Guidelines for the preparation of a
NATIONAL TABLE OF FREQUENCY ALLOCATIONS
(NTFA)

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Guidelines for the preparation of a National Table of Frequency Allocations (NTFA)

These guidelines focus on the detailed preparation of a National Table of Frequency Allocation (NTFA). In addition it is providing a brief overview of the essential requirements of the international and national spectrum framework(s) to assist in the understanding of how an NTFA should operate within these frameworks. This report was prepared by ITU expert Terence Jeacock, under the supervision of the ITU Telecommunication Development Bureau (BDT) Spectrum Management and Broadcasting Division and with the co-operation of the ITU Radiocommunication Bureau (BR).

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1   Introduction

In ITU and in other national and international specialized organizations, there have been many studies over the last few years to demonstrate that the radio spectrum is a major national asset, contributing significant value to the economy and playing a vital role in social and physical welfare and national security. In all countries there are many competing demands to use the spectrum for different radio services, from government, public and private users. In addition, there will be obligations to reserve certain frequency bands for "international" systems such as maritime and aeronautical services and spectrum demands for other global or regional terrestrial and satellite telecommunications systems that require a degree of frequency harmonisation for cross-border interoperability.

It is a government responsibility to develop national spectrum management policies that conform to the international treaty obligations of the ITU Radio Regulations[1] while meeting national spectrum needs. Within the national legal framework for telecommunications (including radiocommunications), a spectrum management organisation usually has the delegated authority to prepare spectrum plans that meet government policies. In practice, this will involve considerable consultation with spectrum stakeholders, including government users and major public users or other agencies, to ensure optimal use of the radio spectrum. National spectrum plans should be reviewed regularly and, when necessary, be updated to keep pace with technology and changing demands.

One of the most important tools for effective spectrum management is a carefully prepared National Table of Frequency Allocations (NTFA). This is the outcome of national spectrum planning and will have been approved at senior government level (e.g. by the Cabinet Office depending on the structure of the government and power delegated as per the law of the country) and given the appropriate legal authority to ensure it is implemented and can be enforced.

The NTFA will have several levels of detail. The top level should define clearly how frequency bands have been allocated in conformity with the Radio Regulations to radiocommunications services in the country concerned. The next level should define how these "service bands" are divided or shared between major uses, in particular government (including military and security services) and non-government uses. This is particularly important when detailed frequency planning or assignment responsibilities are delegated to different government departments or agencies. Further sub-levels may define specific uses or technical conditions of use (e.g. channel arrangements).

In the last decade, there have been significant developments in both technological and regulatory approaches to national spectrum management. Some administrations have been moving away from the traditional centralised control "administrative approach" to more flexible "market-based" regulation. However, the NTFA continues to have an essential role whichever approach is taken.

These guidelines focus on the detailed preparation of an NTFA. However, it is necessary to provide a brief overview of the essential requirements of the international and national spectrum framework(s) to assist in the understanding of how an NTFA should operate within these frameworks. Annex 1 provides links to ITU and other resources for the reader to obtain a far more detailed description and assistance in various aspects of spectrum management.

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[1]   See sections 2.1 : ITU Radio Regulations; further info at: www.itu.int/pub/R-REG

2   The ITU Radio Regulations

2.1   General scope

Since radiowaves ignore borders, international coordination of spectrum use is necessary, and the ITU Radio Regulations (hereinafter the Regulations)[2] is the legal instrument that does this: it determines how the radio frequency spectrum is shared between different services and how satellite orbits are to be used, and it prescribes how equipment and systems must operate to ensure peaceful cohabitation, avoiding interference with each other, in today's increasingly crowded airwaves.

The Regulations have a binding nature for ITU Member states, and ITU acts as depositary of the Regulations, which are elaborated and revised by administrations and membership during world radio conferences (WRCs)[3] (every 3 to 4 years). The most recent version is the Radio Regulations, Edition 2012, as revised during WRC-12. The majority of the provisions of these Regulations entered into force on 1 January 2013.

The Regulations are compiled in four volumes (and a set of maps), as follows:

- VOLUME 1: Articles (59)
- VOLUME 2: Appendices (22)
- VOLUME 3: Resolutions (151) and Recommendations (24)
- VOLUME 4: ITU-R Recommendations incorporated by reference (39)
- MAPS: Set of Maps for App. 27

The Regulations are complemented by its Rules of Procedure, which, where necessary, explain or clarify the way in which the provisions of the Regulations are to be applied. These Rules of Procedure are adopted by the Radio Regulations Board (RRB).[4] The central provision of the Regulations is to enable recognition of spectrum uses and their protection against harmful interference, at national and international levels.[5]

2.2   Key definitions

Before considering the preparation of tables of frequency allocations, it is perhaps necessary to review some of the terminology used in spectrum management. The complete definitions are given in the Regulations. The most relevant definitions and a simplified description are given below (numbering corresponds to that used in the Regulations):

2.2.1   Services and stations

- **1.3**   *Telecommunication*: Any transmission, emission or reception of signs, signals, writings, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems.

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[2]   The legal framework of ITU comprises the basic instruments of the Union, which have treaty status and are binding on ITU Member States. These instruments are the Constitution and Convention of the International Telecommunication Union and the Administrative Regulations, which complement the Constitution and the Convention. The Radio Regulations (RR) form an integral part of the Administrative Regulations: available free of charge (download) at: www.itu.int/pub/R-REG-RR-2012

[3]   Further WRC info at: www.itu.int/ITU-R/index.asp?category=conferences&rlink=wrc&lang=en

[4]   Further information about Rules of Procedure and RRB can be found at: www.itu.int/pub/R-REG. Rules of Procedure are also available free of charge (download) at: www.itu.int/pub/R-REG-ROP/en

[5]   Relevant definitions of: interference, permissible interference, accepted interference, and harmful interference are provided in the Regulations (respectively): 1.166, 1.167, 1.168, 1.169. Unless explicitly indicated otherwise, as in spectrum management literature generally, the word "*interference*" shall be interpreted as "*harmful interference*".

- **1.5** *Radio waves* or *hertzian waves*: Electromagnetic waves of frequencies arbitrarily lower than 3000 GHz, propagated in space without artificial guide.

- **1.19** *Radiocommunication service*: A service involving the transmission, emission and/or reception of radio waves for specific telecommunication purposes.

- **1.61** *Station*: One or more transmitters or receivers or a combination of transmitters and receivers, including the accessory equipment, necessary at one location for carrying on a radiocommunication service, or the radio astronomy service.

The Regulations classify services that use radio communications according to several parameters, namely:

- Link type: Terrestrial (earth to earth) or satellite (earth-satellite, satellite-earth, satellite-satellite);

- Type of coverage: land, maritime, aeronautical;

- Station type: fixed, mobile;

- Type of use: communications, broadcasting, navigation and associated, meteorological, scientific, earth observation, time standard, astronomy, security, special.

The Regulations also define the different types of radio stations, classified as:

- terrestrial space;

- land, sea, air;

- fixed, mobile;

- broadcasting, amateur radio, radio-astronomy, etc.

The Regulations define 41 types of services and 53 types of stations (more stations than services, as some stations simultaneously involve several services).

2.2.2   Frequency management

- **1.16 allocation (of a frequency band)**: Entry in the Table of Frequency Allocations of a given frequency band for the purpose of its use by one or more terrestrial or space radiocommunication services or the radio astronomy service under specified conditions. This term shall also be applied to the frequency band concerned.

- **1.17 allotment** (of a radio frequency or radio frequency channel): Entry of a designated frequency channel in an agreed plan, adopted by a competent conference, for use by one or more administrations for a terrestrial or space radiocommunication service in one or more identified countries or geographical areas and under specified conditions.

- **1.18 assignment** (of a radio frequency or radio frequency channel): Authorization given by an administration for a radio station to use a radio frequency or radio frequency channel under specified conditions.

According to these definitions, it can be concluded that:

- An *allocation* is then a distribution of frequencies to radio services. An allocation can be made to a service on either an exclusive or shared basis. If an allocation is shared, the services may be given primary or secondary status.

- An *allotment* is an entry of a designated channel in a plan for use by one or more countries in those countries or within designated areas for a radiocommunication service under specified conditions. An allotment is then a distribution of frequencies to geographical areas or countries.

- An *assignment* is an authorization given for a radio station (of a radiocommunication service) to use a radio frequency or a radio frequency channel under specified conditions. An assignment is then a distribution of a frequency or frequencies to a given radio station.

• Allocations are granted to radiocommunications services, while assignments are granted to the operator of a radiocommunication station. Any station assignment has to be consistent with the allocation of the band such station intends to operate.

2.2.3 Other concepts related to spectrum management

Although not explicitly defined in the Regulations, when dealing with band allocations (Article 5), the use in footnotes of the expressions "*identified*" and "*designated*" express the interest/intention of some administrations on a future use of that band for a specific application that may benefit from a mid- and long-term harmonization of the use of that band. Examples are:

• Bands identified for International Mobile Telecommunications (IMT), footnotes: 5.286AA, 5.313.A, 5.317A, 5.3: 84A, 5.388, 5.430A. 5432A, 5.432B, 5.433A.

• Bands identified for use by high-density applications in the fixed-satellite service, footnote: 5.516B.

• Bands designated for industrial, scientific and medical (ISM) applications, footnotes: 5.138, 5.150.

• Bands designated for use by high altitude platform stations, footnotes: 5.552A.

As indicated on those footnotes, such designations/identifications in the international Table of Frequency Allocations do *not preclude the use of this band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations*.

However, they are a key element of worldwide or regional spectrum harmonization, and a pre-requisite for economies of scale and interoperability of equipment and networks, to the benefit of final users, in particular in case of mass applications. At the time where trade barriers are being gradually suppressed and mass application terminals are crossing borders without control, following international spectrum harmonisation is also a good protection against interference arising from non-compliant terminals.

2.2.4 Categories of services and allocations

When the same band is shared between several services, categories are established, such as:

a) Primary services (printed in "capitals" example: FIXED) b) secondary services (with lower case example: Mobile).

   Their privileges and duties are established in the Regulations as:

   5.28 3) Stations of a secondary service:

   5.29 *a)* shall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date;

   5.30 *b)* cannot claim protection from harmful interference from stations of a primary service to which frequencies are already assigned or may be assigned at a later date;

   5.31 *c)* can claim protection, however, from harmful interference from stations of the same or other secondary service(s) to which frequencies may be assigned at a later date

b) Primary Basis (according to the above definitions): means that in accordance with the nature of a right granted to the assignee of a particular spectrum (band or spot frequency), the assignee is the only entity to use the identified spectrum and is entitled to protection from:

   i. harmful interference caused by any other spectrum user who may be authorized to use same spectrum on secondary basis; and

   ii. claims of harmful interference by any such spectrum user.

c) Secondary basis: means the nature of a right granted to the assignee of a particular spectrum (band or spot frequency), is subject to the condition that the entity does not cause any harmful
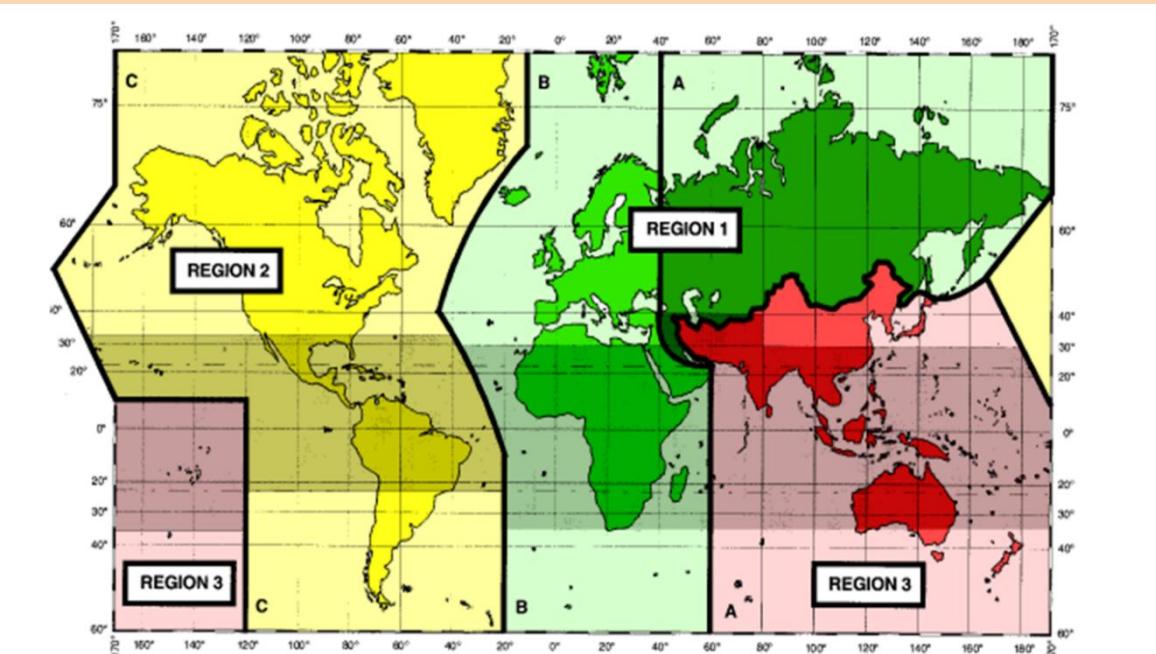
interference to, or claim protection from any harmful interference caused by, other licensees who have been granted the right to use same frequency bands on primary or co primary basis.

It should be noted that the primary services protection considers both present and future stations; therefore regulators need to consider a long term planning of possible assignments nationwide in the concerned band.

2.2.5 Radio Regulations Regions

Frequency bands are allocated to different services either worldwide (worldwide allocation) or regionally (regional allocation). To this end, the world is divided into three Regions (Regions 1, 2, 3), defined in the Radio Regulations (No. 5.2). In the allocations Table, there is a column for each regional allocation. The Regulations Regions are depicted in Figure 1.

Figure 1: the Radio Regulations three Regions

Source: ITU

2.2.6 Footnotes to the Table of Frequency Allocations

Exceptions to the regional allocations (*additional* or *alternative allocations*, *different categories of service*, etc.) or restrictions on allocations in the Table in Section IV of Art. 5 - usually geographical in a smaller area than the region (country, group of countries) - are covered in "*footnotes*" to the Table (numbered 5.nnn, sometimes 5.nnnA, 5.nnnB etc. where an addition has been made by a WRC).

2.2.7 Harmonization

Harmonization (as far as possible) is a key objective of the Regulations, as indicated in Recommendation 34 (REV.WRC-12):

"*recommends that future world radiocommunication conferences:*

2. *should, wherever possible, allocate frequency bands on a worldwide basis (aligned services, categories of service and frequency band limits) taking into account safety, technical, operational, economic and other relevant factors;*

3. should, wherever possible, keep the number of footnotes in Article 5 to a minimum when allocating frequency bands through footnotes, in line with Resolution 26 (Rev.WRC-07);"

2.3 Table of Frequency Allocations

Article 5 of the Radio Regulations contains the (international) Table of Frequency Allocations. The presentation and the special methods of notation used in this Table enable important information about the applicability and status of an allocation to be understood at a glance. These features are summarised below because national allocations should conform to the international Table.

Annex 2 of this report contains an extract from the Table of Frequency Allocations in Article 5 of the Radio Regulations. It shows that:

- the Table of Frequency Allocations is divided into three columns; one for each ITU Region;

- the Table of Frequency Allocations is divided into rows; one for each frequency band;

- the complete Table shows allocations for the electromagnetic spectrum from 8.3 kHz to 275 GHz;

- the frequency ranges below 8.3 kHz and 275-3000 GHz are shown as "Not allocated";

- some frequency bands have considerable variation in allocations between Regions, while some bands have the same allocation in all Regions, i.e. an allocation on a world-wide basis;

- *services* are denoted as having a primary allocation when printed in capital letters (upper-case) e.g. FIXED and secondary services are printed as normal letters (lower-case) e.g. Fixed;

- Footnotes to the Table may be used to specify *additional* or *alternative allocations* for a frequency band or to specify technical or operational restrictions on the use of frequency bands, services or applications.

The excerpt in Figure 2 of the Table of Frequency Allocations in the Radio Regulations illustrates the cases described above.

Figure 2: Excerpt from the Table of Frequency Allocations in the Radio Regulations

Source: ITU

2.4 Radio Regulations and the National Table of Frequency Allocations

The Radio Regulations is a part the ITU Administrative Regulations that collectively contain provisions that govern international telecommunications. They complete the provisions of the ITU Constitution and Convention and are binding on all Member States and therefore the NTFA must be consistent with these

Regulations. However, it also has to respond to national interests and needs in relation to spectrum usage. Some relevant considerations in this regard are as follows:

- **Inclusion of Footnotes of the Regulations**: NTFA might contain a different allocation than those in the allocations table (Art. 5) basically: a) additional allocation (adding more services); b) different (alternative) allocations (allocating to other different services instead); c) change categories to allocated services (different categories).

   As these differences were accepted by the competent WRCs and included in the Regulations, they enjoy international recognition (with the limitations contained in the respective footnote).

- **Choice of allocations**: In most frequency bands, the Regulations leave the flexibility to each country to exercise a choice between several allocations. Often, this choice has to be exercised because the corresponding services would be incompatible over the same territory (e.g. broadcasting and mobile IMT). Alternatively, the NFTA may split the band into sub-bands, each allocated to one or more of those services already allocated in the Regulations.

- **Worldwide and regional harmonization**: In order to benefit from economies of scale, interoperability and facilitate equipment compliance, worldwide and regional harmonisations need to be followed, wherever possible. In this regard, the NTFA should also include details on which a particular standard or detailed "Band Plan" (or channel plan) is applicable in the country for a given allocation, consistent with this harmonisation. This information may be included in Annexes to the NTFA.

- **Technology neutrality**: In order to keep flexibility in adopting new and more efficient technologies, it is preferable to avoid mandating specific technologies for the use of a specific allocation.

3 The International and National Spectrum Management Framework

3.1 Spectrum management levels (of authority)

The radio frequency spectrum is managed on a number of levels:

- **International**: At a **worldwide** level by Member States of the International Telecommunication Union (ITU); and, in most cases, at a **regional** level, by regional organizations[6], which act consistently within the ITU framework (note that in this context, "region" is not directly equivalent to ITU Regions defined above).

- **National** at the **allocation** level by the *administration* of the Member State; and at the **assignment** level by delegated agencies, service providers, operators, users.

3.1.1 International (worldwide level)

The international framework for the use of the radio frequency spectrum is set out in a treaty – **the Radio Regulations** – ratified by the Member States of the International Telecommunication Union (ITU), a specialized UN agency. The Radio Regulations govern the use of the radio-frequency spectrum and the geostationary satellite and non-geostationary-satellite orbits. Article 5 of the Radio Regulations deals with regulations for frequency allocation and contains the (international) Table of Frequency Allocations, together with various definitions concerning frequency allocation. The Table of Frequency Allocations reflects decisions made on the purpose or purposes to which particular frequencies will be put.

World radiocommunication conferences (WRC) are held every three to four years. It is the job of WRC to review, and, if necessary, revise the Radio Regulations, the international treaty governing the use of the

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[6] A list of Regional Telecommunication Organisations is given at www.itu.int/council/regorg.html

radio-frequency spectrum and the geostationary-satellite and non-geostationary-satellite orbits. Revisions are made on the basis of an agenda determined by the ITU Council, which takes into account recommendations made by previous world radiocommunication conferences.

The general scope of the agenda of world radiocommunication conferences is established four to eight years in advance, with the final agenda set by the ITU Council two years before the conference, with the concurrence of a majority of Member States.

Under the terms of the ITU Constitution, a WRC can:

- revise the Radio Regulations and any associated frequency assignment and allotment plans;

- address any radiocommunication matter of a worldwide character;

- instruct the Radio Regulations Board and the Radiocommunication Bureau, and review their activities;

- determine Questions for study by the Radiocommunication Assembly and its Study Groups in preparation for future Radiocommunication Conferences.

3.1.2   International (regional level)

Regional Telecommunication Organizations have been established (usually) by administrations to develop harmonization measures intended to facilitate free movement of telecommunication equipment and services within the region and to offer industry and operators the economies of scale through a larger market with common requirements. Harmonisation measures may include harmonization of frequency use, common technical requirements and preparation of common proposals to ITU world radio conferences. A detailed description of regional harmonization and regional organizations is given in ITU-R Report SM.2093.

3.1.3   National (allocation level)

A national legislative framework must be in place to establish an *administration* recognised by ITU as responsible for discharging the obligations undertaken in the Constitution of the International Telecommunication Union, in the Convention of the International Telecommunication Union and in the Administrative Regulations (CS 1002). These obligations include management of the radio spectrum. The administration may be a government ministry, or an independent regulator operating under a legislative mandate or policy guidelines.

An essential part of this legislative framework will be for the administration to establish a National Table of Frequency Allocations that sets out the radio services that can be used, which frequency bands, and under what conditions. The NTFA should be based on the Table of Frequency Allocations in Article 5 of the Radio Regulations. Section 6 of this report shows how to extend the Table of Frequency Allocations in Article 5 of the Radio Regulations into a National Table and Section 8 suggests typical methods for organising NTFA development. It is good practice to develop a national allocation chart for easy reference of all stake holders.

Over time, in all countries, changes in technology and user needs will require changes to the NTFA. If it is not possible to accommodate these changes in conformity with the allocations of the current *International* Table, it will be necessary for the administration to seek changes to the International Table at a World Radio Conference. In practice, it is normal for administrations to co-operate with other (neighbouring and/or regional) administrations in WRC preparations at regional and global (ITU) levels to enable their changing requirements to be co-ordinated and developed in an organised framework. With the current pace of technology development, this is an on-going task and the administration will establish national consultative procedures to prepare national requirements and positions for presentation at regional preparation meetings and radiocommunication conferences.

3.1.4   National (assignment level)

Assigning a particular frequency (or groups of frequencies) to users (stations) is the detailed level of national spectrum management. The methods used may be administrative, market-based or some spectrum may

be reserved for licence-exempt[7] use that satisfies certain technical or operational conditions, for example restricted power levels and geographic range. For licensed use, this detailed level usually includes establishing policies for technical conditions for frequency use. Conditions of use may vary widely, from reserving particular frequencies for specific uses with detailed technical requirements (for example: channel plans, equipment standards and assignment criteria), to allowing considerable flexibility in spectrum use for particular bands or services with light technical requirements (e.g. a simple spectrum mask). This information on detailed frequency use can be published either as part of the NTFA (e.g. in referenced annexes to the NTFA) or as a separate National Table of Frequency Use.

4 The essential requirements for effective national spectrum management

4.1 Legal basis for spectrum management

The foundation of effective spectrum management is to ensure that the legal basis for the regulation of the spectrum is set out in legislation and detailed in regulations made pursuant to the legislation. Legislation should set out such things as definitions, powers of the Minister or head of the spectrum regulatory authority, the powers of others involved in spectrum regulation, offences and penalties and the organizational structure and framework for regulation of the spectrum.

In addition to the legislation and regulations, there may be other publications issued by the spectrum regulator that provide guidance to a specific group or groups of users of the spectrum.

Something to consider when establishing the legal framework is the use of *incorporation by reference*. Since legislation or even regulations are usually not frequently amended, often incorporation by reference is used to give legal effect to subservient text or documents. Under incorporation by reference, texts in one document having a certain legal status, such as the legislation or regulations, may cite other documents that normally would not have the same legal status and, depending on the nature of such reference, incorporation may confer the same legal status on these other documents. For example, regulations may state that a certain standard, perhaps developed by an international body, shall apply in a given situation. Such incorporation by reference of texts can be of two types: static incorporation or dynamic incorporation. In the former, a specific document issued at a specific date is referred to in the legal text. In the case of dynamic incorporation by reference, the reference in the legal text is to a specific document but with a phrase like "as amended from time to time", which allows for changes without going through the entire legislation or regulation approval process.

In order to preserve clarity and authority in rule-making, the scope of such delegation should be clearly defined. Legislation and/or regulations must make clear who has authority to designate changing sources of external reference when these are not already specified in existing regulation. Such delegation should be set out in a delegation instrument approved by that institution. The development of legislation and regulations and all subservient documentation should be developed in a transparent way with full consultation of spectrum users.

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[7] It should be noted that Article 18 (18.1.1) of the Regulations mandates that: *"No transmitting station may be established or operated by a private person or by any enterprise without a licence issued in an appropriate form and in conformity with the provisions of these Regulations by or on behalf of the government of the country to which the station in question is subject"*. Hence, "*licence-exempt*" and similar expressions (e.g. "*unlicensed*", etc.), refers to radio devices with transmitting capabilities (emitting radio waves) that can be operated by any person, without previously obtaining a particular authorization for it (particular licence).

This particular licensing waiving is only possible because of operation of such devices has been previously authorized to all public through a Generic Use Authorization (GUA), also named *General Licence*, or equivalent names. GUA always includes a set of detailed technical and operational specifications that must be strictly obeyed when operating such devices, in order to guarantee they can be used with a very low risk of causing interference to other similar devices or other services. Then, when a NTFA includes these licence exemptions, the pertinent GUA (or equivalent) should also be included or referenced.

The primary telecommunication legislation should require and authorise the administration to establish a National Table of Frequency Allocations. However, some countries do not include the NTFA itself in the primary legislation. Provided the administration has sufficient enforcement powers, the NTFA can be implemented in practice through licensing and agreement with the other government departments. This gives the administrator or regulator the flexibility to revise the NTFA, when required and subject to consultation, without delays caused by the processes required to change primary legislation.

4.2   Institutional organisation of spectrum management

As described above, the legislation will establish the national authority for spectrum management. In turn, this will depend on overall government policy on national regulatory arrangements. For example, the authority might be a government ministry or an independent regulator; the ministry might be responsible for policy decisions and the regulator for executive matters; often, there are separate authorities for government and non-government radio use.

Whichever organisational option is used, there should be a single organisation with the overall authority to represent the country as the *administration* at ITU.

However, even if this organisation has also been given sole authority for *all* national allocation and assignment, a senior level (i.e. cabinet office) committee should be established to consider and agree major national spectrum allocation strategy and policy issues with the aim of achieving a rational balance between government and non-government use. At the very least, all government spectrum users should be represented at this committee. For example, typical government ministry stakeholders might be: telecommunications, defence, transport, media (broadcasting). Such a policy and strategy committee would probably be chaired by telecommunications, or possibly jointly chaired with defence. In the case where an independent telecommunication regulator has been established, telecommunications might be represented directly by the ministry or be delegated to the regulator.

4.3   Consultation with major spectrum stakeholders

Consultation with stakeholders is essential in virtually every aspect of spectrum management including the development of national legislation and regulations, spectrum policies, technical standards, etc. The type and extent of consultation will depend on government policy and how the institutional authority for spectrum management has been organised. At the working committees described above, it would be normal to include major non-government spectrum stakeholders (e.g. service providers, telecom industry, broadcasting organisations).

While it is seldom practical to consult with each individual spectrum user, effective consultations can take place by also allowing associations or bodies representing groups of users to contribute. In order to facilitate consultation on important spectrum management issues, it is important that the spectrum regulator proposals be made public. In some countries, this is required under broader national legislation governing all regulatory activities, perhaps by a requirement for setting out proposals in an official or widely-distributed publication and/or increasingly by using the Internet and official web pages. Sometimes, several options are presented for public comment. It may also be helpful to allow for exchanges between interested parties. Often, meetings are held between the spectrum regulator and relevant stakeholders and the Internet has increasingly become a standard tool for such consultations. Regardless of the means for obtaining input, minimal guidelines allowing interested parties to contribute should be set, such as allowing for a given period of time, with a deadline by which comments must be submitted. In all consultations, transparency and fairness are paramount.

4.4   National spectrum control and enforcement

National laws and regulations are useless unless the administration has the legal power and practical means to monitor whether spectrum use is in accordance with those laws and regulations and to take effective action against violations. Some form of national spectrum monitoring capability is therefore required to

undertake regular monitoring campaigns to obtain information on spectrum use and gather evidence of illegal activity to support subsequent legal action against offenders. The illegal activity can take the form of unlicensed transmissions or operation that does not conform to the conditions of a licence. Such activity can cause serious disruption to official and commercial national communications. In addition, the administration has an obligation to ensure all emissions from its territory conform to the Radio Regulations and do not cause harmful interference to services, operated in accordance with the Regulations, by other countries. Administrations are encouraged to examine the regular reports from the International Monitoring System to check whether any stations operated from their territory have been reported. Annex 1 contains several references to ITU publications to assist in developing a monitoring capability to assist spectrum management.

5   National spectrum planning and the Table of Frequency Allocations

National spectrum planning should be one of the duties of the spectrum policy and strategy committee, including setting up regular reviews, in particular as part of the preparations for ITU radio conferences. It should be emphasized here that there is a direct relationship between effective planning of the spectrum resource through the continuous review of NTFAs and the economic impact of national spectrum use through an effective and efficient spectrum allocation consistent with international spectrum harmonization.

The NTFA is the published outcome of national spectrum planning. Therefore the national spectrum policy objectives embedded in the NTFA should not only ensure technical compatibility but also *provide the legal/regulatory basis for maximizing economic output from the utilization of the spectrum resource in the particular context of the corresponding country.* Market implications, closer alignment with trading partners and cost efficiencies are all relevant economic aspects in direct relationship with a well planned NTFA.

The spectrum policy and strategy committee should provide broad policy and strategy guidelines for the development of the NTFA taking into account technical and economic objectives. The administration (ministry or regulator) should then take the lead in preparing a draft for committee consideration and agreement. The regulator would normal establish working groups to undertake the detailed technical and regulatory work and provide the expertise in frequency assignment, spectrum engineering, monitoring and standardisation. Representatives from relevant government departments would automatically be working group members to provide detailed advice on government spectrum use and requirements. It is also beneficial to invite experts and practitioners from major non-government spectrum stakeholders to participate.

The NTFA will take the international Table of Frequency Allocations as the source document and work through each frequency band to decide which service allocations are required nationally and, in the case where there is more than one organisation responsible for frequency assignments (for example government and non-government use), decide how frequency bands (or parts of frequency bands) should be shared between the organisations concerned.

Some flexibility is possible with national allocations while maintaining conformity with the Radio Regulations. For example, only those international footnotes relevant to the country need to be applied as national footnotes. Also, in cases where, in the Regulations, a frequency band is allocated to several services, an administration may select which of those services may operate in its territory (choosing one or several) or may decide to split the band into sub-bands, each allocated to one or more services allocated in the Regulations.

6   National Table of Frequency Allocations: structure

A National Table of Frequency Allocations is a method for presenting the national spectrum plan in an easily understandable (tabular) format. As the NTFA is derived from the international Table of Frequency Allocations (Article 5 of the Regulations), the same tabular structure is used as it may easily be adapted to show national allocations, simply by inserting additional columns.

A generic example is shown in Annex A3.1. The first three columns are copied from the Radio Regulations and show the allocations for the three ITU Regions. The order of the region columns could be changed, so the pertinent regional column may be seen beside the national columns, thereby easing comparisons. Two columns are added to show national spectrum use. The first national column shows the frequency band and national service allocation. The second column "Use" shows which national organisations have assignment responsibility for each sub-band by letter codes: G = Government; NG = Non-Government; P = shared between G and NG.

Some flexibility is possible with national allocations while maintaining conformity with the Radio Regulations. In this example, only those international footnotes relevant to the country are listed in the national footnote column. In cases where a band is allocated to several services, an administration may select which of those services may operate in its territory. This flexibility is shown in the generic example. However, for frequency co-ordination, the country must co-ordinate with other countries on the basis of the Regulations allocations unless bi- or multilateral agreement exists.

In order to provide a complete explanatory framework for their National Table of Frequency Allocations, most countries include considerably more information; a generic example is shown in Annex A3.2. The different chapters provide explanatory and definition texts and are usually copied from the Radio Regulations (RR) as the majority of national users are unlikely to have a copy of the Regulations. Additional annexes may also be used to provide detailed information on national frequency use and limitations as described in Section 7 below.

7   National frequency use information

7.1   Relevant information

As explained above, the NTFA provides a general plan for spectrum use at the national service allocation level. Considerably more detailed planning is required at the national assignment level and this can be provided by a National Table of Frequency Use as a separate companion to, or as part of, the NTFA. The amount of and type of information included is optional and depends on the resources of the administration to compile the information. Country examples are given in Annexes A8.1 to A8.5. The main categories of information provided are:

- Detailed information about the assignment of frequencies or blocks of frequencies to different types of system (channelling plans), application or major use. However, assignments to individual stations are not normally shown. (NTFA and spectrum user databases are different but complementary. Examples are given in Annex A4.2).

- Technical conditions for frequency access, for example: channel arrangements, bandwidths, transmitter power limits and equipment standards. Examples are given in Annex A4.3.

- Licensing conditions for frequency access. (Examples of national band sharing arrangements are given in Annex A4.4 and cross-border frequency co-ordination in Annex A4.5.

- Future re-allocations (repurposing): as a result of long-term planning, decisions taken related to future changes of services allocations in some bands shall be duly indicated in the NTFA, with relevant information such as:

  - *assignment freezing*: warning that no new licences will be granted to stations intended to provide current service(s) and relevant conditions (dates, areas, etc.);

  - *reallocation roadmap*: indicating the intended new service(s) and relevant conditions (dates, areas, etc.).

  These national particularities could be indicated through footnotes in the national allocation column (with different nomenclature than that used for the Regulations footnotes, to avoid confusion); in those

footnotes, the necessary links can be established with pertinent NTFA annexes (e.g. band plans and associated roadmaps, retained applications and/or technologies, repurposing roadmaps, etc.)

With an appropriate software tool, it would be possible for the NFTA to depict the present situation and proposals for future years, considering the above mentioned national particularities.

7.2   Options for presenting national frequency use information

There are different options for presenting and publishing national frequency use information. Some administrations publish the information in a separate table. Most of the country examples examined in the preparation of these guidelines provide the information as detailed national footnotes or annexes to the NTFA that may be referenced in additional columns.

The basic NTFA will have columns with the frequency range, the ITU regional international allocation, the national allocation, the type of service and the regional harmonized conditions where applicable. In addition to this basic information, it is becoming very important also to include information that is not only useful nationally but also internationally. This is due to the fact that ICT equipment makers and commercial providers often consult the NTFAs in order to ensure that equipment will be compliant with national requirements.

Therefore, some countries have added, in addition to the basic fields of the NTFA, two (or more) relevant fields: "Summary of use", which explains the <u>types of devices</u> normally deployed in a band; and "References to national policies", which provides direct reference to the relevant regulatory prescriptions (e.g. Licence Exempt details, worldwide or regional compliance standards and national prescriptions). This information is extremely useful in lowering compliance costs and avoiding wrongful import of incompatible wireless devices. In addition to this more expanded NTFA use, it is also a positive addition to link the NTFA to published documents on the details of use of each type of service and the bands they operate in, such as fixed services bands, mobile services bands, broadcasting bands, general user bands, etc. All this provides extensive benefits from the work put into NTFAs.

8   Practical steps to develop a NTFA

An NTFA is a tabular representation (in frequency order) of a previously developed plan for national spectrum and frequency use. Most of the examples of NTFAs shown in the annex are from countries with well-developed national plans. However, there are countries that are in the preliminary stages of introducing spectrum management and are starting with no spectrum plan. In this case, a "skeleton" NTFA can provide a helpful map to enable a logical approach to deciding how to allocate spectrum to services to meet national requirements. An example procedure would be as follows:

a)   Using the international allocation table, construct a draft national table by selecting the allocation "column" for the Region concerned as the base.

b)   Identify and add all footnotes relevant for the Region and country concerned.

c)   Identify and "reserve" in the draft table the frequency bands used by all major "international" services, systems or applications which are already in use or are likely to be used in the country:

- international services for maritime and aeronautical;

- public mobile communications systems;

- broadcasting (especially if there is an ITU regional allotment plan);

- fixed services – use ITU-R recommended frequency arrangements;

- non-public mobile systems - unfortunately there are no ITU recommended channel arrangements, so it will be necessary to consider examples from other countries in the Region concerned and adopt the most common and comprehensive plans;

- fixed and mobile satellite bands, (especially if there is an allotment plan);

- public protection and disaster relief radiocommunication systems (see Recommendation ITU-R M.2015).

d) Identify and reserve in the draft national table all allocations that would be difficult to use without causing interference to (or receiving interference from) services in other countries operating in accordance with the Radio Regulations, even though such services might not be used in the country concerned:

- primary amateur radio allocations;

- radio astronomy (especially frequency bands where all emissions are prohibited);

- frequencies used for industrial scientific and medical applications;

- frequencies used for short-range devices. See ITU-R Recommendation SM.1896: Frequency ranges for global or regional harmonization of short-range devices (SRDs).

e) Collect information on existing national frequency use. Potential sources: existing licensing and assignment records; request users to provide information from their own records; spectrum monitoring. Potential problems:

- records destroyed or no records kept;

- inadequate records – critical information missing (frequencies, transmitter location);

- users (especially government users) might be reluctant to hand over information for security;

- insufficient resources (personnel, equipment) to monitor spectrum in large country.

Annex 10 contains an actual example of a national exercise to collect spectrum usage information to improve spectrum management by requesting existing users to complete a "template" specifying details of use**.**

f) When existing national use is added to the Table, it is most likely that some will not conform to the Radio Regulations or will be using frequencies within frequency bands identified for the services and applications listed above. A transition plan should be prepared for the migration of non-conforming use to the new plan.

g) If some form of monitoring capability is available, especially mobile monitoring, it may be used to verify existing records of spectrum use. Where records are poor or non-existent, monitoring can be used to determine actual frequency use, including finding transmitter locations and control points by direction finding. Annex 1 provides several links to ITU resources for information on monitoring equipment, procedures and practices.

9   Publishing the NTFA and national frequency use tables

Some years ago, a National Table of Frequency Allocations would have been considered a confidential government record and not suitable for public information. With increasing global telecommunications and liberalization of telecommunication markets, it has become a necessity to publish the information as an aid to investment and market planning. An Internet search for "National Frequency Allocation Table", or a visit to the web site of most administrations shows that the majority of administrations publish their tables in a fairly standard format that can be downloaded. Electronic publication is more convenient and cost effective both for administration and user than, for example, a paper version.

Annex 5 contains, in its sub-Annexes, actual examples of published NTFA and Annex 6 contains actual examples of published national footnotes. All of these examples were obtained from administration web sites.

Given the usefulness and flexibility provided by software applications, implementing searchable on-line NTFAs is becoming a need for administrations wanting to provide the public with:

a) a public electronic record that is readily available and with timely updating;

b) a tool for identifying and flagging future modifications to the NTFA, for newly-planned bands and/or services;

c) clear information about the actual use versus allocation of any particular band (in cases of public safety, defense and other restricted government use, these can be simply labelled as "government use" for example);

d) a source of on-line information that can be used to generate important statistics/analytics on spectrum use.

Annex 9 has examples of administration on-line frequency information and e-licensing systems.

Annex 11 has a list of websites and URLs to access many on-line or downloadable NTFAs. These URLs are correct at the time these guidelines were produced.

Annex A5.7 contains an example of the national frequency allocation chart facility in the ITU Spectrum Management System for Developing Countries (SMS4DC[8]). This demonstrates how a National Table of Frequency Allocations can be integrated into the national spectrum management system. Once it has been programmed with the NTFA (including national footnotes e.g. information on channel arrangements applicable to each frequency band), it provides a comprehensive reference facility for frequency assignment staff using SMS4DC.

10 Regional co-operation in presenting National Frequency Allocation Tables

There is considerable regional co-operation and harmonization in spectrum management. This has resulted in regional telecommunications organizations providing "one-stop-shop" frequency allocation and use information systems. A detailed description of regional harmonization and regional organizations is given in ITU-R Report SM.2093. Examples are given in Annex 7.

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[8] See: www.itu.int/pub/D-STG-SPEC

Annex 1: List of reference material (relevant to preparation of an NTFA)

ITU-R Study Group 1 (SG1) (www.itu.int/en/ITU-R/study-groups/rsg1/Pages/default.aspx) is directly involved in Spectrum Management (principles and techniques, general principles of sharing, spectrum monitoring, long-term strategies for spectrum utilization, economic approaches to national spectrum management, automated techniques and assistance to developing countries in cooperation with the Telecommunication Development Sector).

However, certain recommendations from other study groups will assist NTFA preparation e.g. recommendations on channelling arrangements for the fixed service (see Annex A4.2.9).

ITU-R Recommendations

SM.1050 Tasks of a monitoring service

SM.1139 International monitoring system

SM.1265 National alternative allocation methods

SM.1370 Design guidelines for developing automated spectrum management systems

SM.1392 Essential requirements for a spectrum monitoring system for developing countries

SM.1447 Monitoring of the radio coverage of land mobile networks to verify compliance with a given licence

SM.1537 Automation and integration of spectrum monitoring systems with automated spectrum management

SM.1603 Spectrum redeployment as a method of national spectrum management

SM.1880 Spectrum occupancy measurement

SM.1896 Frequency ranges for global or regional harmonization of short-range devices (SRDs)

ITU-R Handbooks and Reports

List of ITU Handbooks (see esp. SG01) and download links: www.itu.int/pub/R-HDB

SM.2012: Economic aspects of spectrum management

SM.2015: Methods for determining national long-term strategies for spectrum utilization

SM.2093: Guidance on the regulatory framework for national spectrum management

SM.2153: Technical and operating parameters and spectrum requirements for short-range devices

SM.2255: Technical characteristics, standards and frequency bands of operation for radio-frequency identification (RFID) and potential harmonization opportunities

Other ITU references

ITU Radio Regulations:

www.itu.int/pub/R-REG-RR/en

ITU International Monitoring System (Reports):

www.itu.int/en/ITU-R/terrestrial/monitoring/Pages/default.aspx

ITU BR Fixed and Mobile Services Department (especially frequency plans)

www.itu.int/en/ITU-R/terrestrial/fmd/Pages/default.aspx

ITU BR Space Services Department

www.itu.int/en/ITU-R/space/Pages/default.aspx

Other reference material

Radio Spectrum Management 2nd Edition (Withers)

Publisher: The Institution of Electrical Engineers

ISBN: 0 85296 770 5

Essentials of Modern Spectrum Management (Cave, Doyle, Webb).

Publisher: Cambridge University Press

ISBN: 978-0-521-20849-9

Annex 2: Radio Regulations: Extract form Article 5: Table of Frequency Allocations

Allocation to services		
Region 1	**Region 2**	**Region 3**
3 230-3 400	FIXED MOBILE except aeronautical mobile BROADCASTING 5.113 5.116 5.118	
3 400-3 500	AERONAUTICAL MOBILE (R)	
3 500-3 800 AMATEUR FIXED MOBILE except aeronautical mobile 5.92	**3 500-3 750** AMATEUR 5.119	**3 500-3 900** AMATEUR FIXED MOBILE
3 800-3 900 FIXED AERONAUTICAL MOBILE (OR) LAND MOBILE	**3 750-4 000** AMATEUR FIXED MOBILE except aeronautical mobile (R)	
3 900-3 950 AERONAUTICAL MOBILE (OR) 5.123		**3 900-3 950** AERONAUTICAL MOBILE BROADCASTING
3 950-4 000 FIXED BROADCASTING	5.122 5.125	**3 950-4 000** FIXED BROADCASTING 5.126
4 000-4 063	FIXED MARITIME MOBILE 5.127 5.126	
4 063-4 438	MARITIME MOBILE 5.79A 5.109 5.110 5.130 5.131 5.132 5.128	

4 438-4 488
FIXED
MOBILE except aeronautical mobile
    (R)
Radiolocation 5.132A
5.132B
	4 438-4 488
	FIXED
	MOBILE except aeronautical mobile
	    (R)
	RADIOLOCATION 5.132A
		4 438-4 488
		FIXED
		MOBILE except aeronautical mobile
		Radiolocation 5.132A

4 488-4 650
    FIXED
    MOBILE except aeronautical mobile (R)
		4 488-4 650
		FIXED
		MOBILE except aeronautical mobile

4 650-4 700	AERONAUTICAL MOBILE (R)	
4 700-4 750	AERONAUTICAL MOBILE (OR)	
4 750-4 850 FIXED AERONAUTICAL MOBILE (OR) LAND MOBILE BROADCASTING 5.113	**4 750-4 850** FIXED MOBILE except aeronautical mobile (R) BROADCASTING 5.113	**4 750-4 850** FIXED BROADCASTING 5.113 Land mobile
4 850-4 995	FIXED LAND MOBILE BROADCASTING 5.113	
4 995-5 003	STANDARD FREQUENCY AND TIME SIGNAL (5 000 kHz)	

The following presentational features and conventions should be noted:

ITU Regions (See Regulations 5.2 to 5.9): The Table is divided into three columns to show different allocations in the three ITU Regions *[probably need to include the Region map]*

Categories of services (See Regulations 5.23-5.31): Radiocommunication services printed in "capitals" (example: FIXED); these are called "primary" services); services the names of which are printed in "normal characters" (example: Mobile); these are called "secondary" services.

Categories of allocations (See Regulations 5.32-5.44): Footnotes to the Table are used to specify different category of service, additional allocations, alternative allocations and miscellaneous provisions. Examples:

5.133 ***Different category of service***: in Armenia, Azerbaijan, Belarus, the Russian Federation, Georgia, Kazakhstan, Latvia, Lithuania, Niger, Uzbekistan, Kyrgyzstan, Tajikistan, Turkmenistan and Ukraine, the allocation of the band 5 130-5 250 kHz to the mobile, except aeronautical mobile, service is on a primary basis (see No. 5.33). (WRC-12)

5.125 ***Additional allocation***: in Greenland, the band 3 950-4 000 kHz is also allocated to the broadcasting service on a primary basis. The power of the broadcasting stations operating in this band shall not exceed that necessary for a national service and shall in no case exceed 5 kW.

5.132B ***Alternative allocation***: in Armenia, Austria, Belarus, Moldova, Uzbekistan and Kyrgyzstan, the frequency band 4 438-4 488 kHz is allocated to the fixed and mobile, except aeronautical mobile (R), services on a primary basis. (WRC-12)

5.132 The frequencies 4 210 kHz, 6 314 kHz, 8 416.5 kHz, 12 579 kHz, 16 806.5 kHz, 19 680.5 kHz, 22 376 kHz and 26 100.5 kHz are the international frequencies for the transmission of maritime safety information (MSI) (see Appendix 17).

Annex 3: NTFA in table format and generic contents

A3.1: Generic presentation of an NTFA in table format

kHz

Allocation to Services			National Allocation	
Region 1	Region 2	Region 3	Frequency and Service	Use
4 063-4 438 MARITIME MOBILE 5.79A 5.109 5.110 5.130 5.131 5.132 ***5.128***			4063-4438 Maritime Mobile 5.79A 5.109 5.110 5.130 5.131 5.132	**G**
4 438-4 488 FIXED MOBILE except æronautical mobile (R) Radiolocation 5.132A	4 438-4 488 FIXED MOBILE except æronautical mobile (R) RADIOLOCATION 5.132A	4 438-4 488 FIXED MOBILE except æronautical mobile Radiolocation 5.132A	4 438-4 450 FIXED	**G**
			4 450-4 460 MOBILE except æronautical Mobile	**NG**
			4 460-4 488 Mobile except æronautical Mobile RADIOLOCATION 5.132A	**S** **(Mobile NG)** **(Radiolocation G)**

The Region 2 (imaginary) country example above demonstrates some flexibility for national allocations in accordance the Radio Regulations and national distribution of bands between government and non-government use.

- In the band 4 063-4 438 kHz: Footnote 5.128 is not applicable to the country and has been omitted in the national table; a Government (G) department is responsible for management.

- The band 4 438-4 488 kHz has been split into 3 sub-bands 4 438-4 450 kHz for Government FIXED services; 4 450-4 460 kHz for Non-Government MOBILE services; 4 460-4 488 shared between Government RADIOLOCATION services and Non-Government Mobile services with secondary *national* status. **Note:** the country must accept *international co-ordination* in accordance with the international table

A3.2: Generic contents of a National Table of Frequency Allocations

NTFA		Radio Regulations
Chapter 1		
	I. Meaning of abbreviations	
	II. Terms and definition	
	Section I. General terms	**1.2 - 1.15**
	Section II. Frequency management	**1.16 - 1.18**
	Section III. Radiocommunication services	**1.19 - 1.60**
	Section IV. Radio stations and systems	**1.61 - 1.115**
	Section V. Operational terms	**1.116 - 1.136**
	Section VI. Characteristics of emissions and radio equipment	**1.137 - 1.165**
	Section VII. Frequency sharing	**1.166 - 1.176**
	Section VIII. Technical terms relating to space	**1.177 - 1.191**
Chapter 2	Frequency bands	**2.1 - 2.2**
Chapter 3	Technical characteristics of stations	**3.1 - 3.14**
Chapter 4	Assignment and use of frequencies	
	Section I. General rules for assignment and use of frequencies	**4.1 - 4.9**
Chapter 5	Frequency allocations	**5.1**
	Section I. Regions and areas	**5.2 - 5.9**
	Section II. Categories of services and allocations	**5.23 - 5.44**
	Section III. Footnotes of the Radio Regulations	**5.53 - 5.565**
	Section IV. Plan of Frequency Bands Allocations in the [*Country*] (National Frequency Table)	**National footnotes and general information**
	Section V. National Frequency Table	
Annexes	Examples of annexes are given in Annex 4	

Annex 4: National table of frequency use: Typical information to be included (in annexes)

A4.1 The information about detailed frequency use, as described in paragraphs 4.2 – 4.4 below should be contained in annexes to the national table of frequency use, with appropriate references given in the Table. Examples of national table of frequency use and annexes are given in Annex 8.

A4.2   Identified frequency bands for typical systems and applications

Paragraphs 4.2.1 – 4.2.12 provide guidelines to identify major types of spectrum use and the frequency bands allocated or designated internationally.

A4.2.1   Identification of Government and Non-Government frequency bands

Frequency bands should be identified as either Government, Non-Government or shared (between government and non-government services and systems) . Where appropriate and within national security requirements, it may be helpful and informative to describe further the general type of government use e.g. defence, emergency services, etc.

A4.2.2   Identification of bands used by aeronautical services

Certain bands are allocated in the Radio Regulations for aeronautical mobile services. The channel and allotment plans are included in the Radio Regulations. Some countries include this detailed information in their NTFA.

> **Appendix 26**: Provisions and associated frequency allotment plan for the aeronautical mobile (OR) service in the bands allocated exclusively to that service between 3 025 kHz and 18 030 kHz

> **Appendix 27**: Frequency allotment plan for the aeronautical mobile (R) service and related information

The International Civil Aviation Organisation (ICAO) coordinates the use of other frequency bands allocated to the aeronautical mobile service and aeronautical radionavigation service. For the latest information the relevant ICAO publications should be checked. Examples of frequency use of the main aeronautical systems are:

255-495 kHz 505-526.5 kHz	Non-directional beacons (NDB) and locators
108-117.975 MHz	Instrument Landing System (ILS) localizer (below 112 MHz), VHF OmniRanging (VOR) and Ground-Based Augmentation System (GBAS):
117.975-137.0 MHz	Air-ground communications
328.6-335.4 MHz	ILS Glide Path
960-1215 MHz	Distance Measuring Equipment (DME)
5030-5150 MHz	Microwave Landing System (MLS)

A4.2.3   Identification of bands used by maritime services

Certain bands are allocated in the Radio Regulations for Maritime Mobile services. The channel and allotment plans are included in the Radio Regulations. Some countries include this detailed information in their NTFA.

> **Appendix 17**: Frequencies and channelling arrangements in the high-frequency bands for the maritime mobile service

> **Appendix 18**: Table of transmitting frequencies in the VHF maritime mobile band

> **Appendix 25**: Provisions and associated frequency allotment plan for coast radiotelephone stations operating in the exclusive maritime mobile bands between 4 000 kHz and 27 500 kHz

Also *5.287*: In the maritime mobile service, the frequencies 457.525 MHz, 457.550 MHz, 457.575 MHz, 467.525 MHz, 467.550 MHz and 467.575 MHz may be used by on-board communication stations. Where needed, equipment designed for 12.5 kHz channel spacing using also the additional frequencies 457.5375 MHz, 457.5625 MHz, 467.5375 MHz and 467.5625 MHz may be introduced for on-board communications. The use of these frequencies in territorial waters may be subject to the national regulations of the administration concerned. The characteristics of the equipment used shall conform to those specified in Recommendation ITU-R M.1174-2. (WRC-07)

A4.2.4   Identification of frequency bands used by public mobile communications systems

Examples of footnotes in the Radio Regulations identifying frequency bands for use by International Mobile Telecommunications (IMT):

5.317A Those parts of the band 698-960 MHz in Region 2 and the band 790-960 MHz in Regions 1 and 3 which are allocated to the mobile service on a primary basis are identified for use by administrations wishing to implement International Mobile Telecommunications (IMT) – see Resolutions **224 (Rev.WRC-12)** and **749 (Rev.WRC-12)**, as appropriate. This identification does not preclude the use of these bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. (WRC-12)

5.384A The bands, or portions of the bands, 1 710-1 885 MHz, 2 300-2 400 MHz and 2 500-2 690 MHz, are identified for use by administrations wishing to implement International Mobile Telecommunications (IMT) in accordance with Resolution **223 (Rev.WRC-07)***. This identification does not preclude the use of these bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. (WRC-07)

5.388 The bands 1 885-2 025 MHz and 2 110-2 200 MHz are intended for use, on a worldwide basis, by administrations wishing to implement International Mobile Telecommunications (IMT). Such use does not preclude the use of these bands by other services to which they are allocated. The bands should be made available for IMT in accordance with Resolution **212 (Rev.WRC-07)** (See also Resolution **223 (Rev.WRC-07)***). (WRC-12)

A4.2.5   Identification of frequency bands used for Public protection and disaster relief (PPDR)

Resolution 646 (Rev.WRC-12) identifies frequency bands in the three ITU Regions for PPDR use. In accordance with this Resolution, ITU-R Recommendation M.2015 recommends suitable frequency arrangements.

A4.2.6   Identification of frequencies used for Distress and Safety, Search and Rescue and Emergency.

The frequencies that could be listed are those identified in the Radio Regulations and those that have been designated on a national base.

Example frequencies identified in the Radio Regulations are:

- 5.82 Transmission by coast stations or meteorological and navigational warnings and urgent information to ships by means of narrow-band direct-printing (NBDP) telegraphy (national NAVTEX).
- 5.108 International distress and calling frequencies for radiotelephony.
- 5.109 GMDSS distress and safety calls using digital selective calling (DSC).
- 5.110 International distress frequencies for narrow-band direct-printing telegraphy.
- 5.111 Frequencies used for search and rescue operations concerning manned space vehicles.
- 5.132 International frequencies for the transmission of maritime safety information.

A4.2.7   Identification of frequency bands used for short range devices

Short range devices (SRD) have a wide variety of uses and operate on frequencies throughout the spectrum. In some countries, because of the low interference potential, SRD operate on a licence-exempt basis subject to certain technical and operational conditions. ITU-R Recommendation SM.1896 recommends frequency ranges for global or regional harmonization of short-range devices.

A4.2.8   Identification of frequency bands used for land mobile systems for private business use

Land mobile systems for private business (also known as Private Mobile Radio (PMR)) operate in parts of the VHF and UHF bands allocated to the Land Mobile service. There is some regional harmonisation of use and channel arrangements. Annex A8.4 is an example of frequency band and channelling arrangements used in some European countries for the frequency range 27 – 960 MHz. It shows how sub-bands are used for single frequency (simplex) operation and paired sub-bands used for two-frequency (duplex) operation.

A4.2.9   Identification of frequency bands used for the fixed service

ITU-R has published a series of recommended radio-frequency channel arrangements for bands allocated to the fixed service. A list of these recommendations (January 2014) is given in the table below.

ITU Rec	Recommendation Title
F-342	Radio-frequency channel arrangements for fixed wireless systems operating in the 2 and 4 GHz bands
F-343	Radio-frequency channel arrangements for high-capacity fixed wireless systems operating in the lower 6 GHz (5 925 to 6 425 MHz) band
F-384	Radio-frequency channel arrangements for medium- and high- capacity digital fixed wireless systems operating in the 6 425-7 125 MHz band
F-385	Radio-frequency channel arrangements for fixed wireless systems operating in the 7 110-7 900 MHz band
F-386	Radio-frequency channel arrangements for fixed wireless systems operating in the 8 GHz (7 725 to 8 500 MHz) band
F-387	Radio-frequency channel arrangements for fixed wireless systems operating in the 10.7-11.7 GHz band
F-497	Radio-frequency channel arrangements for fixed wireless systems operating in the 13 GHz (12.75-13.25 GHz) frequency band
F-595	Radio-frequency channel arrangements for fixed wireless systems operating in the 17.7-19.7 GHz frequency band
F-635	Radio-frequency channel arrangements based on a homogeneous pattern for fixed wireless systems operating in the 4 GHz (3 400-4 200 MHz) band
F-636	Radio-frequency channel arrangements for fixed wireless systems operating in the 14.4-15.35 GHz band
F-637	Radio-frequency channel arrangements for fixed wireless systems operating in the 21.2-23.6 GHz band
F-701	Radio-frequency channel arrangements for digital point-to-multipoint radio systems operating in frequency bands in the range 1 350 to 2 690 MHz (1.5, 1.8, 2.0, 2.2, 2.4 and 2.6 GHz)
F-747	Radio-frequency channel arrangements for fixed wireless system operating in the 10.0-10.68 GHz band
F-748	Radio-frequency arrangements for systems of the fixed service operating in the 25, 26 and 28 GHz bands
F-749	Radio-frequency arrangements for systems of the fixed service operating in sub-bands in the 36-40.5 GHz band
F-1098	Radio-frequency channel arrangements for fixed wireless systems in the 1 900-2 300 MHz band
F-1099	Radio-frequency channel arrangements for high- and medium-capacity digital fixed wireless systems in the upper 4 GHz (4 400-5 000 MHz) band
F-1242	Radio-frequency channel arrangements for digital radio systems operating in the range 1 350 MHz to 1 530 MHz

ITU Rec	Recommendation Title
F-1243	Radio-frequency channel arrangements for digital radio systems operating in the range 2 290-2 670 MHz
F-1496	Radio-frequency channel arrangements for fixed wireless systems operating in the band 51.4-52.6 GHz
F-1497	Radio-frequency channel arrangements for fixed wireless systems operating in the band 55.78-59 GHz
F-1520	Radio-frequency arrangements for systems in the fixed service operating in the band 31.8-33.4 GHz
F-1567	Radio-frequency channel arrangement for digital fixed wireless systems operating in the frequency band 406.1-450 MHz
F-1568	Radio-frequency block arrangements for fixed wireless access systems in the range 10.15-10.3/10.5-10.65 GHz
F-2004	Radio-frequency channel arrangements for fixed service systems operating in the 92-95 GHz range
F-2005	Radio-frequency channel and block arrangements for fixed wireless systems operating in the 42 GHz (40.5 to 43.5 GHz) band
F-2006	Radio-frequency channel and block arrangements for fixed wireless systems operating in the 71-76 and 81-86 GHz bands

A4.2.10   Identification of frequency bands used for radio astronomy

The Radio Regulations allocate or identify a number of frequency bands for the radio astronomy service. In some bands all emissions are prohibited, in other bands administrations are urged to tale all practical steps to protect the service.

5.340 All emissions are prohibited in the following bands:

Bands below 100 GHz	Bands above 100 GHz
1 400-1 427 MHz,	100-102 GHz,
2 690-2 700 MHz, except those provided for by No. **5.422**,	109.5-111.8 GHz,
10.68-10.7 GHz, except those provided for by No. **5.483**,	114.25-116 GHz,
15.35-15.4 GHz, except those provided for by No. **5.511**,	148.5-151.5 GHz,
23.6-24 GHz,	164-167 GHz,
31.3-31.5 GHz,	182-185 GHz,
31.5-31.8 GHz, in Region 2,	190-191.8 GHz,
48.94-49.04 GHz, from airborne stations	200-209 GHz,
50.2-50.4 GHz2,	226-231.5 GHz,
52.6-54.25 GHz,	250-252 GHz. (WRC-03)
86-92 GHz,	

5.149 lists the following frequencies allocated to the radio astronomy service. Administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference.

Bands below 5 000 MHz	5 000 MHz – 100 GHz	Bands above 100 GHz
13 360-13 410 kHz,	6 650-6 675.2 MHz,	102-109.5 GHz,
25 550-25 670 kHz,	10.6-10.68 GHz,	111.8-114.25 GHz,
37.5-38.25 MHz,	14.47-14.5 GHz,	128.33-128.59 GHz,
73-74.6 MHz in Regions 1 and 3,	22.01-22.21 GHz,	129.23-129.49 GHz,
150.05-153 MHz in Region 1,	22.21-22.5 GHz,	130-134 GHz,
322-328.6 MHz,	22.81-22.86 GHz,	136-148.5 GHz,
406.1-410 MHz,	23.07-23.12 GHz,	151.5-158.5 GHz,
608-614 MHz in Regions 1 and 3,	31.2-31.3 GHz,	168.59-168.93 GHz,
1 330-1 400 MHz,	31.5-31.8 GHz in Regions 1 and 3,	171.11-171.45 GHz,
1 610.6-1 613.8 MHz,	36.43-36.5 GHz,	172.31-172.65 GHz,
1 660-1 670 MHz,	42.5-43.5 GHz,	173.52-173.85 GHz,
1 718.8-1 722.2 MHz,	48.94-49.04 GHz,	195.75-196.15 GHz,
2 655-2 690 MHz,	76-86 GHz,	209-226 GHz,
3 260-3 267 MHz,	92-94 GHz,	241-250 GHz,
3 332-3 339 MHz,	94.1-100 GHz,	252-275 GHz
3 345.8-3 352.5 MHz,		
4 825-4 835 MHz,		
4 950-4 990 MHz,		
4 990-5 000 MHz,		

A4.2.11   Identification of frequency bands used for industrial scientific and medical apparatus

ISM equipment generates radio-frequency energy for ISM applications (e.g. rf heating) and this can radiate to cause interference to radiocommunication services. ISM has the following provisions in the Radio Regulations:

5.138 The following bands: 6 765-6 795 kHz (centre frequency 6 780 kHz), 433.05-434.79 MHz (centre frequency 433.92 MHz) in Region 1 except in the countries mentioned in No. **5.280**, 61-61.5 GHz (centre frequency 61.25 GHz), 122-123 GHz (centre frequency 122.5 GHz), and 244-246 GHz (centre frequency 245 GHz) are designated for industrial, scientific and medical (ISM) applications. The use of these frequency bands for ISM applications shall be subject to special authorization by the administration concerned, in agreement with other administrations whose radiocommunication services might be affected. In applying this provision, administrations shall have due regard to the latest relevant ITU-R Recommendations.

5.150 The following bands:

13 553-13 567 kHz (centre frequency 13 560 kHz),

26 957-27 283 kHz (centre frequency 27 120 kHz),

40.66-40.70 MHz (centre frequency 40.68 MHz),

902-928 MHz in Region 2 (centre frequency 915 MHz),

2 400-2 500 MHz (centre frequency 2 450 MHz),

5 725-5 875 MHz (centre frequency 5 800 MHz), and

24-24.25 GHz (centre frequency 24.125 GHz)

are also designated for industrial, scientific and medical (ISM) applications. Radiocommunication services operating within these bands must accept harmful interference which may be caused by these applications. ISM equipment operating in these bands is subject to the provisions of No. **15.13**.

A4.2.12   Identification of bands used for new methods of frequency allocation and assignment

A number of studies are in progress in ITU-R and by some administrations concerning more flexible allocation and assignment methods including those using new technology. Those administrations adopting these new methods and techniques are likely to identify the spectrum in their NTFAs. Examples of these methods and technologies are:

- *Flexible use frequency bands*: These bands are not reserved or licenced for specific purposes but may be used for any purpose provided the technology meets certain technical requirements, often specified as a "spectrum mask".

- *White Space Spectrum*: This technology uses gaps in radio spectrum, called white spaces, which exist in between frequency bands that, for example, have been reserved for TV broadcasting and wireless microphones broadcasting (470 MHz to 790 MHz). Use of these white spaces will allow devices to transmit and receive wireless signals for applications such as broadband access for rural communities, Wi-Fi-like services or new machine-to-machine networks. Compared with other forms of wireless technologies, such as regular Bluetooth and Wi-Fi, the radio waves used by "White Space Devices" (WSD) will be able to travel larger distances and easily through walls as they would use UHF frequencies. The use of white space technology will be one way of meeting the growing demand for mobile data in many countries.

- *Ultra Wide Band (UWB)*: Ultra-wideband is a technology for transmitting information spread over a large bandwidth (>500 MHz); this should, in theory and under the right circumstances, be able to share spectrum with other users. After considerable study in ITU, regulatory and technical criteria have been established that are intended to provide an efficient use of radio bandwidth while enabling a range of high value applications, for example: high-data-rate personal area network (PAN) wireless connectivity; longer-range, low-data-rate applications; and radar and imaging systems. However, due to the wide-band nature of these devices they are permitted to operate across many frequency bands and for this reason it may be impractical to include them in the footnotes.

A4.3   Technical conditions for frequency access: channel arrangements, licence exempt

Each type of application identified in the national frequency use table should have certain technical conditions for frequency access. Some administrations include the basic technical requirements in the Radio Regulations for example:

- Radio Regulations Appendix 1: Classification of emissions and necessary bandwidths.

- Radio Regulations Appendix 2: Table of transmitter frequency tolerances.

ITU-R Recommendations and regional recommendations (examples to be given):

- channelling arrangements specifying: channel bandwidths; channel centre frequencies; for dual-frequency (duplex) channels the transmit and receive frequency sub-bands and frequency separation;

- planning standards: e.r.p. limits; co- and adjacent channel interference limits;

- relevant equipment standards.

Annex A8.3 provides an example template used by European countries to define, in a harmonised format, a list of parameters which can be used to regulate the use of the radio spectrum. Such Radio Interface Specifications (RIS) define the technical and licensing conditions for access to particular frequency bands. Each RIS is given a unique reference which can be shown against the relevant frequency band in the NTFA. The RIS provides sufficient information for users and equipment manufacturers to know what equipment is required to use specific frequency bands and what licensing regime will be applied.

A4.4 Special arrangements between government and non government use for band sharing

In some countries where spectrum has been allocated (nationally) for government and non-government use and managed by separate authorities, greater spectrum utilization can be achieved by special arrangements between the authorities for frequency sharing under certain circumstances. For example:

a) Spectrum allocated for government use might (for operational reasons) be required only in a few geographical areas, enabling non-government use in other, well-defined areas.

b) Government users might require certain sub-bands only in times of national emergency or special exercises. A co-operative arrangement would require the non-government users to cease use on command. This type of arrangement is ideally suited to cellular radio operators. It provides the operators with the benefit of additional (government) spectrum to cope with traffic congestion but use their well-managed networks to seamlessly switch their subscribers to their "exclusive" (non-government) spectrum when commanded.

c) Systems which have suitable technical characteristics maybe able to share spectrum, for example non-government short range devices.

In each case, provided that the authorities can reach agreement on access rights to the spectrum concerned and ensure the necessary protection to each others' services, a national footnote can be included in the NTFA referring to the terms of the agreement in an annex to the NTFA. An example of a special arrangement between government and non-government use is given in Annex A8.2.

A4.5 Special Arrangements, cross-border frequency coordination agreements and Memoranda of Understanding (MoU)

Countries with borders often have bi-lateral (and multi-lateral) special arrangements and Memoranda of Understanding with neighbouring countries to set out the technical and procedural arrangements for frequency sharing in border areas (see ITU-R SM.1049 : A method of spectrum management to be used for aiding frequency assignment for terrestrial services in border areas). As these can have a considerable impact on technical conditions and frequency availability in border areas, it useful to include these in annexes to the NTFA (or national frequency use table).

Annex 5: Examples of National Tables of Frequency Allocations

A5.1 *Moldova*: The presentation of this NTFA has been considerably simplified by displaying only the allocation column for the relevant ITU Region for the country. The Footnotes column contains national footnotes (RNnnn) and international footnotes relevant to Moldova. The Usage column indicates whether the band is for Government us (G), Non-Government use (NG), or shared use (P). The NTFA is available as downloadable PDF. Moldova also provides an on-line searchable "State Register of Radio Frequencies and Radio Stations". Administration web-site: www.cnfr.md/ (available in several languages).

A5.2 *Hungary*: The Hungarian NTFA shows the columns for allocations in the three ITU Regions, a column for the allocations relevant to Hungary, separate columns for civil, non-civil use and common use. National footnotes are shown. Hungary also has a separate Table of National Frequency Use (see Annex A7.1). Both tables may be downloaded from the administration web-site: http://english.nmhh.hu/

A5.3 *Germany*: The Germany frequency use plan is presented as a downloadable PDF database. It can be viewed (in German) at: www.bundesnetzagentur.de (Telecommunications – Frequency Management)

A5.4 *Kingdom of Bahrain*: This NTFA also combines a column for "Major Utilization in the Kingdom of Bahrain". In particular it provides an example of how frequency bands are designated on a national basis for public mobile telecommunication systems and also indicates the number of operators and division of spectrum between them and frequency arrangements. Spectrum documents may be downloaded from: www.tra.org.bh/EN/marketSpectrum.aspx

A5.5 *USA*: The USA NTFA is presented as a downloadable PDF. The three ITU Regions are shown (the USA has territories in Region 2 and Region 3); columns showing Federal and non-Federal Use (with national footnotes) and a column listing relevant references to the FCC Rule Part(s). The FCC Rules are in the Electronic Code of Federal Regulations (eCFR) www.gpo.gov/fdsys/search/home.action Browse "Code of Federal Regulations", Title 47 Telecommunications.

A5.6 *USA*: Graphical Spectrum Chart. This is published by the National Telecommunications and Information Administration (NTIA) responsible for US Federal Services. It can be downloaded from: www.ntia.doc.gov/files/ntia/publications/spectrum_wall_chart_aug2011.pdf

Such charts are useful to provide a broad oversight of allocations but are difficult to read in detail.

Annex A5.7 contains an example of the national frequency allocation chart facility in the ITU Spectrum Management System for Developing Countries (SMS4DC[9]). This demonstrates how a National Table of Frequency Allocations can be integrated into the national spectrum management system. Once it has been programmed with the NTFA (including national footnotes e.g. information on channel arrangements applicable to each frequency band), it provides a comprehensive reference facility for frequency assignment staff using SMS4DC.

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[9]   See: www.itu.int/pub/D-STG-SPEC

A5.1: Examples of a National Frequency Allocation Table: Moldova

Region 1	National allocation		
Frequency band – services - footnotes	Frequency band - services	Footnotes	Usage
143.65 - 144 MHz AERONAUTICAL MOBILE (OR) 5.210, 5.211, 5.212, 5.214	143.65 - 144 MHz AERONAUTICAL MOBILE (OR)	RN018, RN035	G
144 - 146 MHz AMATEUR AMATEUR-SATELLITE 5.216	144 - 146 MHz AMATEUR AMATEUR-SATELLITE	RN018, RN035	NG
146 - 148 MHz FIXED MOBILE except aeronautical mobile (R)	146 - 148 MHz FIXED MOBILE except aeronautical mobile (R)	RN018, RN018A, RN018B, RN035	G
148 – 149.9 MHz FIXED MOBILE except aeronautical mobile (R) MOBILE-SATELLITE (Earth-to-space) 5.209 5.218, 5.219, 5.221	148 - 149.9 MHz FIXED MOBILE except aeronautical mobile (R) MOBILE-SATELLITE (Earth-to-space)	5.209, 5.218, 5.219, 5.221 RN018, RN018A, RN035	G
149.9 – 150.05 MHz RADIONAVIGATION- SATELLITE 5.224B MOBILE-SATELLITE (Earth-to-space) 5.209, 5.224A 5.220, 5.222, 5.223	149.9 - 150.05 MHz RADIONAVIGATION- SATELLITE MOBILE-SATELLITE (Earth-to-space)	5.209, 5.220, 5.222, 5.223, 5.224A, 5.224B RN018, RN018A, RN035	P
150.05 - 153 MHz FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY 5.149	150.05 - 153 MHz FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY	5.149 RN018, RN018A, RN019, RN035	P
153 - 154 MHz FIXED MOBILE except aeronautical mobile (R) Meteorological Aids	153 - 154 MHz FIXED MOBILE except aeronautical mobile (R) Meteorological Aids	RN018, RN018A, RN019, RN035	P
154 - 156.4875 MHz	154 - 156.4875 MHz	5.226,	P

A5.2: Examples of a National Frequency Allocation Table: Hungary

INTERNATIONAL ALLOCATION				ALLOCATION IN HUNGARY		
RADIO REGULATIONS			RR ALLOCATION RELEVANT TO HUNGARY	NON-CIVIL	CIVIL	COMMON
REGION 1	REGION 2	REGION 3				
84-86 kHz RADIONAVIGATION 5.60	84-86 kHz RADIONAVIGATION 5.60 Fixed Maritime mobile 5.57 5.59		84-86 kHz RADIONAVIGATION 5.60	84-86 kHz H7	84-86 kHz H2 H5 H7	84-86 kHz RADIONAVIGATION 5.60 H3 H9
86-90 kHz FIXED MARITIME MOBILE 5.57 RADIONAVIGATION 5.56	86-90 kHz FIXED MARITIME MOBILE 5.57 RADIONAVIGATION 5.60		86-90 kHz FIXED MARITIME MOBILE 5.57 RADIONAVIGATION 5.56	86-90 kHz H7	86-90 kHz H2 H5 H7	86-90 kHz FIXED H6 RADIONAVIGATION H3 H9
90-110 kHz RADIONAVIGATION 5.62 Fixed 5.64	5.61 RADIONAVIGATION 5.62 Fixed 5.64		90-110 kHz RADIONAVIGATION 5.62 Fixed 5.64	90-110 kHz H7	90-110 kHz H2 H5 H7	90-110 kHz RADIONAVIGATION 5.62 H3 H4 Fixed 5.64 H6
110-112 kHz FIXED MARITIME MOBILE RADIONAVIGATION 5.64	110-130 kHz FIXED MARITIME MOBILE MARITIME RADIONAVIGATION 5.60 Radiolocation	110-112 kHz FIXED MARITIME MOBILE RADIONAVIGATION 5.60 5.64	110-112 kHz FIXED MARITIME MOBILE RADIONAVIGATION 5.64	110-112 kHz H7	110-112 kHz H2 H5 H7	110-112 kHz FIXED 5.64 H6 RADIONAVIGATION H3 H4
112-115 kHz FIXED RADIONAVIGATION 5.60 Maritime mobile 5.64 5.66		112-117.6 kHz RADIONAVIGATION 5.60 Fixed Maritime mobile 5.64 5.65	112-115 kHz RADIONAVIGATION 5.60 5.64	112-115 kHz H7	112-115 kHz H2 H5 H7	112-115 kHz RADIONAVIGATION 5.60 H3 H4
115-117.6 kHz RADIONAVIGATION 5.60 Maritime mobile 5.64 5.66			115-117.6 kHz RADIONAVIGATION 5.60 Fixed Maritime mobile 5.64	115-117.6 kHz H7	115-117.6 kHz H2 H5 H7	115-117.6 kHz RADIONAVIGATION 5.60 H3 H4 Fixed 5.64 H6
117.6-126 kHz FIXED MARITIME MOBILE RADIONAVIGATION 5.60 5.64		117.6-126 kHz FIXED MARITIME MOBILE RADIONAVIGATION 5.60 5.64	117.6-126 kHz FIXED MARITIME MOBILE RADIONAVIGATION 5.60 5.64	117.6-126 kHz H7	117.6-126 kHz H2 H5 H7	117.6-126 kHz FIXED 5.64 H6 RADIONAVIGATION 5.60 H3 H4
126-129 kHz RADIONAVIGATION 5.60 5.64		126-129 kHz RADIONAVIGATION 5.60 Fixed Maritime mobile 5.64 5.65	126-129 kHz RADIONAVIGATION 5.60	126-129 kHz H7	126-129 kHz H2 H5 H7	126-129 kHz RADIONAVIGATION 5.60 H3 H4

A5.3: Examples of a National Table of Frequency Allocations: Germany

© Bundesnetzagentur   Frequenznutzungsplan

Frequenznutzungsteilplan:	**14**	Eintrag: **14003**	Stand: AUGUST 2011

Frequenzbereich: 117,6 - 126 kHz

Nutzungsbestimmung(en): D64 2 5

Funkdienst: MOBILER SEEFUNKDIENST 3

Nutzung: ziv

Frequenznutzung: Seefunk

Frequenzteilbereich(e): 117,6 - 126 kHz

Frequenznutzungs-bedingungen:
Übertragung von Nachrichten
- zwischen Seefunkstellen oder
- Küstenfunkstellen und Seefunkstellen

Es gelten die technischen Parameter gemäß VO Funk.

Frequenznutzungsteilplan:	**14**	Eintrag: **14004**	Stand: AUGUST 2011

Frequenzbereich: 117,6 - 126 kHz

Nutzungsbestimmung(en): D64 2 5

Funkdienst: NAVIGATIONSFUNKDIENST D60

Nutzung: ziv

Frequenznutzung:

Frequenzteilbereich(e): 117,6 - 126 kHz

Frequenznutzungs-bedingungen: *Keine Frequenznutzung geplant*

Frequenznutzungsteilplan:	**15**	Eintrag: **15001**	Stand: AUGUST 2011

Frequenzbereich: 126 - 129 kHz

Nutzungsbestimmung(en): 2 5

Funkdienst: NAVIGATIONSFUNKDIENST D60

Nutzung: ziv, mil

Frequenznutzung: Navigationsfunk

Frequenzteilbereich(e): 126 - 129 kHz

Frequenznutzungs-bedingungen:
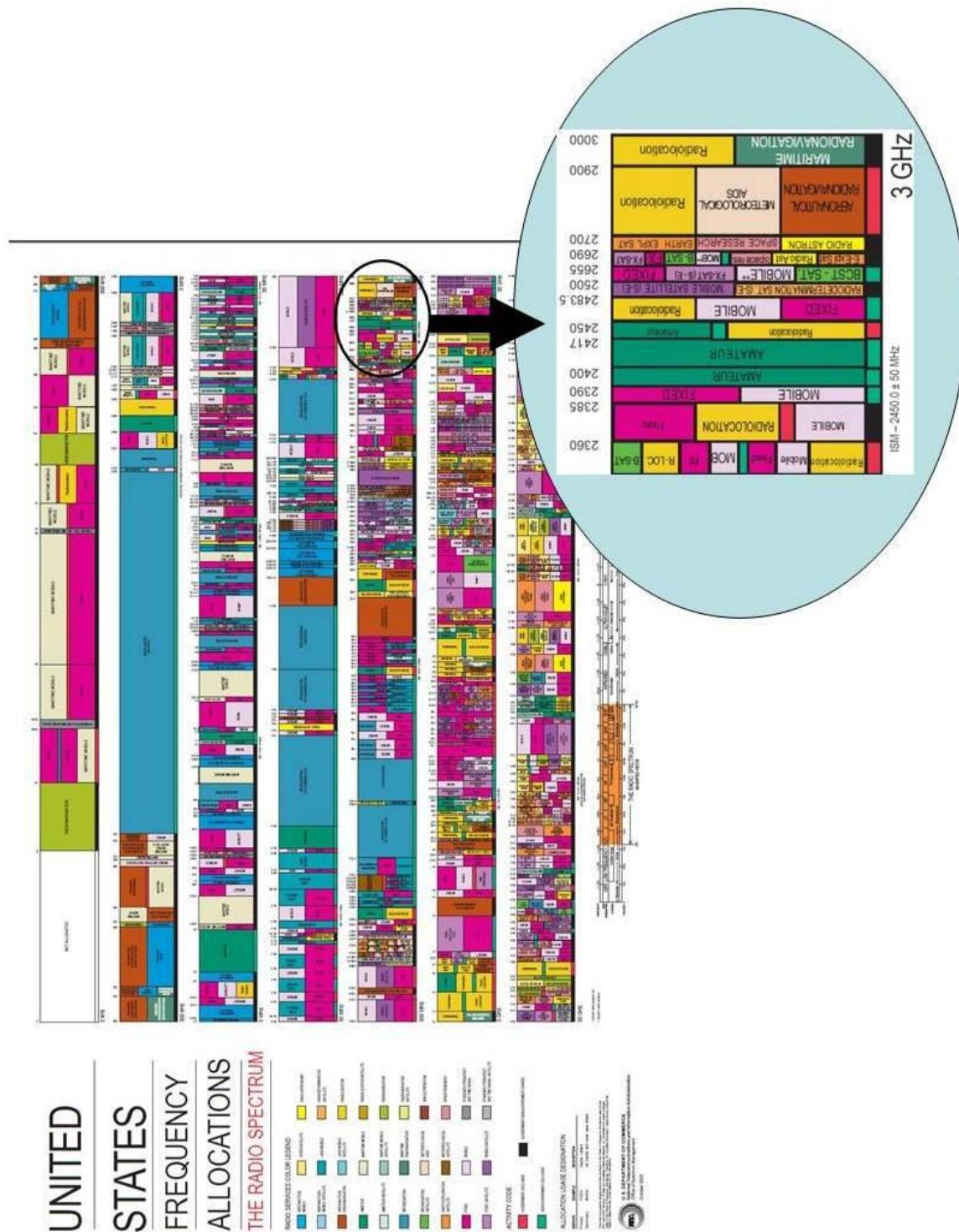
A5.4: Examples of National Table of Frequency Allocations: Kingdom of Bahrain

Frequency Allocation	ITU RR allocations for Region 1	National Allocations for Kingdom of Bahrain	Major utilization in Kingdom of Bahrain	Additional Information
1 710-2 025 MHz	1 710-1 930 FIXED MOBILE 5.384A 5.388A 5.388B 5.149 5.341 5.385 5.386 5.387 5.388	1 710-1 930 FIXED MOBILE 5.384A 5.388A 5.388B 5.149 5.341 5.385 5.388	Public fixed and mobile GSM1800 IMT candidate band (1710-1885 MHz) Op1 1735-1760 / 1830-1855 MHz, Op2 1780-1785 / 1875-1880 MHz GSM Guard band 1790 - 1795 MHz DECT 1880-1900 MHz IMT2000	1710-1785 MHz paired with 1805-1880 MHz 3rd mobile licence incl GSM1800 – 2x15 MHz IMT2000 TDD 1900-1920 MHz FDD 1920-1930 / 2110-2120 MHz
	1 930-1 970 FIXED MOBILE 5.388A 5.388	1 930-1 970 FIXED MOBILE 5.388A 5.388	Public fixed and mobile IMT2000 (FDD) 3 operators each with 2x15 MHz FDD & 5 MHz TDD	IMT2000 FDD 1930 – 1970 / 2120 – 2160 MHz
	1 970-1 980 FIXED MOBILE 5.388A 5.388	1 970-1 980 FIXED MOBILE 5.388A 5.388	IMT2000 (FDD)	IMT2000 FDD 1970 – 1980 / 2160 – 2170 MHz
	1 980-2 010 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.351A 5.388 5.389A 5.389B 5.389F	1 980-2 010 FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.351A 5.388 5.389A 5.389B 5.389F	IMT2000 space segment	
	2 010-2 025 FIXED MOBILE 5.388A 5.388B 5.388	2 010-2 025 FIXED MOBILE 5.388A 5.388B 5.388	IMT2000 (TDD)	
2 025-2 200 MHz	2 025-2 110 SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space) FIXED MOBILE 5.391 SPACE RESEARCH (Earth-to-space) (space-to-space) 5.392	2 025-2 110 SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space) FIXED MOBILE 5.391 SPACE RESEARCH (Earth-to-space) (space-to-space) 5.392	Government mobile	
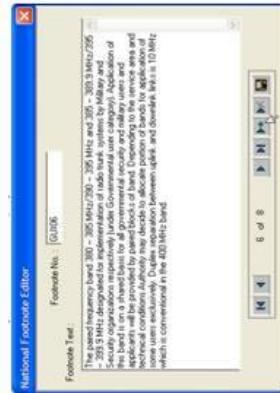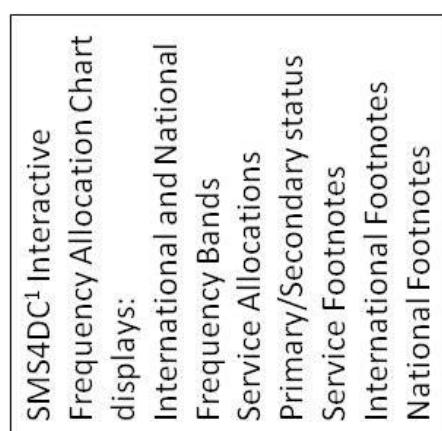
A5.5: Examples of a National Table of Frequency Allocations: USA

Table of Frequency Allocations			2200-2655 MHz (UHF)		Page 37
International Table			**United States Table**		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
2200-2290 SPACE OPERATION (space-to-Earth) (space-to-space) EARTH EXPLORATION-SATELLITE (space-to-Earth) (space-to-space) FIXED MOBILE 5.391 SPACE RESEARCH (space-to-Earth) (space-to-space) 5.392			2200-2290 SPACE OPERATION (space-to-Earth) (space-to-space) EARTH EXPLORATION-SATELLITE (space-to-Earth) (space-to-space) FIXED (line-of-sight only) MOBILE (line-of-sight only including aeronautical telemetry, but excluding flight testing of manned aircraft) 5.391 SPACE RESEARCH (space-to-Earth) (space-to-space) 5.392 US303	2200-2290 US303	
2290-2300 FIXED MOBILE except aeronautical mobile SPACE RESEARCH (deep space) (space-to-Earth)			2290-2300 FIXED MOBILE except aeronautical mobile SPACE RESEARCH (deep space) (space-to-Earth)	2290-2300 SPACE RESEARCH (deep space) (space-to-Earth)	
2300-2450 FIXED MOBILE 5.384A Amateur Radiolocation	2300-2450 FIXED MOBILE 5.384A RADIOLOCATION Amateur		2300-2305 G122	2300-2305 Amateur	Amateur Radio (97)
			2305-2310 US97 G122	2305-2310 FIXED MOBILE except aeronautical mobile RADIOLOCATION Amateur US97	Wireless Communications (27) Amateur Radio (97)
			2310-2320 Fixed Mobile US339 Radiolocation G2 US97 US327	2310-2320 FIXED MOBILE US339 BROADCASTING-SATELLITE RADIOLOCATION 5.396 US97 US327	Wireless Communications (27) Aviation (87)
			2320-2345 Fixed Radiolocation G2 US327	2320-2345 BROADCASTING-SATELLITE 5.396 US327	Satellite Communications (25)
			2345-2360 Fixed Mobile US339 Radiolocation G2 US327	2345-2360 FIXED MOBILE US339 BROADCASTING-SATELLITE RADIOLOCATION 5.396 US327	Wireless Communications (27) Aviation (87)
			2360-2390 MOBILE US276 RADIOLOCATION G2 G120 Fixed US101	2360-2390 MOBILE US276 US101	Aviation (87) Personal Radio (95)
			2390-2395 MOBILE US276 US101	2390-2395 AMATEUR MOBILE US276 US101	Aviation (87) Personal Radio (95) Amateur Radio (97)
5.150 5.282 5.395	5.150 5.282 5.393 5.394 5.396				

A5.6: Example of a graphical presentation of NTFA: USA

A5.7: Frequency allocation chart facility in SMS4DC[10]

SMS4DC[1] Interactive
Frequency Allocation Chart
displays:
International and National
Frequency Bands
Service Allocations
Primary/Secondary status
Service Footnotes
International Footnotes
National Footnotes

Editing input screens

Allocation editor

International Footnote editor

National Footnote editor

Annex 6: Examples of national footnotes

These examples have been chosen to demonstrate the wide range of information that can be given by the use of national footnotes.

A6.1: Canada

C36 (CAN-00)   In the bands 1 990-2 025 MHz and 2 160-2 200 MHz, a moratorium has been placed on the licensing of new systems in the fixed service. Existing fixed service systems operating in these bands will have priority over the mobile-satellite service until January 1, 2003. After this date, specific fixed service stations will be displaced, according to the transition policy, to enable the implementation of mobile-satellite service systems in certain sub-bands. The earliest mandatory date for fixed service frequency assignments that may be subject to displacement will be January 1, 2003.

C38A (CAN-04)   The use of the band 2 500-2 690 MHz by the mobile service is subject to future spectrum policy and licensing considerations.

C39A (CAN-05)   The band 5 725-5 825 MHz is designated for use by licence-exempt wireless local area networks and devices with established maximum power levels and based upon not interfering with, or claiming protection from, licensed services.

A6.2: Kingdom of Bahrain

BHR8   In the longer term VORs will be decommissioned in this band, after which the band will be exclusively allocated to the aeronautical mobile service.

BHR9   In the medium term 8.33 KHz channel spacing in the band 117.975-137 MHz may be introduced in accordance with regional plans developed under the auspices of the International Civil Aviation Organization (ICAO).

BHR11   The band 450 - 470 MHz is a candidate band for a variety of modern mobile technologies including GSM, TETRA, IS95, IMT as well as a residual band for analogue single and two frequency conventional and trunked mobile networks. A strategy for the future use of this band will be elaborated by the Spectrum Strategy and Coordination Committee (SSCC).

A6.3: Pakistan

PAK08   The frequency range 61-68 MHz can be considered for Terrestrial TV Broadcasting Service

PAK16   The frequency ranges 485-490/495-500 MHz and 806-811/851-856 MHz are identified for Radio Trunking Services. Both 12.5 kHz and 25.0 kHz channel spacing will be considered on a case by case basis.

A6.4: Thailand

T20   Channel arrangements of the bands 2025.5-2109.5 MHz and 2200.5-2284.5 MHz in the fixed service are in accordance with Annex 1 to Recommendation ITU-R F.1098-1.

T21   Channel arrangements of the bands 2306-2387 MHz and 2400-2481 MHz in the fixed service are in accordance with Annex 1 to Recommendation ITU-R F.746-3.

T22   Channel arrangements of the bands 2484.5-2568.5 MHz and 2603.5-2687.5 MHz in the fixed service are in accordance with Recommendation ITU-R F.283-5 and their use is limited to stations in upcountry area.

T23   The band 2504-2688 MHz in the fixed service is also designated for Multichannel Multipoint Distribution Service (MMDS) application and limited to stations in Bangkok and suburb area.

A6.5: Vietnam

VTN6A   The band 450-470 MHz is identified for International Mobile Telecommunication (IMT) systems.

VTN7   The bands 453.08-457.37 MHz and 463.08-467.37 MHz are reserved for the land mobile communication system employing CDMA (Code Division Multiple Access) technology. If necessary, the Administration shall specify these bands in detail plans of frequency.

VTN7A   The bands 470-485 MHz and 610-698 MHz are priority used for the Broadcasting and Fixed service, the band 585-610 MHz is priority used for Broadcasting service. Television digitalized is encouraged.

A6.6: Great Britain

UK1   Except by special agreement having the approval of the National Frequency Planning Group [a UK Cabinet Office Committee] this frequency band, or the allocation to this radio service, is reserved exclusively for CIVIL use in accordance with 'Allocation to Services' [The NTFA gives additional information in an explanatory note].

UK2   Except by special agreement having the approval of the NFPG this frequency band, or the allocation to this radio service, is reserved exclusively for MILITARY use in accordance with the 'Allocation to Services' (The NTFA gives additional information in an explanatory note).

UK3   Responsibility for assigning frequencies in this band in accordance with the Allocation to Services rests with Ofcom and the Scottish Government for emergency services (The NTFA gives additional information in an explanatory note).

UK8   Details of the Memoranda of Understanding (MoUs) and Agreements entered into by Ofcom relating to cross-border radio frequency coordination and the management of interference are contained at [Annex K]

UK9   The Ministry of Defence requires at times to activate stations of the land mobile service, employing low power for voice communications, in the range 1.5-30.0 MHz. Temporary assignments will be negotiated directly with Ofcom and the Departments concerned or likely to be affected. In certain bands however this general but qualified agreement to MILITARY out-of-band usage cannot be permitted. These bands are annotated UK9.

UK11   Specific details of frequency bands available for low power devices exempt from licensing are contained in Annex B. Please note that in addition to this footnote Ultra wide-band (UWB) equipment is also authorised to transmit in most frequency bands, as mandated by European Commission Decisions 2007/131/EC and 2009/343/EC. Due to the wide-band nature of the devices they permitted to operate across most frequency bands and for this reason we have not included them in the footnotes.

Annex 7: Examples of regional cooperation in Frequency Allocation Tables

A7-1 *Inter-American Telecommunication Commission (CITEL)* provides an on-line searchable database of allocations of the members of the Organisation of American States.

A7-2 *Eastern Caribbean Telecommunications Authority (ECTEL)* five Eastern Caribbean states (Commonwealth of Dominica, Grenada, Saint Christopher and Nevis, Saint Lucia, Saint Vincent and The Grenadines) provides an on-line searchable database of allocations of the members of ECTEL

A7-3 European Conference of Postal and Telecommunications Administrations (CEPT)

CEPT was established in 1959 and now has 48 member countries. The CEPT Electronic Communications Committee (ECC) considers and develops policies on electronic communications activities in European context, taking account of European and international legislations and regulations. The CEPT European Communications Office (ECO) provides advice and support to CEPT to help it to develop and deliver its policies and decisions in an effective and transparent way. The ECC has agreed ERC Report 25: the European Common Frequency Allocation Table (ECA)[11]. The ECO provides the ECO Frequency Information System (EFIS)[12], an on-line searchable database on the harmonised availability of information regarding spectrum use in Europe ([/](/)) by providing a single portal to access to the NTFAs of member countries.

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[11] ECC Report 25: www.erodocdb.dk/Docs/doc98/official/pdf/ERCREP025.PDF

[12] EFIS: www.efis.dk/

A7.1: Example of regional cooperation in allocation tables

Inter-American Telecommunication Commission (CITEL)

Country	LF-UF	Units	Services and FN (150-160MHz)
ITU-R123	149.9-150.05	MHz	MOBILE-SATELLITE (Earth-to-space) 5.209 5.224A RADIONAVIGATION-SATELLITE 5.224B 5.220 5.222 5.223
ITU-R123	149.9-150.05	MHz	MOBILE-SATELLITE (Earth-to-space) 5.209 5.224A RADIONAVIGATION-SATELLITE 5.224B 5.220 5.222 5.223
EU-R1	149.9-150.05	MHz	MOBILE MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION-SATELLITE EU.6
ARG	149.9-150.05	MHz	MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION-SATELLITE
ARG	149.9-150.05	MHz	RADIONAVIGATION-SATELLITE MOBILE-SATELLITE (Earth-to-space)
ATG	149.9-150.05	MHz	MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION-SATELLITE
B	149.9-150.05	MHz	MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION-SATELLITE
B	149.9-150.05	MHz	MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION-SATELLITE
B	149.9-150.05	MHz	MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION-SATELLITE 5.220 5.223
B	149.9-150.05	MHz	MOBILE-SATELLITE (Earth-to-space) 5.209 5.224A RADIONAVIGATION-SATELLITE 5.224B 5.220 5.223
BUL	149.9-150.05	MHz	RADIONAVIGATION-SATELLITE BUL.40
BRB	149.9-150.05	MHz	MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION-SATELLITE
CAN	149.9-150.05	MHz	LAND MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION-SATELLITE

Organization of American States
Inter-American Telecommunication Commission

Report Generation for Existing Allocation English Database

Please enter the appropriate fields to create a report. Note that to generate a report of all records in the database, leave all the fields blank.
Depending on the report size the report creation may take 5 minutes.

Retrieval Options

	Lower Limit	Upper Limit	Units
Frequency Range	150	160	MHz

Service — Use * for partial matches, e.g., mob* to match mobile, mobility, etc

Service

Footnote — All

Filter Options

Region — All

Country — All / ARG / ATG / B
(To select more than one country use Cnt/-Shift)

Include Footnote — No

Create Report

A7.2: Example of regional cooperation in allocation tables

Eastern Caribbean Telecommunications Authority (ECTEL)

1 525-1 610 MHz	
Allocation to services	
ITU Region 2	**O.E.C.S**
1 525-1 530	1 525-1 530
SPACE OPERATION (space-to-Earth)	MOBILE-SATELLITE 5.347A 5.351A
MOBILE-SATELLITE (space-to-Earth)	
5.347A 5.351A	
Earth exploration-satellite	
Fixed	
Mobile 343 341 351 354	
1 530-1 535	1 530-1 535
SPACE OPERATION (space-to-Earth)	MARITIME MOBILE-SATELLITE
MOBILE-SATELLITE (space-to-Earth) 347A 351A 353A	
Earth exploration-satellite	
Fixed	
Mobile 343 341 351 354	
1 535-1 559	1 535-1 559
MOBILE-SATELLITE (space-to-Earth)	MOBILE-SATELLITE
347A 351A 341 351 353A 354	347A 351A 341 351 353A 354
355 356 357 357A 359 362A	355 356 357 357A 359 362A
1 559-1 610	1 559-1 610
AERONAUTICAL RADIONAVIGATION	AERONAUTICAL RADIONAVIGATION
RADIONAVIGATION-SATELLITE	1600
(space-to-Earth) (space-to-space) 328B	*GMDSS (Satellite EPIRBs)*
329A 341 362B 362C 363	
1 610-1 660 MHz	
Allocation to services	
ITU Region 2	**O.E.C.S**
1 610-1 610.6	1 610-1 621.350
MOBILE-SATELLITE (Earth-to-space)	Mobile Satellite (GMPCS) (Earth-to-space)
351A	351A
AERONAUTICAL RADIONAVIGATION	
RADIODETERMINATION - SATELLITE	
(Earth-to-space)	
341 364 366 367 368 370 372	
1 610.6-1 613.8	
MOBILE-SATELLITE (Earth-to-space)	
351A	
RADIO ASTRONOMY	
ERONAUTICAL	
RADIONAVIGATION	
RADIODETERMINATION-SATELLITE	
(Earth-to-space)	
149 341 364 366 367 368 370 372	

A7.3: Example of regional cooperation in allocation tables

European Conference of Postal and Telecommunications Administrations (CEPT)

890 - 942 MHz

Allocation	Applications	ECC/ERC Decisions	EU	Standards	Notes
BROADCASTING 5.322	GSM	ECC/REC/(05)08, ERC/DEC/(97)02, ERC/DEC/(94)01	EU32, EU30	EN 301 502, EN 301 511, EN 300 609	Within the band 890-915 MHz paired with the band 935-960 MHz
FIXED	Radiolocation				
MOBILE except aeronautical mobile 5.317A					
Radiolocation	TRA-ECS	ECC/DEC/(06)13, ECC/REC/(08)02	EU30	EN 301 908	IMT is considered as a part of TRA-ECS
5.323	MCV	ECC/DEC/(08)08	EU30		
5.317A, 5.323, EU2, EU13, EU14, EU29	Defence systems		EU30		The bands 870-876 MHz and 915-921 MHz are identified as preferred bands for TRR, in particular for cross-border operations. In countries where these bands are or will be in civil use according to ERC/ECC Decisions (e.g. digital PMR/PAMR), shared use of the bands should be considered on a national basis. Other sub-bands within the tuning range 610-960 MHz may also be used on a national basis according to the national requirements
	PMR/PAMR	ECC/DEC/(04)06, ECC/DEC/(02)05, T/R 25-08		EN 301 166, EN 301 449, EN 301 526, EN 302 426, EN 302 561	Within the band 870-876 MHz paired with 915-921 MHz
					The band 915-925 MHz is identified for IMT in the RRs, but within CEPT this band is not planned for the harmonised introduction of IMT
	GSM-R	ECC/DEC/(02)05, ECC/REC/(05)08		EN 301 502, EN 301 511	Within the band 876-880 MHz paired with 921-925 MHz. Railway systems

EU Footnote	
EU2	Civil-military sharing
EU13	CEPT Administrations are urged to take all practical steps to clear the band 645-960 MHz of the assignments to the aeronautical radionavigation service.
EU14	Radiolocation limited to military requirements for naval ship borne radars
EU29	The frequency bands 890-915 / 935-960 MHz, 880-890 / 925-935 MHz, 1710-1785 / 1805-1880 MHz, 1920-1980 MHz and 2110-2170 MHz are reserved for public cellular mobile use only. Other services such as the fixed service should only be allowed in the above bands where coexistence with public mobile systems is possible i.e. in sparsely populated or rural areas where the frequency band is not needed for mobile cellular systems.
EU30	National administrations should consider co-ordination zones around the EISCAT sites when using the band 925-935 MHz for mobile services including international planning for military services. Short Range Devices should not use this band.
EU32	The bands 880-915 MHz and 925-960 MHz are currently used for GSM (2nd generation terrestrial mobile system) in most CEPT member countries and by IMT, depending on the market demands and national licensing schemes.

ECC Decision	
DEC(94)01	Frequency bands to be designated for the coordinated introduction of the GSM digital pan-European communication system
DEC(97)02	Frequency bands to be used for the GSM Digital Pan-European extended frequency bands to be used for the GSM Digital Pan-European Communications System
DEC(02)05	designation and availability of frequency bands for railway purposes in the 876-880 MHz and 921-925 MHz bands
DEC(04)06	frequency bands for the introduction of Wide Band Digital Land Mobile PMR/PAMR in the 400 MHz and 800/900 MHz bands amended 9 December 2011
DEC(05)08	frequency bands for high density applications in the Fixed-Satellite Service (space-to-Earth and Earth-to-space)
DEC(06)13	designation of the bands 880-915 MHz, 925-960 MHz, 1710-1785 MHz and 1805-1880 MHz for terrestrial UMTS, LTE and WiMAX systems
DEC(08)02	Withdrawal of six ERC Decisions re. Social Alarm, individual licensing of SRDs and DMO
DEC(08)08	harmonised use of GSM system on board vessels in the frequency bands 880.9/1.5-925.9/60 MHz and 1710-1785/1805-1880 MHz.

Annex 8: Examples of tables of frequency use

A8.1: National tables of frequency use: Hungary (This example is completely separate from the NTFA but each use is a reference from the NTFA)

Annex 1 to Decree No. 7/2011 (X.6.)NMHH

Table of Radio Applications

Frequency bands and radio applications available for civil purposes defined in hTFA			Rules relating to the use of frequency bands	
Frequency bands and radio services		**Radio applications**	**International and national documents**	**Special conditions, individual requirements**
Below 9 kHz				
	H1	O	Devices for detecting avalanche victims (SRD) on the frequency 2 275 Hz.		Annex 2, Chapter V
	H2	A	Inductive applications (SRD).	MSZ EN 300 330-2	Annex 2, Chapter V Exempted from the obligation of individual licensing.
9-14 kHz				
RADIONAVIGATION	H3	A	En-route (ground-air) radionavigation systems.		
	H4		Long range en-route (ground-air) hyperbolic radionavigation system (Omega system).		
	H2		Inductive applications (SRD).	ERC/REC 70-03, Annex 9 MSZ EN 300 330-2	Exempted from the obligation of individual licensing.
	H5		Ultra low power active medical implant systems using inductive loop techniques for telemetry purposes (SRD).	2006/771/EC; 2009/381/EC ERC/REC 70-03, Annex 12 MSZ EN 302 195-2	The conditions for the frequency use are identical with those specified in Annex 4. Exempted from the obligation of individual licensing. Annex 4 contains the conditions for the EU harmonisation.
14-19.95 kHz				
FIXED	H6	A	Point-to-point and point-to-multipoint links.		Annex 2, Chapter II, section 1
	H2		Inductive applications (SRD).	ERC/REC 70-03, Annex 9 MSZ EN 300 330-2	Exempted from the obligation of individual licensing.
	H5		Ultra low power active medical implant systems using inductive loop techniques for telemetry purposes (SRD).	2006/771/EC; 2009/381/EC ERC/REC 70-03, Annex 12 MSZ EN 302 195-2	The conditions for the frequency use are identical with those specified in Annex 4. Exempted from the obligation of individual licensing. Annex 4 contains the conditions for the EU harmonisation.
	H7		Inductive on-site paging applications in the band 16-19.95 kHz.	ECC/REC/(02)01; MSZ EN 300 224-2	
19.95-20.05 kHz				
STANDARD FREQUENCY AND TIME SIGNAL	H8	A	Applications of the standard frequency and time signal service.		
	H2		Inductive applications (SRD).	ERC/REC 70-03, Annex 9 MSZ EN 300 330-2	Exempted from the obligation of individual licensing.
	H5		Ultra low power active medical implant systems using inductive loop techniques for telemetry purposes (SRD).	2006/771/EC; 2009/381/EC ERC/REC 70-03, Annex 12 MSZ EN 302 195-2	The conditions for the frequency use are identical with those specified in Annex 4. Exempted from the obligation of individual licensing. Annex 4 contains the conditions for the EU harmonisation.
	H7		Inductive on-site paging applications.	ECC/REC/(02)01; MSZ EN 300 224-2	
20.05-70 kHz				
FIXED	H6	A	Point-to-point and point-to-multipoint links.		Annex 2, Chapter II, section 1

A8.2: National table of frequency use: United Kingdom

The UK national table of frequency use is combined with the NTFA by providing frequency use information in a set of detailed annexes and footnotes. This example shows information on applications in the comments column with a reference to an annex giving detailed frequency (and geographical) sharing arrangements between civil and military users.

Allocation to United Kingdom Services		Comments	
430 – 440 MHz		UK63	The civil Radiolocation service operates on 432·5 MHz, 438·0 MHz, and 445·25 MHz in accordance with the Oslo Agreement, 1983.
FIXED			
MOBILE	UK8, 64, 65	UK64.	The Aeronautical Mobile service is limited to airborne transmissions in connection with the telemetry operations in the band 432·5-450·0 MHz.
RADIOLOCATION	UK 63		
Amateur-Satellite	UK7		
Amateur	UK7		
5.138, 5.282	UK2, 6, 11, EU1	UK65	By special arrangement civil Land Mobile services may operate within sub-bands 425·0-429·0 MHz, 431·0-432·0 MHz, 440·0-443·5 MHz, and 445·5-449·5 MHz in agreed areas and on a non-interference basis to military services (see Annex C.)
		EU1	Commission Decisions 2006/771/EC, 2008/432/EC, 2009/381/EC, 2010/368/EU and 2011/829/EU (harmonised use of spectrum for short range devices (SRDs)) applies.

ANNEX C

FREQUENCY SHARING ARRANGEMENTS BETWEEN CIVIL LAND MOBILE AND MILITARY SERVICES IN THE BAND 410-450 MHz

Footnote UK65

1 The sub-bands in which civil land mobile may share with military services are:

a. 425-429 MHz;
b. 431-432 MHz;
c. 440·0-443·5 MHz;
d. 445·5-449·5 MHz.

Sharing between civil digital services and military services in these bands is on the basis of individual channels agreed between Ofcom and the MoD.

2. Civil land mobile use of the sub-bands in Section 1 will be limited geographically to the following areas within a radius of:

a. 56 km of London (Charing Cross).
b. 50 km of the centre of Warrington, Cheshire.
c. 40 km of the centre of Birmingham and Glasgow.
d. 32 km of the centres of Aberdeen, Bradford, Derby, Edinburgh, Halifax, Leeds, Leicester, Middlesbrough, Nottingham, Preston, Sheffield and Tyneside.
e. 10 km of Coventry (SP 330 790), Bristol (ST 600 740), Swansea (SS 650 950), Newport (ST 310 880) and Cardiff (ST 190 760).

Civil land mobile use will be permitted outside of these areas where agreed between Ofcom and the MoD on a case-by-case basis.

3. Civil land mobile use of the sub-band at paragraph 1b will be limited to an area within a radius of 56 km of Charing Cross, London, except for the following frequencies which may not be used:

a. 431·85 MHz and 431·9 MHz ± 6·25 kHz;
b. 431·5 MHz and 431·65 MHz ± 12·5 kHz.

4. The following frequencies may not be used in the areas described at paragraph 2d:

a. 447·7 MHz ±6·25 kHz;
b. 447·75 MHz, 448·25 MHz, and 448·75 MHz all ±12·5 kHz.

5. The following frequencies must not be used by the civil land mobile service at any of the areas described below:

a. 425·025 MHz within 32 km of Leicester and Worcester;
b. 443·5 MHz may not be used within 32 km of any of the designated areas in 2d above.

A8.3: National table of frequency use: Harmonized template for national radio interface specifications used by European countries

Normative part

Nr	Parameter	Description	Comments
1	Radiocommunication Service	Radiocommunication Service according to ECC/DEC/(01)03, Annex 1 if applicable.	The abbreviation for the Service should be defined in the comments section
2	Application	Application according to ECC/DEC/(01)03, Annex 2. Description of allowed application(s) within the frequency band if applicable.	Application details. In particular cases specific provisions may be given to define the application (kind of use and assigned frequencies within the band etc.) or which user groups may get frequencies.
3	Frequency band	Lower and upper limits of the frequency band where the particular technical interface regulations are valid. The transmitting frequency band limits are given as channel edges rather than centre frequencies of lowest and highest channels within the band. Several transmitting frequency bands, using the same Radio Interface parameters, may be specified.	The transmit centre frequency may be specified or additional information regarding the receive frequencies may be given.
4	Channelling	Description of channelling or channel spacing.	In addition to the channel spacing (or in some cases the bandwidth), the centre or reference frequencies (e.g. min. / max. frequencies) to be used for the referred emissions may be defined for different channel spacing in some RIS. The method of multiplexing may be covered in relevant cases.
5	Modulation / Occupied bandwidth	Designation of emission in accordance with Article 2.7 (Appendix 1) of the ITU Radio Regulations (RR) or description of modulation using other terms.	
6	Direction / Separation	Duplex direction and separation if applicable.	
7	Transmit power / Power density	The maximum transmit power (upper power limit), is normally specified in radiated power or power density (e.r.p., e.i.r.p., etc.) and direction (angle, polarization). Alternatively electromagnetic field strength can be given as a function of distance or area. Where justified, the maximum conducted output power / power density of the transmitter may be specified as an alternative. For certain applications the minimum transmit power / power density (lower power limit) may be specified.	For applications authorised on an individual basis, the maximum radiated power, the radiated power flux density or the maximum conducted output power, and in some cases, also the lower power limit may be specified in the licence provisions only. In Block levels for BEM should be included in this field.
8	Channel access and occupation rules	Channel access and occupation rules specify the obligations to protect other applications in the same band or to facilitate sharing between the applications using the same band and when justified in adjacent bands. This is done by : • requiring the level of protection and/or mitigation which results from the use of validated mitigation and spectrum access techniques in the Harmonised Standard. Pending the adoption of Harmonised Standards the RIS can specify or refer to spectrum access and mitigation techniques which is/are considered adequate. • defining the electromagnetic field strength value not to be exceeded at the location of the other (protected) user(s) or at the boundary of a certain geographical area (e.g. radio astronomy sites).	Channel occupation rules are imposed mostly on the equipment exempted from individual authorisation and in some cases on the equipment used on an individual authorisation basis, using shared channels. Description of mitigation techniques or relevant reference should be included in this field
9	Authorisation regime	This field should reflect the authorisation regime described in the ECC deliverable. This should be either "general authorisation" or "individual authorisation". Licence exempt corresponds to "general authorisation", light licencing also can correspond to "general authorisation" if there is for instance a need to register (but no formal approval process).	This field should specify the authorisation regime as much as necessary to ensure the proper functioning of the internal market. This field should be used to define special geographical area or time restrictions for the use of radio stations within a country (indoor use, radio astronomy sites, airports, etc.) The comments in this field, may also give additional information such as temporary authorisation or user registration requirements. Some authorisations may be issued entirely on non-interference / non-protected basis or exclusive/non-exclusive. Typically, three alternatives for authorisation are used. If individual frequency assignment is required for use, then an individual authorisation is always required. This may also be the case for some other reasons, e.g. to issue call signs to radio stations, or where it is necessary at least to know the users (registration). In some countries, exemption from individual authorisation is called as "general authorisation" or "class licence", if there is a need to establish general rules for the use of spectrum. In some other countries only the term "licence exemption" is used, even if this may also stipulate conditions for use. It can be foreseen that, in the future, also the authorisation method (first come first served, beauty contest etc.) and licence fees or spectrum pricing may need to be described.

A8.3: (continued)
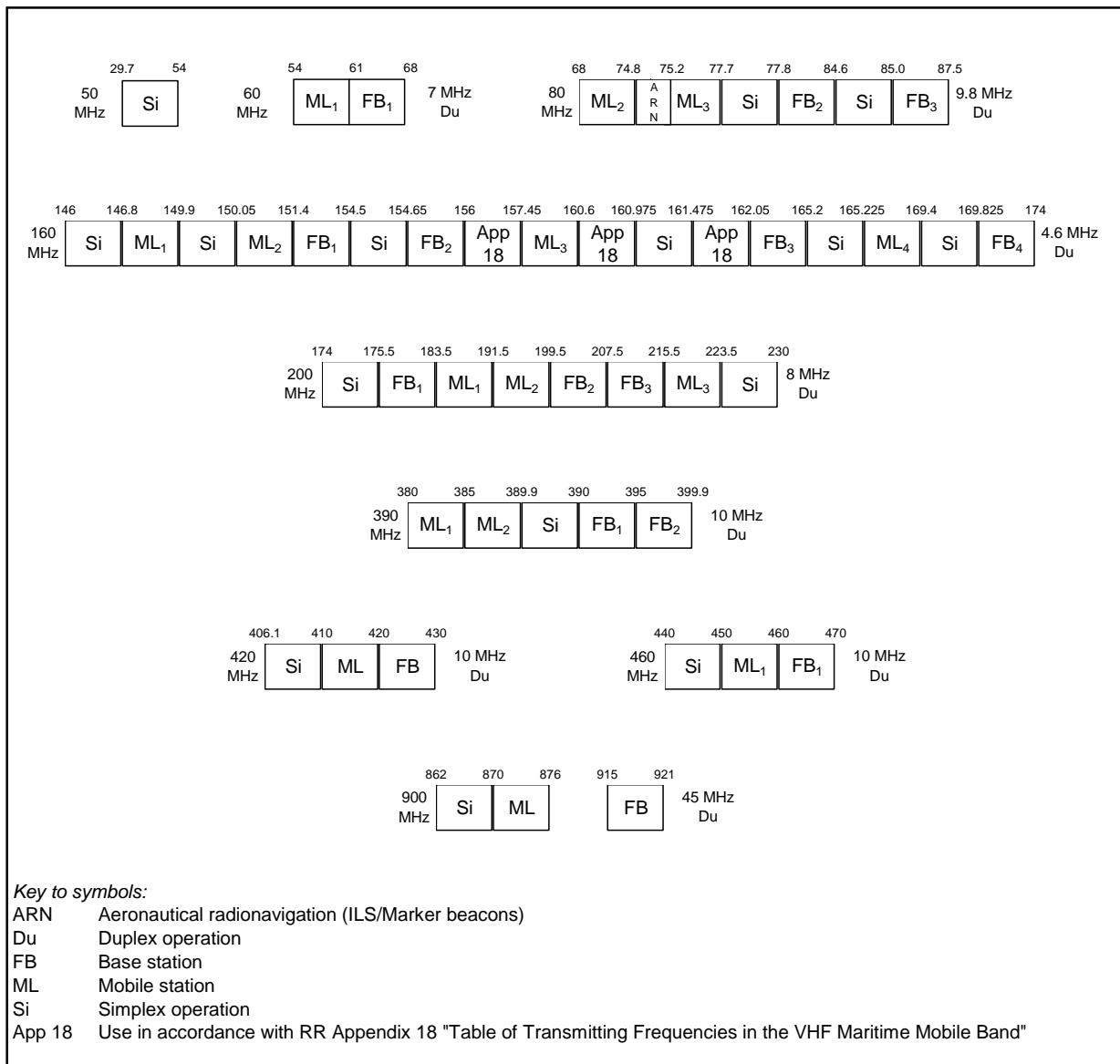
|			In the case of BEM (Block Edge Mask) type of authorisation a description should be included in this field (as BEM a actually licensing conditions)
10	Additional essential requirements according to Art. 3.3 of R&TTE Directive	This field is used to indicate special requirements stipulated by an European Commission Decision invoking Art. 3.3 of the Directive 1999/5/EC.	Additional information if appropriate. Typically Commission Decisions impose specific quality levels to be achieved for safety of life and other applications.
11	Frequency planning assumptions	The frequency planning assumptions may cover additional issues such as receiver parameters, assumed antenna characteristics and radio environment. These assumptions are taken into account for network planning purposes and in the case of harmful interference to the radio services. NB: this field may be used for any normative technical parameter that does not fit obviously in the other fields	The main reason of stating the frequency planning assumptions is that the relevant Harmonised Standard may not contain in all cases all the parameters used; in interference calculations for new frequency assignments, or; in international co-ordination processes, or; in compatibility analysis. In the case of BEM, out of block levels can be included in this field or in an Annex to this template (possibly in the form of tables).

Informative Part

Nr	Parameter	Description	Comments
12	Planned changes	Any planned changes or indication of evolution	
13	Reference	EC Decisions Harmonised Standards CEPT / ECC Decisions or Recommendations NB. When defining their national implementations to be notified to EFIS, administrations may include references to their National Frequency Allocation Table.	Only harmonised Standards covering article 3.2 and article 3.3 requirements are mentioned.
14	Notification number		
15	Remarks	Additional information may be given in this field.	Parameters destined to harmonised ETSI standards may be mentioned here.

A8.4: Example of frequency band and channelling arrangements: European countries

The frequency band and channelling arrangements for the land mobile service in frequency bands between 30-960 MHz are contained in recommendation T/R 25-08 developed within the CEPT framework. The CEPT has developed various recommended channel arrangements for fixed and mobile services.

Key to symbols:

ARN	Aeronautical radionavigation (ILS/Marker beacons)
Du	Duplex operation
FB	Base station
ML	Mobile station
Si	Simplex operation
App 18	Use in accordance with RR Appendix 18 "Table of Transmitting Frequencies in the VHF Maritime Mobile Band"

A8.5: Example of frequency band and channelling arrangements: Australia

The Australian Communications and Media Authority plans for frequency bands are available from: www.acma.gov.au/Industry/Spectrum/Spectrum-planning/About-spectrum-planning/band-plans-spectrum-planning-acma.

The plans provide a detailed text description with exact frequency limits and also present the information in a diagram format.

The example diagrams below are for the 148-174 MHz and 820-960 MHz bands:
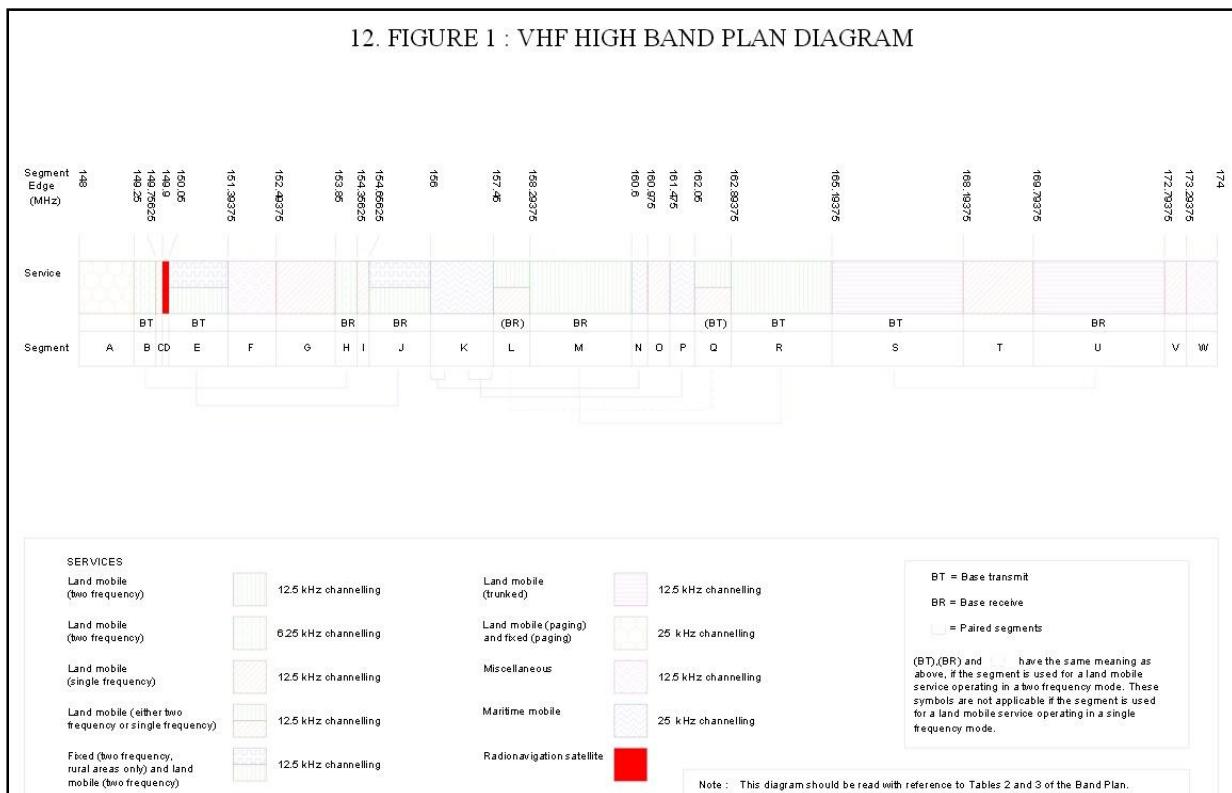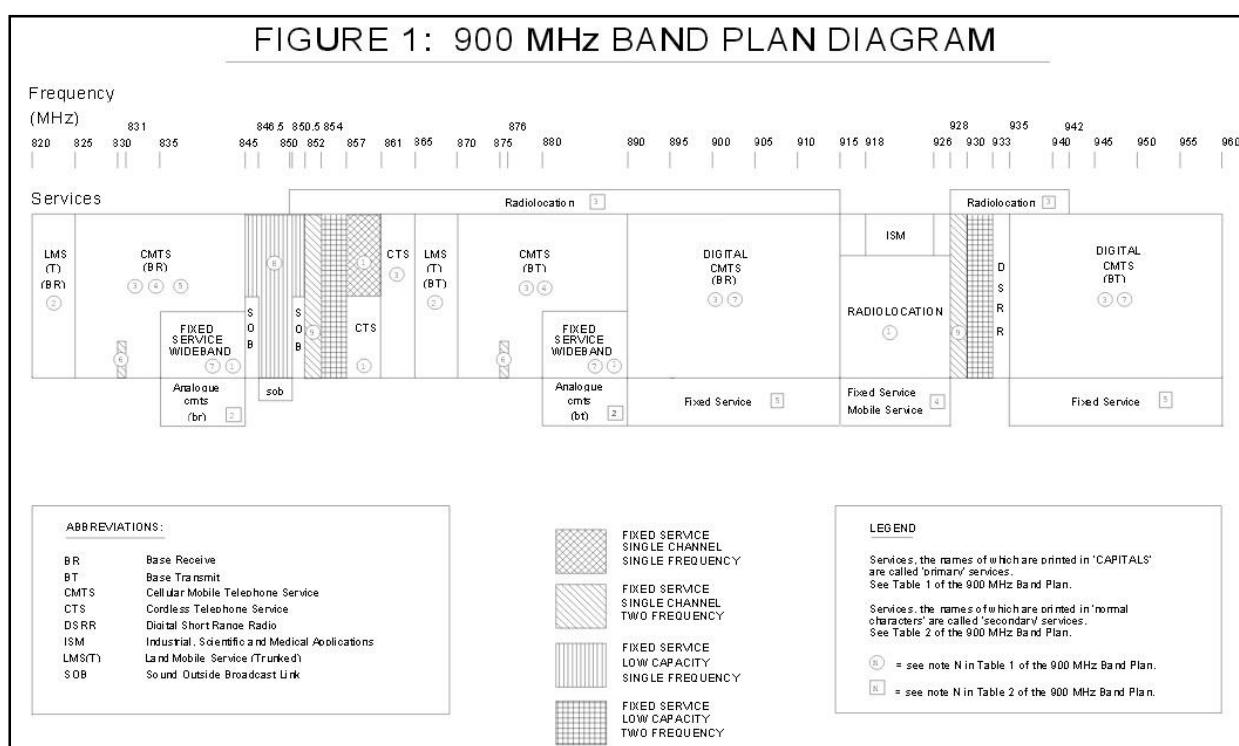
FIGURE 1: 900 MHz BAND PLAN DIAGRAM

Annex 9: Examples of on-line access to frequency allocation and use information

A9.1: USA

A9.2: Canada

Industry Canada provides a detailed on-line search facility for the national frequency database through the Spectrum Direct system

Annex 10: Example of obtaining information on national spectrum use from operators: Nigeria

The following text is an example of a national exercise to collect spectrum usage information to improve spectrum management by requesting existing users to complete a "template" specifying details of use**.**

As part of continuing efforts to provide efficient management of the radio frequency spectrum in Nigeria, the Commission is putting in place a modern Spectrum Management and Monitoring System (SMMS). As part of the SMMS implementation, detailed information is required about current and continuing utilisation of frequencies assigned to telecommunications operators, equipment operating on those frequencies and sites/locations where they are deployed, etc. The information is required for creating a database on the utilization of frequencies and associated information that will be constantly updated. The records will provide an invaluable resource for:
• Facilitating resolution of interference
• Spectrum planning, policy; and
• The overall spectrum management strategy of the Commission.

All telecommunications operators are accordingly required to furnish the relevant information to the Commission according to the prescribed format and also update the same periodically as specified by the Commission.

Telecommunications operators are requested to download the following *Spectrum Utilisation Reporting Templates* (MS Excel) where relevant and fill in the required data and thereafter forward the completed forms via email to [the administration].

• Base Station Data Gathering Template (33.5 kB) – This is to collate Base Station Data from all telecommunications operators.
• Deployed Microwave Links Reporting Template (399 kB) – This is for all operators of telecommunications systems or networks, public or private, that have deployed microwave links. Operators are required to file subsequent updates of the deployed microwave hops on the 1st of April, August and December. The updates should include previous submissions in black font, indications of deleted links in red, added links in blue and/or links with parameters modified in purple.
• Licence Exempt Spectrum Reporting Template (20.73 kB) – This is for all users of License Exempt frequency bands to register the spectrum in use by their operations.

Annex 11: List of example administration web sites and URLS to access NTFA

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Africa

Kenya: www.cck.go.ke/licensing/spectrum/freq_table.html

Nigeria: www.ncc.gov.ng/index.php?option=com_content&view=article&id=83&Itemid=97

Lesotho: www.lca.org.ls/images/documents/lesotho_national_frequency_allocation_plan.pdf

Mauritius: www.icta.mu/radiocommunication/frequencyplan.htm

Tanzania: www.egov.go.tz/home/pages/309

Uganda: www.ucc.co.ug/data/smenu/77/Spectrum.html

Arab States

Bahrain: www.tra.org.bh/EN/marketSpectrum.aspx

Jordan: www.trc.gov.jo/index.php?option=com_content&task=view&id=439&lang=english

Saudi Arabia: www.citc.gov.sa/English/RulesandSystems/Bylaws/Pages/default.aspx

Asia-Pacific Telecommunity (APT):

List of the web sites of APT member countries: www.apt.int/AFIS

Europe:

http://ec.europa.eu/enterprise/sectors/rtte/documents/additional-information/index_en.htm

North and South America

Organisation of American States spectrum information database:
http://oasforum.oas.org/citelituv3.nsf/ensearchform?openform

Canada: www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf01678.html

Mexico: www.cft.gob.mx:8080/portal/

Peru: www.mtc.gob.pe/portal/inicio.html

Annex 12: Glossary of Abbreviations

This Glossary of Abbreviations is contained in the Hungary NTFA. It is included here as a useful example as the majority of the abbreviations will be generally applicable. A more detailed database of terms and definitions can be found out at: www.itu.int/online/termite/index.html

A/A	Air-to-Air
ACAS	Airborne Collision Avoidance System
AES	Aircraft Earth Station
A/G/A	Air-Ground-Air
AIS	Universal Shipborne Automatic Identification System
AVI	Automatic Vehicle Identification for Railways
BFWA	Broadband Fixed Wireless Access
BWA	Broadband Wireless Access
CEPT	European Conference of Postal and Telecommunications Administrations
CGC	Complementary Ground Component
CT1	Cordless Telephone 1
CT2	Cordless Telephone 2
DECT	Digital European Cordless Telecommunications
DME	Distance Measuring Equipment
DMO	Direct Mode Operation
DSC	Digital Selective Calling
DSRR	Digital Short Range Radio
DVB-H	Digital Video Broadcasting – Handheld
EC	European Community
ECC	Electronic Communications Committee
ECC/DEC	ECC Decision
ECC/REC	ECC Recommendation
EDR	Unified Digital Radiocommunication System
EEC	European Economic Community
EFIS	ERO Frequency Information System
e.i.r.p.	Equivalent Isotropically Radiated Power
EN	European Standard
epfd	Equivalent power flux-density
EPIRB	Emergency Position-Indicating Radiobeacon
ERC	European Radiocommunications Committee
ERC/DEC	ERC Decision
ERC/REC	ERC Recommendation
ERMES	European Radio Messaging System

ERO	European Radiocommunications Office
ETCS	European Train Control System
FM	Frequency Modulation
GBSAR	Ground Based Synthetic Aperture Radar
GMDSS	Global Maritime Distress and Safety System
GMT	Greenwich Mean Time
GNSS	Global Navigation Satellite System
GSM	Global System for Mobile Communications
GSM 1800	GSM in the 1800 MHz band
GSM-R	GSM-Railway
HAPS	High Altitude Platform Station
HDFSS	High-density applications in the fixed-satellite service
HF	High Frequency
ICAO	International Civil Aviation Organization
ICAO Annex 10	Annex 10 to the Convention on International Civil Aviation (aeronautical telecommunication)
ILS	Instrument Landing System
ILS LOC	Localizer Element of ILS
IMO	International Maritime Organization
IMT-2000	International Mobile Telecommunications-2000
ISM	Industrial, Scientific and Medical
ITS	Intelligent Transport Systems
ITU	International Telecommunication Union
ITU-R	ITU Radiocommunication Sector
LF	Low Frequency
Loran	Long range air navigation system
LTE	Long Term Evolution
MBS	Mobile Broadband System
MCA	Mobile Communication on Aircraft
MF	Medium Frequency
MLS	Microwave Landing System
MSI	Maritime Safety Information
MVDS	Multipoint Video Distribution System
MWS	Multimedia Wireless System
NATO	North Atlantic Treaty Organisation
NAVTEX	Automated direct-printing telegraph system for navigational and meteorological warnings and urgent information to ship

NDB	Non-Directional Radio Beacon
NGSO	Non-Geostationary Orbit
NJFA	NATO Joint Civil/Military Frequency Agreement
NTFA	National Table of Frequency Allocations
(OR)	Off-route
PAMR	Public Access Mobile Radio
PMR	Professional/Private Mobile Radio
PMR 446	Professional Mobile Radio 446
PR 27	Personal Radio 27
PSTN	Public Switched Telecommunication Network
(R)	Route
Rev.WRC-03	Revised by WRC-03
Rev.WRC-2000	Revised by WRC-2000
Rev.WRC-95	Revised by WRC-95
Rev.WRC-97	Revised by WRC-97
RFID	Radio Frequency Identification
RLAN	Radio Local Area Network
ROES	Receive Only Earth Station
RR	Radio Regulations
RTTT	Road Transport & Traffic Telematics
SART	Search and Rescue Transponder
S-DAB	Satellite Digital Audio Broadcasting
SI	System International of Units
SIT	Satellite Interactive Terminal
SIT	Shipborne Interrogator-Transponder
SNG	Satellite News Gathering
S-PCS	Satellite Personal Communications Services/Systems
SRD	Short Range Device
SSB	Single-Sideband
SSR	Secondary Surveillance Radar
SUT	Satellite User Terminal
TACAN	Tactical Air Navigation System
T-DAB	Terrestrial Digital Audio Broadcasting
TLPR	Tank Level Probing Radar
TV	Television
TVOR	Terminal VOR
UHF	Ultra High Frequency

UIC	International Union of Railways
UMTS	Universal Mobile Telecommunications System
UNO	United Nations Organization
UTC	Coordinated Universal Time
UWB	Ultra-Wideband
VHF	Very High Frequency
VOR	VHF Omnidirectional Radio Range
VSAT	Very Small Aperture Terminal
WARC	World Administrative Radio Conference
WARC-92	World Administrative Radio Conference for Dealing with Frequency Allocations in Certain Parts of the Spectrum, Malaga-Torremolinos, 1992
WAS	Wireless Access Systems
WiBro	Wireless Broadband
WiMAX	Worldwide Interoperability for Microwave Access
WRC	World Radiocommunication Conference
WRC-03	World Radiocommunication Conference, Geneva, 2003
WRC-2000	World Radiocommunication Conference, Istanbul, 2000
WRC-95	World Radiocommunication Conference, Geneva, 1995
WRC-97	World Radiocommunication Conference, Geneva, 1997

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