Radio Regulations

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Radio Regulations (RR)

1. RR: Organization and Main concepts
2. International Table of Frequency Allocations (ITFA)
3. Rules of Procedure
4. Master International Frequency Register, MIFR, and BR IFIC
5. RR and National Spectrum Management
1. RR: Organization and Main concepts

2. International Table of Frequency Allocations (ITFA)

3. Rules of Procedure

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5. RR and National Spectrum Management
“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.

Radio waves (or hertzian waves): Electromagnetic waves of frequencies arbitrarily lower than 3000 GHz, propagated in space without artificial guide.”
Principles in the Preamble to the Radio Regulations:

“No. 0.3 In using frequency bands for radio services, Members shall bear in mind that radio frequencies and the geostationary-satellite orbit are limited natural resources and that they must be used rationally, efficiently and economically, in conformity with the provisions of these Regulations, so that countries or groups of countries may have equitable access to both, taking into account the special needs of the developing countries and the geographical situation of particular countries (No. 196 of the Constitution).”

“No. 0.4 All stations, whatever their purpose, must be established and operated in such a manner as not to cause harmful interference to the radio services or communications of other Members or of recognized operating agencies, or of other duly authorized operating agencies which carry on a radio service, and which operate in accordance with the provisions of these Regulations (No. 197 of the Constitution).”
Services and Stations:

**RR, No. 1.19 Radiocommunication service:** A service involving the transmission, emission and/or reception of radio waves for specific telecommunication purposes. In these Regulations, unless otherwise stated, any radiocommunication service relates to terrestrial radiocommunication. (e.g. Mobile service, Mobile satellite service)

**RR, No. 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.” (e.g. mobile earth station)
- Two main key criteria:
  - Kind of links: Terrestrial vs Space (using satellites or not?)
  - Area of influence: Land, Maritime, Aeronautical
- By **default** all services are: **terrestrial** (space services shall be explicitly indicated; RR 1.19)
- Some radio services can be subsets of others (Rec. ITU-R SM.1133)

The following services are not defined by the Radio Regulations (RR) as being part of any grouping of services.

- Broadcasting
- Amateur
- Radio astronomy
- Meteorological aids
- Standard frequency and time signal
Space services

- Mobile-satellite
  - Land mobile-satellite
  - Maritime mobile-satellite
    - Aeronautical mobile-satellite
      - Aeronautical mobile-satellite (R)
      - Aeronautical mobile-satellite (OR)
  - Maritime mobile-satellite
    - Radiodetermination-satellite
      - Radionavigation-satellite
        - Aeronautical radionavigation-satellite
        - Maritime radionavigation-satellite
      - Radiolocation-satellite
    - Earth exploration-satellite
      - Meteorological-satellite

The following services are not defined by the RR as being part of any grouping of services:

- Fixed-satellite
- Broadcasting-satellite
- Amateur-satellite
- Radio astronomy
- Standard frequency and time signal-satellite
- Space operations
- Space research
- Inter-satellite
RR, No. 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.

RR, No. 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.

RR, No. 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.

<table>
<thead>
<tr>
<th>Frequency distribution to</th>
<th>French</th>
<th>English</th>
<th>Spanish</th>
<th>Arabic</th>
<th>Chinese</th>
<th>Russian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services</td>
<td>Attribution (attribuer)</td>
<td>Allocation (to allocate)</td>
<td>Atribución (atribuir)</td>
<td>توزيع (بوزع)</td>
<td>划分</td>
<td>распределение (распределять)</td>
</tr>
<tr>
<td>Areas or countries</td>
<td>Allotissement (allotir)</td>
<td>Allotment (to allot)</td>
<td>Adjudicación (adjudicar)</td>
<td>تعين (بعين)</td>
<td>分配</td>
<td>выделение (выделять)</td>
</tr>
<tr>
<td>Stations</td>
<td>Assignation (assigner)</td>
<td>Assignment (to assign)</td>
<td>Asignación (asignar)</td>
<td>تخصيص (بخصص)</td>
<td>指配</td>
<td>присвоение (присваивать)</td>
</tr>
</tbody>
</table>
Other concepts: although not explicitly defined, on the RR when dealing with band allocations (Art. 5), the use into footnotes of expressions: “identified” and “designated” express the interest/intention of some administrations on a future use of that band for a specific application; that in benefit of a mid and long term harmonization of the use of that band. Examples*:

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

RR, No. 5.552A: Bands designated for use by high altitude platform stations

RR, No. 5.516B: bands identified* for use by high-density applications in the fixed-satellite service


*: Footnotes stated that: “This identification does 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”.
**RR, No. 1.166 interference:** The effect of unwanted energy due to one or a combination of emissions, radiations, or inductions upon reception in a radiocommunication system, manifested by any performance degradation, misinterpretation, or loss of information which could be extracted in the absence of such unwanted energy.

A Rx may face many interferences sources: intra-band (same or other services); adjacent bands/services; permanent and intermittent; fixed or mobile source; unintentional and intentional; current and futures, etc.
RR, No. 1.167 **permissible interference**: Observed or **predicted** interference which complies with quantitative interference and sharing criteria contained in these Regulations or in ITU-R Recommendations or in special agreements as provided for in these Regulations.

RR, No. 1.168 **accepted interference**: Interference at a higher level than that defined as permissible interference and which has been **agreed upon** between two or more administrations without prejudice to other administrations.

RR, No. 1.169 **harmful interference**: Interference which **endangers** the functioning of a radionavigation service or of other safety services or seriously **degrades**, **obstructs**, or **repeatedly interrupts** a radiocommunication service operating in accordance with Radio Regulations (CS).

*In Spectrum Management and Regulation, the use of the expression: “Interference” refers by default to “harmful interference”*
Category of Services (basis) might be in a:
- a) PRIMARY basis (indicated by capital letters)*; e.g.: FIXED
- b) Secondary basis (indicated by lower case)*; e.g.: Fixed

RR, No. 5.28 Stations of a secondary service:
RR, No. 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;
RR, No. 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;
RR, No. 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** (**first in time, first in right)

* In Arabic and Chinese versions, allocations in a primary basis are indicated by bold characters, it, e.g.:
  - Primary: 
    - متنقلة بحرية
    - 无线电定位
  - Secondary: 
    - متنقلة بحرية
    - 无线电定位
**RADIO REGULATIONS: CATEGORIES OF SERVICES**

**Tx**: 1, 2, ...

**Rx**: 1, 2, ...

**ALL PRIMARY**: present and future

**Secondary**

**Other Secondary**: ONLY previous

**Prevent**

**Accept**

**NI/NP**: No interference / No Protection
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RR REGIONS

The image shows a map divided into three regions:

- **Region 1**: Located in the upper right corner, covering parts of Europe, Asia, and Australia.
- **Region 2**: Located in the lower left corner, covering parts of the Americas.
- **Region 3**: Located in the upper left and lower right corners, covering parts of Asia and Australia.

The map is color-coded to distinguish between the regions.
### Example RR, Art. 5:

<table>
<thead>
<tr>
<th>Frequency Band</th>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>495-505</td>
<td><strong>MARITIME MOBILE</strong></td>
<td><strong>MARITIME MOBILE</strong></td>
<td><strong>MARITIME MOBILE</strong></td>
</tr>
<tr>
<td><strong>505-526.5</strong></td>
<td><strong>MARITIME MOBILE</strong> 5.79 Aeronautical Radionavigation</td>
<td><strong>MARITIME MOBILE</strong> 5.79 Aeronautical Radionavigation</td>
<td><strong>MARITIME MOBILE</strong> 5.79 Aeronautical Radionavigation</td>
</tr>
<tr>
<td>505-510</td>
<td><strong>MARITIME MOBILE</strong> 5.79 Aeronautical Radionavigation</td>
<td><strong>MARITIME MOBILE</strong> 5.79 Aeronautical Radionavigation</td>
<td><strong>MARITIME MOBILE</strong> 5.79 Aeronautical Radionavigation</td>
</tr>
<tr>
<td>510-525</td>
<td><strong>MARITIME MOBILE</strong> 5.79 Aeronautical Radionavigation</td>
<td><strong>MARITIME MOBILE</strong> 5.79 Aeronautical Radionavigation</td>
<td><strong>MARITIME MOBILE</strong> 5.79 Aeronautical Radionavigation</td>
</tr>
</tbody>
</table>

- **Primary** and **Secondary**: These labels indicate the primary and secondary roles of the frequency bands allocated for different services (e.g., maritime mobile, aeronautical radionavigation).
- **Regional Band Split**: This term refers to the allocation of frequency bands across different regions (Region 1, Region 2, Region 3).
- **Harmonized**: This indicates that the frequency bands are harmonized across regions, ensuring consistent use globally.
- **CO-PRIMARY**: This denotes that the frequency bands are co-primary, meaning they are equally important and share the same band.
- **Shared**: This indicates that the frequency bands are shared between primary and secondary roles.

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**Footnotes**:
- Footnote (below): Provides additional details or explanations below the table.
- Footnote (right): Provides additional details or explanations to the right of the table.
1. E.g. **Different Category of Services** than RR, Art. 5 (RR No. 5.32 & 5.33):

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>Service Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>137-137.025</td>
<td>SPACE OPERATION (space-to-Earth)</td>
</tr>
<tr>
<td></td>
<td>METEOROLOGICAL-SATELLITE (space-to-Earth)</td>
</tr>
<tr>
<td></td>
<td>MOBILE-SATELLITE (space-to-Earth) 5.208A 5.208B 5.209</td>
</tr>
<tr>
<td></td>
<td>SPACE RESEARCH (space-to-Earth)</td>
</tr>
<tr>
<td></td>
<td>Fixed</td>
</tr>
<tr>
<td></td>
<td>Mobile except aeronautical mobile (R)</td>
</tr>
<tr>
<td></td>
<td>5.204 5.205 5.206 5.207 5.208</td>
</tr>
</tbody>
</table>

**5.204 Different category of service:** in Afghanistan, Saudi Arabia, Bahrain, Bangladesh, Brunei Darussalam, China, Cuba, the United Arab Emirates, India, Indonesia, Iran (Islamic Republic of), Iraq, Kuwait, Montenegro, Oman, Pakistan, the Philippines, Qatar, Serbia, Singapore, Thailand and Yemen, the band **137-138 MHz** is allocated to the **fixed and mobile**, except aeronautical mobile (R), services on a **primary basis** (see No. **5.33**). (WRC-07)
2. E.g. *Additional allocations* than RR Art. 5 List (RR No. 5.34 to 5.37):

<table>
<thead>
<tr>
<th>68-74.8 FIXED</th>
<th>68-72 BROADCASTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOBILE except aeronautical mobile</td>
<td>Fixed Mobile 5.173</td>
</tr>
<tr>
<td>72-73 FIXED MOBILE</td>
<td>RADIO ASTRONOMY 5.178</td>
</tr>
<tr>
<td>73-74.6 FIXED MOBILE</td>
<td>74.6-74.8 FIXED MOBILE</td>
</tr>
<tr>
<td>5.149 5.175 5.177 5.179</td>
<td>5.149 5.167 5.179</td>
</tr>
</tbody>
</table>

**5.176 Additional allocation:** in Australia, China, Korea (Rep. of), the Philippines, the Dem. People’s Rep. of Korea and Samoa, the band 68-74 MHz is *also allocated* to the broadcasting service on a primary basis. (WRC-07)
3. Alternative allocations, RR No. 5.38 to 5.41

5.167 Alternative allocation: in Bangladesh, Brunei Darussalam, India, Iran (Islamic Republic of), Pakistan, Singapore and Thailand, the band 50-54 MHz is allocated to the fixed, mobile and broadcasting services on a primary basis. (WRC-07)
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The Rules of Procedure complement the Radio Regulations (RR) by providing clarification of the application of particular Regulations or establishing the necessary practical procedures that may not be provided for in the current Regulatory Provisions.

**RoP are revised at RRB meetings**  
RoP are free of charge and are available at:  
[https://www.itu.int/pub/R-REG-ROP/en](https://www.itu.int/pub/R-REG-ROP/en)
In appliance of provision 4.5 (RR)

4.5 The frequency assigned to a station of a given service shall be separated from the limits of the band allocated to this service in such a way that, taking account of the frequency band assigned to a station, no harmful interference is caused to services to which frequency bands immediately adjoined are allocated.

it shall be followed the associated procedure (RoP)

4.5 The application of this provision involves the case of an adjacent band not allocated to the service concerned as well as the case of an adjacent band allocated to the service concerned with a different category of allocation.

1. A frequency assignment, of which the assigned frequency band overlaps a band not allocated to the service concerned, shall receive an unfavourable regulatory finding under No. 11.31.

1.1 A frequency assignment, of which the assigned frequency band overlaps a band allocated with a lower category of service will be considered as having the lower category of service and, when recorded, will bear a symbol to this effect. (See Symbols R and S in Table 13B, Column 13B2, of the Preface to the IFL.)

2. To resolve cases of harmful interference between services in adjacent bands it was decided that, irrespective of the phenomena at the origin of the interference (out-of-band emission, intermodulation products, etc.), the administration responsible for the emission overlapping a non_allocated band shall use appropriate means to eliminate the interference.
RoP are to be used by administrations and the BR in applying the Radio Regulations. The RoP have three main parts:

- **Part A**: Rules relating to a provision of the *Radio Regulations*, or a limited number of them
- **Part B**: Rules relating to a process such as the technical examinations
- **Part C**: Rules relating to internal working methods of the Radio Regulations Board (RRB)
The Radio Regulations Navigation Tool is a Java application dedicated to the browsing among the provisions of the following set of documents:

- Volumes I to IV of the Radio Regulations (Edition 2012)
- Rules of Procedures (Edition 2012, rev.8)
- ITU Constitution and Convention (Edition 2011)
- Plenipotentiary Conference 2014 Resolutions,

http://www.itu.int/pub/R-REG-RRX

The updated version of this Tool (RR 2016) will be available in 1Q17
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Stations shall be duly registered, with the technical parameters and other relevant data:

- **Nationally**: National Spectrum Users Database
- **Internationally**: ITU Master International Frequency Register, MIFR

Interference situations need to be objectively analyzed, and measured

- **Nationally**: Application of Spectrum National Rules
- **Internationally**: Application of provisions on RR and RoP

Such analysis can only be made if affected stations are duly registered (Stations recognition and protection cannot be “in abstract”)}
STATIONS COORDINATION

Country A

National Database
National Regulation

Country B

ITU MIFR
RR & RoP

Tx 1
Rx 1
Tx 2
Rx 2
RR, Art 18: Licenses

**RR, No. 18.1:** 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.

Central provision of the RR: enables recognition of spectrum uses and their protection against harmful interference, at national and international level.

The international recognition requires the entry into the MIFR.
“Unlicensed Devices”

Expressions: “unlicensed”, “license exempt”, “blanket licenses” etc., refer to radio devices with transmitting capabilities (emitting radio waves) that can be operated by any person, without obtaining previously a particular authorization for it (particular assignment, license).

They always operate in a regime of “non-interference/non-protection basis” to allocated services.

They shall share frequencies with other similar devices, all of them with equally rights, i.e., none of them having any priority (operation is likely lower than secondary). Without a limit to the amount of devices operating simultaneously in a same area, average used bandwidth cannot be guaranteed (QoS levels cannot be guaranteed).

Particular licensing waiving is only possible because of operation of “unlicensed devices” has been previously authorized to all public through a Generic Use Authorization, (also named General License, or equivalent names). Generic Use Authorization always includes a set of detailed technical and operational specifications that must be strictly obeyed when operating such devices, in order to guarantee their use without interfering to other similar devices or other services.

The expression “unlicensed” shall not be misinterpreted as permission to operating these devices in a free will fashion; its operation must strictly observe its GUA. Any alteration to exceed authorized pre setup parameters is an infringement of that GUA.
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Spectrum management goals include:

- making the radio spectrum available for government and non-government uses to stimulate social and economic progress
- making efficient and effective use of the spectrum

3 main layers:

1. **Planning**: Defining the use of different bands: Allocations to services: National Table of Frequency Allocations → should be coherent with ITFA (Art. 5 of RR)

2. **Licensing**: Authorizing of emissions, and technical conditions: Assignments to Stations (Licenses). Licenses are registered in a National Spectrum Assignments Database → those requiring international recognition should be registered in ITU MIFR

3. **Monitoring & Enforcement**: Verifying the use of spectrum in conformity with licenses conditions; preventive and corrective measures

Spectrum Harmonization

National Process (Standards, Roadmap, Refarming, Licensing ...)

WRC Process (Allocation, identification ...)

Regional Process (Band Plans, Proposals, ...)

National SM Regulations and Policies

Updated RR

National and Regional Proposals to WRC
Radio Regulations (RR)

Spectrum cannot be confined to a given territory

RR is an international treaty and should be considered by national administrations

Stations should be duly registered to be protected

International harmonization brings many advantages for Administrations
(facilitates coordination, roaming, allows for economies of scale)
Thank you!

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