Strategic Framework for the Management of the Radio Spectrum 2007 - 2010

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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 October 2006, the Malta Communications Authority (MCA) published a consultation paper entitled 'Policy Review and Strategic Framework of Radio Spectrum Management'.[1] The consultation depicted 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, the consultation paper set out the MCA's proposed strategy for managing the use of the radio spectrum resource in Malta over the next three to five years.

The MCA noted the broadly positive comments received in response to the consultation[2] with respect to the use of market-based approaches to spectrum management where this would provide benefits, such as economic efficiency, promotion of innovation and competition, and flexibility. The MCA also noted the comments received with respect to the benefits of coordination, harmonisation and standardisation measures of radio spectrum use where appropriate.

Taking into consideration the feedback received to the above-mentioned consultation and the recent developments within the sector, this document presents the basic principles, existing and emerging policy issues warranting consideration over the coming years and the medium to long-term objectives for managing the use of the radio spectrum resource in Malta. 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.

Radio spectrum policies and their administration fall within the broader government initiatives to improve Malta's economic, social and cultural environment. Therefore the radio spectrum should be administered in such a way that it provides the greatest possible level of use and social benefits, to the extent that this promotes innovation, the development of technology and a broader range of wireless-based services. The 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.

[1] Refer to http://www.mca.org.mt/infocentre/openarticle.asp?id=890&pref=28.
[2] Refer to http://www.mca.org.mt/infocentre/openarticle.asp?id=1058&pref=28.

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.

A market-based model for the allocation and assignment of spectrum, allows more freedom to market players to decide how spectrum should be used, and lowers 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 may be used to optimise the spectrum market, such as administrative pricing, auctions, secondary trading, liberalisation, ownership limitations and implementation requirements.

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. 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 policy 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, and as a European centre of excellence in the field of information and communications technology. 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 the policy issues identified in this document have not been argued to a conclusion. Each one needs to 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.

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 goals 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.

For each of these strategic goals a number of specific objectives have been identified for the various categories of spectrum use. It is noted that the MCA will review its spectrum strategy at regular intervals to reflect changes in markets, technologies and legislation.

The MCA's strategy needs to reflect international and regional developments. Of particular relevance currently is the greater emphasis form a regulatory perspective on technology and service neutrality, obligations to promote sustainable competition and the development of the internal European market.

Structure of this Document

Readers are referred to additional information contained in the above-mentioned consultation document and response to the consultation.

None of the material in this document should be taken to reflect the views of the Ministry for Competitiveness and Communications (MCMP) or to represent official Government policy, unless it is explicitly stated otherwise.

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 key existing and emerging policy issues that have been considered in the development of the strategic framework.

Section 4 presents an overview of the key strategic goals for radio spectrum and outlines the strategy for managing the radio spectrum in general and for specific services in detail.

Section 5 depicts the implementation strategy in relation to one or more of the five (5) strategic goals mentioned above.

1. Policy Environment

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[3] and the assignment[4] 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;
- 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

[3] **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).

[4] **Assignment** is the process of deciding which users should gain a licence (i.e. for the 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

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[5] 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,[6] 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[7] or by a statutory preferential position rather than by market-based mechanisms.

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 to be used for safety, defence, law enforcement and public broadcasting purposes.[8] Technical and economic efficiencies may sometimes be constrained by international obligations related to spectrum use.

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or third-party use, such as by defining levels below which a licensee may experience harmful interference (e.g. Ultra wide band technology).

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

[6] 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 / flexibility, 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.

[7] 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.

[8] For example, the reservation of frequencies for the transmission of local broadcast content in digital format meeting general interest objectives.

To ensure the optimal use of radio spectrum, fees are generally charged on spectrum use. The 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.[9] Importantly, fees must be objectively justified, transparent, non-discriminatory and proportionate in relation to their intended purpose.[10]

1.1 Government's Strategic Vision

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.

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:

- assisting economic growth and jobs[11] 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.

1.2 International Allocation and Developments

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.

[9] 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.

[10] In addition fees must take into account the objectives set out in Article 4 of the Electronic Communications (Regulation) Act (Cap 399).

[11] 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'.

Much of the radio spectrum is planned internationally and in some cases this constrains how specific frequencies or frequency bands are allocated or may be used locally. 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 (International Telecommunication Union) 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.

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[12] and the European Conference for Postal and Telecommunications Administrations (CEPT). 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.[13]

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.

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. In addition, various individual countries, both in and outside of Europe, are in the process of adjusting their national radio spectrum policy.

[12] 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. In addition European Commission decisions serve as an important tool to pave the way for harmonising spectrum throughout the European Union. The European Commission closely follows the implementation of such decisions, which include agreed dates for implementation, in the Member States.

[13] Refer to Appendix A – The International Perspective of the above-mentioned Consultation Paper for further information on the respective roles of the international bodies.

The European Commission has recently issued the following communications in which it presented proposals for greater free market operation and more flexibility of the spectrum policy:

- Communication COM(2007) 50 from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions entitled 'Rapid access to spectrum for wireless electronic communications services through more flexibility' dated 8th February 2007.[14]

- 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.

1.3 National Allocations

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.[15] 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. Nevertheless, international decisions on the allocation of frequency bands and the assignment to specific services provide the framework for the national radio spectrum policy and as such restrict the degree of freedom for national frequency policies.

Spectrum is planned by Government by laying down the allocation decisions in the National Frequency Plan (NFP) taking into account international and regional regulations.[16] A significant principle in this context concerns the effective use of frequencies. In allocating frequencies Government has to chose between different kinds of applications. One of the factors affecting this choice is that some frequency bands are more suitable for a specific application than others.[17]

[14] The aim of this Communication is to set the practical steps necessary from now until 2010 in order to pave the way towards more flexible spectrum management in bands with individual rights of use for which the review of the current electronic communications framework will ultimately offer the regulatory basis. The initial set of frequency bands currently under investigation for the implementation of more flexibility (1350 MHz in total) include: 470-862 MHz band, 880-915 MHz / 925-960 MHz as well as 1710-1785 MHz / 1805-1880 MHz, 1900-1980 MHz / 2010-2025 MHz / 2110-2170 MHz, 2500 – 2690 MHz (the 2.6 GHz band) and 3.4-3.8 GHz.

[15] 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.

[16] The NFP may be viewed at: http://www.mca.org.mt/infocentre/openarticle.asp?id=516&pref=24.

[17] Government may assign a frequency band to several users or applications i.e. for third-party use and for sharing. As far as sharing is concerned, it may do so by allocating parts of the frequency bands to several primary users. Third-party use may be imposed by defining levels below which a licensee may experience interference that is acceptable. Such parameters for third-party use are set in consultation with the primary user and form part of the licence.

The NFP outlines the types of radiocommunication services allocated to each frequency band, the standards that apply,[18] together with some notes on information on the current use as well as 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.

1.4 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.

[18] Such as in the case of short range devices – Annex 5 of the NFP.

2. Regulatory Environment

The MCA is the National Regulatory Authority (NRA) responsible for the regulation of the electronic communications sector,[19] including radiocommunications,[20] and broadcasting transmission.[21] 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.[22] 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;
- take into account the radio spectrum policy within the EU;
- in meeting its objective to ensure the efficient management and effective 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. 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.

[19] 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).

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

[21] In relation to broadcasting, the MCA's role is limited to spectrum management and assignment issues related to electronic communications networks and service providers (i.e. plans and co-ordinates internationally, in co-operation with other stakeholders, broadcast transmission networks for Malta, develops and issues licences for digital terrestrial TV and radio broadcasting and monitors and enforce compliance with licence terms and conditions. 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.

[22] 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 current digital TV licence has introduced competition. The fee exempt licence bands are creating a series of local wireless access networks that are solving the 'last hundred feet' problem.

At present, 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) provides the basis for the setting of the level of fees for radiocommunications apparatus in Malta.

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);
- Electronic Communications Networks and Services (General) Regulations (Legal Notice 412 of 2004).

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. Since 2004, licensing for the rights of use of radio spectrum 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). 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.

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.

The MCA's role as a spectrum manager is to ensure as far as possible the optimal use of spectrum resources under its management, 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 (4) main areas, namely policy advice to the Minister responsible for Communications with respect to frequency allocation and related matters, 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.[23] Along with the Ministry for Competitiveness and Communications (MCMP), 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.[24] 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. In addition the MCA together with the MCMP participates in the development of EC decisions and recommendations in order to ensure the co-ordinated use of radio spectrum and harmonised conditions for the availability and efficient use of radio spectrum.

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. 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.[25]

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.[26]

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.

[23] 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).

[24] The MCA together with the MCMP will represent Malta at the World Radio Conference 2007 and in the ITU, CEPT and the EU.

[25] Refer to Appendix B: Radio Spectrum Monitoring and Enforcement of the above-mentioned Consultation Paper.

[26] 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.

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.[27] 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 (also referred to as safety of life 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.[28] 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 and effective 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.
- 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.

[27] 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 Feb 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).

[28] 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. 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.

- 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, individual licences are issued for the rights of use of radio spectrum or for the possession and operation of radiocommunications apparatus.

The MCA is currently reviewing the licence and fee structures pertaining to radiocommunications equipment. The process includes a review of 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. It is planned that those 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 devises and specific maritime and aeronautical equipment) will be subject to licence exempt / general authorisation arrangements.

To streamline and simplify the licensing process for aeronautical and maritime-related radiocommunications equipment 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). The Department of Civil Aviation (DCA) within the MCMP is responsible for the administrative functions associated with the licensing of certain radiocommunications equipment used by aeronautical users.

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.[29] 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,[30] comparative (i.e. beauty contest) or competitive (such as auctions) selection processes are used in order to determine which entities will be granted spectrum rights of use.[31] 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, may be used in the assignment of

[29] 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.

[30] It may be that the number of interested parties exceeds the total number of available licences, or that there are more interested parties for one or more specific licences within this total number.

[31] 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.

such spectrum bands. Licences for the use of scarce frequencies are temporary and as a general rule it is not possible to extend scarce licences.[32] The term of the licence is determined on the basis of a reasonable payback time of investments. Payment for the use of these frequencies is based on the relevant administrative costs[33] and for the efficient and effective use of spectrum.[34]

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.[35] Payment for the use of these frequencies have been based on the relevant administrative costs and for the efficient and effective use of spectrum 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,[36] 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. In principle, the fees should cover the costs of interference management, international co-ordination, domestic planning, technical standards, enforcement and compliance, and the costs that relate to safeguarding the efficient and effective use of spectrum, bandwidth and power.[37] 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).

[32] In principle, an extension is only an option in the case of important social and economic interests (e.g. during the transitional phase - which should be as short as possible – in connection with the conversion to a new technology, which allows more efficient use of spectrum). In doing so the effective use of radio spectrum needs to be ensured. It is noted that, in general, when the term of the licence has expired, both existing and new market players should be given the opportunity to acquire and use scarce frequencies.

[33] i.e. the costs that are directly related to any frequency assignment, including any associated post-assignment costs.

[34] 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 are 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 are 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.

[35] 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).

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

[37] Licence fees should also be set having regard to spectrum band, amount of spectrum occupied and coverage area authorised by the licence. As mentioned above the MCA is currently reviewing fee structures of those

3. Existing and Emerging Policy Issues

This section identifies the main drivers of future spectrum demand and depicts the existing and emerging policy issues that have been considered in developing the strategic framework for the management of radio spectrum. Each one needs to 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

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.

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;
- demand for wireless broadband services offering mobility;
- demand for multi-channel TV and radio particularly if mobile reception is required; and

services where spectrum scarcity may not be a factor and will consider whether the fee structures adequately supports these objectives.

- 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.

Technology Drivers and Enablers

Malta's spectrum policy is, in principle, technology and service neutral[38] 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.[39]

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), offering the potential to carry very large amounts of data;
- cognitive and software defined radios 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.

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

[38] In practice, spectrum allocation is largely dictated by the technical specifications of radiocommunications equipment manufactured overseas in conformity with ITU guidelines. Technology neutrality means that spectrum users should be free to use any type of radio network or access technology in a given spectrum band to provided a service provided they do not cause interference (exceptions should be limited and justified e.g. avoiding harmful interference, proper sharing of authorized spectrum, protection of health against electromagnetic fields). Service neutrality means that spectrum users should be able to provide any service or mix of services in a given spectrum (exceptions justified by public interest objectives).

[39] A technology neutral approach is one of the core principles of the EU regulatory framework for electronic communications and services. Furthermore Member States encourage the implementation of standards and/or specifications adopted by the European standards organization.

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.

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.[40] 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). Some of these have a safety function in addition to their socio-cultural utility.

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 past years 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.

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

[40] The MCA encourages the sharing of infrastructure, wherever possible, as a means of lowering costs, expanding coverage, as well as to avoid the duplication of resources and to address possible environmental concerns.

competition and a single European market in electronic communications. The regulatory framework is undergoing its first review.[41] In its review process, the European Commission is following a "triple-play" approach aiming at innovation, investments and integration.

The most important objectives to be achieved with the review of the regulatory framework for electronic communication networks and services are to: strengthen investment through infrastructure-based competition; promote innovation through openness of the rules for new technologies; complete the single market by making the application of EU rules more consistent across the twenty-seven (27) 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 policy and 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 Liberalisation of Spectrum Management

The issues related to liberalisation of spectrum management[42] will continue to be studied to identify opportunities to liberalise specific frequency bands or services[43] where this would provide benefits, such as economic efficiency, promotion of innovation and competition, and flexibility.

[41] 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.

[42] 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).

[43] Specifically, the bands earmarked for the implementation of more flexibility by the European Commission (refer to **Section 1.2** and footnote 14 above) and as specified in the strategic framework depicted in **Section 4** of this document.

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, much 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 could also discourage 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[44] 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.[45]

3.3 Use of Market Based Mechanisms

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[46] 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.

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

[44] 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.

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

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 and 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 the assignments of long-term spectrum rights via the above-mentioned 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.

3.3.1 Administrative Pricing

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),[47] will be considered for certain spectrum bands.[48]

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.

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

[46] 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.

[47] 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.

[48] For example, in cases where the assignment of spectrum via auctions is not suitable.

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. In such circumstances a number of options are open to spectrum managers, including:

- ensuring that a spectrum-efficient technology is utilised;
- 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.[49]

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.

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.

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

[49] 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, 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.

potential selling price rather than on the basis of its actual value) in the radio spectrum markets.[50]

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. Without the necessary safeguards, 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

At this stage a single approach for awarding spectrum rights is not preferred and each case will be considered on its own merits.[51] 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.

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.

[50] Spectrum assignment rules should be designed in ways which will prevent any operator from immediately gaining market power in a services market. Intervention by the spectrum regulator could reduce the risk of market failure associated with abuse of power in spectrum markets.

[51] E.g. auction and comparative assessment, with or without a financial bid, or a combination of a comparative assessment and an auction (for example, first a comparative assessment and in the case of 'an equal score', an auction after that).

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).[52] 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 and effective use.

Decisions must be made on the type of auction, 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 (i.e. the need to safeguard a social and cultural interest) such as coverage to remote areas, roll-out of networks within a particular timeframe, delivery of specific services, etc. The winners' substantive bid in a comparative assessment is laid down in the licence requirements in retrospect. 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.

[52] 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.

Secondary Trading

The concepts in relation to spectrum trading will be studied to allow a gradual move to spectrum trading for specific spectrum bands or services,[53] subject to sufficient safeguards to ensure that potential benefits are not offset by adverse consequences.

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[54] (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.[55]

Trading can take several forms as discussed in the consultation document. 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.

[53] Specifically, the bands earmarked for trading and liberalisation by the European Commission (refer to **Section 1.2** and footnote 14 above) and as specified in the strategic framework depicted in **Section 4** of this document.

[54] 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 will not be allowed.

[55] 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.

3.3.3 Licence Exempt Spectrum

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.[56]

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 arrangements 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.

It is recognised that although there may not be the need for imposing individual licence arrangements, it may be necessary to keep track of users. For this reason, there may be an obligation to register in such cases.[57] This would allow the possibility of transferring the use to the licensed spectrum area where frequencies become scarce, where there is abuse, or where there is the need to reallocate the relevant frequencies.[58]

[56] Licence exemptions / general authorisation arrangement should be introduced where there is little risk of harmful interference and there are no other impediments.

[57] Also referred to as 'Light-licensing' approach. This approach offers increased flexibility in regulating spectrum, whether by allowing some kind of control of the deployment and use of an application where necessary or by achieving simplified procedures for issuing licences compared with traditional procedures.

[58] In view of the administrative burden, the greatest possible restraint will be exercised and any such change will be announced in a timely fashion. The possibility of whether additional frequency space could provide a solution will be examined first.

3.4 Non-Commercial Assignments

To support national development objectives and value to society for radiocommunication services having a 'public interest' use, 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 between the ministries involved in collaboration with the MCA.

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, radio astronomy); 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.[59]

[59] New technologies offer the possibility of new applications for higher frequency bands currently not in commercial use. It is noted that in the case where third-party use is concerned it may be necessary to make arrangements regarding the discontinuation of this third-party use in, for example, emergency situations. Third-party use therefore should be permitted on the basis of a licence for the rights of use.

3.5 Transitional Arrangements and Implementation

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.[60]

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.[61]

The spectrum policy recommendations described above will be implemented in a gradual manner. It is envisaged that in the short to medium-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 and the establishment of guidelines for issuing future rights of use of radio frequencies.[62]

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 existing and future licensing conditions.[63]

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.[64]

[60] In line with Article 14 of the Authorisation Directive, Member States shall ensure that the rights, conditions and procedures concerning general authorisations and rights of use may only be amended in objectively justified cases and in a proportionate manner. Notice shall be given in an appropriate manner of the intention to make such amendments and interested parties, including users and consumers, shall be allowed a sufficient period of time to express their views on the proposed amendments, which shall be no less than four weeks except in exceptional circumstances.

[61] It is noted that the rights and obligations of licence holders should be clear and not changed without notice and good reason.

[62] It is noted that the European Commission this year intends to publish a Recommendation to give guidance on coherent authorisation conditions across Europe limited to the minimum necessary to enable the efficient use of spectrum and to be applied to the first set of bands for which flexible usage is to be applied i.e. envisaged for the implementation of WAPECS (Wireless Access Policy for Electronic Communications Services). Refer to European Commission communication mentioned in **Section 1.2** above and to the Radio Spectrum Policy Group WAPECS opinion dated 23rd November 2005.

[63] 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. It is noted that, in principle, past decisions on licensing conditions do not necessarily determine how future licensing decisions should be made, subject to relevant consideration of the requirements under EU and local legislation.

[64] 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. Strategic Framework

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 goals 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.

The MCA's strategic framework for managing the radio spectrum 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[65] that require consideration in order to meet the broad policy and strategic objectives. This strategic framework is intended to be periodically updated to reflect changes in markets, technology and demand for radio spectrum for different applications.

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.[66]
- 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.[67]
- Support and promote innovation, research and development in new radiocommunications techniques, spectrum-based services and applications.

[65] Refer to Appendix C – The Radiocommunications Sector of the above-mentioned Consultation Paper for an overview of the different services authorized for use in Malta and information on the key drivers of spectrum demand on a service by service basis.

[66] Licences should be as technology and service-neutral as possible.

[67] Spectrum should be made available for new technologies, new services and new stakeholders.

- 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 availability for applications / assignments, existing licences, pending applications and licensing procedures.[68]

- 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 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 Resources

[68] Refer to Commission Decision 2007/344/EC on harmonised availability of information regarding spectrum use within the Community dated 16th May 2007. Also refer to ERO Frequency Information System http://www.efis.dk/search/general.

- 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.[69]

- 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.

- Ensure that fees for the rights of use of radio frequencies reflect the need to ensure their optimal use.

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 harmful 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 Policies and 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.

[69] E.g. via monitoring, market surveillance and enforcement.

- 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)[70] 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.
- Continue to participate and influence the development of EC decisions and recommendations.
- Influence and support the development of harmonised standards.
- Influence and support the harmonised introduction of pan-European services.
- 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 Policies and Strategies for Specific Radio Services

Public Mobile Services

- Consider the future assignment of spectrum in the GSM bands and 3G bands alongside international, European and wider policy considerations in relation to spectrum liberalisation.[71] Consider the potential demand for innovative wireless services in these and other frequency bands.

[70] See CEPT ERC Report 25, The European table of frequency allocations and utilisations covering the frequency range 9 kHz to 1000 GHz - http://www.ero.dk/documentation/docs/doc98/official/pdf/ERCREP025.PDF.

[71] On the 25th July 2007 the European Commission published proposals to repeal the GSM Directive and allow the 900MHz and 1800MHz bands to be used by next generation wireless services – Refer to COM(2007) 367. The objective is to allow a larger choice of services and technologies and thereby maximize competition in the use of the bands so far covered by the GSM Commission Directive, while ensuring that services remain coordinated and protecting the continued operation of GSM (as a first step this would include UMTS).

- 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 IMT applications[72] subject to market demand whilst accommodating any requirements for any existing services.

- Consider and consult on the future of other bands identified for 3G services (e.g. 2.6 GHz band)[73] and for other services (e.g. WiMax)[74] on a technologically neutral basis and based on a common European approach.

- Endeavour to accommodate requirements for trials of convergent wireless technologies as these arise in appropriate spectrum.

- Continuously monitor the 2G and 3G operators to ensure that they are in compliance with their licence conditions.[75]

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 television 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).

[72] ECC/DEC/(06)01- ECC Decision of 24 March 2006 on the harmonised untilisation of spectrum for terrestrial IMT-2000/UMTS systems operating within the bands 1900-1980 MHz, 2010-2025 MHz and 2110-2170 MHz. These services are used for 3rd generation mobile services today, but market developments point towards the introduction of broadcasting type of services as well as broadband connections in light of convergence.

[73] 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.

[74] This band is intended for use by 3rd generation mobile services, but it is of equal interest for the provision of broadband using other technologies (e.g. WiMax). Other potential uses could include, *inter alia*, mobile multimedia, mobile television, wireless broadband and wireless cameras.

[75] such as measuring 3G mobile operators' compliance with their rollout obligations.

[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.

Digital Terrestrial Broadcasting in Malta

- Review spectrum options for Digital Video Broadcasting (DVB) and/or Digital Audio Broadcasting (DAB) based delivery of content to mobile platforms and hand-held devices[77] to facilitate the deployment of Mobile TV.[78]

- Continue the international co-ordination with our neighbouring countries with respect to DVB and DAB infrastructures.

- Continue to monitor terms of coverage and reception quality 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.

- 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.

- Continue to appropriately inform citizens about changes in the television 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.[79]

Terrestrial Wireless Broadband Services

- 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.

[77] E.g. for the delivery of mobile content using technologies such as DVB-H (Digital Video Broadcasting for Handhelds) or T-DMB (Terrestial Digital Mulitmedia Broadcast). It is noted that the European Commission urges Member States and industry to facilitate and accelerate the deployment of mobile TV across Europe and to encourage the use of DVB-H as the single European standard for mobile TV. Refer to the European Commission communications on the strengthening the internal market for mobile TV published on the 18th July 2007.

[78] The transmission of Mobile TV services can take place over various networks including cellular mobile, terrestrial broadcast, satellite and Internet-based.

[79] 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. As a result of convergence of broadcasting and mobile services any frequencies released following switchover are of high interest for new services such as mobile TV as well as for extending the reach of all types of wireless electronic communications services.

- Study and consult on the use of the 5.8 GHz band with a view to developing it for point-to-multipoint / BWA applications and based on European harmonised conditions.

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

- Carry out a comprehensive review of the 10.5 GHz,[80] 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.

- Encourage the introduction of new cost-effective wireless technologies e.g. based on the WiMAX standard.

- Continuously monitor the BWA operators to ensure that they are in compliance with their licence conditions.

Terrestrial Fixed Link 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 pricing (such as 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.

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

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

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.[81]

- 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) 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.[82]

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.

[81] For example the implementation of Commission Decision 2006/804/EC on harmonisation of the radio spectrum for radio frequency identification (RFID) devices operating in the ultra high frequency (UHF) band and Commission Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the European Community.

[82] i.e. through CEPT Decisions / Recommendations and EU legislation (e.g. Commission Directives / Decisions and Recommendations). E.g. the MCA together with the MCMP contributes to and then implements European Decisions.

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 radiocommunication 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.
- Continue to contribute and monitor the European work on the authorisation for Mobile Communication Onboard Aircraft (MCA) in European Member States and consult with all interested parties on implications of any proposals.[83]

Satellite Services

- Encourage the development of satellite services.
- Continue to monitor the European work on the selection and authorisation process related to the use of mobile satellite services (MSS) in 2 GHz bands.[84]
- Review current satellite related legislation with a view to adapting it to cover future licensable services.
- Where possible, exempt most low interference risk terminals which are typified by operating in harmonised spectrum to harmonised standards.

[83] Refer to ECC/DEC/(06)07 ECC Decision of 1 December 2006 on the harmonised use of airborne GSM systems in the frequency bands 1710-1785 and 1805-1880 MHz. Following on from the work on MCA at CEPT ECC working groups the European Commission set about formulating a pan-European regulatory approach to deal with the authorisation and subsequent licensing of such services. Work is ongoing in regards to development of a Commission Decision on MCA.

[84] The European administrations have agreed to maintain these bands for satellite usage and in order to support the European Community policies and to foster a more efficient use of the radio spectrum, a common approach is being considered. No commercial services have been provided so far in Europe in these bands, but there is a renewed interest for the provision of national and pan-European broadband satellite services. The Commission, in cooperation with the Member States, has adopted the Decision 2007/98/EC reserving the 2 GHz frequency bands for MSS systems, paving the way for the possible deployment of mobile TV services in these bands. Refer to the Proposal (COM(2007) 480 final) for a Decision of the European Parliament and of the Council on the selection and authorisation of systems providing mobile satellite services (MSS) dated 22nd August 2007.

- Maintain an awareness of international developments.
- Review the current licensing / authorisation regime attached to earth stations (including those on vessels and aircrafts).

Business Radio Services

- Ensure that spectrum is available to accommodate new business radio technologies.
- Encourage the development and use of new technologies for digital business radio.
- 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,[85] 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 public access mobile radio (PAMR) services in the 870 – 876 / 915 – 921 MHz bands.[86]

Defence Systems and Public Safety Services

- Maintain an awareness of international civil / military radiocommunication developments.
- Liaise with the defence forces and entities responsible for public safety services, as required, to solve any issues of mutual concern.
- Support the public safety services by ensuring spectrum is available to meet the future needs of the emergency and law enforcement services
- Continue to ensure that spectrum used by defence systems and public safety services are free from harmful interference.

Amateur Service

- Ensure that spectrum allocated to the amateur service on an international basis is made available to the local community.

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

[86] Refer to ECC Decision of 19 March 2004 on the availability of frequency bands for the introduction of Wide Band Digital Land Mobile PMR/PAMR in the 400 MHz and 800/900 MHz bands.

- 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 radiocommunications licence issued in a country that has signed up to CEPT T/R 61-01[87] 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.

- Automotive Short Range Radar - A recent EC Decision opened 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.[88]

[87] 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).

[88] 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. Implementing the Strategic Framework

Taking into consideration the existing and emerging policy issues identified in the document, the implementation of the strategy framework for the management of the radio spectrum in relation to one or more of the five (5) identified strategic goals have been grouped appropriately and prioritised in the summary table overleaf.

The above-mentioned policy issues will be 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 given priority.

Service	Key Issues	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), auctions 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	Consider the future assignment of spectrum in the GSM/3G bands alongside international, European and wider policy considerations in relation to spectrum liberalisation.	i, ii, iii, iv	M	M
		Consultation with industry to develop a coherent strategy to facilitate the development of 3G services in other bands (e.g. 2.6 GHz band) subject to market demand whilst accommodating any ongoing requirements.	i, ii, iii, v	M	M
	Demand for innovative wireless services	Consider the future of other bands identified for IMT-2000 applications on a technological neutral basis.	i, ii, iii, iv	M	L
Broadcasting	Television and Sound Broadcasting	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
		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
	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

Service	Key Issues	Strategy	Objectives*	Impact*	Urgency*
	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
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	H	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	H	M
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	H	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	M	M
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

Service	Key Issues	Strategy	Objectives*	Impact*	Urgency*
	Seek opportunities related to licence exempt services (and simplified assignment methods) applying the most technology and service neutral grounds possible	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 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 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 and Public Safety Services	Encourage the use of harmonised military, defence and public safety services spectrum	Maintain an awareness of international civil / military spectrum use.	iii, v	L	L
		Liase with the defence forces and entities responsible for public safety, as required, to resolve any spectrum related concerns.	i, ii, iii, iv	L	L
		Ensure spectrum is available to meet the future needs of the emergency and law enforcement services.	i, ii, iii	M	L

Service	Key Issues	Strategy	Objectives*	Impact*	Urgency*
		Continue to ensure that spectrum for defence systems and public safety services is interference free.	iii, v	H	L
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	L
		Consider a licence scheme for making spectrum available for wideband digital public access mobile radio (PAMR) services in the 870 – 876 / 915 – 921 MHz bands	i, ii, iv, v	M	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 Issues	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