Policy Review and Strategic Framework of Radio Spectrum Management

Consultation Paper

30th October 2006

Malta Communications Authority
Valletta Waterfront, Pinto Wharf, Valletta VLT01, Malta, Europe
Tel: (356) 21 336 840. Fax: (356) 21 336 846
website: www.mca.org.mt
e-mail: info@mca.org.mt

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Executive Summary

The radio frequency spectrum is a vital and finite national resource of immense potential value for Malta. The radio spectrum provides the means to convey audio, video or other information content over distances from a few metres to thousands of kilometres. It is essential for the provision of radiocommunication services, such as mobile communications and wireless reception of broadcast services. It is also fundamental to the safe operation of air and maritime transport, is used widely by the defence forces and emergency services and supports important scientific applications such as meteorology and radio astronomy.

In July 2004, the Malta Communications Authority (MCA) was assigned the responsibility for the regulation of radiocommunications, including the management and monitoring of the radio frequency spectrum. The migration of these functions was carried out following an extensive review of the functions performed by the previous Wireless and Telegraphy Department (WTD) within the Ministry for Competitiveness and Communications (MCMP).

This document depicts the radio spectrum management environment in Malta and its effectiveness, the factors that influence that environment and the existing and emerging policy issues warranting consideration over the coming years. Moreover, this document sets out the MCA's proposed strategy for managing the use of the radio spectrum resource in Malta over the next three to five years. It also serves to ensure that Malta can leverage the maximum benefits economically, strategically and in a wider social context, from the use of the radio spectrum.

This document is a response to four key drivers, namely:

- the need to inform the Minister responsible for Communications on the existing and emerging policy issues warranting consideration in the coming years as a result of technology development and convergence that are creating a dynamic environment, where spectrum is becoming an even more important resource;
- the need for a clear, well-balanced strategy to maximise the impact that the use of the radio spectrum has on economic and social development;
- the need to ensure that spectrum is managed in a flexible, transparent way, with prompt decision-making to meet the challenges of convergence, increased mobility and ubiquity of services; and
- the need to provide stakeholders with a publicly available well-informed strategy which takes account of future developments and the requirements of Maltese users, and national objectives, and information on which to base investment decisions.

Radio spectrum policies and their administration fall within the broader government initiatives to improve Malta's economic, social and cultural environment. The key policy issues identified in this document that need to be considered further by Government in collaboration

with the MCA in the short-to-medium term relate mainly to radio spectrum allocation and assignment issues, competition issues and technology issues.

The rapid technological developments and the convergence of electronic communications, media content and electronic devices are creating a dynamic environment where spectrum is becoming an even more important resource. To a certain extent, models for managing and regulating radio spectrum usage have failed to keep apace with these developments, giving rise to an increasing risk that, without change, the traditional approach will prevent the Maltese society from reaping the benefits of this new dynamic environment. For this reason, a review of spectrum policy and management of this precious resource is needed.

One response is to use a market-based model for the allocation and assignment of spectrum, allowing more freedom to market players to decide how spectrum should be used, and lowering the barriers for access to spectrum rights by making possible the trading of the rights of use. Nevertheless, the assumption that market mechanisms will ensure spectrum is assigned to its highest value user, has not necessarily been realised in practice. Various approaches that might be used to optimise the spectrum market, such as administrative pricing, auctions, secondary trading, liberalisation, ownership limitations and implementation requirements, are considered in this document.

Social and cultural objectives that depend on the utilisation of spectrum are, in general, met through administrative assignments, including the reservation of frequencies for possible 'public interest' use. For example, in the broadcasting sector, there are allocation and funding issues, as demand often exceeds supply. With respect to spectrum for public safety and security purposes there appears to be an adequate supply but it is recognised that there could be better co-ordination in its use.

New technologies impact on the spectrum use and management. There is a general shift away from hardwired voice and data services to various types of wireless delivery, some of which operate in the spectrum commons. Convergence in technology is notable in cellular telephony (text, pictures, Internet, radio) and television broadcasting (interactive digital television, Internet and programming on demand). There are opportunities and issues with these developments. New technologies operating in the spectrum commons are designed to use spectrum efficiently, are self-managing as regards interference and attract little in the way of compliance costs, to the benefit of manufactures and consumers. On the other hand, they are difficult to categorise and regulate particularly with respect to interference problems for the other uses of the spectrum.

Government, together with the MCA, has started to address and resolve the above-mentioned issues. Continuing to address these issues will further contribute to the creation of a communication technology infrastructure that enhances Malta's competitiveness, economic performance and social achievements. This would also enhance Malta's position as an ideal location for organisations wishing to use Malta as a manufacturing base and/or test bed for trial deployments of new wireless technologies and services. Furthermore, the efficient and effective use of radio spectrum offers significant opportunities to reduce costs, raise productivity and enhance quality of life.

It is noted that none of the policy issues identified in this document have been argued to a conclusion. Each one needs to be prioritised, incorporated in the MCA work programme and progressed through research, analysis and consultation, down to a set of recommendations to Government, with those carrying the highest urgency and impact being given priority. These policy issues and the proposed strategies for dealing with these issues are identified throughout the text and summarised in the final section.

To ensure the efficient management and effective use of the radio spectrum with particular regard to the availability of spectrum and the current and future demand for spectrum the following broad strategic objectives have been identified:

i. facilitating access to radio spectrum through an objective, transparent and non-discriminatory process that meets statutory requirements;

ii. promoting the development and deployment of new technologies and services;

iii. maximising the economic and social benefits arising from the use of radio spectrum;

iv. ensuring the efficient and effective use of scarce radio spectrum resources; and

v. ensuring compliance with national, international and European obligations and the avoidance of harmful interference.

Structure of this Document

The remainder of this document comprises the following:

Section 1 provides an overview of the economic, social and cultural policy objectives that underpin Malta's management of the radio spectrum.

Section 2 provides an overview of the current spectrum management structures and processes.

Section 3 identifies the main drivers of future spectrum demand, including market, technology, social and cultural, economic and legal developments and addresses the key policy issues that have been considered in the development of the proposed strategic framework.

Section 4 presents an overview of the key strategic goals for radio spectrum over the next three to five years and outlines the proposed strategy for managing the radio spectrum in general and for specific services in detail.

Section 5 lists and prioritises the key policy issues identified in the report and the proposed strategies for dealing with these issues.

Appendix A describes the role of the various international bodies. **Appendix B** outlines the strategy with regard to monitoring spectrum use and ensuring compliance with spectrum regulations. **Appendix C** provides an overview of the different services authorised for use in Malta and information on the key drivers of spectrum demand on a service by service basis.

It is noted that parts of the analysis and commentary contained in this document are drawn from various current national and international sources including the review commissioned by the MCMP on the migration of the WTD functions to the MCA, the International Telecommunication Union (ITU) 2004 publication entitled 'Radio Spectrum Management for a Converging World' and the recent spectrum management policies and strategies developed by foreign jurisdictions including the European Commission (EC), the United Kingdom, Ireland, the Netherlands, the United States and New Zealand.

Consultation Period

The MCA welcomes comments from the public, users, government, industry and interest groups to the issues and proposals contained in this document. This wide cross-section of views will assist the MCA in identifying and prioritising the policy issues together with the strategies for dealing with such issues.

The consultation period will run from **30th October 2006** to **15th December 2006** during which period the MCA welcomes written comments on any of the issues and proposals raised in this document.

Having analysed and considered the comments received, the MCA will publish a report on the consultation which will, *inter alia*, summarise the responses to the consultation. This report will be followed by the publication of a finalised strategy and detailed work programme for management of the radio spectrum for the next three to five years.

How to Respond

All responses must arrive at the MCA by no later than the **15th December 2006**.

In order to promote further openness and transparency, the MCA will publish the names of all respondents. Moreover, in the interests of transparency, all representations will be published, except where respondents indicate that a response, or part of it, is confidential.[1]

The MCA will take steps to protect the confidentiality of all such material from the moment that it is received at the MCA's offices. In the interests of transparency, respondents should avoid applying confidential markings wherever possible.

All comments should be made in writing and, where possible, sent by email to info@mca.org.mt. However, copies may also be posted or faxed to the address below:

[1] In accordance with the MCA's confidentiality guidelines and procedures (refer to www.mca.org.mt).

'Policy Review and Strategic Framework of Radio Spectrum Management'
Chief of Policy and Planning
Malta Communications Authority
Valletta Waterfront,
Pinto Wharf,
Valletta VLT 01,
Malta, Europe
Tel: +356 21 336840
Fax: +356 21 336846

Parts of the analysis and commentary contained in this document are drawn from current national and international sources. It is included for the sake of balance and for discussion purposes only. None of the material in this document should be taken to reflect the views of the MCMP or to represent official Government policy, unless it is explicitly stated otherwise.

1. Policy Environment

Radio waves are defined by the International Telecommunication Union (ITU) as electronic waves of frequencies arbitrarily lower than 3000 GHz propagated in space without artificial guides. In practice, the range of frequencies accessible with current technology is 9 kHz to 100 GHz (the upper limit has risen over the years as technological progress has allowed higher frequencies to be exploited). This is regarded as the radio spectrum for all practical purposes.

Within this very wide range, different frequency bands have very different characteristics. At the lowest frequencies, radio signals are capable of travelling very long distances but can carry relatively little data. At the highest frequencies, they are capable of carrying large amounts of information but can only travel short distances and can be impeded by trees and buildings, or even rain at the very highest frequencies. Intermediate frequencies offer different mixes of distance and information-carrying capacity.

The 'prime' spectrum for communications services is sometimes considered to be between 100MHz and 3GHz as this offers the optimum combination of distance and information-carrying capacity. Most of the spectrum below 3 GHz is used for mobile and aeronautical applications, reflecting the long transmission range and non line-of-sight reception capability at these frequencies, whereas the higher frequencies are predominantly used by fixed terrestrial and satellite services.

The economic value of spectrum access is determined by a combination of factors including the suitability of a particular frequency band for specific technologies, equipment availability and the phenomenon of interference. Because of high existing usage and competing demand, obtaining access to some of the more versatile parts of the radio spectrum can be difficult due to its utility and scarcity. For example, frequencies in the 300 MHz to 3 GHz range are currently generally regarded as the most valuable because they support wide area mobile applications which are highly valued by users because of the functionality they offer and because there are few if any realistic alternatives.

Spectrum allocations[2] and standards, agreed within the ITU, the European Conference for Postal and Telecommunications Administrations (CEPT) and the European Union,[3] and

[2] **Allocation** is the process of deciding which use the spectrum should be put to. In addition to allocating spectrum for commercial use, Government has the responsibility for the allocation of spectrum to uses that are in the public interest and that would not normally by provided by commercial services (e.g. public broadcasting, armed forces, police and emergency services). The National Frequency Plan (NFP) published on the MCA's website (www.mca.org.mt/infocentre/openarticle.asp?id=516&pref=24) lists the allocations made by Government for radio frequency spectrum in Malta taking into account international and regional regulations. The tables contained in the NFP outline the types of radiocommunications allocated to each frequency band, the standards that apply, together with some notes on future developments where applicable. The NFP reflects the principle of allocating frequencies according to a procedure that is, as far as possible, technology and service-neutral.

[3] In particular the European directives, which are applicable, *inter alia*, to allocation procedures for licences to be issued and the accompanying requirements, that are significant.

observed by Malta, play a large part in ensuring compatibility of radio systems and minimising harmful interference.

As a small country surrounded by neighbouring countries, Malta must take account of other countries and has a great interest in harmonisation and standardisation in order to restrict interference and to be able to use equipment that can be marketed in several countries.[4] This means that Malta is in a position to pursue its own radio spectrum policy within its own borders and the frameworks referred to above, as long as interference affecting users in these neighbouring countries remains at the acceptable level that has been agreed on.

1.1 Policy Objectives

The radio spectrum is a scarce finite resource that supports a range of wireless communications services critical to the Maltese economy and to a variety of government functions. The utility of the resource depends crucially on the management of interference from competing users. Thus, if managed effectively and efficiently, spectrum can contribute to innovation, job creation, economic growth and public welfare.

Management of the radio spectrum is the combination of administrative, regulatory and technical procedures necessary to ensure the efficient operation of radiocommunication equipment and services. Simply stated, spectrum management is the overall process of regulating and administering the use of the radio frequency spectrum.

A primary goal of spectrum management is to maximize the value of spectrum to the Maltese society. Value can be derived from the radio spectrum in a number of ways. As a tradable good, it has an economic value, but it could also facilitate the achievement of social and cultural objectives that are independent of the radio spectrum's commercial worth.

In managing the radio spectrum (i.e. in making decisions about the allocation and the assignment[5] of spectrum), it is important to strike a balance between the competing factors related to the economic, social and cultural objectives of the relevant radiocommunication services. These factors include:

- ensuring that the requirements of all radiocommunication services are met and that there is a balance between the various public policy requirements;

[4] Harmonisation encourages the global convergence of products and helps establish an effective single market for applications, with consequent economies of scale and benefits to the consumer (cheaper and more readily available equipment). Standardization of services and the equipment used for these may be highly important to users but also to service providers and manufacturers, and for some applications, like radio communication and aviation, it is even indispensable.

[5] **Assignment** is the process of deciding which users should gain a licence (i.e. rights of use) or authorisation to use the spectrum within the agreed allocation. However, there are varying degrees of allocation depending on the level of international agreement and the degree of specification. An assignment for the rights of use does not confer any right of ownership of the frequency spectrum. It allows the assigned frequency channel to be used during the term of the licence in accordance with the conditions of the licence. It is noted that the assignment of the right of use of spectrum is not fully exclusive, because there can be sharing or third-party use, such as by defining levels below which a licensee may experience harmful interference.

- maximising social and cultural benefits arising from radiocommunications use, for example in relation to broadcasting, public safety, national security and health care; and

- enhancing Malta's competitiveness by ensuring that adequate spectrum is allocated and assigned to uses that derive the highest economic value from it.

In addition, there is a need to ensure the efficient and productive use of the spectrum within the bounds of spectrum constraints and technology developments. The regulatory process of ensuring the optimal use of the spectrum needs to be flexible and responsive in order to adapt to changes in technologies, demand, markets and public policy.

For providers of commercial services[6] such as mobile telephony, the value of spectrum resource is the profit that can be obtained from supplying services that use spectrum as an input, which in turn depends on the demand for those services, their cost of supply, and the nature of the competition in actual or potential markets. In a perfect market – that is, a market with a comfortably large number of well-informed and willing buyers and sellers – the spectrum would be valued at its market price. It is generally appropriate for such services to be assigned spectrum by market-based mechanisms,[7] as their providers are considered to be in the best position to assess its current value.

Non-commercial services could be defined as radiocommunications that tend to be funded by government and voluntary organisations due to their non-profit nature and their use involves a public interest. This could concern a social as well as a cultural interest. It encompasses services and applications concerning the country's safety and security, such as defence, emergency services, the police and, air traffic management and vessel traffic control. In addition, it includes all other services and applications considered essential from a social or cultural perspective, such as public service broadcasting or the use of the frequency spectrum for scientific purposes, including meteorology and radio astronomy.

Public interest tasks are so beneficial to society that undisturbed (i.e. without any harmful interference) access to sufficient spectrum is guaranteed. When spectrum is assigned to these services by market-based mechanisms – that is, in competition with providers of commercial radiocommunication services – the probability is that affordable spectrum would not be readily available to such services. Therefore, it is generally seen appropriate that spectrum is assigned to such services by administrative mechanisms[8] or by a statutory preferential position rather than by market-based mechanisms.

[6] i.e. the use of frequencies for economic activities involving a commercial interest.

[7] This is known as the '**private property method**', also referred to as the 'market-based model'. This is broadly the use of auctions and trading with liberalisation, to allow the market to modify historical allocations towards those more likely to maximise economic efficiency. Spectrum pricing (such as administrative pricing) can also inject some market disciplines into the allocation and assignment process.

[8] This is known as the '**administrative method**', also referred to as the 'command-and-control model'. This is the historical approach where the regulator decides how much spectrum each application should have and allocates and assigns the spectrum accordingly. It is still the predominant method of managing spectrum.

Public policy goals play a significant role in determining spectrum management policies such as whether spectrum is assigned administratively or via market-based mechanisms. Efficiencies may have to be compromised in order to safeguard the provision of certain public services such as safety, defence and public broadcasting services.[9] Technical and economic efficiencies may sometimes be constrained by international obligations related to spectrum use.

To ensure the optimal use of radio spectrum, fees are charged on spectrum use. Optimal use of spectrum depends on a number of factors, including:

- demand for spectrum in particular bands and/or geographic areas;
- public policy considerations;
- economic and market considerations;
- social considerations;
- technology; and
- legal factors (e.g. European or international obligations).

In general, spectrum fees should be set at a level that ensures the technical and economic efficient use of scarce radio spectrum resources, encourages the development and deployment of new technologies and services and reflects its value to society.[10] Importantly, fees must be objectively justified, transparent, non-discriminatory and proportionate in relation to their intended purpose.

1.2 Government's Strategic Vision

As depicted in the 'Pre-Budget 2006 Document - A Better Quality of Life', Government's vision for Malta is that of a dynamic, high-value-added economy founded on competence, skills and excellence and capable of sustaining a high standard of living for its entire people.[11]

It is recognised that the single underlying priority to achieving this vision remains competitiveness. Government's key objective is to improve national competitiveness, thus consolidating Malta's progress towards renewed economic growth and prosperity.

Spectrum policy has the potential to contribute to Malta's competitiveness in the following key areas:

[9] For example, the reservation of frequencies for the transmission of local broadcast content in digital format.
[10] Fees encourage users to release spectrum to others when its retention is no longer justified. Fees also make it easier to avoid spectrum hoarding and reduce inefficient use of spectrum.
[11] Refer to website of the Department of Information http://www.doi.gov.mt.

- assisting economic growth and jobs[12] by creating and maintaining a spectrum management environment in which existing and new radiocommunication technologies can develop easily and cost-effectively;

- creating the appropriate environment for new radiocommunications-based industries that in turn offer employment opportunities;

- improving the skills of the Maltese workforce; and

- enhancing communications and lowering associated costs for government, organisations, education institutions and research establishments.

1.3 The International Perspective

Radio frequencies extend beyond national borders so radio spectrum management requires an in-depth knowledge of, and involvement in, European and global spectrum management developments.

Much of the radio spectrum is planned internationally and in some cases this constrains how specific frequencies or frequency bands may be used. This is particularly so in the aeronautical and maritime sectors where, because of the global nature of these services, ships and aircraft must use specific frequencies for navigation and communication purposes. In addition, there are a number of internationally harmonised frequencies for commercial radio systems such as cellular telephony.

The TV and radio broadcast bands have been harmonised for many decades, to facilitate co-ordination between neighbouring countries and the development of consumer markets. Other parts of the spectrum may be used to meet specific national requirements, as long as these comply with the requirements of the ITU Radio Regulations and any relevant regional agreement.

Today, spectrum at the international level is managed within the framework of the ITU. This specialised agency of the United Nations has, among its major purposes, the avoidance of radio interference and the equitable and efficient use of spectrum and orbital resources. The management of spectrum on an international level, however, is not restricted to the ITU.

As a critical resource, regional organisations also play a greater role in spectrum management policies. Thus, within EU Member States, there is a three level regulatory structure governing radio spectrum usage, comprising global, regional and national layers. Global regulation is primarily the remit of the ITU, while regional regulatory remits lie with the EU and the CEPT.

[12] Refer to Communication COM(2005) 229 from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions entitled 'i2010 – A European Information Society for Growth and Employment'.

These bodies define the broad framework within which all spectrum users must operate, and in some cases have developed harmonised approaches to spectrum use in order to facilitate international services, open markets and minimise the risk of interference between users.

The role of these international bodies is described in more detail in **Appendix A**.

1.4 Spectrum Management Overseas

In a number of overseas jurisdictions, radio spectrum is treated entirely as a community asset and distributed accordingly to perceived need at the lowest possible cost. In others, it is partly or wholly categorised as a natural resource from which the greatest possible financial return should be generated. Mixed economies, combining free market and state regulated distribution mechanisms, tend to embody both principles but are not always clear, in principle or practice, as to the boundary between them.

Most nations of the world, with such rare exceptions as Guatemala,[13] have tended to retain administrative licensing of spectrum in a governed market. However, there is a growing trend towards the free market assignment of 'commercial' spectrum. In the United Kingdom, for example, Ofcom[14] has recommended liberalisation of the management regime.

Various international initiatives have been launched to adjust the spectrum policy for the purpose of responding to rapid market and technology developments. For example, the ITU is investigating whether the international allocations should be adjusted to developments such as convergence. Recently, the European Commission (EC) issued a communication in which it presented proposals for greater free market operation and more flexibility of the spectrum policy.[15] In addition, various individual countries, both in and outside of Europe, are in the process of adjusting their national radio spectrum policy.

1.5 Conclusion

Radio spectrum is required for the use of a wide variety of radiocommunication services, which in turn are subject to a diverse range of legislative controls and policy intentions. Some services are predicted to function optimally in an open market environment, others in a governed environment, and a further group in an environment that has elements of both. A need to balance the policies and purposes of Government and of service providers, is characteristic of such a mixed spectrum management regime. These issues are examined in further detail in the subsequent sections.

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[13] Refer to ITU's report 'Spectrum for a converging world – case study of Guatemala', www.itu.int/osg/spu/ni/spectrum/guat-rsm.pdf. Also refer to the document published by Sunrise Consultants 'Selling the airwaves – spectrum trading in practice' www.sunriseconsultants.com/spectrum.html.

[14] Refer to http://www.ofcom.org.uk/.

[15] Communication COM(2005) 400 from the Commission to the Council, the European Parliament and the European Economic and Social Committee and the Committee of the Regions entitled 'A market-based approach to spectrum management in the European Union' dated 14th September 2005 (refer to http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/com/2005/com2005_0400en01.pdf). Also refer to the Wireless Access Policy for Electronic Communications Services (WAPECS) developed by the Radio Spectrum Policy Group dated 23rd November 2005 (refer to http://rspg.groups.eu.int/doc/documents/opinions/rspg05_102_op_wapecs.pdf).

2. National Framework

In Malta, the MCA is the National Regulatory Authority (NRA) responsible for the regulation of the electronic communications sector,[16] including radiocommunications,[17] and broadcasting transmission.[18]

In line with the principal statutory duties, the MCA seeks to further the interests of consumers in relation to electronic communication matters by promoting competition. Furthermore, the MCA creates regulatory policies that promote effective investment and stimulates the delivery of services.[19]

In carrying out its role in relation to radio spectrum management the MCA must:

- take into account policy directions issued by the Ministry responsible for Communications;
- in meeting its objective to ensure the efficient management and use of the radio spectrum, ensure that measures taken are objective, transparent, non-discriminatory and proportionate; and
- have regard to international developments with regard to the radio frequency spectrum.

2.1 Legislative Framework for Spectrum Management

The Radiocommunications Act (Cap 49) provides the licensing framework for radiocommunications apparatus in Malta.[20] Under the Radiocommunications Act everybody requires a licence to have in possession apparatus for radiocommunications and this generally takes the form of a licence or a general authorisation created under secondary legislation. The Minister responsible for Communications has the authority to develop secondary legislation to permit the licensing or the general authorisation of different types of radiocommunications apparatus. The Fees Leviable by Government Departments Regulations issued under the Fees Ordinance (Cap 35)[21] provides the basis for the setting of the level of fees for radiocommunications apparatus in Malta.

[16] Electronic communications networks and services and the management and monitoring of the radio frequency spectrum as defined in the Electronic Communications (Regulations) Act (Cap 399).

[17] For the purpose of issuing and managing radiocommunications apparatus licences (including general authorisations) in terms of the Radiocommunications Act (Cap 49).

[18] In relation to broadcasting, the MCA's role is limited to spectrum management and assignment issues related to electronic communications service providers. Broadcast policy and assignments to analogue broadcasters are the responsibility of the Minister responsible for broadcasting and the Malta Broadcasting Authority respectively. Nevertheless, it is recognised that spectrum policy is closely connected with broadcasting policy: hence the need to work closely between all parties.

[19] This is exactly what the issue of radio spectrum licences has done in many of the spectrum bands. The mobile phone industry is transforming the lives of the Maltese, increasing penetration rates, continuing their investment and driving innovation. The digital TV licences have broken the monopoly hold of cable TV. The fee exempt licence bands are creating a series of wireless local area networks that are solving the 'last hundred feet' problem.

[20] Refer to http://docs.justice.gov.mt/lom/legislation/english/leg/vol_3/chapt49.pdf.

[21] Refer to http://docs.justice.gov.mt/lom/legislation/english/subleg/35/01.pdf.

Until July 2004 spectrum was regulated by the then Wireless Telegraphy Ordinance (now the Radiocommunications Act) through spectrum-related conditions imposed on the licensees via licences of radiocommunications apparatus. In July 2004, the new European Union (EU) Framework for electronic communications was transposed into Maltese law. The framework is composed of primary and secondary legislation:

- Electronic Communications (Regulations) Act (Cap 399);[22]
- Electronic Communications Networks and Services (General) Regulations (Legal Notice 412 of 2004).[23]

The new regulatory framework does not replace the Radiocommunications Act. The Radiocommunications Act only regulates the possession of equipment whilst the Electronic Communications (Regulations) Act regulates the assignment of frequencies where such use involves the provision of an electronic communications network or service. Licence fees for the right to use radio spectrum are set out in a subsidiary legislation under the Electronic Communications (Regulation) Act (Cap 399). Since 2004, licensing of wireless electronic communications services and networks must be carried out in accordance with the requirements of the framework regulations.

The new framework regulations do not include broadcast content regulation. The primary legislation applicable to the Broadcasting sector comprises of the Broadcasting Act (Cap 350).[24] Maltese television and radio broadcasters (analogue) are licensed for the use of spectrum and apparatus under the Broadcasting Act. Broadcasting distribution and transmission systems are subject to the new regulatory framework for electronic communications networks and services. In February 2005, Government outlined its policy on the successful development of digital audio and digital television broadcasting including the assignment of spectrum licences for the transmission of local broadcasting content.[25]

2.2 Spectrum Management Objectives

In managing spectrum, regulators are concerned with two forms of efficiency - technical and economic - which are pursued within the overall context of public policy. The objective of technical efficiency principally relates to achieving the most intensive use possible of available spectrum within acceptable interference levels. It also seeks to promote the development and introduction of spectrum-saving technologies. Economic efficiency, on the other hand, involves ensuring that spectrum is allocated and assigned to uses that derive the highest economic value from it. Overall, the regulatory process of ensuring both technical and economic efficiency has to be sufficiently flexible and responsive in order to adapt to changes in market valuations and technologies.

[22] Refer to http://docs.justice.gov.mt/lom/legislation/english/leg/vol_12/chapt399.pdf.
[23] Refer to http://docs.justice.gov.mt/lom/Legislation/English/SubLeg/399/28.pdf.
[24] Refer to http://docs.justice.gov.mt/lom/legislation/english/leg/vol_9/chapt350.pdf.
[25] Refer to http://www.mcmp.gov.mt/pdfs/strategydoc.pdf.

The MCA's role as a spectrum manager is to ensure as far as possible the optimal use of spectrum resources under its management,[26] within the constraints set by national and international legislation and regulations, technology considerations and national public policy objectives. The MCA reports on its activities in respect of radio spectrum through public consultations and its annual reports. The MCA's spectrum management activities embrace four main areas, namely policy advice to the Minister responsible for Communications with respect to frequency allocation and related matters,[27] the regulatory framework, frequency assignment and enforcement.

The process of allocating frequencies to radio services and the regulatory framework are largely determined by external factors such as public policy, legislation and international agreements or regulations.[28] Along with the MCMP as the Ministry responsible for Communications, the MCA plays an active role in international fora to ensure that, as far as possible, the international allocation and regulatory framework accommodates Malta's specific requirements. The MCA also participates in technical compatibility studies and in the development of technical standards to support more efficient and flexible use of the radio spectrum.[29]

Frequency assignment and enforcement activities govern how individual users may access radio spectrum and ensure that legal and technical conditions are complied with, in order to avoid harmful interference. Frequency assignment includes the processing of licence applications and the issue and renewal of licence documents (refer to **Section 2.3** below). Enforcement includes monitoring the spectrum to ensure that use is in accordance with licence conditions, carrying out inspections on radiocommunications installations, and taking legal action where the conditions are infringed (refer to **Appendix B**).

The MCA requires substantial investment in human capital to maintain its expertise and needs to upgrade and replace technical equipment to appropriately deal with spectrum issues and enforce rules regarding interference and other technical requirements. The resources available to the MCA to carry out its spectrum management role include policy, technical and administrative staff, technical planning tools and databases containing information on licences and spectrum use.[30]

[26] As already mentioned, the MCA does not manage the entire spectrum. Frequencies used for the provision of (analogue) broadcasting services are assigned by the Malta Broadcasting Authority.

[27] The MCA is also responsible for ensuring that spectrum allotments (i.e. the designation of specific frequencies for assignment within a specific allocation) are planned in accordance with sound engineering principles.

[28] Under Part IV of the Electronic Communications (Regulations) Act the Minister responsible for communications is responsible for drawing up, adoption and publication of the National Frequency Plan (NFP), in consultation with the MCA. The NFP is based on the ITU Radio Regulations and takes into account the European table of frequency allocations and utilisations (ERC Report 25) as well as the European Recommendation relating to the use of frequencies for Short Range Devices (SRD) (ERC/REC/70-03).

[29] In the recent past, allocations were very detailed and narrow. For example, an allocation would allow for fixed point-to-point microwave and nothing more. Now, allocations are inclined to be more broad and flexible, where internationally permitted to do so.

Together, these resources enable the MCA to manage the use of radio spectrum in a way that maximises the benefit to individual users and the country as a whole, keep pace with technological developments and trends and promote the implementation of new spectrum management techniques and policies.

2.3 The Radio Spectrum Licensing Regime

The radiocommunications licensing regime, in the main, is designed to minimise interference, ensure compatibility of adjacent technologies and ensure technical and economic efficiency.[31]

The use of radio frequencies has to be carefully planned and authorised to ensure the provision of a sufficiently high standard of service, otherwise it can cause interference to other users. In particular, it is vital that emergency services, aircraft and shipping, be enabled to communicate sufficiently and successfully. Interference can also impair the success of businesses and prevent individuals from the enjoyment of radio and television programmes. Thus, it is clear that access to the frequency spectrum needs to be controlled.

In some cases, sufficient organisation of frequency use can be achieved by using licence exempt or general authorisation arrangements.[32] In such cases it is not necessary to regulate the characteristics or the individual use of the radio spectrum. Furthermore, it is not necessary to have any dialogue with the end user of the spectrum or radio equipment. In other cases, only a small amount of information about the spectrum use is required and a kind of registration system might meet these requirements. However this approach is not sufficient in many cases. Even though the frequency bands are harmonised and the radio systems standardised, more detailed administrative work may still be required. There may be several reasons for this:

- For the efficient use of the spectrum and avoidance of interference it is necessary to plan the technical characteristics of certain stations and to set specific technical conditions and parameters for their use.

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[30] The MCA has implemented an integrated frequency management solution referred to as a Frequency Management Automated System (FMAS). This system assists the MCA in the administration and control of the radio frequency spectrum.

[31] Refer to regulation 64 of the Electronic Communications Networks and Services (General) Regulations on the conditions which may be attached to rights of use for radio frequencies. Also refer to the CEPT report published in February 2004 covering the licensing procedures that are applicable for the use of radio equipment or the use of frequencies (http://www.ero.dk/documentation/docs/doc98/official/Word/ERCREP061.DOC).

[32] This is also known as '**spectrum commons**' and 'unlicensed access'. The regulator allows free access to the spectrum, although users must agree to the rules of the commons prior to entering (e.g. generic technical specifications which prevent harmful interference to licensed usage in the same band and to limit the risk of interference with other unlicensed usages). For using these frequencies on an unlicensed basis, there is neither exclusive usage nor a guarantee of interference-free operation. It is possible for some classes of radio licences to be exempted from licensing requirements, but the use of general authorisations (sometimes referred to as class licences) are preferred where individual licences are impracticable or inappropriate. Hence, exemptions are seldom considered, other than temporarily, when a General Authorisation is pending. A General Authorisation is issued to operate radiocommunications apparatus or for the use of specified spectrum with no requirement for individual licensing or fee payments. It is recognised that even if there is no need for imposing individual licence requirements, it may be necessary to keep track of users. For this reason, there may be an obligation to notify (possibly at a minimum cost for the relevant notification) in such cases.

- The frequency used in a given location must be available for use by another user in a separate location without any interference being caused.

- To ensure that there is no overloading when the same channel needs to be assigned to more than one user in a given location.

- Radio transmitters are often concentrated in locations which are attractive because of geographical conditions, availability of antenna sites, etc. In such locations mutual interference through several different mechanisms may occur.

- There may be a need to set priorities to certain user categories. It may be necessary, for example, to prohibit the use of certain attractive frequency bands for hobby purposes, or to allow only security services on certain other bands.

- Co-ordination with neighbouring countries has to take place.

For these reasons, use of radio frequencies requires direct contact with the user. In order to carry out these tasks, licences are issued for the rights of use of radio spectrum or for the possession and operation of radiocommunications apparatus.

Prior to the migration of the WTD functions to the MCA all access to spectrum was granted by assigning frequencies for use by a service to individual users, on a first come first served basis and via licence fee exemptions for those systems that operate without unduly affecting other users (e.g. short range devices).[33] At that time, spectrum was regulated by the then Wireless Telegraphy Ordinance through spectrum-related conditions imposed on the licensees via licences of radiocommunications apparatus.

The review of the functions of the WTD re-examined the need for individual licences for radiocommunications apparatus and looked at ways where national interest safeguards could still be met through licence exempt / general authorisation arrangements.[34] This approach is planned to be implemented for licence categories that fail to satisfy one or more of the above-mentioned reasons for requiring a licence (e.g. wireless access networks and services operating in the harmonised 2.4 GHz and 5 GHz bands, short range devices and specific maritime and aeronautical equipment).

The WTD review also identified the requirement to streamline and simplify the licensing process for aeronautical and maritime-related radiocommunications equipment by creating a 'one-stop-shop' service for all aeronautical and maritime-related matters. The administrative functions associated with the licensing of radiocommunications equipment used by merchant ships or other seagoing vessels have been delegated to the Malta Maritime Authority (MMA).

[33] Refer to the Fees Leviable by Government Departments Regulations issued under Fees Ordinance (Cap 35) for a list of radiocommunications equipment exempt from a licence fee. Also refer to Annex 5 of the NFP for a list of permitted short range devices subject to an exemption from a licence fee.

[34] Refer to Article 5 (1) and (2) of the Authorisation Directive and the policy and regulatory principles laid down in the Framework Directive Article 9 and Article 8. Also refer to the Electronic Communications Networks and Services (General) Regulations, regulation 61 (1).

The Department of Civil Aviation (DCA)[35] within the MCMP is responsible for the administrative functions associated with the licensing of certain radiocommunications equipment used by aeronautical users.[36]

The MCA is currently reviewing the licence and fee structures for the possession of radiocommunications equipment[37] and intends to consult on the revised licence and fee structures in the coming months. The consultation will review the licence and fee structures for a broad range of radiocommunication services including: fixed radio links, business radio, ships' radio, aircraft radio and radio amateur licences, and propose simple and transparent fees that will reduce bureaucracy and promote the optimal use of spectrum.

As mentioned above, since July 2004 the Electronic Communications (Regulations) Act regulates the assignment of frequencies for commercial services.[38] There can be situations where the number of licences for the rights of use of these radio frequencies is limited to ensure the efficient use of spectrum as a result of its utility and scarcity.[39] If there is spectrum available to meet the demand, it is generally assigned administratively on a first come first served basis. Where demand for the available spectrum exceeds supply, comparative (i.e. beauty contest) or competitive (such as auctions) selection processes have started to be used,[40] in order to determine which entities will be granted spectrum rights of use.[41] To encourage competitive behaviour and discourage anti-competitive behaviour, spectrum caps restricting the amount of spectrum that one entity may hold, coupled with implementation requirements (such as coverage and rollout requirements) to avoid spectrum hoarding, have also been used in the assignment of such spectrum bands.

The recent licences awarded for the rights of use of spectrum for commercial services involving a limited number of providers and major investments have been granted for periods of between eight (8) and fifteen (15) years retaining the right to commence any procedure necessary for the re-assignment of the rights of use upon expiry of the licence.[42] Payment

[35] Refer to the website of the Department of Civil Aviation http://www.dca.gov.mt/.

[36] The process for licensing radiocommunications equipment use by aeronautical users is currently being reviewed by the MCA.

[37] Licences for radiocommunications apparatus may or may not require the assignment of individual frequencies.

[38] Electronic Communications Networks and Services as defined in the Electronic Communications (Regulations) Act. It is noted that the Act also covers electronic communication networks which are not limited to commercial use.

[39] Refer to the Authorisation Directive Article 5 (5) and the Electronic Communications Networks and Services (General) Regulations, regulation 61 (6). This concerns mainly large-scale use involving a limited number of providers and major investments (e.g. GSM, UMTS, DTTV and BWA licences). In these cases, every licensee is granted the right to use its frequencies for a longer period of time.

[40] Refer to the document entitled 'Policy and Implementation Strategy regarding DTTV, 3G and BWA' jointly published by the MCMP and the MCA in February 2005 and the document entitled 'Policy and Implementation Strategy – Terrestrial Digital Audio Broadcasting' jointly published by the MCMP and the MCA in August 2005 (http://www.mcmp.gov.mt/news.asp).

[41] The assignment of such licences does not mean that licensees are granted economically exclusive rights of use. In addition, it is impossible to issue any guarantee that similar applications will not be permitted in other bands during the term of the licence. As a result of broader allocations in other bands and the development of radio technology, similar applications will emerge.

[42] These licences have been subject to the smallest possible number of requirements and restrictions, in line with the European directives, in particular the Authorisation Directive (2002/20/EC). The rights of use of spectrum may be viewed at http://www.mca.org.mt.

for the use of these frequencies have been based on the relevant administrative costs and for the efficient and effective use of spectrum[43] coupled with a performance bond linked to a commitment to provide services by a certain date.

When there exists substantial availability of spectrum (i.e. spectrum scarcity is not a factor) and there is the need for an individual licence,[44] such licences are issued for a specified period and extended without prior notice, subject to payment of an annual fee. The licences are subject to individual requirements that are based on effective spectrum use. The frequency space granted does not exceed the amount necessary for the purpose indicated by the applicant. The fees, in the main, are based on cost recovery and cover the costs of interference management, international co-ordination, domestic planning, technical standards, enforcement and compliance, with some differentials that relate to safeguarding the efficient and effective use of spectrum, bandwidth and power.[45] Scarcity or the failure to use frequencies effectively may be reasons for not extending the licence. If scarcity arises, the licences may not be extended and may involve moving to a market-based assignment mechanism or making additional frequency space available.

Frequency use for non-commercial services (i.e. spectrum use that involves a public interest) are assigned administratively, such as, by direct assignment of frequencies or preferential licensing treatment, or by a statutory preferential position (such as for defence, public security or civil protection requirements).[46]

Appendix C provides an overview of the different radiocommunication services currently authorised for use in Malta.

[43] Refer to Article 18 of the Electronic Communications (Regulations) Act (Cap 399) with respect to the difference between administrative charges and fees for rights of use for radio frequencies. The fees for the rights of use of these radio frequencies have been established on the primary objective to promote the optimal use of the spectrum e.g. via administrative pricing, established reserve price, amount bid at the auction or comparative assessment. The spectrum fees for commercial services have been assigned via different financial arrangements e.g. a lump sum determined in advance, annual amounts, or annual amounts on the basis of a predefined percentage of the turnover.

[44] This concerns for example the use of business radio for industrial and commercial users (e.g. taxis, couriers, warehouses etc.) and fixed radio links.

[45] Licence fees are also set having regard to spectrum location, geographical location, amount of spectrum occupied and coverage area authorised by the licence.

[46] Refer to Article 20 of the Radiocommunications Act and Article 43 of the Electronic Communications (Regulation) Act.

3. Existing and Emerging Policy Issues

This section identifies the main drivers of future spectrum demand, including market, technology, social and cultural, economic and legal developments, and addresses the key policy issues that have been considered in the development of the proposed strategic framework presented in **Section 4** of this document.

3.1 Key Drivers Affecting Future Spectrum Demand

A key element of spectrum policy is to ensure that, as far as possible, sufficient spectrum is available to meet future demand. Spectrum demand is a function of the demand for the services and applications that require spectrum, but is also influenced by technology developments that enable spectrum to be used in a more efficient manner. For example, the migration from analogue to digital TV broadcasting enables several TV programme services to be simultaneously transmitted using the same amount of spectrum as a single analogue programme.

Demand for spectrum is also somewhat dependent on the effects driven by technical and / or economic limitations of other non-wireless technologies such as the use of broadband wireless access technologies to improve the availability and reach of broadband services.

Wider social and economic developments affecting people's approach to work and leisure will also impact on demand, particularly the extent to which people wish to communicate on the move and the desire for multi-room utilisation in both the home and in the workplace.

The drivers of spectrum demand have been grouped into five main categories, namely, market, technology, social and cultural, economic and, legal and regulatory. **Appendix C** presents additional information on the key drivers of spectrum demand on a service by service basis.

3.1.1 Market Drivers

The key market drivers that are likely to have an impact on future radio spectrum demand in Malta include:

- convergence, i.e. the deployment of multiple digital media such as broadcasting, electronic communications and information technology to deliver integrated multimedia content and services;[47]
- demand for wireless broadband services offering mobility;

[47] 'Multimedia services' are seen as the coming together of the traditional broadcasting (point-to-area coverage) and communication services (one-to-one) in a mobile environment.

- demand for multi-channel TV and radio particularly if mobile reception is required; and
- demand for mobile multimedia content, particularly delivery of high volumes of audiovisual or other high bandwidth content which could create demand for further mobile spectrum or access to alternative delivery platforms such as broadcasting technologies.

Convergence

The electronic communications sector in Malta is evolving rapidly and is expected to consolidate during the coming years as the deployment of a range of new products and services such as digital terrestrial television (DTTV) and radio (T-DAB), third generation mobile (3G), broadband wireless access (BWA) and the move to Internet Protocol (IP) based networks is finalised.

There is an increasing choice of transmission platforms over which content can be delivered to wireless devices. For example mobile phones that have integrated digital television (DTV) receivers are emerging and can thus receive audiovisual content from either mobile or broadcast networks. In the future it seems likely that devices will connect to multiple networks and that there will be increasing 'convergence' between traditionally distinct services like broadcast, fixed and mobile communications.

The introduction of services such as wireless local area networks as a home networking technology has added a further stimulus towards convergence. What exact form this convergence may take is as yet unclear but the increasing combination of wireline, wireless, IP, content, multi-mode terminals and information communication technology (ICT) services to provide a ubiquitous and seamless service to end-users provides both new opportunities and challenges. The provision of networks and devices, will not only provide voice over IP telephony (VoIP) and real time data transmissions, but will also cover entertainment services ranging from music to photography.

Convergent services may include textual, audio (speech or music) and / or video material. In some cases convergence can involve elements from outside the wireless sector (e.g. Voice over IP). Radio spectrum has considerable potential for the mobile delivery of convergent services and content, and convergence is likely to have a significant impact on the economic contribution derived from the use of the radio spectrum.

Convergence is likely to require a more flexible approach to spectrum management than has traditionally been the case, although there will continue to be a need to ensure technical compatibility between different users of the radio spectrum.

Demand for Broadband Services

Broadband penetration levels have increased significantly over the past eighteen months. Malta is practically at the same level as the average penetration within the EU at 12.7%, whilst the local broadband penetration is significantly higher than the new EU entrants.

The information-based economy has required Government to form new strategies for achieving or retaining economic competitiveness. A major consideration of this strategy shift

has been the important role of broadband communications in retaining economic vitality. The ready availability and take-up of competitive broadband services is critical to both Malta's competitiveness and Malta's growing reputation as a world-class ICT Centre of Excellence. In this context, apart from continuing to pursue supply-led initiatives, government is carrying out work to promote broadband through education, training and awareness programmes and content-driven initiatives. The recent BWA licensing initiative is expected to generate further growth in the broadband sector over the coming years.

Demand for Multi-Channel TV and Radio

There are over 100,000 cable television subscribers, and now a digital terrestrial television platform that provides multi-channel services (i.e. channels other than the local Maltese terrestrial channels), is available. Approximately 14% of the estimated total number of households have migrated to digital in less than a year. Many terrestrial viewers are also able to receive terrestrial broadcasts from Italy in addition to local services. In order to compete effectively with cable and satellite options, or to satisfy consumer demand for mobile reception of multi-channel services, terrestrial digital services may have to offer a similar range of channels / services.

Demand for Mobile Multimedia Content

Demand for on-line content is likely to extend to the mobile environment once 3G mobile becomes available. Cost-effective delivery of audiovisual material may require either additional spectrum or the adoption of novel technologies that combine mobile and broadcast media.

New technology developments such as the Handheld Digital Video Broadcasting (H-DVB) standard blur the traditional distinctions between broadcast and telecommunications services, enabling the delivery of both conventional TV programmes and convergent multimedia content to mobile receivers in a manner that makes technically efficient use of available spectrum.

Terrestrial Digital Audio Broadcasting (T-DAB) may also have a role to play in supporting mobile multimedia services.[48]

3.1.2 Technology Drivers and Enablers

Malta's spectrum policy is, in principle, technology and service neutral[49] and, as far as possible, leaves decisions on use of the spectrum to the market which is generally considered to be in a better position to make decisions on technical innovation. Some restrictions are inherent for the management of the spectrum, but both government and the MCA seek to apply technological neutrality as far as is practicable.[50]

[48] A policy and strategic document with respect to the allocation and assignment of spectrum for T-DAB networks and services was published in August 2005. T-DAB frequencies were assigned via an auction process in the first quarter of 2006.

[49] In practice, spectrum allocation is largely dictated by the technical specifications of radiocommunications equipment manufactured overseas in conformity with ITU guidelines.

[50] It is noted that a technology neutral approach is one of the core principles of the EU regulatory framework. Furthermore Member States should encourage the implementation of standards and/or specifications adopted by the European standards organisations.

As well as creating new services, new digital technologies generally enable more efficient use of the spectrum. Therefore, the spectrum management regime needs to provide suitable flexible arrangements for users to migrate from legacy technologies. New technology developments are taking place that could have a significant bearing on how spectrum is used in the future to deliver electronic communication technologies. Some of the key developments include:

- convergent networks and devices that combine fixed, mobile and broadcast transmission media enabling different content and services to be delivered to the same terminal using the most appropriate choice of platform;
- improved spectrum efficiency, enabling higher volumes of data to be transmitted in a given amount of spectrum;
- technologies such as Ultra Wide Band (UWB),[51] offering the potential to carry very large amounts of data;
- cognitive and software defined radios[52] that can adapt dynamically to different environments depending on time and location, frequency availability, etc; and
- the increasing practicality of utilising bands located higher in the frequency spectrum.

3.1.3 Social and Cultural Drivers

The framework for social and cultural objectives that influence radio spectrum management is contained in a range of government policies. Radio spectrum has a crucial role to play in supporting key social objectives, such as ensuring widespread access to broadband services and public service broadcasting content, or efficient delivery of public services such as health and law enforcement.

In this area, the value of spectrum is determined vis-à-vis policy criteria rather than through the operation of the spectrum market. The assumption is that, through the meeting of policy objectives, spectrum achieves the highest value to society, an assumption that is reliant on a robust and effective policy process accurately identifying and describing objectives of maximum social and cultural value.

[51] UWB is a new technology which provides a means of wirelessly conveying large amounts of data over very short distances using very low power signals that are spread over a very wide bandwidth. Refer to http://europa.eu.int/information_society/policy/radio_spectrum/by_topics/uwb/index_en.htm for information on the harmonised introduction of UWB-based applications in the EU.

[52] Cognitive radio is an area of advanced research that could one day lead to more efficient use of radio spectrum. The concept involves intelligent end user devices that are capable of adapting to a particular radio spectrum environment, most efficiently providing a particular service without causing interference to other users. Software Defined Radio (SDR) is often considered along with cognitive radio, since the ability for a device to carry out any level of 'cognitive functions' would require a sophisticated level of software programmability. SDR's are characterised by the use of general purpose programmable hardware in place of dedicated radio modules found in traditional radio systems.

There are a number of areas where social, cultural and public policy issues might influence demand for radio spectrum. Two areas where these factors are particularly relevant are extending the availability of broadband access and future broadcasting services. To some extent, these are linked since digitisation of television may provide opportunities to extend future broadband availability either using the digital TV or audio platforms, or by making use of some of the spectrum to extend broadband access to remote areas. Broadcasting has played a key role in promoting national culture and language while new opportunities for specialist programming will arise with the introduction of digital services.

Other drivers that must be considered are the need to ensure access to spectrum for government services, the use of radio spectrum to improve traffic management and public transport and environmental issues related to infrastructure sharing.

A small proportion of radio spectrum is also available for personal and recreational uses. Examples are amateur radio, personal radio services (e.g. citizens' band radio, wireless controlled models, personal GPS devices, short-range locking and alarm devices). Many of these have a safety function in addition to their socio-cultural utility.

3.1.4 Economic Drivers

Many of the services that use radio spectrum are dependent on discretionary spending by consumers and demand is therefore likely to be influenced by levels of disposable income and the general state of the economy.

Malta's economic growth over the last decade has undoubtedly contributed to the boom in mobile communications and continuing growth is likely to drive demand for new services and content (e.g. mobile and broadband services). Employment patterns will also have a bearing, for example increased working from home (as result of increasing levels of traffic congestion and further implementation of family-friendly work methods) could drive demand for broadband connections.

3.1.5 Legal and Regulatory Drivers

Malta's legislative framework for wireless services is largely driven by European developments, such as the introduction in 2004 of the new regulatory package which has had a significant impact on the manner in which the electronic communications sector is regulated throughout Europe. The main emphasis of this framework is the promotion of competition and a single European market in electronic communications. The regulatory framework is undergoing its first review this year.[53] In its review process, the EC is following a "triple-play" approach aiming at innovation, investments and integration.

The most important objectives to be achieved with the 2006 review are to: strengthen investment through infrastructure-based competition; promote innovation through openness

[53] Refer to http://europa.eu.int/information_society/policy/ecomm/tomorrow/index_en.htm. Also refer to the Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions (COM2006/334) dated 28th June 2006 on the Review of the EU Regulatory Framrwork for electronic communications networks and services.

of the rules for new technologies; complete the single market by making the application of EU rules more consistent across the 25 Member States; and by encouraging cross-border communication services. The framework is designed to be future proof, and to take account of the convergence of digital technologies that allow everything from phone calls to entertainment to be delivered over all sorts of networks to all sorts of devices - PCs, televisions, mobile phones and more. The implications of this new framework will be included in future strategy documents.

As already mentioned, there is increasing interest at the European level in moving towards new market-based approaches to spectrum management (such as secondary trading and liberalising spectrum management) to support innovation and the development of new wireless products and services. Spectrum liberalisation - the ability to use spectrum for purposes other than it was originally licensed for - is likely to be a key enabler of technology convergence. For example, spectrum currently used for broadcasting could be used to support mobile services (such as multimedia content delivery), or spectrum currently used to deliver fixed access services could also provide mobility. These possibilities raise many issues for incumbent users of radio spectrum and spectrum management agencies alike.

3.2 Use of Market-based Mechanisms

In recent years, demand for radio spectrum has risen sharply and unpredictably, with consequent pressure on an increasingly scarce resource. The importance of the effective management of radio spectrum has grown proportionally, putting a significant strain on the central planning task of the regulator. By giving the market a more substantial role in the allocation and assignment of spectrum to those applications and operators that can use it most efficiently, the burden on regulators can be reduced considerably. Indeed, it is the main players in the market that have the most detailed knowledge of emerging technologies and applications, and their chances of success.

As a result of the rising demand for radio spectrum there has been increasing international interest in the application of market-based approaches to spectrum management, with the objective of increasing flexibility and promoting more economically efficient use of the radio spectrum. The principal market-based mechanisms that have been applied include administrative pricing, auctions, secondary trading - where the rights of use is assigned to a single user, and licence exempt / general authorisations - where spectrum is shared with other users.

It is recognised that each market-based management model is a useful tool and ‘one size does not fit all’. Developing the right ‘mix’ between each management model is important for achieving both EU[54] and national policy objectives. The optimal ‘mix’ between them will depend on various criteria, such as time to market, protection from harmful interference, quality of service and the promotion of innovative technologies and services.

[54] Communication COM(2005) 411 from the Commission to the Council and the European Parliament entitled ’A forward-looking Radio Spectrum Policy for the European Union: Second Annual Report’ presents the Commission’s overall approach to this subject.

3.3.1 Administrative Pricing

The aim of administrative pricing is to encourage users to make more efficient and effective use of the spectrum with the intention of bringing the demand for spectrum into equilibrium with its supply, by encouraging users to install more bandwidth efficient technologies in congested bands / areas, handing back spectrum they do not need, or moving to less congested parts of the spectrum. There is a clear need to further develop administrative pricing for parts of the spectrum where there is congestion, as a mechanism to inject market forces into spectrum usage.

While congestion is not a serious problem in most geographical areas in Malta, there are some key locations where it does occur. In addition, as new services come on stream and the demand for spectrum grows it may be necessary to remove incumbent operators from the spectrum.[55] In such circumstances a number of options are open to spectrum managers, including:

- ensuring that a spectrum-efficient technology is utilised;[56]
- closing the affected bands to prohibit further congestion;
- allocating additional spectrum to the affected services in other bands; and
- migrating some users to other bands.[57]

Market-based mechanisms such as administrative pricing and spectrum trading (refer below) can be used as a tool in facilitating such options (e.g. by encouraging spectrum users to use more spectrum efficient technologies). Where administrative pricing looks to the market value of spectrum usage, defining the methodology to determine that market value becomes increasingly complex as the variables that must be taken into account increase. Depending on the service, the following variables in different combinations might be considered:

- amount of bandwidth per channel used;
- number of channels used;
- loading on the channel;
- regional or national application;

[55] For example, recently it was necessary to migrate spectrum allocated for Fixed Links so as to free up the spectrum agreed internationally for the use of 3G services.

[56] For example, in the case of two-way radio, a repeater frequency (semi-duplex) is only assigned where there are approx. 50 users.

[57] The process of changing or reallocating spectrum is known as re-farming and the relocation of incumbent users to new spectrum is known as migration. In making migration and re-farming decisions the changes in international agreement of allocation (such as in the case of 3G services), the NFP, forecast demand, rights of existing users, implication for users (in terms of cost and inconvenience) and timing to ensure that migration can take place with minimum disruption or cost for legitimate users are taken into account.

- congested or uncongested bands;
- geographic area covered;
- quality of service required;
- is a new innovative system being implemented?
- has the user relocated?

Administrative pricing has been adopted by a number of jurisdictions, however recent experience suggests that calculating such charges can be difficult and moreover these are unlikely to be accurate. Furthermore, raising the price of spectrum through this mechanism could run counter to government's policy of reducing business compliance costs.

Nevertheless, the body of theory and experience in techniques such as administrative pricing (specifically Administrative Incentive Pricing)[58] and spectrum trading (refer to Section 3.3.2 below) has been improving to the extent that most practitioners would now agree that market mechanisms should be used to determine the best use of the spectrum, although there is still some disagreement over the details.

As a mechanism to encourage the efficient and effective use of spectrum and inject market forces into spectrum usage, administrative pricing mechanisms, such as Administrative Incentive Pricing (AIP), will be considered for certain spectrum bands.[59]

Care will be taken to ensure that the structure of the pricing is appropriate to each sector to which it is to be applied, and that the rate at which it is introduced is such that any adverse effects on a particular sector are minimised.

3.3.2 Auctions and Secondary Trading

Using market-based approaches, such as auctions and secondary trading of spectrum rights, would develop a real market as opposed to the pseudo-market of administrative pricing. With a market-based approach such as auctions and secondary trading, spectrum is offered on the open market, relying on competition to determine the value of the spectrum to purchasers.

Assignments of long-term spectrum rights via market-based mechanisms can generate efficient outcomes, as the competition to obtain spectrum should lead to radio frequencies being used by the entities valuing them most.

[58] A method of pricing whereby prices are set for spectrum rights of use that are intended to reflect the opportunity cost (the value of the best alternative use of that spectrum) of spectrum use, based on the marginal value of the spectrum.
[59] For example, in cases where the assignment of spectrum via auctions is not suitable.

Such market-based approaches are deemed to have significant economic benefits and would generally improve citizens' choice and access to new technologies and services at lower prices. Trading would allow prices to fluctuate according to supply and demand and the true market value would be known at all times. The main disadvantage, in some critics' views, is that the 'windfall' gains would be enjoyed by those who happen to be holding spectrum at the time trading is introduced, as this benefit should accrue to the country as a whole. In addition, auctions and spectrum trading (without sufficient safeguards) could involve a risk that spectrum will concentrate in the hands of only a few players and this could result in speculation (i.e. buying spectrum on the basis of its potential selling price rather than on the basis of its actual value) in the radio spectrum markets.

This mechanism works most effectively when there are large numbers of willing and informed buyers and sellers, but is less effective where buyers are few and high entry costs prevail. The relatively small number of operators in the Maltese market creates a likelihood that the rights of use of spectrum could be concentrated, with the conditions by which markets operate competitively being compromised.

Auctions vs. Beauty Contests

Auctions are deemed to be effective determinants of value where there are many competing buyers. Advantages include transparency, a relative low cost of operation and significant revenue returns to Government. Auctions also produce a market price that could be applied to spectrum assigned by other means: for example administrative pricing. While well-resourced bidders tend to overshadow small or low value users, with resulting diminished downstream competition, it is recognised that auctions are a cost-effective rationing mechanism where no social and cultural objectives are at risk.

A spectrum cap is a restriction on the amount of spectrum that any one entity may hold. A spectrum cap can be imposed at the original assignment: for example through auction rules which prevent any one person from purchasing more than, for example, one third of the rights of use of spectrum on offer in the auction, or incrementally acquiring more than one third of the total frequencies allocated to the industry. The extension of such a spectrum cap to cover secondary trading could be justifiable.

Eligibility requirements are a potential useful mechanism for ensuring that government policy objectives are met, while maintaining a commercial spectrum market. When acquiring such spectrum, bidders are able to take into account the cost of providing the specified service. A policy issue that needs to be considered is whether justification for the application of spectrum caps or eligibility requirements should be based on competition policy (e.g. enhancing competition) or public policy (e.g. encouraging diversity).

Implementation requirements and 'use-it-or-lose-it' provisions may also be applied when assigning spectrum. Such requirements should and could prevent spectrum hoarding and/or

barriers to re-assignment of spectrum to higher value users (i.e. speculation in spectrum).[60] Nevertheless, implementation requirements could result in the risk of creating economic inefficiencies by restricting the market players (and investors) flexibility to adjust their investment towards other technologies if that constitutes a more efficient way of using the resources following the assignment of a licence.

Auctions, if well constructed and operated, will deliver a market determined price for the spectrum and are generally regarded as being less likely to raise legal challenges than comparative selection procedures. However, it is important that the auction is designed to treat all potential bidders fairly and transparently and to achieve a realistic market price for the spectrum concerned in order to encourage its efficient use.

Decisions must be made on the type of auction,[61] configuration of lots and the size of each rights of use of radio spectrum. Weighting should be given respectively to competing objectives such as technical neutrality (which suggests that no judgements should be made as to the likely end use of the rights of use), technical efficiency (which suggests that the lots should be defined in ways that facilitates their likely end use) and competition issues (which suggest that the number of lots should facilitate competition in the downstream market).

Comparative selection procedures, otherwise known as 'beauty contests', are an important spectrum management tool which allow the achievement of specific policy objectives such as coverage to remote areas, roll-out of networks within a particular timeframe, delivery of specific services, etc. One of the challenges in designing a beauty contest is that of establishing an appropriate fee for access to the spectrum.

Comparative assignments are superficially attractive, as they ensure that a wider range of considerations than price determines the highest value use of the spectrum. However, all beauty contests rely on a subjective judgement by the decision-maker and can be unreliable as a method of assignment.

At this stage a single approach for awarding spectrum rights is not preferred and each case will be considered on its own merits. However, auctions are considered to be the most suitable assignment mechanism where demand exceeds supply and where no social and cultural objectives are at risk.

When designing auctions (including the application of spectrum caps, eligibility requirements and implementation requirements) and considering between objectives of assigning spectrum to the bidder according to the highest value and promoting the competitiveness of downstream markets, the views of all stakeholders, available market and technical information, expert technical analysis and consideration of overseas trends will be taken into consideration.

[60] It is noted that eligibility requirements, implementation requirements, 'use-it-or-lose it' provisions and efficient use may be extended to cover spectrum trading and passed on to secondary buyers to avoid issues related to hoarding and spectrum speculation.

[61] e.g. simultaneous multiple-round ascending auctions, sealed-bid auctions.

Secondary Trading

It is noted that, despite best efforts, auction design can be complex and lot design could hamper competition. The facility of secondary trading promotes economically efficient use of spectrum after initial assignment and allows the market to remedy the problem.

Secondary trading allows spectrum rights to be traded between entities, providing a means of accessing radio spectrum via the market rather than the regulator. Spectrum trading allows a licensee to transfer the right to use all or part of the licensed spectrum, usually in return for some financial consideration. Nevertheless, the regulator still has a role to ensure that the traded spectrum continues to be used in an appropriate manner, as in cases of, for example, failure of the secondary market, irrational blocking the rights of use of the spectrum from evolving to its highest valued user[62] (nevertheless if the secondary market is functioning, this should be done reluctantly, and on a case-by-case basis) and in the case of rare circumstances where the regulator may need to intervene to enable the offering of some new service that is immediately essential to the public welfare.

When the licences for the rights of use of spectrum are renewed, a review that the configuration of the rights of use promotes highest value use or whether adjustments are warranted, may be considered. Buyers and sellers require clarity over the expiry of usage rights. If the duration of usage rights is uncertain or approaching its end date, then this will depress the value of the licence in a secondary market. Moreover, investment is likely to be depressed if renewal is uncertain. However, expiry and reclamation powers provide useful flexibility as a public policy tool. When creating tradable rights, regulators need to balance these conflicting interests.[63]

Trading can take several forms which are described briefly below. These can be applied either individually or in combination, e.g. partial trading of spectrum may or may not involve reconfiguration or change of use, depending on the prevailing rules and the wishes of the trading parties.

i. Transfer of Undertakings

This involves the transfer of a right of use from one organisation to another, in line with existing rules for many licences. Transfer of undertaking involves no change to the conditions attached to the right of use, such as the duration (if specified) and any obligations such as coverage, tariffs or service quality. In the case of large radio networks using scarce radio spectrum (such as GSM or 3G mobile networks), competition issues could arise if, for example, an existing operator wished to merge with, or take over, a competitor. In such

[62] Clear measures should be in place to prevent any speculation with rights of use of radio spectrum. Otherwise this could result in increased costs not only for potential spectrum users, but also for consumers and business users and will have a negative impact on the efficient use of radio spectrum. Speculation with radio spectrum must not be allowed.

[63] Refer to the report entitled 'Study on conditions and options in introducing secondary trading of radio spectrum in the European Community' prepared by Analysys Consulting Ltd, DotEcon Ltd and Hogan & Harson LLP for the European Commission and published in May 2004.

cases it is likely that only one of the existing rights of use would be retained and the other would be returned to the regulator for re-licensing.

ii. Re-Configuration

Re-configuration refers to the situation where a right of use changes hands but the new user wishes to change certain aspects, such as the geographic coverage area. This might arise, for example, if a number of local Business Radio licences are acquired by a single company that wants to operate them as a single network covering a contiguous area. This may involve changing the location or technical characteristics of some of the base stations. Any changes arising from reconfiguration would only affect the conditions attached to the right of use and not change the type of use.

iii. Partial Trading of Spectrum

The situation may arise where a user has more spectrum than is needed, or has insufficient spectrum and would like to acquire more. In these situations there may be benefit in being able to 'disaggregate' the licensed spectrum and to trade part of the spectrum with another user.

iv. Spectrum Leasing

The ability for a licensee to hire or lease spectrum to another user on a short or longer term basis could allow occasional spectrum users to gain the benefits of access to spectrum without having to apply for their own licence. If incumbent spectrum licensees who do not require all of their spectrum at all times are able to benefit financially from hiring or leasing spectrum, they may be persuaded to allow others to use parts of their spectrum when or where it is not required. Leasing could also allow new users to get access to spectrum on mutually agreed terms without the existing user having to relinquish the spectrum permanently.

v. Change of Use

Change of use goes considerably further than re-configuration, in that not only the conditions attached to the right of use are changed, but the type of right of use also changes. In some cases, a user may wish to split a licence to use different parts of the spectrum for different kinds of service, perhaps selling part of the spectrum in the process. Change of use raises potentially complex issues, for example in relation to interference where different technologies are deployed and subject to international agreements and international coordination requirements.

The concepts in relation to spectrum trading will be studied to allow a gradual move to spectrum trading for specific spectrum bands or services,[64] subject to sufficient safeguards to ensure that potential benefits are not offset by adverse consequences.

3.3.3 Liberalisation of Spectrum Management

Given the rapid evolution of technology, it is very difficult to predict what services will be available or which frequency range will be efficient for any service even a few years from now, mush less what the public demand for each service will be and how to respond to changing demand. Even if the most economically efficient use of spectrum at any given time could be correctly identified, spectrum allocations would have to be continually modified to reflect technological and economic developments.

This reallocation process necessarily consumes substantial public and private resources, reduces certainty for users of spectrum, discourages investment, and delays the introduction of new services. This process also discourages innovation because it requires entrepreneurs to disclose their ideas to the public well in advance of their introduction, severely diminishing the competitive advantage from being first to market.

'Liberalisation' of spectrum management, by removing regulatory constraints that are not required to avoid harmful interference[65] or meet specific policy objectives, could provide such flexibility. Examples of liberalisation may include relaxing the rules relating to the transfer of licences between undertakings or the types of service that can be provided in particular parts of the spectrum.

Although a flexible spectrum management regime may increase economic efficiency on a national level, this may threaten the benefits of co-ordination and harmonisation. Indeed, differing spectrum management regimes among countries could make international coordination more difficult. The policy challenge is to increase the flexibility of the spectrum management regime, while seeking to retain the main benefits of harmonisation and standardisation measures.[66]

In parallel with the study on spectrum trading the issues related to liberalisation of spectrum management[67] will be studied to identify opportunities to liberalise specific frequency bands or services[68] where this would provide benefits, such as economic efficiency, promotion of innovation and competition, and flexibility.

[64] Specifically, the bands earmarked for trading and liberalisation by the European Commission (refer to Section 1.4 above) and as specified in the proposed strategy depicted in **Section 4** of this document.

[65] There is a trade-off between increasing the flexibility available to any one user of the spectrum and reducing the risk of interference to other users. The general policy is to set technical restrictions that are the minimum necessary to provide adequate protection against harmful interference.

[66] Refer to the CEPT ECC Report 080 published in March 2006 entitled 'Enhancing harmonisation and introducing flexibility in the spectrum regulatory framework'

[67] Including issues relating to restrictions of spectrum use for technical reasons (to avoid interference) and decisions that may be taken on the conditions of existing or new licences (e.g. the effects on the promotion of competition, the efficient and effective use of the spectrum, the protection of consumers or the availability of electronic communications services).

[68] Specifically, the bands earmarked for trading and liberalisation by the European Commission (refer to Section 1.4 above) and as specified in the proposed strategy depicted in **Section 4** of this document.

3.3.4 Licence Exempt Spectrum

A further option for change is to progressively allocate more spectrum to the licence-exempt use ('spectrum commons' model) via general authorisations, which tend to ease the demand for individually licensed frequencies and lower the transactional costs of licensing.

Intelligent technologies may, in the foreseeable future, make this a practicable option even for such essential functions as emergency services and defence. New technologies are shifting the emphasis in radio spectrum management away from frequency allocation within clearly defined engineering parameters, to open access systems operating concurrently in broadly defined spectrum bands. For example, new radio technologies, such as Software Defined Radio and Cognitive Radio, allow transmitters themselves to find radio spectrum frequencies that are vacant at a given point of time. In addition, there are technologies, such as UWB, where the transmit power is 'spread' over a larger part of the spectrum.

It is recognised that, while presenting opportunities for more intensive use of the available spectrum, new technologies operating in the 'spectrum commons' environment are difficult to categorise and regulate and may result in loss of direct revenue to government. Therefore, assignment procedures may have to be modified and levels of spectrum monitoring increased. In addition, alternative arrangement about financing the spectrum monitoring for these licence-exempt categories will need to be identified. Nevertheless, the creation of a more flexible framework for the use of frequency space will result in lower entry barriers to the spectrum and in reduced management costs for the authorities and a lighter administrative burden for the users.

Where possible, access to radio spectrum will be via licence exempt / general authorisation arrangements. Such a regime will be used to accommodate new technologies as they are introduced. Allocation of such spectrum to these technologies has to be subject to compliance with specific technical and interference issues.

3.3.5 Non-Commercial Assignments

There are many spectrum uses where market-based approaches are not desirable and that the best way to support national development objectives and value to society is administratively designed to meet national needs.

These include, *inter alia*, radiocommunication-based services:

- of a non-communications nature (e.g. radio beacons, radar);
- provided in the public interest (e.g. defence, security, safety of life);
- subject to international accords (e.g. maritime and aviation);
- meeting the Government's social and cultural policy objectives (e.g. public broadcasting);

- facilitating scientific studies (e.g. meteorology); and
- services related to other non-commercial activities (e.g. citizens' band, amateur radio).

It is recognised that the frequencies used for public interest use should not be more than needed for the exercise of these tasks. The use of scarce frequencies for public interest purposes is at the expense of other possibilities of using the spectrum and this renders the remaining spectrum more scarce. The spectrum assigned for public interest tasks will not always be fully used all of the time. This means that third-party use could be possible.[69]

With respect to public security and civil-protection services, it is noted that the fragmentation of these radiocommunication services could hinder the efficient co-ordination of the various services in the event of a major incident or emergency. The issue is not one of efficient spectrum use but of effective linkages between the services, whose integration at major incidents and during large-scale civil emergencies would be greatly facilitated by the use of compatible equipment on common frequencies.

To support national development objectives and value to society for the above-mentioned radiocommunication services, and where the specific assignment of spectrum is necessary, spectrum will continue to be assigned administratively (such as the direct assignment of frequencies and preferential licensing treatment) or by a statutory preferential position.

A study on whether third-party use for specific spectrum bands assigned for public interest tasks is possible and arrangements to be made about the conditions to be attached to such third-party use will be undertaken in consultation with the MCA and the ministries involved.

3.3 Transitional Arrangements and Implementation

It is important to note that none of the policy issues identified above have been argued to a conclusion. Each one needs to be prioritised, incorporated within the MCA strategic framework (refer to **Section 4**) and work programme for the management of radio spectrum, and progressed through research, analysis and consultation, down to a set of recommendations to government, with those carrying the highest urgency and impact being given priority. It is envisaged that in the short term, specific parts of the spectrum policy will be implemented within the current legal framework, whereas other parts will first require an amendment of the relevant regulations.

The introduction of spectrum markets (such as secondary trading and liberalisation) could impact the value of existing licences as well as on related investments. Such an impact might affect different licensees in different ways. In any case, that impact will reflect the

[69] New technologies offer the possibility of new applications for higher frequency bands currently not in commercial use.

existing and future licensing conditions.[70] Existing rights of the current licence holders will have to be taken into account, while at the same time ensuring compatibility with competition law requirements and general European Community law principles.[71]

In principle, existing licences with the requirements related thereto will not be amended during the term of the licences. As a general rule, existing rights will be amended only in a manner favourable to users and only after consultation with interested parties.

Should a specific case require an amendment unfavourable to the licensee, the licensee will be informed in advance and its view taken into account. A reasonable timeframe for the implementation of the relevant additions and / or amendments to the licence will be provided.

[70] If the rights of use of radio spectrum are not properly defined this may result in failure of identifying the users which value the spectrum most when initially assigning the spectrum or when spectrum is traded.

[71] Refer to the Communication COM(2005) 400 from the Commission to the Council, the European Parliament and the European Economic and Social Committee and the Committee of the Regions entitled 'A market-based approach to spectrum management in the European Union' dated 14th September 2005.

4. Strategy for Managing the Radio Spectrum

To ensure the efficient management and effective use of the radio spectrum with particular regard to the availability of spectrum and the current and future demand for spectrum the following key strategic objectives have been identified:

i. facilitating access to radio spectrum through an objective, transparent and non-discriminatory process that meets statutory requirements;

ii. promoting the development and deployment of new technologies and services;

iii. maximising the economic and social benefits arising from the use of radio spectrum;

iv. ensuring the efficient and effective use of scarce radio spectrum resources; and

v. ensuring compliance with national, international and European obligations and the avoidance of harmful interference.

This strategy is intended to be periodically updated to reflect changes in markets, technology and demand for radio spectrum for different applications. A key purpose of the strategy is to consider future demand for spectrum and whether any changes to the manner in which spectrum is managed and allocated to different services are required to meet growth in demand.

The strategy is developed in the context of the global, European and national policy and regulatory framework that governs spectrum in Malta. The strategy comprises a number of strategic goals in relation to each of the above areas along with a number of issues in relation to specific radio services that require consideration in order to meet the broad strategic objectives.

4.1 Key Strategic Goals for Spectrum Management

Facilitating Access to Radio Spectrum

- Ensure flexibility and ease of access to radio spectrum to accommodate technological advances and market factors.
- Adapt the allocation of, and access to, the spectrum resource to provide spectrum that best meets the needs of the user.
- Facilitate the development and deployment of new and innovative services.
- Support and promote innovation, research and development in new radiocommunications techniques, spectrum-based services and applications.

- Review the current procedures with a view to bringing licence duration more in line with investment cycles, noting that a radio spectrum licence does not confer ownership nor a continued right to a particular radio frequency.

- Ensure that current licensing schemes are appropriate and simple to use and administer so that licences can be issued quickly.

- Continue to provide the public with the best and most up-to-date information on frequency allocation plans, vacant spectrum, spectrum available for applications / assignments, existing licences, pending applications and licensing procedures.

- Encourage, and when appropriate, require electronic filing of licences and other applications involving spectrum.

- Maintain, update and improve electronic information systems, as necessary, to streamline and harmonise licensing and co-ordination processes.

- Encourage and authorise radiocommunication system trials and new technology experiments (e.g. UWB technology)[72] in frequency bands appropriate to the intended applications and subject to the availability of suitable spectrum.

Maximising Economic and Social Benefits

- Identify opportunities to promote the use of radio / wireless systems to enhance Malta's competitiveness.

- Continue to consult regularly and widely on spectrum issues in order to have the views of all stakeholders when making decisions.

- Continue to ensure that spectrum continues to be available to meet the needs of public safety, emergency services, safety of life services and the defence forces, in view of their vital role in the safeguarding of human life, property and national security.

- Where appropriate, seek to liberalise the constraints applied to spectrum rights of use, to permit deployment of alternative technologies or services, where harmful interference does not result.

- Implement and seek opportunities to promote the take-up of 'trial licence schemes' in order to position Malta as a test-bed for wireless system testing and service trials.

- Continue monitoring the spectrum with a view to ensure that it is free from unwanted emissions to the benefit of the public.

Ensuring the Efficient and Effective Use of Scarce Spectrum Resources

[72] Refer to ECC/DEC/(06)04 ECC Decision of 24 March 2006 on the harmonised conditions for devices using UWB technology in bands below 10.6 GHz.

- Optimise the use of the spectrum resource by encouraging the use of spectrum efficient radio systems and the use of the most appropriate frequency band for the application in order to maximise spectrum usage in critical frequency bands.

- Consider the introduction of Administrative Incentive Pricing (AIP) in order to encourage efficient use of the spectrum, with the intention of bringing the demand for spectrum into equilibrium with its supply.

- Continue to enforce licensing requirements to ensure that licensees are using spectrum efficiently and productively.

- Consider opportunities to permit one or more forms of trading in spectrum rights (spectrum trading) in relation to specific services, to test its appropriateness and operation in the local market.

Ensuring Compliance with National and International Requirements

- Continue working to protect Malta's national interests when harmonising and co-ordinating spectrum utilisation with other countries.

- Continue to plan and manage the utilisation of the spectrum resource in accordance with national, international and European legislation.

- Where appropriate, comply with international agreements on frequency usage and technical standards as a requirement for spectrum access, recognising that these agreements are necessary for harmonious system operation, efficient spectrum management, spectrum utilisation, compatibility, competitiveness and avoidance of interference.

- Continue to represent and promote Malta's position with regard to all radio services in the relevant international fora, at both a European and global level, within the EU, ITU and CEPT.

4.2 Strategies at the International Level

Global Framework Level

- Support the harmonisation of global spectrum allocations where the harmonisation fits in with Malta's strategic vision.

- Ensure that Malta's interests as a whole are promoted and safeguarded.

- Participate actively in key ITU activities, insofar as available resources permit, to support greater efficiency in its operations.

- Support the development of relevant international standards.

- Take an active role in the work of international meetings in line with Malta's legislative mandate.

- Improve the co-ordination of frequency assignments with other administrations by bi-lateral or multi-lateral agreements, as appropriate.

European Framework Level

- Work within European frameworks to ensure that the availability of spectrum and regulatory practices are in line with Malta's objectives, particularly where they bring benefits to consumers in terms of increased choice, more competitive pricing and better quality services.

- Implement, to the maximum extent possible, the CEPT/ECC Table of European Common Frequency Allocations (ECA)[73] in order to support regional harmonisation, noting that implementation of the ECA is regularly under review within CEPT.

- Implement CEPT European Communications Committee (ECC) Decisions and Recommendations, where appropriate.

- Influence and support the development of harmonised standards.

- Improve co-ordination of frequency assignments with other administrations, through a harmonised European or global approach or by bi-lateral or multi-lateral agreements, as appropriate.

4.3 Strategies for Specific Radio Services

Public Mobile Services

- There is unassigned spectrum in the GSM bands (2 x 55 MHz) and 3G bands (2 x 19.8 MHz plus 1 x 5 MHz). Consider the future of these bands alongside international and wider policy considerations in relation to spectrum liberalisation. Consider the potential demand for innovative wireless services in these and other frequency bands.

- Continue to monitor the European work on the designation of the 900 and 1800 MHz for 3G mobile and consult with all interested parties on implications of any proposals.

- Consider and consult on proposals to introduce a new national licensing scheme, which would permit the trading of licences or the leasing of licensed frequencies to other parties where not required by the licensee.

- Consult with all interested parties to develop a coherent strategy to facilitate the development of 3G services in the other bands identified for 3G services[74] following the rollout of 3G services by the current providers and subject to market demand whilst accommodating any requirements for any existing services.

[73] See CEPT ERC Report 25, The European table of frequency allocations and utilisations covering the frequency range 9 kHz to 275 GHz (available at www.ero.dk).

[74] ECC/DEC/(06)01- ECC Decision of 24 March 2006 on the harmonised utilisation of spectrum for terrestrial IMT-2000/UMTS systems operating within the bands 1900-1980 MHz, 2010-2025 MHz and 2110-2170 MHz.

- Consider the future of other bands identified for 3G services (e.g. 2.5 GHz band[75]) for other services on a technologically neutral basis.
- Endeavour to accommodate requirements for trials of convergent wireless technologies as these arise in appropriate spectrum.
- Review spectrum options for DVB and/or DAB-based delivery of content to mobile platforms and hand-held devices.
- Continuously monitor the 2G and 3G operators to ensure that they are in compliance with their licence conditions.

Broadcasting

Television and Sound Broadcasting

- Ensure operator compliance and protect authorised services from illegal spectrum use.
- Monitor progress towards digital migration in broadcasting.
- Ensure that all necessary follow-up action is taken to satisfy the requirements of Malta's broadcasting sector following the ITU Regional Radiocommunication Conference (RRC-06).[76]
- Protect analogue broadcasting until the analogue turn-off-date established by Malta (31st December 2010).
- Carryout consultations as needed on technical and commercial operations for use of any spectrum released by switchover (i.e. following analogue turn-off-date).

Digital Terrestrial Broadcasting in Malta

- Monitor terms of coverage, reception quality and interference in line with licence obligations.
- Encourage the establishment of a date by when all current free-to-air broadcasts are also made available as digital transmissions.
- Continue the international co-ordination with our neighbouring countries with respect to DTTV and T-DAB infrastructures.

[75] ECC/DEC/(05)05 - ECC Decision of 18 March 2005 on harmonised utilisation of spectrum for IMT-2000/UMTS systems operating within the band 2500-2690 MHz.

[76] The new agreement from RRC06, GE06, replaces the Stockholm 1961 agreement. The Regional Agreement GE06 adopted by RRC-06 governs the use of frequencies by the broadcasting service and other primary terrestrial services in the frequency bands 174-230 MHz and 470-862 MHz. They also contain frequency assignment and frequency allotment plans for the digital broadcasting service (television and sound), the analogue television plan applicable in the transition period, the coordinated list of assignments to other terrestrial primary services in these bands, and the Resolutions adopted by RRC-06.

- Facilitate the development of a free-to-air offering of nationally broadcast programming on digital television platforms.

- Ensure that the implications for the TV broadcasting, manufacturing and distribution industries are handled in a coordinated way.

- Appropriately inform citizens about changes in the broadcasting environment and that analogue switch-off will be expected to result in a minimum of inconvenience for viewers.

- Ensure that mechanisms are in place to achieve switchover in 2010 and that any resulting release in spectrum is dealt with in a way that is as market-driven as possible and consistent with government's policy and strategic approach and the EU spectrum policy priorities.[77]

Terrestrial Fixed Wireless Communication Services

- Encourage the use of fixed links for infrastructure and competition development, for the maximum benefits of all licensees and in particular new market entrants.

- Review the spectrum usage and requirements of licensees to ensure that all licensees continue to use spectrum efficiently.

- Actively encourage operators to use the latest technology in order to ensure efficient use of the spectrum.

- Study the introduction of Administrative Incentive Pricing (AIP) to encourage the use of more bandwidth efficient technologies in congested bands / geographic areas.

- Review the current licensing strategy to ascertain if there are circumstances where the licensing of a block of spectrum may lead to improved efficiencies and, if so, how and in what spectrum this type of licensing approach could be facilitated.

- Continuously review the fixed links frequency bands and the most efficient channelling arrangements with a view to rationalisation where possible.

- Study sharing implications between Satellite and Fixed services in the 4 GHz band which is currently unused in Malta.

- Consider a liberalised approach to new frequency bands (e.g. 3.7 GHz and 4 GHz) to allow the market to decide optimum use e.g. for fixed links or broadband wireless access.

[77] Refer to the Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions (COM/2005/461) dated 29th September 2005 covering the EU spectrum policy priorities for the digital switchover in the context of the ITU Regional RRC-06 - http://europa.eu.int/eur-lex/lex/LexUriServ/LexUriServ.do?uri=CELEX:52005DC0461:EN:NOT.

- Study the potential and demand for new fixed links bands at higher frequencies e.g. 58 GHz band.

- To support the national objective of bringing Maltese broadband penetration into line with other leading EU countries:

  - continue to identify appropriate spectrum allocations, both licensed and licence-exempt, for wireless broadband services which are supported, or likely to be supported, by ready availability of choice of equipment;

  - study and consult on the use of the 5.8 GHz band with a view to developing it for point-to-multipoint / BWA applications.

  - seek opportunities for further licence-exempt broadband wireless access services.

  - carry out a comprehensive review of the 10.5 GHz,[78] 24.5 GHz and 26.5 GHz band and 27.5 GHz – 29.5 GHz in order to rationalise the use of the band and improve its usefulness to a range of services; and

  - encourage introduction of new cost-effective wireless technologies e.g. based on the WiMAX standard.[79]

Licence Exempt / General Authorisation Services

- Where possible, facilitate new short range device applications and other licence exempt services by making spectrum available for such applications subject to technical feasibility and harmonisation.

- Continue to exempt services from requiring an individual licence where this is appropriate in the local context and for equipment whose technical parameters are fully harmonised (classified as Class 1 under the R&TTE directive[80]) and where the risk of harmful interference is very minimal.

- Monitor and contribute to European and international developments in licence-exempt applications and technologies and ensure these can be accommodated in Malta.[81]

[78] This band is currently heavily used by other services (mainly broadcasting links).

[79] The term 'WiMAX' describes a set of standards being developed to deliver broadband wide area wireless communication over a wide range of frequencies between 1 and 60 GHz. The standards are being developed within the US IEEE standards body, under the IEEE 802.16 banner. This builds on the success of the established 802.11 series of standards that include the well known 'Wi-Fi' standard and are widely used in wireless LANs and public wireless 'hotspots'. The WiMAX standard is being promoted globally by the WiMAX Forum, with over one-hundred industry players (refer to http://www.wimaxforum.org/home/). Also refer to **Appendix C** of this document.

[80] The difference between Class 1 and Class 2 is set out in European Commission Decision 2000/299/EC.

[81] i.e. through CEPT Decisions / Recommendations and EU legislation (e.g. Frequency Directives).

Maritime Services

- Continue to provide support to Malta at international fora to ensure adequate spectrum is available for the maritime services.
- Continue to provide protection from interference to maritime safety of life services.
- Promote the use of spectrum efficient technologies in the maritime bands, thereby maximising the spectrum available for growth and new applications.
- Ensure spectrum is available for use by new emerging systems, in line with international requirements.
- Continue to work with the MMA to introduce a general authorisation regime for use of VHF radios and other equipment on board vessels.
- Review the current licensing regime, fees and related conditions attached to maritime licences.
- Continue to work with the MMA with respect to an efficient and effective one-stop-shop process licensing regime for all radiocommunications maritime related matters.
- Introduce a licensing / authorisation regime for maritime radar and radio navigation services.
- Investigate an appropriate licensing regime for the provision of voice and data services on vessels.

Aeronautical Services

- Continue to provide support to Malta at international fora to ensure adequate spectrum is available for aeronautical services.
- Continue to provide protection from interference to aeronautical safety of life services.
- Promote the use of spectrum efficient technologies in the aeronautical bands, thereby maximising the spectrum available for growth and new applications.
- Ensure spectrum is available for use by emerging systems, in line with international requirements.
- Review the current licensing regime, fees and related conditions attached to aeronautical licences.
- Work with the DCA with respect to an efficient and effective one-stop-shop process licensing regime for all aeronautical radiocommunications related matters.
- Introduce a licensing / authorisation regime for aeronautical radar and radio navigation services.

- Investigate an appropriate licensing regime for the provision of voice and data services on aircraft.

Satellite Services

- Encourage the development of satellite services.
- Review current satellite related legislation with a view to adapting it to cover future licensable services such as High-Density Fixed Satellite Service (HDFSS).
- Where possible, exempt most low interference risk terminals which are typified by operating in harmonised spectrum to harmonised standards.
- Maintain an awareness of international developments.
- Develop a licensing / authorisation regime for earth stations (e.g. on vessels and aircrafts).

Defence Systems

- Maintain an awareness of international civil / military radiocommunication developments.
- Liaise with the defence forces as required, to solve any issues of mutual concern.

Business Radio Services

- Ensure that spectrum is available to accommodate new business radio technologies.
- Encourage the development and use of new technologies, such as the ETSI standard for digital business radio (TS 102 361).
- Review frequency bands with a view to ensuring there is adequate spectrum for the introduction of new and emerging digital technologies.
- Continue to monitor private mobile radio (PMR) installations to ensure compliance with licence conditions.
- Review the current licensing regime, fees and related conditions attached to PMR licences.
- Consider and consult on proposals to introduce a new national business radio licensing scheme,[82] which would permit the trading of licences or the leasing of licensed frequencies to other parties where not required by the licensee.
- Consider a licence scheme for making spectrum available for wideband digital PAMR services in the 870 – 876 / 915 – 921 MHz bands.

Public Safety Services

- Support the public safety services by ensuring spectrum is:
  - available to meet the future needs of the emergency and law enforcement services; and is
  - free from harmful interference.

Amateur Service

- Consider the options for moving to a general authorisation regime or radically simplifying the amateur licences regime.
- Consider the option for foreigners visiting Malta and holding a valid amateur radio licence issued in a country that has signed up to CEPT T/R 61-01[83] to be permitted to operate without a national licence for a period of up to twelve months.

Science Services

- Liaise with scientific organisations to ensure that current and future spectrum requirements of science services are fully understood and, wherever possible, incorporated into national plans for future spectrum planning conferences.
- Remain appraised of possible means for reducing unwanted emissions to protect Radio astronomy, Frequency and Time Services and other passive services.
- Continue to offer a high degree of protection to meteorological services, in view of their use in the safeguarding of human life and property.
- Offer protection to any Earth-exploration services in view of the potential impact of interference on passive and active sensors which could severely disrupt scientific research programmes.
- In common with the proposal for aeronautical and maritime radars, introduce a licensing / authorisation regime for meteorological radars.

Miscellaneous Services

Citizens' Band

Consider the options for moving to a general authorisation regime or radically simplifying the citizens' band (CB) radio licences regime.

[82] Also referred to as Public Access Mobile Radio (PAMR), business radio service that provides services to third party subscribers.

[83] CEPT Recommendation T/R 61-01 (Nice 1985, Paris 1992, August 1992, Nicosia 2003) CEPT Radio Amateur Licence (http://www.ero.dk/doc98/Official/Pdf/TR6101E.PDF).

Automotive Short Range Radar

A recent EC Decision opens the 24 GHz band (24.15 GHz ± 2.5 GHz) for Automotive Short Range Radar (SRR) in vehicles, on a non-interference and non-protected basis for a limited period. This period is either until 1 July 2013 or until a 7.0% penetration of equipped vehicles in any European national market is met - whichever occurs first. A process is required to collect and report on the penetration of vehicles with 24GHz SRR.[84]

[84] Refer to Commission Decision 2005/50/EC on the harmonisation of the 24 GHz range radio spectrum band for the time-limited use by automotive short-range radar equipment in the Community.

5. Summary of Issues and Priorities

The specific policy issues (refer to **Section 3** above) and the proposed strategy (refer to **Section 4** above) for dealing with these issues in relation to one or more of the five (5) identified strategic objectives have been grouped appropriately and prioritised in the summary table overleaf.

Each one needs to be prioritised, incorporated in the MCA strategic framework and work programme and progressed through research, analysis and consultation, down to a set of recommendations to government, with those carrying the highest urgency and impact being given priority.

Service	Key Policy Issues	Proposed Strategy	Objectives*	Impact*	Urgency*
All	Promotion and protection of use of the radio spectrum in Malta	Continue to represent and promote Malta's position both locally and abroad, while safeguarding its rights, with regard to all radio services in bilateral and multilateral discussions with neighbouring countries and at the relevant international fora within the European Union (EU), International Telecommunication Union (ITU) and European Conference for Postal and Telecommunications Administrations (CEPT).	i, ii, iii, iv, v	H	S
Commercial Services	A mechanism for which the benefits of market-based assignments can be maximised and its drawbacks moderated	The use of market-based techniques such as Administrative Incentive Pricing (AIP) and the progressive introduction of spectrum trading and liberalisation for specific bands will be considered in order to deal with congestion in a fair way and to assign spectrum at a price that reflects its value to society.	i, ii, iii, iv, v	H	M
Public Mobile	Future expansion of spectrum for 3G mobile services	Continue to monitor the European work on the designation of the GSM bands (900 and 1800 MHz) for 3G mobile and consult with all interested parties on implications of any proposals.	i, ii, iii, iv	L	L
		Consultation with industry to develop a coherent strategy to facilitate the development of 3G services in other bands subject to market demand whilst accommodating any ongoing requirements.	i, ii, iii, v	L	L
	Demand for innovative wireless services	Consider the future of other bands identified for 3G services for other services on a technological neutral basis.	i, ii, iii, iv	M	L
		Review spectrum options for Digital Video Broadcasting (DVB) and/or Digital Audio Broadcasting (DAB) based on delivery of content to mobile platforms and handheld / portable devices.	i, ii, iii	M	S
Broadcasting	Television and Sound Broadcasting	Ensure operator compliance and protect authorised services from illegal spectrum use.	iv, v	M	M
		Ensure that all necessary follow-up action is taken to satisfy the radio spectrum requirements of Malta's broadcasting sector following ITU RRC-06.	i, ii, iii, v	H	S

Service	Key Policy Issues	Proposed Strategy	Objectives*	Impact*	Urgency*
	Digital Dividend following switchover in 2010	Consult as needed on the technical and commercial operations for use of any spectrum release by digital switchover.	i, ii, iii, iv	M	L
	Digital Broadcasting Services in Malta	Monitor licence obligations of digital TV and radio providers.	ii, iii, iv, v	M	M
		Continue the international co-ordination with our neighbouring countries of Digital TV and Radio infrastructures.	i, ii, iii, iv	H	S
Fixed Terrestrial Services	Dealing with congestion / encouraging efficient use	Review the spectrum usage and requirements of licensees to ensure the continued efficient use of spectrum.	i, ii, iii, iv	M	S
		Review the current licence strategy to identify whether there exist circumstances where licensing of a block of spectrum may lead to improved efficiencies and if so, how and what spectrum, could facilitate this type of licensing approach.	i, ii, iii, iv	M	M
		Encourage operators to use the latest technology in order to ensure efficient use of the spectrum.	ii, iv, v	M	L
		Ongoing review of fixed links frequency plans with a view to rationalisation where possible.	i, ii, iii, iv	L	L
Wireless Broadband Services	Increasing Malta's broadband penetration rate in line with other leading EU Member States	Continue to identify appropriate spectrum allocations, both licensed and licence-exempt, for wireless broadband services which are supported or likely to be supported, by ready availability and choice of equipment.	i, ii, iii, iv, v	M	M
		Encourage the introduction of new cost-effective wireless technologies.	i, ii, iii, iv	M	M
		Seek opportunities for further licence-exempt BWA services.	i, ii, iii	M	M
		Study and consult on the use of the 5.8 GHz band and the 26 GHz band with a view to developing it for point-to-multipoint / BWA applications.	i, ii, iii, iv, v	M	M

Service	Key Policy Issues	Proposed Strategy	Objectives*	Impact*	Urgency*
Licence Exempt / General Authorisation Services	Encouraging the use of new Short Range Device (SRD) products, applications and technologies	Facilitate new SRD applications by making spectrum available, where appropriate for such applications, subject to technical feasibility.	i, ii, iii, v	M	M
	Seek opportunities related to licence exempt services	Continue to exempt services from requiring an individual licence where this is appropriate in the local context.	i, ii, iii, v	M	M
	Impact of short-range licence exempt applications and technologies	Monitor and contribute to international (CEPT and EU) development in licence-exempt applications and technologies and ensure that these can be accommodated in Malta.	i, ii, iii	M	M
Aeronautical & Maritime	Maintaining safe and effective aeronautical and maritime communications	Continue to provide protection from interference for aeronautical and maritime safety of life radiocommunications services.	iii, v	H	L
	Availability of radio spectrum for new applications	Promote the use of spectrum efficient technologies in the aeronautical and maritime bands, thereby maximising the spectrum available for growth and new applications.	i, ii, iv	L	L
		Ensure that spectrum is available for use by new emerging systems - in line with international requirements.	i, ii, iii, v	L	L
		Review the licensing regime and fees associated with aeronautical and maritime licences.	iii, iv, v	M	M
Satellite Services		Review current satellite related legislation with a view to adapting it to cover future licensable services such as High-Density Fixed Satellite Service (HDFSS) and earth stations on vessels and aircrafts.	i, ii, iii, iv	L	L
		Where possible, licence-exempt most low interference risk terminals which are typified by operating in harmonised spectrum to harmonised standards.	iii, v	L	L
		Maintain an awareness of international developments.	i, ii, iii	L	L
Defence Systems	Encourage the use of harmonised military and defence spectrum	Maintain an awareness of international civil / military spectrum use.	iii, v	L	L
		Liase with the defence forces as required to resolve any spectrum related concerns.	i, ii, iii, iv	L	L

Service	Key Policy Issues	Proposed Strategy	Objectives*	Impact*	Urgency*
Business Radio		Continue to support the requirements of the Private Mobile Radio (PMR) users.	i, ii, iii	L	L
		Review frequency bands with a view to ensuring there is adequate spectrum for the introduction of new and emerging digital technologies.	I, ii, iii	L	L
		Continue to monitor PMR installations to ensure compliance with licence conditions.	iv, v	M	L
		Consult on proposals to introduce a national business radio licence scheme for the provision of services to third parties.	I, ii, iii, iv	M	M
		Proceed with a licence scheme for making spectrum available for wideband digital public access mobile radio (PAMR) services	i, ii, iv, v	M	M
Public Safety Services	Co-ordination of the various services in the event of a major incident or emergency	Ensure spectrum is available to meet the future needs of the emergency and law enforcement services.	i, ii, iii	M	L
		Ensure spectrum is interference free.	iii, v	H	L
Radio Amateurs		Ensure that spectrum allocated to the amateur service on an international basis is made available to the local community.	i, ii, v	L	L
		Consider the options for moving to a general authorisation regime or radically simplifying the amateur licences regime.	i, iii, iv, v	L	L
Science Services		Liaise with scientific organisations to ensure that current and future spectrum requirements of the science services are fully understood and, wherever possible, incorporated into national plans for future spectrum planning conferences.	i, ii, iii, v	L	L
		Remain appraised of possible means of reducing unwanted emissions to protect radio astronomy, frequency and time services and other passive services.	iii, iv, v	M	L

Service	Key Policy Issues	Proposed Strategy	Objectives*	Impact*	Urgency*
		Continue to offer a high degree of protection to meteorological services, in view of their use in the safeguarding of human life and property.	iii, v	M	L
		Offer protection to any earth-exploration services in view of the potential impact of interference on passive and active sensors which could severely disrupt scientific research programmes.	iii, v	M	L
		Introduce a licensing / authorisation regime for meteorological radars.	i, ii, iii	L	L

- Objectives
    - Refer to Strategic Objectives identified in **Section 4** above
- Impact
    - H - High impact on spectrum management and users
    - M - Medium impact on spectrum management and some users
    - L - Low impact on spectrum management and users
- Urgency
    - S – High urgency likely to have significant consequences if not tackled within a relatively short time frame
    - M – Medium urgency likely to have significant consequences if not tackled in the medium term
    - L – Low urgency with no significant consequences if not tackled in the short to medium term

Appendix A - The International Perspective

A1. The European Union

The European Union (EU) comprises twenty-five (25) Member States operating together under a series of international treaties including the Treaty on the EU that established the European Commission (EC) which is responsible for implementation of the treaties, managing EU policy and making proposals for new legislation to achieve the objectives of the various treaties.

The EC is able to, and has used, legally binding regulatory measures to achieve policy objectives, including objectives related to radio spectrum usage and management. The pace of these regulatory measures is gathering speed as market integration becomes a reality within the EU.

The EC policy objectives for radio spectrum usage include:

- facilitating technological innovation and competition in radiocommunications, mobile telephony and wireless local networks;
- pursuing Community objectives with regard to the radio spectrum within a predictable and legally certain regulatory framework;
- ensuring an appropriate balancing of the interests of the individual Member States, of the European Community and of the different user communities; and
- safeguarding the Community's interests in the international negotiations on the radio spectrum.

Following a review of the whole EU Framework for telecommunications, on 14th February 2002, the EU adopted a series of new Directives designed to strengthen competition in the EU electronic communications market.[85] These Directives were transposed into Maltese law in July 2004 and provide for access to radio spectrum to be primarily driven by policy objectives, while recognising that access must be conditioned by technical considerations.

This package includes Directive 21/2002/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services (Framework Directive). Articles 8 and 9 of the Framework Directive lay down the principles for the use and management of radio frequencies for electronic communications services. In particular, Member States shall ensure that the allocation and assignment of radio frequencies by national regulatory authorities are based on objective, transparent, non-discriminatory and proportionate criteria.

[85] Refer to http://europa.eu.int/information_society/policy/ecomm/todays_framework/overview/index_en.htm.

The Authorisation Directive 2002/20/EC also imposes certain obligations upon Member States regarding the rights of use for radio frequencies and conditions which may be attached to such rights. It defines the procedures for limiting the number of rights of use to be granted for radio frequencies and regulates the imposition of fees for rights of use.

In addition, the Directive 1999/5/EC of the European Parliament and of the Council of 9th March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity, in short R&TTE Directive (1999/5/EC), puts into place a framework for the placing on the market and putting into service of, *inter alia*, radio equipment. Its Article 7 states that, as an exception, Member States can restrict the putting into service of compliant equipment when justified.

The new regulatory package also includes a Radio Spectrum Decision[86] that is a platform for realising a coherent approach on spectrum strategy across the EU. To achieve the goals of the Directives and the Decision, the EU has established a Radio Spectrum Committee (RSC) to implement measures in close cooperation with the CEPT, as well as a Radio Spectrum Policy Group (RSPG) which gives political advice to the EC on strategic policy questions. The EC also works in close cooperation with the CEPT on international negotiations concerning worldwide spectrum issues such as the ITU World Radiocommunication Conferences.

The EU has also played a significant role in the movement of goods throughout Europe and in the placing of goods on the market throughout the Community. In relation to the radio and electronic communications sector, there are two Directives in particular which need to be discussed, the Electromagnetic Compatibility (EMC) Directive and the Radio and Telecommunications Terminal Equipment (R&TTE) Directive.

A1.1 EMC Directive

Directive 89/336/EEC relating to Electromagnetic Compatibility (EMC) was transposed into law in Malta by Legal Notice 368 of 2002. These Regulations apply to apparatus[87] which is liable to cause or be disturbed by electromagnetic disturbance. Under the EMC Regulations, the Market Surveillance Directorate has the power to withdraw from the market, apparatus which is not in compliance with the regulations. Additionally, the MCA has the powers to appoint authorised officers for the purpose of seizing apparatus and documents that may be required to fulfil MCA's functions or the functions of a competent body or notified body under the Regulations.

A1.2 R&TTE Directive

[86] Spectrum Decision (676/2002/EC) OJ L 108 of 24.4.2002 p. 1. The Radio Spectrum Decision covers spectrum use outside communications and empowers the European Commission to mandate the CEPT to develop technical solutions for harmonising spectrum use to give effect to EU policies. These solutions can be made legally binding by Commission Decisions via technical implementation measures.

[87] Apparatus is defined in the Regulations as "all electrical and electronic appliances and equipment (together with equipment and installations) containing either electrical or electronic components or both electrical and electronic components to which these Regulations apply".

All radio and telecommunications terminal equipment placed on the market in Malta is required to comply with the Radio and Telecommunications Terminal Equipment (R&TTE) Directive 1999/5/EC. This Directive was transposed into Maltese law by Legal Notice 374 of 2002. The main provisions of the Directive are that radio and telecommunications terminal equipment must meet safety and electromagnetic compatibility requirements as well as, for radio equipment, the efficient use of the radio spectrum.

In terms of the MCA's role under the Regulations, the MCA is required to notify the EC of the regulated interfaces in Malta as well as details of the interfaces offered by public electronic communications network operators in Malta. Under the R&TTE Regulations, the MCA has also been designated as the authority responsible for market surveillance.

The R&TTE Directive encompasses the requirements of the Low Voltage Directive (LVD) and the Electromagnetic Compatibility Directive (EMCD) (Directives 73/23/EEC and 89/336/EEC respectively). In testing compliance to the R&TTE Directive, manufacturers have the option of using harmonised standards.[88] Although their use is not mandatory, harmonised standards give a presumption of conformity to the essential requirements of the Directive within their scope.

A list of the harmonised standards under the R&TTE Directive is maintained on the EC's website.[89] Harmonised standards under the R&TTE Directive are mostly developed by ETSI. Furthermore, harmonised standards that have been published under the LVD[90] and EMCD[91] give a presumption of conformity to the low voltage and EMC requirements of the R&TTE Directive respectively. Where a manufacturer chooses not to use a harmonised standard to test compliance, he/she must demonstrate how the essential requirements of the R&TTE Directive are met.

Under the R&TTE Directive a number of EC Decisions have been adopted.[92] One such Decision is EC Decision 2000/299/EC[93] of the 6th of April 2000 which relates to the initial classification of radio and telecommunications terminal equipment and the application of equipment 'identifiers'. This Decision stipulates that telecommunications terminal equipment and radio equipment which can be placed on the market and put into service without restrictions are referred to as "Class 1". An Equipment Class Identifier is not assigned for this class of equipment.

Radio equipment for which Member States apply restrictions in terms of placing on the market or putting into service is referred to as "Class 2" and a specific equipment identifier is assigned to this class of equipment. More information on the classification of equipment in

[88] Refer to http://europa.eu.int/comm/enterprise/rtte/harstand.htm.
[89] Refer to http://europa.eu.int/comm/enterprise/newapproach/standardization/harmstds/reflist/radiotte.html.
[90] Refer to http://europa.eu.int/comm/enterprise/newapproach/standardization/harmstds/reflist/lvd.html.
[91] Refer to http://europa.eu.int/comm/enterprise/newapproach/standardization/harmstds/reflist/emc.html.
[92] Refer to http://europa.eu.int/comm/enterprise/rtte/decision/present.htm.
[93] Refer to http://europa.eu.int/comm/enterprise/rtte/decision/classif.htm.

accordance with the R&TTE Directive is available on the European Radiocommunications Office (ERO) website.[94]

The Malta Standards Authority (MSA) attends the TCAM. This is the standing committee under the R&TTE Directive which assists the EC in the implementation of the Directive. TCAM meets approximately three times per year.

A1.3 CEPT

The European Conference of Postal and Telecommunications Administrations (CEPT)[95] established in 1959 is a body of policy-makers and regulators currently encompassing forty-six (46) European countries covering almost the entire geographic area of Europe. The essential aims of the CEPT are to strengthen relations between member administrations, to promote their co-operation and to contribute to creating a dynamic market in the field of European posts and telecommunications.

Its functions include:

- working out common views on the priorities and aims set in the field of posts and telecommunications;
- examining, in a European context, public policy and regulatory issues regarding posts and telecommunications;
- promoting the harmonisation of regulations;
- establishing necessary contacts and co-operation with European organisations and bodies and other institutions dealing with postal and telecommunications matters; and
- providing a forum for the preparation of common positions for congresses and/or conferences of international postal and telecommunications organisations and bodies.

The CEPT, which deals exclusively with sovereign regulatory matters, has established two committees, one on postal matters (CERP) and another dealing with radiocommunications and telecommunications issues, the ECC (Electronic Communications Committee). The committees handle harmonisation activities within their respective fields of responsibility, and adopt recommendations and decisions. Under the ECC there are a number of working groups and project teams which develop and deal with radio spectrum issues for consideration by the ECC plenary meetings. The ECC also adopts Decisions, Recommendations and Reports aimed at efficient spectrum utilisation and harmonisation.

While the implementation of the Decisions and Recommendations by national administrations is on a voluntary basis, as the CEPT and ECC have no legislative power, the ECC has played a significant role in harmonising spectrum use in Europe providing, for

[94] Refer to http://www.ero.dk/rtte.
[95] Refer to http://www.cept.org/.

example, a table of European frequency allocations which is, in effect, a long term strategic plan for harmonisation and use of the radio spectrum throughout Europe.

Within the available resources, the Ministry responsible for Communications together with the MCA is actively involved in the most relevant CEPT working groups, project teams and the ECC plenary sessions in order to promote and protect Malta's interests.

A1.4 The European Commission and the CEPT

Over the last few years the EC has shown an increased interest in spectrum issues including the work of the CEPT. In this regard, the EC has mandated CEPT to undertake studies on specific spectrum issues and as appropriate, to develop Recommendations and Decisions, for adoption by Member States.[96]

An example of the EC involvement in CEPT activities concerns the selection of appropriate frequency bands for the introduction of Automotive Short Range Radars (SRR). These SRRs are intended to be used in motor vehicles for collision avoidance purposes. A band had already been identified by CEPT in the 77 GHz region for this type of application, however the technology was considered to be insufficiently mature for mass production of devices using that band. Therefore an interim solution was proposed by the automotive industry in the 24 GHz region to facilitate an early introduction of these devices. This part of the spectrum is already used for a range of applications including microwave links supporting mobile telephony infrastructure, passive sensing of the Earth's environment (particularly temperature) by earth-exploration satellites and radio astronomy observatories.

Due to the challenge of sharing between SRR and these services, the EC mandated CEPT to study the issue and a complex package was developed. This package comprises a report from CEPT to the EC which explored the options available, an ECC Decision[97] on the 79 GHz band as the long-term home for automotive SRR applications, an ECC Decision[98] designating the 24 GHz band for automotive SRR under certain conditions, an EC Decision establishing a legislative framework for the use of the 24 GHz band by SRR and an associated harmonised standard developed by ETSI.

In the case of the 24 GHz band the ECC and EC Decisions make the band available to SRR applications for a limited time period on a non-interference and unprotected basis, with a limit on the level of penetration by SRRs in the market of any Member State supported by a legislative basis for preventing further devices being placed on the market in the event of interference or penetration levels being exceeded and, in any case, after a cut-off date. This

[96] Refer to http://europa.eu.int/information_society/policy/radio_spectrum/index_en.htm for a list of recommendations and decisions. A recent decision includes the Commission Decision 2005/928/EC on the harmonisation of the 169,4-169,8125 MHz frequency band in the Community (frequency band originally designated for the ERMES paging system) and identifies a specific radio frequency band for special needs devices, and should stimulate the growth of an EU-wide market for them.

[97] ECC/DEC/(04)03 - ECC Decision of 19 March 2004 on the frequency band 77-81 GHz to be designated for the use of Automotive Short Range Radars (available at www.ero.dk)

[98] ECC/DEC/(04)10 - ECC Decision of 12 November 2004 on the frequency bands to be designated for the temporary introduction of Automotive Short Range Radars (SRR) (available at www.ero.dk).

example illustrates the relationships between CEPT, the EC and individual Member States in developing harmonised solutions for the use of the radio spectrum.

A.2 The Global Framework

A2.1 The ITU

The effective integration of each nation into the international community of spectrum users is required to ensure availability of interference-free services such as international aeronautical and maritime communications supporting air and sea travel, global mobile communications, satellite communications, international broadcasting and public safety services such as search and rescue. Because radio waves do not respect international boundaries and many systems operate on a worldwide basis, the international community has developed a structure for co-operatively managing interference between services and between nations. International co-operation in the field of telecommunications can be traced back to 1865 with the establishment of the International Telegraph Union as a method of solving interference problems. In 1939, participating nations decided to create a single organisation known as the International Telecommunication Union (ITU), governed by a single International Telecommunications Convention supplemented by the Radio Regulations.

The ITU uses a number of structures and associated meetings to carry out its activities, including World Radiocommunication Conferences that review and amend the Radio Regulations which contain technical and procedural provisions related to each of the various radio services. The Radio Regulations serve as the primary international agreement covering rules and procedures for operating radio equipment and resolving and preventing interference and contain the international frequency allocation table. While each nation remains sovereign in their use of the radio spectrum, the work of the ITU forms the global framework on which regional and national planning is developed.

Malta operates within a global economy. International markets and competition must therefore be taken into account in the development and introduction of new services. Spectrum allocation issues also have to take the international dimension into account. To maintain an effective and responsive regulatory structure, there is an ongoing need for participation in appropriate international fora to track and influence developments in international regulation, harmonisation of standards and new market opportunities and to monitor developments in technologies and applications.

The MCMP and the MCA have been a key participant in Maltese delegations to International fora including the Conference Preparatory meeting to prepare for the 2003 World Radiocommunication Conference, the World Radiocommunication Conference itself, the preparatory meetings relating to both sessions of the Regional Radiocommunication Conference (RRC-04 and RRC-06) and the RRC conferences themselves. Led by the Ambassador and Permanent Representative of Malta to the United Nations in Geneva, the Maltese delegation, which includes MCA staff, works to meet objectives and goals established in the national preparatory process.

A2.2 WTO

The allocation and use of frequencies in the EU is subject to the provisions of the new regulatory framework for electronic communications networks and services. The provisions of these Directives reflect the commitments in the GATS (General Agreement on Trade in Services) Agreement on Basic Telecommunications Services and in the Technical Barriers to Trade (TBT) Agreement, which are applicable to the EU and its Member States.

A2.2.1 Background

The General Agreement on Trade in Services (GATS) was concluded in 1994 following the Uruguay Round of GATT negotiations on December 15, 1993. The Agreement on Basic Telecommunications entered into force on January 1, 1998 and constituted part of the GATS commitments. 55 schedules of commitments on telecommunications services which sought to liberalise the world telecommunications market, representing 69 WTO member governments had been agreed to.

The EU committed to one concessions schedule for its (then) 15 Member States. With respect to any measure covered by the Agreement, each Member shall accord unconditionally to services and service suppliers of any other Member, treatment no less favourable than it accords to like services and service suppliers of any other country. The GATS allows some freedom to allocate and assign frequencies domestically provided that any such provisions do not have the purpose or effect of blocking, or unreasonably limiting market access for operators from other WTO Member countries. Frequency management policies if implemented in accordance with these provisions do not *per se* constitute a market access barrier.

The Agreement on Technical Barriers to Trade (TBT) relates to trade in goods. The first agreement was signed in 1979, at the end of the Tokyo Round of negotiations, by 32 GATT Contracting Parties. The Standards Code, as the Agreement was called, laid down the rules for preparation, adoption and application of technical regulations, standards and conformity assessment procedures. A GATT working group, set up to evaluate the impact of non-tariff barriers in international trade, had concluded that technical barriers were the largest category of non-tariff measures faced by exporters. The new WTO Agreement on Technical Barriers to Trade, or TBT Agreement, has strengthened and clarified the provisions of the Tokyo Round Standards Code. The TBT Agreement, negotiated during the Uruguay Round is an integral part of the WTO Agreement.

The difference between a standard and a technical regulation lies in compliance. While conformity with standards is voluntary, technical regulations are by nature mandatory. They have different implications for international trade. If an imported product does not fulfil the requirements of a technical regulation, it will not be allowed to be put on sale. In the case of standards, non-complying imported products will be allowed on the market, but then their market share may be affected if consumers prefer products that meet local standards such as quality for textiles and clothing.

A2..2.2 Community and International Obligations Applicable

The EU's commitments in the GATS agreement are reflected in the above-mentioned Directives. Under these Directives, the designation of radio frequencies for specific communications services and licensing must be based on objective criteria and procedures must be transparent and published in an appropriate manner. Where Member States decide to limit licenses to use radio frequencies, in order to ensure the efficient use and effective management of frequency spectrum, they must do so having regard to the principle of proportionality and the need to maximise benefits for users and to facilitate the development of competition. Where there is no limitation on the number of licenses, any undertaking which fulfils the conditions decided and published by the Member State is entitled to receive a full licence.

The Technical Barriers to Trade Agreement (TBT) tries to ensure that regulations, standards, testing and certification procedures do not create unnecessary obstacles to trade in goods, or are used as an excuse for protectionism. The Agreement ensures Members accord to imported products national and non-discriminatory treatment in relation to technical regulations, standards and conformity assessment procedures.

Exclusive reservation of specific frequency bands for a specific standard or system must remain limited to those cases where it is necessary, in particular, to ensure the efficient use of spectrum and, as a general rule, reference to product requirements in terms of performance is preferable to reference to design or descriptive characteristics.

The TBT also contains general criteria for determining whether a measure constitutes an unnecessary obstacle to trade, and shall not be more trade-restrictive than to fulfil a legitimate objective, which includes, *inter alia*, national security requirements, the prevention of deceptive practices, protection of human health or safety, animal or plant life or health, or the environment.

Appendix B - Radio Spectrum Monitoring and Enforcement

B1. Introduction

The MCA monitors licensed operators to ensure that they are in compliance with their licence conditions and investigates complaints of harmful interference. The MCA is also obliged to ensure that all radio equipment placed on the market is in compliance with the R&TTE and EMC Directives (refer to **Appendix A** above). The MCA also monitors the radio spectrum to ensure that there are no illegal operators and will take action against anyone operating a radiocommunications system or using radio spectrum without the necessary licence / authorisation, or where spectrum is not being used in accordance with specified conditions.

B2. Monitoring

Spectrum monitoring is one of the essential tools of spectrum management. Spectrum monitoring techniques are developed to ensure that technical parameters and standards for radiocommunication systems are adhered to. In addition, spectrum monitoring assists in promoting the efficient utilisation of the radio frequency spectrum. Spectrum monitoring can be defined as a process of observing the radio frequency spectrum and reporting on its use. Normally, reporting is done for the benefit of other sections working in spectrum management, such as frequency management, licensing, and enforcement, and also to external customers.

Spectrum monitoring is necessary in practice because authorised use of the spectrum does not ensure that it is being used as intended. The monitoring system provides a method of verification of the spectrum management process. The purpose of spectrum monitoring is to support the spectrum management process in general and the frequency assignment and planning functions.

Normal budgetary and personnel constraints require the use of fixed monitoring stations spread throughout the country to provide an accurate picture of spectrum use / utilisation, with mobile monitoring stations dealing with interference problems.

B2.1 Purpose of Spectrum Monitoring

Specifically, the goals of monitoring are to:

- assist in the resolution of electromagnetic spectrum interference, whether on a local, regional or global scale, so that radio services and stations may coexist compatibly, reducing and minimising resources associated with installing and operating these electronic communications services;

- provide economic benefit to a country's infrastructure through access to interference-free, accessible electronic communication services;

- assist in ensuring an acceptable quality of radio and television reception by the general public;

- provide valuable monitoring data to an administration's electromagnetic spectrum management process concerning the actual use of frequencies and bands (e.g., channel occupancy and band congestion), through verification of proper technical and operational characteristics of transmitted signals, detection and identification of illegal transmitters and the generation and verification of frequency records; and

- provide valuable monitoring information for programmes organized by the ITU Radiocommunication Bureau, for example in preparing reports to Radiocommunication Conferences, in seeking special assistance of administrations in eliminating harmful interference, in clearing out-of-band operations, or in assisting with the finding of available frequencies.

B2.2 Relationship between Spectrum Monitoring and Spectrum Management

The functions of spectrum monitoring and spectrum management are closely related. Monitoring supports the overall spectrum management effort by providing general measurement of channel and band usage, including channel availability statistics of a technical and operational nature, thereby giving a measure of spectrum occupancy. Monitoring is also useful for planning, in that it can assist spectrum managers in understanding the level of spectrum use as compared to the assignments that are registered.

A monitoring and measurement system can help in some instances where a solution to a problem requires more than knowledge of authorised or designed characteristics of radio systems. A monitoring and measuring system also obtains information on the operation of individual stations for regulatory, enforcement and compliance purposes, and can be used to establish the location and identity of stations causing interference.

In general terms, monitoring gives feedback to spectrum management on whether the practical use of the spectrum matches the national policy. Monitoring can also identify the need for future requirements for spectrum management officials. In this case monitoring provides forward information to spectrum management.

B3. Compliance and Enforcement

B3.1 R&TTE Directive – Legal Notice 374 of 2002

The R&TTE and the Mutual Recognition of their conformity Regulations, provides that a member state may not prevent the sale (placing on the market) of apparatus for radio communications or any piece of telecommunications terminal equipment, provided that the equipment in question complies with the requirements of the said regulations.
From the MCA's point of view, this means that we can act against a retailer, wholesaler, distributor, importer or manufacturer if their product is non-compliant and this includes non-compliant documentation, packaging and labelling.

B3.2 EMC Directive – Legal Notice 368 of 2002

The EMC Directive 89/336/EEC was adopted in Malta by Legal Notice 368 of 2002, under the Product Safety Act (Cap 427). Goods conforming to 89/336/EC will not produce emissions above the permitted limit, thereby avoiding interference with other equipment. This relates to the EMC compliance of products and covers most items not covered by R&TTE with similar powers. This Directive is in the process of being revised.

B3.3 Inspection of Radio Installations

The inspection of radio installations is an effective means of regulating and ensuring more efficient use of the radio spectrum. The MCA has an ongoing programme of inspection of existing licensed radio installations. New business radio installations are inspected for compliance following the issuing of licences.

B3.4 NIR Auditing

Non-ionising radiation (NIR) is the term given to electromagnetic radiation which has insufficient energy to cause ionisation (molecular changes) in living matter. It includes static and power frequency fields, radiofrequencies, microwaves, infra-red, visible and ultraviolet radiation.

The MCA's responsibility and capacity to act in this area is solely to ensure that its licensees comply with their licence conditions relating to non-ionising radiation, such that all NIR emissions from their radio installations are within the levels set down by the International Commission on Non-Ionising Radiation Protection (ICNIRP) in 1998.[99]

Licensees must take full account of the ICNIRP limits when designing, constructing, and operating any radio installations. ICNIRP is an independent, scientific organisation established in 1992 under the auspices of the World Health Organisation (WHO) to provide guidance and recommendations on NIR issues globally.

ICNIRP operates in co-operation with the Environmental Health Division of the WHO and the United Nations Environment Programme. In 1998 ICNIRP issued a position paper on the health and safety aspects of NIR, reviewing both the thermal and other effects of NIR. The report's conclusion endorsed the 1988 limits produced by the International Radiation Protection Association (IRPA).

As from 2001 the MCA arranged for audits of compliance of major licensed operators to be carried out. This was to ensure that the radiation emissions from telecommunication masts

[99] Refer to Legal Notice 412 of 2004 - Electronic Communications Networks and Services (General) Regulations (Schedule Twelve, Section B Conditions applicable to authorized undertakings bullet 13. Integrity of the network, electro-magnetic radiation and harmful interference).

were within the ICNIRP guidelines for NIR emission levels.[100] The MCA will continue to monitor licensee compliance to NIR guideline limits.

[100] Refer to http://www.mca.org.mt/infocentre/openarticle.asp?id=795&pref=36 for radio emission audit reports.

Appendix C - The Radiocommunications Sector in Malta

C1. Electronic Communications Services

C1.1 Terrestrial Fixed Wireless Communication Services

Fixed terrestrial services can be divided into two main groups:

- point-to-point links;
- point-to-multipoint systems which can be further subdivided into:
  - point-to-multipoint links;
  - broadband wireless access;

Point-to-point terrestrial links (also referred to as fixed links) provide communications between two fixed stations with a clear line of sight between them separated by distances typically ranging from a few metres up to fifty (50) kilometres. They are used mainly by electronic communications operators, mobile phone operators,[101] broadcasters, utilities and the emergency services to provide transmission networks which are cheaper and quicker to build than fibre-based networks. They are used extensively in mobile and fixed electronic communications networks, both to carry trunk traffic and to provide broadband access networks. As a result, fixed links play a vital role in the development of a competitive electronic communications sector in Malta.

Fixed services are an essential element of 'backbone' distribution of electronic communications and broadcasting, providing wireless connections between main centres at a modest cost. Typically, a provider will look to a combination of radio and cable (copper or fibre-optic) in the provision of services (e.g. Internet), deployed according to their relative cost in any particular location. The majority of fixed links use the frequency bands above 1000 MHz (1 GHz). The frequency bands between 3 – 11 GHz are suitable for the development of long distance, high capacity infrastructure radio networks. Access networks (i.e. networks that connects directly to the end user or customer) generally occupy the bands above 12 GHz.

Assignment of the traditional fixed service bands used for backbone services is at present through an administrative assignment on a first come first serve basis.[102] Some operators are initiating backbone links in the 'spectrum commons' i.e. spectrum under a general authorisation / licence fee exemption. Other fixed services provide point-to-point links,

[101] There is strong growth in all the currently available fixed link bands mainly due to the rollout of 3G, DTTV and BWA networks and services leading to spectrum scarcity in some bands.

[102] The MCA is currently reviewing the licensing process for point-to point links to ensure the optimal use of radio frequencies following the anticipated growth in all available fixed link bands.

typically used for the telemetry systems or Supervisory Control And Data Acquisition (SCADA) applications, by public utilities and alarm monitoring companies.

Point-to-multipoint systems provide communications between a central base station, hub or node and two (2) or more outstations. These types of systems can be used in support of backhaul networks or for access. Point-to-multipoint links are used by security companies, for alarm monitoring, utilities and electronic communications operators.

Point-to-multipoint systems, which are used to provide end-user (residential or business customer) access to a electronic communications network, are referred to as BWA systems. BWA provides an alternative to wired solutions such as digital subscriber line (DSL) or cable, providing competition to incumbent operators and extending broadband access in 'the last mile' to areas where wired solutions are technically or economically unavailable.

The key drivers with wireless broadband access markets are likely to be the same as those for other broadband platforms such as DSL and cable. A number of initiatives are underway in Europe to develop additional 'licence-exempt' BWA services. Internet service providers are offering broadband services to their customers via DSL or Cable, while the electrical line company is also looking to exploit and expand on their network experience and customer knowledge in establishing electronic communications networks to supplement their electricity offerings (powerline communications).

In Europe BWA licences have been awarded using a number of different approaches, notably auctions, comparative selection and first-come first-served. Where auctions or comparative selection have been deployed, results have been mixed. The ability to trade spectrum rights is also being considered to be a useful tool. In Malta, three national licences have recently been issued in the 3.5 GHz band for BWA systems. These bands were awarded via a comparative process - beauty contest - on a technology and service neutral approach.[103]

The WiMAX standard is being promoted globally by the WiMAX Forum, with over one-hundred industry players. The Forum recently announced the formation of a Regulatory Working Group, tasked with improving availability of WiMAX spectrum worldwide. WiMAX can be used to backhaul 802.11 hotspots and WLANs to the Internet, and enable a wireless alternative to cable and DSL for last mile broadband access. The Forum claims up to 50 km service area range where a line of sight is available and a typical working range of 5 – 8 km under non-line of sight conditions, with data rates of up to 280 Mbps per base station. It is suggested that WiMAX technology will be incorporated in notebook computers and PDAs in early 2006 allowing for urban areas and cities to become 'hotzones' for outdoor broadband wireless access.

[103] Refer to the MCA website www.mca.org.mt to view the respective BWA licences. A performance bond (in addition to the spectrum fee) linked to a commitment to provide services by a certain date was also imposed on the applicants, to ensure that the applicants were serious.

There are two main versions of WiMAX, 802.16d and 802.16e. The former is intended for fixed (indoor or outdoor) access, similar to existing BWA services, while the latter provides mobility (albeit limited, more properly described as "nomadic", in that features like seamless handover are not available). WiMAX is not, strictly speaking, a new technology, but a more innovative and commercially viable adaptation of existing non-line of sight BWA technology.

The WiMAX Forum is currently focusing on the 2.5 GHz, 3.5 GHz and 5.8 GHz bands, using both TDD[104] and FDD[105] technology. However the forum is also lobbying within the ITU to expand the frequency allocations. Two key issues raised by the emerging WiMAX standards is the potential impact on future demand for licensed and licence-exempt spectrum in the bands concerned, and the potential to deliver mobile-type services in spectrum that was formerly considered only suitable for fixed applications.

C1.2 Mobile Telephony

Mobile cellular telephony encompasses second (2G) or GSM[106] and third generation (3G) services or IMT-2000/UMTS,[107] all operating in spectrum that has been assigned in the form of rights of use to Vodafone (Malta) Ltd and MobIsle Communications Ltd (Go Mobile). GSM systems operate in both the 900 MHz and 1800 MHz frequency bands with enhancements for GSM networks such as GPRS[108] to improve their data handling capability.

The two 2G (GSM) cellular operators licensed in Malta have, on average, 2 x 26 MHz of assigned spectrum. The 2 x 10 MHz E-GSM spectrum is unassigned.[109] Similarly, in the GSM 1800 band there is 2 x 40 MHz spectrum yet to be assigned.[110] In the GSM 900 band, only two channels are available for assignments which amount to 400 kHz. The remaining GSM frequency bands are being used by other services, most of which are unlicensed services.[111] The total amount of spectrum available for assignment to GSM services is 2 x 55 MHz. The two 3G operators, licensed in September 2005, each have 2 x 19.8 MHz plus 1 x 5 MHz. These bands were awarded administratively (together with coverage and roll-out

[104] Time Division Duplex, technique whereby the same frequency can used for forward and reverse transmission.

[105] Frequency Division Duplex, technique where two separate frequencies are used for forward and reverse transmission.

[106] GSM - Global System for Mobile Communications is a cellular, digital, land-based mobile communications system.

[107] UMTS is a European standard which is part of the IMT-2000 family. Other IMT-2000 standards may be deployed but at the time of the licence competition the EU required that at least one UMTS-based 3G mobile network must be licensed in each Member State to facilitate roaming (Decision no. 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 refers).

[108] GPRS- General Packet Radio Service is a GSM data technique that transmits and receives data in packets rather than establishing a continuous channel from a portable terminal for the transmission and reception of data. It makes very efficient use of available radio spectrum and users only pay for the volume of data sent and received.

[109] In this band 25 kHz of spectrum is being used by the nationwide paging operator to provide its services.

[110] Refer to the MCA website www.mca.org.mt for spectrum band assignments in the 2G and 3G bands. A broadcasting link has been authorised in this band on condition that it is switched off within 30 days from date of notification.

[111] This band is also used by the network of the nationwide paging operator and CT1 cordless telephones. Although CT1 cordless telephones can neither be imported nor be placed for sale on the market, such equipment is still in use.

obligations) and the value of spectrum was based on an administrative pricing mechanism.[112] A third 3G spectrum band has not been assigned.

Mobile communications is one of the fastest growing electronic communications sectors with mobile phone penetration rates in Malta now standing at approximately 82%. The key drivers of demand for mobile telephony are likely to be new and faster data applications, for example the delivery of audiovisual content to mobile phones or high speed access to the Internet. Falling voice tariffs could also lead to substitution of fixed telephony by mobile, further driving up demand for spectrum. However, to some extent the effect of this may be offset by technology developments such as VoIP allowing more voice traffic to be carried in the existing spectrum.

Public mobile networks require access to exclusive radio spectrum so that the networks can be planned to deliver a specific grade of service in a controlled interference environment. In most parts of the world, public mobile services have been authorised on a national basis and licensees self-manage their block or blocks of available spectrum as effectively as possible.

As a limited amount of spectrum is allocated internationally for mobile services, it is therefore necessary to limit the number of rights of use that can be issued and, under the terms of the EU Authorisation Directive, it is necessary to grant such rights using selection criteria that are objective, transparent, non-discriminatory and proportionate.

The majority of European 2G licences were awarded using comparative selection procedures with initially, only one or two operators having licences. Several European countries chose to adopt auctions for licensing third generation mobile services. Others, including Malta, chose a direct assignment or comparative selection procedure. Both auctions and comparative selection have been effective in terms of awarding licences in a timely manner and to operators who have proceeded to roll out networks and offer competitive data services.

C1.3 Business Radio Services

Despite the continued rapid growth of cellular telephony, business or private mobile radio (PMR) is still a relatively popular communication system for applications where most traffic is between a control point and one or more mobile terminals, or where groups of mobile terminals need to communicate on a ‘one to all’ basis.

Business radio is also attractive where the user requires complete control over network operation and costs. The main uses of business radio are for public safety and security (e.g. emergency services), public utilities (power, water, transport etc.), industrial and commercial users (taxis, couriers, warehouses etc.) as well as various voluntary organisations, all of whom need reliable means of communicating with personnel and groups of personnel on the move.

[112] Refer to the MCA website www.mca.org.mt to view the respective 3G licences.

Analogue land mobile is an older technology progressively being superseded by digital delivery. The VHF land mobile spectrum is heavily congested and there is little room for growth or for new entrants, particularly in areas such as San Gwann and Naxxar. Extensions to the lower UHF mobile bands, also used by public safety and security services, alleviated the situation.

The main advantages of digital technology are the ability to transmit data at higher speeds and improved security for eavesdropping. The first European digital standard TETRA (Terrestrial Trunked Radio), was aimed primarily at large public safety of Public Access Mobile Radio (PAMR) networks. In Malta, the Civil Protection Department owns such a network. While there appears to be little interest in TETRA for commercial applications, currently alternative digital technologies are coming onto the market that are likely to be better suited to smaller users.

The business radio market is currently static in terms of volume of licences but there are signs that some users are interested in migrating to more advanced digital systems that are more efficient and can offer more services with higher speed data transmission rates. Digital business radio has the potential to offer operational, cost and safety benefits to users but also faces competition from new developments such as 'Push to Talk' over cellular networks (POC) and voice over WLANs. It seems likely that future demand for digital business radio services will be accommodated in existing spectrum, however if digital services are successful this could stimulate demand for wider bandwidth systems, perhaps using spectrum in higher frequency bands than currently used for business radio. The 800 MHz and 900 MHz bands are being considered for wideband PAMR systems.

For conventional wide area business radio systems operating on shared frequency channels, a first-come-first-served approach is appropriate, with fees levied that reflect the costs associated with licensing and managing the optimal use of the spectrum. In case of national exclusive channels, these may be made available on a first come first served basis with fees levied that reflect the efficient and effective use of spectrum and costs associated with licensing and monitoring the rights of use. Where there is a scarcity of these channels, a comparative or competitive selection process may be necessary. As the nature of business radio services varies from user to user, it is unlikely to be possible to apply meaningful selection criteria for comparative selection, therefore an auction would be favoured.

National channels licensed in this way provide scope for rights holders to lease access to channels in specific areas, either on a temporary or permanent basis, where the spectrum is not required by the licensee. A national business radio licensing scheme that would include such a provision for third party use will be considered.

C1.4 Other Services

The granting of broadcasting related licences and the development of the broadcasting sector, both in terms of content and infrastructure, is leading to a greater demand for radio spectrum resources. These services will be used by services ancillary to broadcasting (SAB) such as studio-to-transmitter links (STLs) and outside broadcast (OB) links. STLs are used

to deliver programs from the studios to the main transmitting site. OB links are used for television linking from special events locations, such as horse racing, football games and other significant cultural or sports occasions.

Given that most of the existing systems are not using spectrum efficiently and therefore are using large chunks of bandwidth, future assignment of spectrum will only be consider for systems which use spectrum in an efficient manner. SAB systems are licensed under the Radiocommunications Act. The licensing mechanism with respect to SABs is currently being reviewed.

The paging service consists of one-way data communication sent to a mobile device that alerts the user when it arrives. The communication could consist of a numeric or alpha-numeric message. Within Europe, the paging technology is considered as a sunset technology. In Malta, the service provided by the national paging operator, operates in the GSM 900 MHz band and it has been operating since the early 1990s, where the main users are governmental entities. Given that the paging market has been taken over by GSM, it is not expected that additional spectrum will be required by the paging operator.

Tracking services can be provided either by means of satellite or terrestrial systems. In Malta, the provision of these services is by terrestrial means using low frequency (LF) infrastructures and ultra-high frequency (UHF) systems. The local system provides real time location information, with an accuracy of less than 50 meters for 95% of the time and locations. In Malta, these services have been operating since 1998.

C2. Broadcasting Services

Broadcasting services are accessible to virtually all Maltese. Providers of these services include commercial entities, government owned companies and individuals. The drivers of future spectrum demand will be dependent on the manner in which digital TV and digital radio evolves.

The rollout of the digital terrestrial platform to complement and eventually replace the existing analogue network is likely to be inevitable in the long term, assuming the rest of Europe migrates. Demand could also arise for access to UHF spectrum for the delivery of mobile content using technologies such as DVB-H or T-DMB.

There is a more immediate demand for additional FM radio stations, particularly community radio stations. Due to the importance attached to broadcasting from a political, social and cultural perspective, broadcasting has been, and no doubt will continue to be, afforded a prominent position in both national and international spectrum allocation policies.

Local broadcasters operate under a licence issued by the Malta Broadcasting Authority. The assignment of public interest analogue broadcasting spectrum is determined largely by the Malta Broadcasting Act. Assignment and advice on the use of spectrum for digital television and radio is provided by the MCA. The MCA retains responsibility for technical planning, coordination and monitoring of interference.

C2.1 Radio

Community radio is a type of radio station that broadcasts to smaller areas. They focus on a specific community or locality or on a range of listeners inside a small broadcast area. Their job is to benefit communities rather than make a profit.[113] Community radio stations also need a licence which is awarded by the Malta Broadcasting Authority in line with the Malta Broadcasting Act. An analysis of the community radio-licensing regime is currently being carried out by the MCA and the Malta Broadcasting Authority.

At the end of August 2005, the MCMP jointly with the MCA, published a detailed policy document describing the process that led to the assignment of the available T-DAB frequencies.[114]

C2.2 Television

At present, most television services are based on analogue terrestrial transmission using spectrum in the VHF and UHF bands, broadcasting from hill-top sites to give coverage of main population areas that are supplemented by a multiplicity of low-powered transmitters in areas shaded from the main sites.

Satellite television broadcasting is available in digital format. Such service providers use a conditional access system to encrypt most programmes. A number of independent retailers sell free-to-air satellite receiving equipment to the public.

Melita Cable plc has recently started to distribute television services in digital format over its cable system, which has commenced without alteration to current government policy. The MCA assigned frequencies to two digital terrestrial televisions network operators (Maltacom plc and Multiplus Ltd) on the 11th May 2005. Multiplus Ltd has also started to offer digital television services in digital format over its terrestrial network.

All broadcasters are required to comply with codes approved by the Malta Broadcasting Authority. There are defined procedures for complaints about content to be investigated and, if confirmed, remedied.

The MCA monitors the progress towards digital migration in broadcasting. The MCA ensures that digital terrestrial operators abide by their licence conditions and monitors developments towards digital migration set to take place in December 2010.

C3. Short Range Devices

The most widespread radio systems both locally and abroad are Short Range Devices (SRDs). These provide uni-directional (one-way) and bi-directional (two-way) communication which have low capability of causing harmful interference to other radio equipment. SRDs

[113] The Malta Broadcasting Act defines 'community radio service' as a radio service designed to cater for the needs of a particular community or locality and having a limited range of reception.

[114] Refer to the MCA's website (www.mca.org.mt) for a copy of the policy document and the licence awarded for T-DAB services.

use either integral, dedicated or external antennas and all modes of modulation can be permitted subject to relevant standards.

Thus, SRDs are low power radio transmitters that serve a multitude of purposes e.g. car door openers, baby alarms, wireless microphones and wireless local area networks (WLANs). SRDs are deployed in both private and commercial scenarios. They include:

- industrial scientific and medical (ISMs) devices where the radio energy is used for a purpose other than communication: e.g. industrial kilns for drying wood, medical diathermy and domestic microwave ovens;
- communication of data over short distances, as in wireless local area networks (WLAN / Wi-Fi);
- telemetry and telecontrol: e.g. Radio Frequency Identification (RFID) tags used for animal ID and to track individual goods and pallets of cargo;
- radio-controlled models and toys;
- baby-minders;
- security devices: e.g. keyless car locking and garage door openers; and
- proximity detectors: e.g. security detectors and car radar systems for collision avoidance.

SRDs occupy a range of diverse frequencies in the radio spectrum, ranging from kilohertz, through megahertz to gigahertz frequencies. Due to their low power and localised usage, SRDs are regarded as having a low capability of causing interference. Consequently, in Malta like in most other European countries, SRDs have generally been made exempt from the need for individual radio licences however, subject to certain technical constraints.

The common position on spectrum allocations for SRDs within CEPT is outlined in ERC Recommendation 70-03 (ERC/REC/70-03). This Recommendation contains the most widely accepted CEPT position with respect to SRDs and provides a useful reference document for EU Member States.

One of the fundamental drivers of the SRD service is the fact that most SRDs do not require an individual user licence for operation.[115] This means that they can be deployed quickly and inexpensively since there is no requirement to wait for a licence to be issued, nor is there any licence cost involved. In addition, SRDs are produced for the mass market and, as such, benefit from harmonised use of spectrum across Europe.

In terms of the R&TTE Directive most SRDs are classified as Class 1. This means that Class 1 SRDs are free to be placed on the EU market and to move across EU Member

[115] It is noted that, although certain devices are classified as SRDs, in some countries an individual licence is still required. This is due to the high power levels of some of these devices.

States – therefore without the requirement of individual licensing. However, such devices are subject to certain conditions through general authorisations.

As stated above, although many SRDs are by necessity very low cost devices, they may be deployed in very high volumes and could have a significant impact on the efficiency of certain business processes. For example, RFIDs enable retailers and others involved in distribution chains to keep better control of their stock and are expected to become as ubiquitous as bar codes once their unit cost starts to fall.

In addition to the SRDs, there are a number of other radio services currently being reviewed to move to a general authorisation regime or a simplified radio licences regime such as citizens' band (CB) radio. The use of CB radio is likely to remain at current levels as it is mainly used by those who do not want to go down the route of obtaining a radio amateur licence.

PMR 446 are licence exempt radio services. The main advantages are the low cost and easy availability of equipment which lends itself to flexible and occasional use. The main uses are personal (contact with families and friends) as well as light professional (e.g. on a site where workers may need to communicate with each other to facilitate their work). In general the potential for interference is not a concern as it is not intended for professional use. Work is currently ongoing to provide a digital alternative to PMR 446 which will be able to use digital codes to provide a greater degree of protection from interference and also better security.

The use of wireless local area networks is being driven by convergence between home entertainment and computing and the increasing availability of one or more computers in every household. Wireless local area networks are easy to use and install, are low cost and are being heavily promoted in computer and IT related establishments. As equipment is becoming available to the IEE 802.11g standard, much higher data throughputs have become available that allows video to be streamed throughout the house. It is the use of such devices in the home that will drive the market growth.

The expected exponential growth in the use of Bluetooth devices has not yet materialised. However, one area where it should see increasing demand is in the connection of multiple personal devices over short distances. For example, Bluetooth devices can be used to easily connect from a computer to a mobile phone, without the need for wired connections, and so provide the download of games, etc. from the internet onto the mobile. The use of headsets using Bluetooth devices is increasing with the ready availability in retail outlets, reduced costs and the advantages of not needing wired connections that can be damaged when not in use.

C4. Public Safety and Security

C4.1 Defence Systems

The defence forces have actively utilised radiocommunications from the earliest days and the use of radio spectrum is considered critical to national security. There are no specific service

allocations for defence applications in the ITU Radio Regulations as defence communications are recognised as the prerogative of each Sovereign State. In Europe there is increasing pressure on all elements of spectrum including civil and military applications and consequently there is a need for greater sharing between civil and military applications.

The Armed Forces of Malta (AFM) is an extensive user of spectrum. Blocks of bandwidths throughout the entire radio frequency spectrum are being used by the AFM for defence / security purposes. These bands are largely self-regulated by the AFM, where their main use being for tactical communications. The AFM also uses frequencies shared with non-military (civilian) users. Some sea-borne and airborne navigation devices use internationally-agreed aeronautical and maritime bands and employ common technical specifications.

Currently, radiocommunications equipment and spectrum licences are not issued to the AFM.

C4.2 Public Safety and Security Services

Non-military public safety and security services include such organisations as police, civil protection, ambulance, and search and rescue. While some of these services are professional and uniform, others are partly or wholly staffed by volunteers.

All these services require a wireless infrastructure, carrying both voice and data, with some commonality between services (e.g. between police, fire and ambulance services at road accidents). Civilian public safety groups that operate only in emergency situations (e.g. local search and rescue) may use communication networks operated by organisations whose routine responsibilities lie elsewhere.

In the main radiocommunications equipment and spectrum licences are currently not issued for public safety and security services.

C5. Maritime and Aeronautical Services

Due to the global nature of maritime service, the management of the radio spectrum is largely governed by national and international regulations relating to safety of life at sea. The ITU allocates frequency bands for the operation of maritime services and these permit both long range (in frequency bands below 30 MHz and in bands allocated to marine satellite services) and shorter range communications. In addition, specific frequency channels are allocated as international distress channels and are also required to be kept free from harmful interference at all times. There are also some bands allocated to maritime communications on a national basis.[116]

[116] Malta is a member of the International Maritime Organisation (IMO). Malta follows those parts of the SOLAS convention concerning radiocommunications.

In Malta, the Malta Maritime Authority (MMA) is responsible for marine regulation and for ensuring compliance with legislation requiring certain classes of vessels to install a radio[117] which is to be operated by a properly qualified operator.

The radio spectrum that is used by the aeronautical sector is, in the main, planned internationally. The ITU Radio Regulations, the International Civil Aviation Organisation (ICAO),[118] Eurocontrol[119] as well as national and European legislation all set down requirements applicable to the aeronautical services.

Spectrum is allocated internationally for a variety of aeronautical applications, including air-ground voice and data communication, radars and automated landing systems. The safety critical nature of these services and the need to reach high altitudes over great distances means that even distant sources of interference present a major problem, hence it is not generally feasible to use aeronautical radio spectrum for other radio services. This means that demand for spectrum is determined internationally and there is little scope for individual countries to deviate from the internationally agreed spectrum allocations.

In Malta, regulation of the aviation industry is the responsibility of the Department of Civil Aviation (DCA). The MCA's role in this area is limited to overseeing and administering the issue of radio licences for aircraft stations, for ground based stations, transportable apparatus, radars, direct finding apparatus and radio navigation systems.

This group of services operates largely at frequencies determined by international agreements and conventions and is accessed mainly by shipping and aircraft. Its primary purpose is to ensure safety, either direct (location, and protection of crew, passengers and cargo) or indirect (protection of third parties and property from, for example, collision impact). Services take the form of:

- navigation aids (e.g. radio beacons, Global Positioning Systems);
- air/sea traffic control (e.g. air-to-ground/ship-to-shore communications, Instrument Landing Systems [ILS], VHF Omnidirectional Radio range [VOR]);
- collision avoidance systems (e.g. radar, transponders, air-to-air/ship-to-ship radio);
- emergency assistance systems (e.g. INMARSAT, COSPAS-SARSAT, EPIRBs, Search and Rescue); and
- commercial and personal communications (e.g. radio, cellular and satellite services).

Most of the spectrum used in this category is clearly defined, under ITU and other international conventions, as being for aeronautical, maritime or distress and calling communications. All licences issued for radiocommunications equipment are currently

[117] Every passenger ship or cargo ship of 300 Gross Tons or above is required to install a radio in compliance with the Global Maritime Distress and Safety System (GMDSS). Similar requirements apply to fishing vessels.
[118] Refer to http://www.icao.int/.
[119] Refer to http://eurocontrol.int.

assigned administratively. Plans are in place to replace the current administrative licensing process with general authorisations for specific aeronautical and marine services.

A large number of licences have been issued for radiocommunications equipment operating in these bands, the majority of which operates on common frequencies (e.g., in fishing vessels, recreational craft and small aircraft). There is increasing use overseas of satellite communications, particularly for aeronautical and maritime broadband data applications.

As with defence and other public safety and security services, spectrum is used intermittently, as and when the need arises, but needs to be kept clear of other traffic and/or interference to meet such needs. Efficient use is not, relative to public safety, the priority.

C6. Other Radiocommunication Services

C6.1 Science Services

Spectrum is used by several scientific services. These services use radio emissions to register naturally occurring physical phenomena or to communicate information between different locations. The science services use the radio spectrum for a range of applications, for example, observations of the natural environment made by sensors (referred to as remote sensors) that function at frequencies set aside for the purpose. Earth exploration satellites and the meteorological satellite services are defined as science services, using passive or active sensors carried by satellites in the Earth's orbit. A special case is the radio astronomy service, which observes emissions of natural origin arriving from beyond the Earth's atmosphere. All radio astronomy allocations are used passively (i.e. there are no man-made transmissions involved).

There are three other science-related radio services. The meteorological aids service, which is used for links to platforms, airborne or seaborne, which gather meteorological data. The standard frequency and time signal service; and the corresponding standard frequency and time signal-satellite service, which is used for comparison of time and frequency standards and the dissemination of these standards. Where possible, frequency bands are made available on application.

Earth-based Radio Astronomy

Radio astronomy is the study of celestial objects through passive observation of radio waves emitted or reflected by these objects. The domestic band plans for radio astronomy, in the main, mirror the ITU assignments. A number of bands are dedicated exclusively to radio astronomy use. Other bands are shared with fixed terrestrial and mobile services that have the ability to interfere with radio astronomy use. It is noted that the degree of protection afforded to astronomy sites in particular bands has the potential to constrain the deployment of alternative services.

Although this spectrum band does not generate any revenue to Government for its use, there are potential costs associated with investigating any interference queries. To date this has been largely mitigated by the ITU regulation which requires the user to take all reasonable steps to prevent it. Such costs have, to date, been negligible.

Meteorological Services

Meteorology depends on radio, both to collect the data upon which predictions are based and to disseminate to the public and specialised users the weather information and warnings which result. The dissemination of weather information to the public and specialised users uses the normal communications channels such as broadcasting, telephony or aviation / maritime radio. A number of bands are dedicated to such meteorological services as weather balloons, radar and satellites.

Standard Frequency and Time Signal Service

The Radio Regulations define the standard frequency and time signal service as: 'A radiocommunications service for scientific, technical and other purposes, providing the transmission of specified frequencies, time signals, or both, of stated high precision, intended for general reception'.

There are no standard frequency and time installations in Malta. Satellite-based standard frequency and time signals have become available using very high accuracy atomic clocks on board each orbiting satellite that are constantly monitored by a control centre on the ground. The most well known is the Global Positioning System (GPS) operated by the United States Department of Defence. The EU is developing a satellite radio navigation system called Galileo. This project is designed to introduce greater safety in air traffic management and air navigation, as well as road traffic management and other surface transport applications by developing and deploying up to 30 earth orbit satellites.

C6.2 Amateur Services

A licence entitles the operator to transmit within particular bands which are shared amongst all amateur users. There is a requirement to obtain the relevant operator qualification prior to a licence being issued. Users of amateur bands are forbidden to operate for financial gain.

Bands are allocated in accordance with the ITU Radio Regulations. Their provision acknowledges the potential of the hobby to advance the communication and technical skills of radio and to enhance international goodwill. The amount of spectrum dedicated to the amateur services in Malta is large compared with the number of licensed users.

The Amateur Service is specifically recognised by the ITU with a formal service definition in the Radio Regulations and specific spectrum allocated to it within the International Table of Frequency Allocations.[120] Radio Amateurs in Malta are licensed under the Radiocommunications Act. In addition to the current radio frequency bands allocated to radio amateurs, a number of bands as allocated in the National Frequency Plan (NFP) make these available for use on application. These bands are:

- 76 – 81 GHz;

[120] The international Table of Frequency Allocations is contained in Article 5 of the Regulations. It specifies the way frequency bands are to be shared among different radiocommunication services in the three regions 1, 2 and 3.

- 122.25 – 123 GHz;
- 134 – 136 GHz;
- 136 - 141 GHz;
- 241 – 248 GHz;
- 248 - 250 GHz.

Radio amateurs can use a range of bands across the spectrum for hobby and voluntary activities. At present there are 3 levels of licences: intermediate (Class B), full licences (Class A) and temporary (to be exempted from licence). Each level gives amateurs access to a wider range of bands and may enable the use of higher power. Each level is accessed via a training course and an examination of competence. The examination is in line with the syllabus recommended by CEPT.