a result, the number of radio frequencies available for use is diminishing day by day.

The radio spectrum is a significant and increasingly scarce national resource that should be used in an optimised manner. Therefore, the existence of a body able to manage the radio spectrum in order to ensure efficient spectrum usage and maximisation of end-user benefits is absolutely necessary.

As of 1 January 2001, pursuant to L.2867/2000, this responsibility was assigned to EETT. As a function, management and monitoring of the radio spectrum includes the following tasks:

- ▶ The assignment and any form of authorisation in general regarding the use of a specific radio frequency, at a specific radio communications station, operating under specific technical characteristics
- ▶ The assignment of frequencies to telecommunications service providers, for developing their networks
- ▶ The monitoring of radio frequencies usage, in order to ensure compliance with the requirements of the relevant licences
- ▶ The protection of all legal spectrum users from interference, especially in the case of communications concerning national security and the protection of human life
- ▶ The determination of those wireless devices that can be used without creating harmful interference to other services

In order to respond to these highly demanding obligations, EETT established its actions along the following lines:

- ✓ Creation of an appropriate regulatory framework, with the key aim to optimise procedures and to facilitate entry of new operators in the market
- ✓ Application of appropriate procedures to manage fully electronic processing of requests for radio frequency assignment
- ✓ Provision of information to interested parties on issues relating to the legal framework and to the procedures applicable

The regulatory framework governing radio spectrum management constitutes a set of rules that determines



the terms for the assignment of radio frequencies to holders of Individual Licences for the provision of telecommunications services, and the fees for the assignment and use of these frequencies. Thus, two basic regulatory texts were formulated, of which the first one³⁵ defines the radio frequency assignment regime and the second one³⁶ determines the annual radio frequency fees.

One of the top priorities for EETT is to establish procedures for radio spectrum management involving electronic tools. This applies to both the expansion and upgrade of the electronic database of the radio frequencies register maintained by the Ministry of Transport and Communications, and the acquisition of specialised software for the analysis and reliable management of radio frequencies. During 2001, actions along this line concerned:

- ▀ Upgrade of the electronic database of the National Radio Frequencies Register and update of all available information concerning usage of radio frequencies by both state bodies and private individuals
- ▀ Acquisition of specialised software that uses a three-dimensional map of the Greek territory for the analysis of wireless networks and for conducting interference studies
- ▀ Procurement and use of specialised software of the International Telecommunications Union - Radiocommunications Sector (ITU-R) for the control of satellite networks

- ▀ Development of software for integrating the existing wireless network analysis software with the electronic data file
- ▀ Creation of model application forms³⁷

The above-mentioned means, the organisation of the relevant procedures and the appropriate training of personnel allowed the examination of applications and the assignment, within a relatively short period of time, of a large number of radio frequencies for the operation of public and private wireless telecommunications networks.

Attending to the provision of timely and full information to interested parties on matters relating to radio spectrum management and monitoring, EETT has launched an effort for the continuous information of the telecommunications market, through the organisation of relevant meetings and Information Days. These actions aim to clarify the procedures and rules that govern the frequency assignment process in Greece. In this context, on 17 June 2001 EETT organised in its offices an Information Day on "The Regulation on the Assignment of Frequencies for the Provision of Public Telecommunications Services", with the aim to inform market players in detail of the above regulatory issues. A further Information Day was organised on 20 December 2001 on "Satellite Communications Licensing in Greece", with the aim to clarify the legal, technical and financial framework governing the licensing of satellite communications services in Greece.

³⁵ "Regulation on the Assignment of Individual Frequencies, under Individual Licence status, for Provision of Public Telecommunications Services", EETT Decision 210/02/2001, FEK Issue 285/B/19-03-2001.

³⁶ "Regulation on the Determination of Spectrum Usage Fees and Frequency Assignment Fees", EETT Decision 210/02/2001, FEK 351/B/30-03-2001.

³⁷ The model application forms are available from the EETT website (www.eett.gr), in the "Wireless Communications" section.



8.2. Assignment of Radio Frequencies to Public Telecommunications Network

8.2.1. Fixed point-to-point wireless links

Fixed wireless links are used for the wireless connection of the nodes of a telecommunications network (forming the “backbone” of the network), as well as for connecting terminal points to the network. In the past, fixed wireless links were almost exclusively used for network deployment in areas where cable-laying presented difficulties (such as the interconnection of islands, inaccessible mountainous areas etc.). Developments in equipment technology, however, have made these networks more reliable and capable of supporting high-speed data connections. As a result, these wireless connections represent now a reliable alternative to the installation of cable infrastructure, having as their main advantage the very short installation time and the relatively low cost. The fact that a significant part of the telecommunications infrastructure of mobile telephony operators relies on point-to-point wireless links is indicative of this.

It is evident from the above that the development of wireless communications contributes significantly to the liberalisation of the telecommunications market, as it provides new entrants with the opportunity to deploy alternative telecommunications networks, within short periods of time and at low cost. At the same time, however, the ever-increasing number of these networks results in more complex requirements regarding the management and assignment of the frequencies required for their operation. It should be noted that over 10,000 frequencies are today used in Greece for such links.

During 2001, all pending applications regarding radio frequency assignment for microwave links (either

forwarded by the Ministry of Transport and Communications or submitted by companies during the year) were processed (see Table 19).

Table 19: Number of radio frequencies allocated in the period 01/01/01-31/12/01 for fixed point-to-point wireless links

Fixed Land-based Point-to-Point Service	Mobile Land-based Service – Special Radio Networks	Fixed Satellite Service
7,527	450	16

8.2.2. Satellite networks

Satellite networks consist of various types of terrestrial satellite stations, varying from very simple ones used by digital satellite TV subscribers for programme reception to very large and complex infrastructure stations that form the nodes of the satellite networks of telecommunications operators. These stations vary widely in terms of technical features as well as in terms of licensing and operation. Indicatively, it is mentioned that whereas the equipment used by satellite TV subscribers is not capable of transmitting and, consequently, no licence is required for its operation, infrastructure satellite stations have transmission capabilities and are thus subject to licensing and frequency assignment modalities.

VSAT satellite terminals represent a widely used category of satellite stations. These terminals are characterised by small-sized antennas and are used mainly for transmitting and receiving data. During 2001, radio frequencies were assigned to both satellite terminals and “hub” satellite stations. In the latter case, the assignment of radio frequencies is of significant importance, as these stations normally use a higher frequency bandwidth and are equipped with powerful transmitting devices. In this context, EETT applied the spectrum management procedures provided for by the International Telecom-



munications Union (ITU), in conjunction with internal procedures developed for harmonising each satellite station with existing wireless networks.

8.3. Assignment of Radio Frequencies to Private Networks

a. Special radio networks

The term “special radio networks” is used to describe the private mobile radio telephony networks. Typically, these consist of mobile radio transceivers communicating with a central station (called “base station”) and are used mainly for covering the communications needs of business users. Examples of such networks are the communications networks used by “radio-taxis” and carrier companies, as well as emergency networks such as those used by the Fire Brigade, the National Ambulance and First Aid Centre etc. These networks are divided in two broad categories: networks covering a small area within a range of a few kilometres (category B networks), and networks covering a larger area, which may extend over two or more prefectures (category A networks). These networks normally use conventional (analogue) technology, and still cover to this date the needs of many professional users requiring cheap and relatively reliable communications means.

Until the end of 2000, the licences for such networks were issued by the relevant Prefectural Administration, where the base of the network was located, with the “concurring opinion” of the Ministry of Transport and Communications. Under L.2867/2000, the relevant “concurring opinion” for issuing the licence has now become a responsibility of EETT, to which the request submitted by the party concerned is forwarded. EETT

examines the technical information of the application and then proceeds to assign the appropriate radio frequency. EETT also specifies the technical terms under which the specific radio frequency may be used, in order to ensure that any undesirable interactions with existing radio networks operating in the same geographic area are avoided.

During 2001, EETT actions regarding special radio networks focused mainly on:

- (a) The update of the National Frequencies Register with information on all licensed special radio networks, in co-operation with all Prefectural Administrations in the country
- (b) The improvement and acceleration of the procedure regarding the examination of applications
- (c) The processing of all pending applications that were forwarded by the Ministry of Transport and Communications, as well as of the applications sent by Prefectural Administrations regarding new networks

In the course of the year, all applications concerning local-range and regional-range networks were processed. Table 20 summarises the status regarding licensing of special radio networks during 2001.

In what regards the 18 applications that were found to be incomplete, it should be clarified that the applicants have been requested to provide the information required.

According to L.2867/2000, EETT is now responsible for collecting the operating fees for special radio networks, which until recently were collected by OTE S.A.. In the context of this responsibility, a Regulation on



Table 20: Special radio networks with local-regional range

01/01/01-31/12/01	Total	Approved	Rejected	Incomplete information	Pending
Requests for Assignment of Radio Frequencies	103	78	3	18	1

the Determination of Operating Fees for Special Radio Networks³⁸ was issued in 2001, specifying the method used in the calculation of the charges payable to EETT.

b. News Gathering Networks

An important category of wireless networks are those that operate on an occasional basis, with the purpose to serve the communications needs of TV crews covering athletic events or reporting news.

These networks include wireless cameras and microphones, as well as temporary links for image transmission from the “field” to the TV studios (required for “live” links). Mobile (vehicle-based) satellite stations, which can be used e.g. for real-time relaying via satellite of a football match being held in a foreign country, also belong in this category. In these cases, the radio frequencies are made available only during the corresponding event and, thus for a limited period of time, in accordance with the request made by the interested party. Because of the urgent nature of these requests, EETT is obliged to respond to them as quickly as possible. During 2001, there

have been several cases of temporary assignment of radio frequencies, concerning mainly coverage of football matches via satellite.

8.4. Control and Monitoring

Efficient use of the scarce resource of radio frequencies presupposes the operation of an efficient mechanism for monitoring and control of their use. The tasks of such a mechanism should include:

- ✓ Resolution of harmful interference problems
- ✓ Auditing and suppression of illegal use of radio frequencies
- ✓ Monitoring of radio frequencies use
- ✓ Auditing of transmission antennas

As of 1 January 2001, pursuant to L.2867/2000, the tasks of monitoring and controlling the use of the radio spectrum, as well as the imposition of penalties to those in breach of the relevant legislation, constitute some of the most important responsibilities of EETT. Suppression of the illegal use of radio frequencies, which constitutes a prerequisite for protecting the rights of legal spectrum users, is also among the principal goals of EETT.

EETT receives relevant complaints and conducts all necessary technical audits and procedures in order to suppress the illegal use of radio frequencies. These audits refer to radio/TV stations and radio communications stations and cover the cases of stations operating

³⁸ “Regulation on the Determination of Operating Fees for Special Radio Networks”, EETT Decision 220/10/2001, FEK Issue 939/B/29-07-2001.



without a licence as well as of stations failing to fulfil the technical conditions for their operation in accordance with their licences.

Given the importance of the spectrum monitoring task, the following priorities have been set:

- ✓ Protection of human life (e.g. ensuring communications concerning public security)
- ✓ Protection of national security (e.g. Military Communications)
- ✓ Protection of legitimate users (e.g. telecommunications operators) against harmful interference
- ✓ Protection of citizens from uncontrollable transmissions

In this context, during 2001, priority checks were conducted regarding cases of interference in airport communication frequencies throughout the Greek territory, following complaints from both the Civil Aviation Authority and the Air Force General Staff. These audits were conducted either by dispatching an EETT mobile radio goniometry unit to the area in question or by measurements carried out by University Departments possessing the required know-how. Despite the particular complexity of interference problems in airborne communications, in the majority of cases the technical audits conducted and the findings established contributed significantly towards locating and eliminating the problems. Almost in all cases, the interference problems were caused by radio broadcasting stations, which, because of non-certified equipment and/or excessive transmit-

ting power, created disturbances to the frequencies used for aircraft communication.

Measurements were also carried out at the new Athens airport "ELEFTHERIOS VENIZELOS". In order to ensure the safe operation of the airport, EETT conducted intensive checks for recording radio broadcasts in the Prefecture of Attica and for locating stations broadcasting illegally. The results of these audits, in the form of technical reports, were forwarded to the competent Ministries of the Press and the mass media and of Transport and Communications, which then issued Decisions ordering the suspension of the operation and the confiscation of the equipment of the illegal radio broadcasting stations. In application of the above-mentioned Decisions, EETT then proceeded to confiscate 20 illegal radio broadcasting stations in the Attica region.

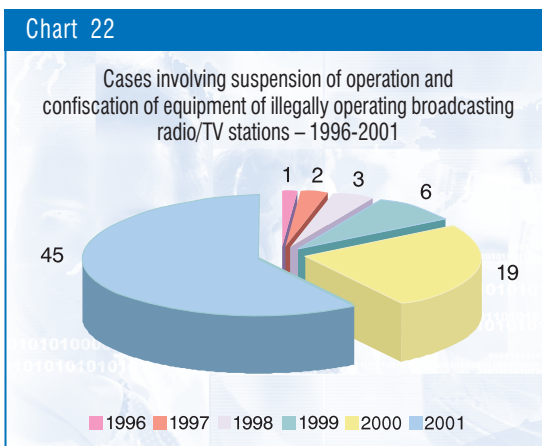
In addition to illegal transmission, other examined cases referred to radio/TV broadcasting stations operating under technical characteristics other than those provided for in their licences. It should be noted, that violation of the technical parameters of the transmission, described in the body of each station's licence, increases dramatically the risk of causing harmful interference. In such cases the legislation on radio/TV broadcasts³⁹ applies, according to which the decision concerning the legality of the operation of radio/TV stations, together with the imposition of administrative penalties to offenders come under the authority of the Ministry of Press and media. With regard to these stations, the responsibility of EETT is limited to performing the measurements required in each case and to forwarding the relevant

³⁹ The major laws being L.2328/1995, L.2644/1998 and L.2778/1999 (article 53).



technical reports to the competent bodies.

The audits conducted by EETT during 2001 resulted in the location and confiscation of a total of 45 radio/TV station transmitters operating in violation of the legislation on radio/TV broadcasts in force, compared to a total of 31 similar actions that had taken place in the 1996-2000 period (Chart 22).



Slightly fewer were the number of complaints received by EETT concerning interference problems in the frequency bands used by radio amateurs. In all cases checked, the source of the interference was located and the problem was eliminated. Cases of complaints concerning inappropriate spectrum use in areas outside Attica, which were technically simpler to deal with, were forwarded to the Transport and Communications Directorates of the Prefectural Authorities having local jurisdiction.

Checking of complaints concerning illegal installation of mobile telephony antenna masts was another important action undertaken by EETT in 2001. During the year, EETT received 286 such complaints: of these,

about half concerned illegal antenna mast constructions, with the remaining complaints concerning the provision of clarifications and information on antenna mast constructions that had already been licensed. On-site inspection reports were drawn up in several cases, in order to bring into action the procedures for imposing administrative penalties. A total of 227 complaints were processed, while the remaining 59 complaints are currently in the processing stage. It is pointed out that the decisions concerning the cases that have already been processed have been forwarded to the Public Prosecutors' Offices and Town Planning Departments having local jurisdiction, for further actions coming under their competence (imposition of administrative penalties and removal of illegal constructions, respectively). In relation to this matter, EETT initiated the process of hearings, while penalties (totalling EUR 43,673) were also imposed in some cases.

8.5. Radio Equipment and Telecommunications Terminal Equipment

The equipment used by subscribers for their connection to the network represents a significant part of every public telecommunications network. This equipment is divided into two broad categories: terminal equipment, which is used for wire-based network access (such as telephone sets, fax machines and ISDN devices), and radio equipment, which uses radiowaves (such as mobile phones).

Both terminal equipment and radio equipment are governed by technical standards in compliance to which they should operate. Regarding the former, compliance with these standards ensures that the equipment used will not cause harmful interference



to other communications services during its operation. The status regarding the placing of all telecommunications equipment on the market is governed at a European level by Directive 99/5/EC.

Introduction of this Directive into the Greek legislation took place by article 10 of L.2867/2000, which provides that "until publication of a Presidential Decree for harmonisation of Directive 99/5/EC, every device falling in the scope of application of Directive 99/5/EC may be placed in circulation and use in accordance with the provisions of the aforementioned Directive." The publication of the relevant PD, due to take place during 2002, is expected to specify the responsibilities of EETT with respect to the application of this Directive.

According to the above Directive, in the case of radio equipment which is to be placed on a national (Member State) market and which uses frequency bands whose use is not harmonised throughout the Community, the technical characteristics of such radio equipment should be notified to the National Authority responsible for Spectrum Management in the relevant Member State.

Since the beginning of the year, EETT has received and processed relevant notifications concerning equipment to be placed on the market. Furthermore, and in order to establish the basis for the application of Directive 99/5/EC in Greece, the following took place:

- ✓ The need for a more efficient processing of radio equipment notifications, the main characteristics for checking the suitability of this equipment and the specifications of a system to manage radio equipment notifications,

were identified

- ✓ A corresponding model notification form was created, and a study was undertaken in order to identify a more efficient way of processing these forms
- ✓ All interested parties were provided with information and clarifications concerning the new procedures governing the distribution of equipment in our country and the application of the Directive in question

At the European level, EETT participates in the TCAM Committee of the Enterprise Directorate-General of the European Commission. EETT submits requests for clarifications concerning the application of the Directive and follows closely all relevant developments.

9. Licensing of Antenna Masts

The high penetration rate of mobile telephony in the Greek market, in conjunction with the introduction of new telecommunications applications (FWA, UMTS) that rely on wireless networks, multiply the need for antenna mast construction installations covering the entire Greek territory. According to L.2801/2000, the installation and operation of every transmitting -and, in certain cases, also receiving- antenna requires (with the exception of special cases) the issue of an Antenna Mast Construction Licence, followed by the relevant approval of the Town Planning Authority having local jurisdiction. As of 1 January 2001, the responsibility for the issue of Antenna Mast Construction Licences lies with EETT (prior to that date, this was a matter under the competence of the Ministry for Transport and Communications).

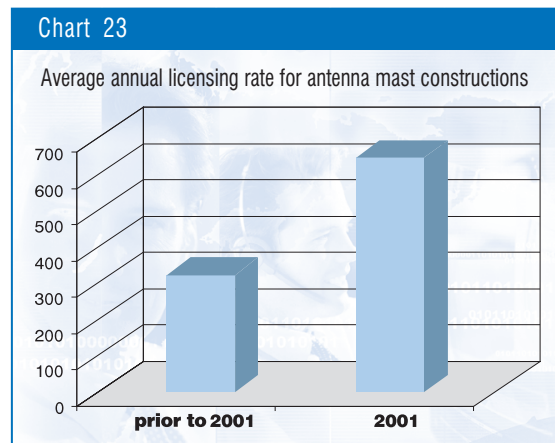


In particular, L.2801/2000 provides that, in order for an Antenna Mast Construction Licence to be issued, the following are required: (a) assignment or approval of the transmitting and receiving frequencies; (b) compliance with the provisions on electromagnetic compatibility; and (c) concurring opinion of the Civil Aviation Authority concerning safety to air navigation. In addition, after the licence issued by EETT is obtained, and in order for the Antenna Mast Construction to be installed and put into operation, the owner of the construction should obtain a relevant approval from the competent Town Planning Authority and the competent Forest Authority (the latter in the event that the location of the installation lies within a forest area).

The concurring opinion of the Hellenic Atomic Energy Commission (EEAE) concerning observance of maximum radiation levels is also a precondition for the licence to be issued. In order to establish the degree in which the allowed maximum levels are observed, all owners of antenna mast constructions are obliged to submit a relevant study to EEAE. Joint Ministerial Decision (KYA) No. 53571/1/3839 specifies the maximum allowable levels concerning safe exposure of the general population to electromagnetic radiation. These levels are consistent with those specified by the World Health Organisation.

In the context of its responsibilities, EETT in 2001 undertook to process the pending applications forwarded by the Ministry of Transport and Communications and, in addition, began to receive new antenna licensing applications submitted by telecommunications operators active in the market. By the end of 2001, EETT had concluded the examination of almost all applications that were accompanied by the necessary supporting documents. In particular, EETT

examined 740 applications, of which 650 were approved, followed by the issue of the corresponding licences. In their majority, these licences concerned antenna masts for mobile telephony, while a smaller number concerned antennas for satellite services and FWA services. Moreover, during 2001, archives containing 2,600 antenna mast construction licences (granted in the period from 1992 to 31.12.2000) were transferred from the Ministry of Transport and Communications to EETT.



EETT developed an electronic Antenna Mast Constructions register, containing data for all the above licences. This register is regularly updated with data from licences issued by EETT.

Pursuant to L.2801/2001, EETT in parallel issued a Regulation on Licences for Antenna Mast Constructions. The Regulation determines in detail the contents of the application, the supporting documents submitted and all details concerning the procedure followed. EETT also issued a Decision specifying the procedure to be observed for installation of FWA antennas in the premises of subscribers.



10. Olympic Games

During the 2004 Olympics to be held in Athens, the requirements concerning radio spectrum allocation will be significant. Therefore, appropriate management and efficient monitoring of the spectrum will be critical for the thorough and successful organisation of the Games, in terms of the technical issues involved as well as in terms of time-related restrictions.

The needs in spectrum that will arise refer to the hundreds of wireless cameras and microphones that are expected to be in simultaneous operation in Games premises. Other applications using radio frequencies include remotely-controlled wireless cameras and the wireless transmission of digital photographs, but also the broadcasting via satellite of the "Olympic feed" across the globe.

In contrast to the usual cases of interference, which may usually be dealt with as soon as the source of the problem is identified, it will not always be possible to solve problems arising during the Olympic Games in a timely manner. Consideration should be given to the very short duration of many events (such as the 100m sprint run, lasting only for about 10 seconds), which allows very little room for reacting to potential interference with the TV signal being broadcast across the world. It becomes evident that, in order to ensure the smooth organisation of the Olympic Games, there is a requirement for proper planning of the entire undertaking and for recording the needs that are expected to arise regarding the frequency assignments, so that the necessary actions are scheduled and carried out in time.

In the context of these obligations, EETT is an active member in the Working Group established in mid-2001 by the main spectrum users in Greece (Armed

Forces, OTE S.A., etc. In addition, EETT and "Athens 2004" Organising Committee representatives visited Sydney, in order to obtain detailed information from the staff in charge in the Australian Authority, which was responsible for radio spectrum management for the Sydney Olympics, about the design and implementation of the relevant project as well as the problems arising and the way in which they were resolved.

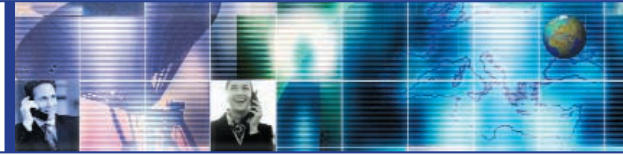
11. Participation in Working Groups of the Electronic Communications Committee

During 2001, EETT participated in the standing Working Groups addressing radio spectrum management issues under the European Radio communications Committee (ERC), recently renamed to Electronic Communications Committee (ECC). ECC forms part of the European Conference of Postal and Telecommunications Administrations (CEPT). Its activities on radio communications refer to policy development and coordination between Member States on regulatory and technical issues.

In particular, its main mission is:

- ▶ To achieve harmonised and efficient use of the radio spectrum across Europe, in order to satisfy the future spectrum requirements of users
- ▶ To support EU views in the ITU Conferences
- ▶ To promote the liberalisation of telecommunications

During 2001, EETT representatives participated in the Conference Preparatory Group for the World Radio communications Conference (CPG Working Group) and in the Frequency Management (FM) Working group. The



aim of the participation in the CPG Working Group is to obtain information and to prepare the positions of our country at a national and European level, in cooperation with the Ministry of Transport and Communication, which is responsible for radio spectrum policy issues. The aim of the participation in the FM Working Group is to obtain timely information on issues concerning usage of radio frequencies and future telecommunications services. EETT also participated in the ERC Plenary, where the overall results from the individual Working Groups are presented.

12. Goals

The supervisory role of EETT concerning radio spectrum management is focused on the rational utilisation of this scarce resource for the benefit of users and of the State, ensuring in parallel the protection of the public. In this context, EETT has set the following goals for 2002:

1. To protect citizens, legitimate users and security forces, through the implementation of a reliable and efficient radio spectrum management system. This system will allow EETT to ensure observance by legitimate users of the licence terms as well as the location of illegal users.
2. To cover, through the operation of the above system, the significant requirements in spectrum allocation, expected to arise in the context of the 2004 Olympics.
3. To rationalise pricing for spectrum services, with the aim to implement mechanisms for proper management and to encourage domestic competition.