



# Radio Regulations

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ITUEvents

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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**



# Radio Regulations (RR)

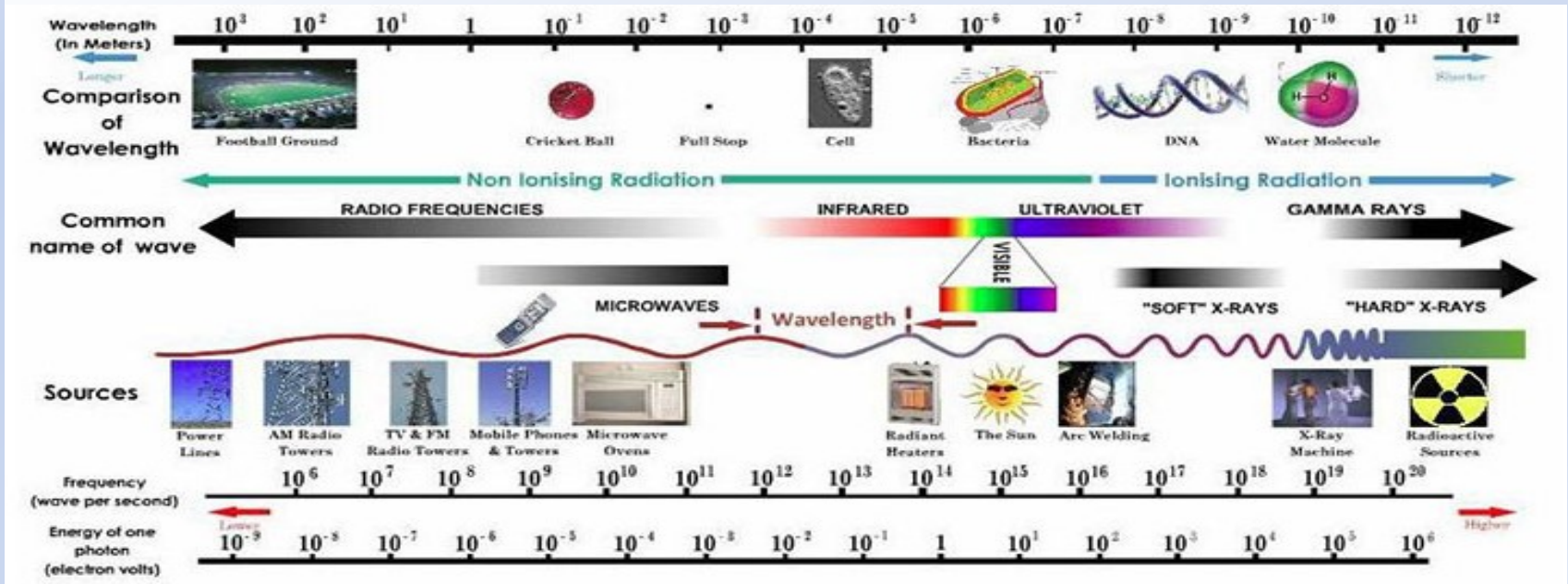
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# RADIOELECTRIC SPECTRUM

**RR 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.

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





# SPECTRUM AS NATURAL RESOURCE

- Natural Resource: phenomena of nature
  - Non replicable: cannot be reproduced (as agriculture)
  - Scarce: quantity of information (Mbps per MHz) that can be transmitted is limited
  - Need to be “shared” by stations using same frequency
  - Spectrum Management and Regulation aim to guarantee and efficient and rational use of Spectrum, both and national and international levels
- Main goal:** prevent and control Interferences: maximize sharing while minimize prejudicing



# RADIO REGULATIONS, RR

Spectrum cannot be limited to a given territory; international coordination is necessary

ITU Radio Regulations (RR) is an International Treaty, elaborated and revised by administrations and membership, during World Radio Conferences (WRC); RR has a binding nature for ITU Member states.

ITU acts as depositary of RR

Last version: RR-16 (as revised during WRC-15)

RR can be downloaded, free of charge, for the general public, in the 6 UN Languages, at:

<http://www.itu.int/pub/R-REG-RR-2016>



# SPECTRUM AS NATURAL RESOURCE

## *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).”*



# RADIO REGULATIONS, RR

**VOLUME 1:** Articles (60)

**VOLUME 2:** Appendices (23)

**VOLUME 3:** Resolutions (160) and Recommendations (24)

**VOLUME 4:** ITU-R Recommendations incorporated by reference (40)

**MAPS:** Set of Maps for App. 27



\* Non consecutive numbering, some with number and letters





# RADIO REGULATIONS: VOLUME 1

**CHAPTER I** – Terminology and technical characteristics

**CHAPTER II** – Frequencies

**CHAPTER III** – Coordination, notification and recording of frequency assignments and Plan modifications

**CHAPTER IV** – Interferences

**CHAPTER V** – Administrative provisions

**CHAPTER VI** – Provisions for services and stations

**CHAPTER VII** – Distress and safety communications

**CHAPTER VIII** – Aeronautical services

**CHAPTER IX** – Maritime services

**CHAPTER X** – Provisions for entry into force of the Radio Regulations



# RADIO REGULATIONS: VOLUME 3 and 4

RR Resolutions	ITU-R Resolutions
from World Radio Conferences	from Radio Assemblies
<b>Radio Regulations Volume 3 (last version: 2016)</b>	<b>Book of ITU-R Resolutions (last version: 2016)</b>
RESOLUTION Number (WRC-year)	RESOLUTION ITU-R Number-Version (year)
<b>RESOLUTION 763 (WRC-15): Stations on board sub-orbital vehicles</b> <b>RESOLUTION 7 (REV. WRC-03): Development of national radio-frequency management</b>	<b>RESOLUTION ITU-R 69 (2015): Development and deployment of international public telecommunications via satellite in developing countries</b> <b>RESOLUTION ITU R 11-5 (2015): Further development of the Spectrum Management System for Developing Countries</b>
<a href="https://www.itu.int/pub/R-REG-RR-2016">https://www.itu.int/pub/R-REG-RR-2016</a>	<a href="https://www.itu.int/pub/R-VADM-RES/en">https://www.itu.int/pub/R-VADM-RES/en</a>
RR Recommendations	ITU-R Recommendations
from World Radio Conferences	from Study Groups
<b>Radio Regulations Volume 3 (last version: 2016)</b>	<b>ITU-R Study Groups</b>
RECOMMENDATION Number (WRC-year)	RECOMENDATION ITU-R Serie Number-Version (month/year)
<b>RECOMMENDATION 724 (WRC-07): Use by civil aviation of frequency allocations on a primary basis to the fixed-satellite service</b> <b>RECOMMENDATION 34 (REV.WRC-12): Principles for the allocation of frequency bands</b>	<b>RECOMMENDATION ITU-R SM.2103-0 (09/2017): Global harmonization of short-range devices categories</b> <b>RECOMMENDATION ITU-R SM.1723-2 (09/2011): Mobile spectrum monitoring unit</b>
<a href="https://www.itu.int/pub/R-REG-RR-2016">https://www.itu.int/pub/R-REG-RR-2016</a>	<a href="https://www.itu.int/pub/R-REC">https://www.itu.int/pub/R-REC</a>

**16.2** The international monitoring system ..... in accordance with **Resolution ITU-R 23** and the most recent version of **Recommendation ITU-R SM.1139**.....

**1.14** Coordinated Universal Time (UTC): Time scale, based on the second (SI), as described in **Resolution 655 (WRC-15)**.

**5.548** In designing systems for the inter-satellite service in the band 32.3-33 GHz, ..... bearing in mind the safety aspects of the radionavigation service (**see Recommendation 707**).



# ITU-R Recommendations Incorporation

List and the end of Vol. 4 →

## Compulsory (by incorporation):

- Linked by the expression: “*shall*”
- version explicitly indicated;
- No automatic update\*;
- Solely applies to the pertinent item, otherwise is voluntary

## Voluntary:

- Linked by the expression: “*should*” or any other text than “~~shall~~”
- version is NOT indicated;
- Automatic update (“*most recent version of*”)
- Apply to all Recommendations not explicitly cited on the list and item
- **TIP:** NO version = Reference; “-version” : incorporation

Cross-reference list of the regulatory provisions, including footnotes and Resolutions, incorporating ITU-R Recommendations by reference

Recommendation ITU-R	Title of the Recommendation	RR provisions and footnotes with ITU-R Recommendations contained in RR Volume 4
TF.460-6	Standard-frequency and time-signal emissions	No. 1.14 (via Resolution 655 (WRC-15))
M.476-5	Direct-printing telegraph equipment in the maritime mobile service	Nos. 19.83, 19.96A, 51.41
M.489-2	Technical characteristics of VHF radiotelephone equipment operating in the maritime mobile service in channels spaced by 25 kHz	Nos. 51.77, 52.231, Appendix 18 ( <i>General notes e</i> )
M.492-6	Operational procedures for the use of direct-printing telegraph equipment in the maritime mobile service	No. 56.2
P.525-2	Calculation of free-space attenuation	No. 5.444B (via Resolution 748 (Rev.WRC-15))



# ITU-R Recommendations Incorporation

## Recommendation P.525

Approved in 2016-11

[Managed by R00-SG03](#)

### Main

Number	Title	Status	Questions
<a href="#">P.525-3 (11/2016)</a>	Calculation of free-space attenuation <b>Note - A previous version of this Recommendation is incorporated by reference in the Radio Regulations.</b>	In force <b>(Main)</b>	N/A

### Previous versions

Number	Title	Status	Questions
<a href="#">P.525-2 (08/94)</a>	Calculation of free-space attenuation <b>Note - This version of the Recommendation is incorporated by reference in the Radio Regulations.</b>	<b>Superseded</b>	N/A

\* **WRC-19 a.i. 2:** *to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly, in accordance with Resolution 28 (Rev.WRC-15), and to decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in Annex 1 to Resolution 27 (Rev.WRC-12)*



# ITU-R Recommendations Incorporation

## Voluntary:

**16.6** Administrative ..... of the international monitoring system should be in accordance with the most recent version of Recommendation ITU-R SM.1139.

**21.2.2** Information on this subject is given in the most recent version of Recommendation ITU-R SF.765

## Incorporated:

**19.102** 3) The types of maritime mobile service identities shall be as described in Annex 1 of Recommendation ITU-R M.585-7.

## Be careful!:

**19.108A** The maritime identification..... Furthermore, as indicated in the most recent version of Recommendation ITU-R M.585, some maritime....

M.585-7 (Annex 1)	Assignment and use of identities in the maritime mobile service	Nos. 19.99, 19.102, 19.111
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**25.6** 2) Administrations shall verify ..... Guidance for standards of competence may be found in the most recent version of Recommendation ITU-R M.1544.



# RADIO REGULATIONS: KEY DEFINITIONS

## **Services and Stations:**

**RR, No. 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

**RR, No. 1.4 radio:** A general term applied to the use of radio waves.

**RR, No. 1.5 Radio waves (or hertzian waves):** Electromagnetic waves of frequencies arbitrarily lower than 3000 GHz, propagated in space without artificial guide

**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

**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



# RR: Radioelectric Services

**1.116 public correspondence:** *Any telecommunication which the offices and stations must, by reason of their being at the disposal of the public, accept for transmission (CS). [CS 1004]*

**1.7 terrestrial radiocommunication:** Any radiocommunication other than space radiocommunication or radio astronomy.

**1.8 space radiocommunication:** Any radiocommunication involving the use of one or more space stations or the use of one or more reflecting satellites or other objects in space.

**1.20 fixed service:** A radiocommunication service between specified fixed points

**1.38 broadcasting service:** A radiocommunication service in which the transmissions are intended for direct reception by the general public. This service may include sound transmissions, television transmissions or other types of transmission (CS). [CS 1010]



# RR: Radioelectric Services

**1.24 mobile service:** A radiocommunication service between mobile and land stations, or between mobile stations (CV.) [CV 103] \*

**1.26 land mobile service:** A mobile service between base stations and land mobile stations, or between land mobile stations.

**1.28 maritime mobile service:** A mobile service between coast stations and ship stations, or between ship stations, or between associated on-board communication stations; survival craft stations and emergency position indicating radiobeacon stations may also participate in this service.

**1.32 aeronautical mobile service:** A mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate; emergency position-indicating radiobeacon stations may also participate in this service on designated distress and emergency frequencies.

- The mobile service covers by default: land, aeronautical, maritime
- In general for maritime services: "*Messages which are of a public correspondence nature shall be excluded from this service*"
- (and aeronautical?: aeronautical mobile (R)\* service: ...reserved for communications relating to safety and regularity of flight, ...





# RR: Radio Stations and Systems

**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.

**1.64 space station:** A station located on an object which is beyond, is intended to go beyond, or has been beyond, the major portion of the Earth's atmosphere.

**1.62 terrestrial station:** A station effecting terrestrial radiocommunication.  
In these Regulations, unless otherwise stated, any station is a terrestrial station

**1.63 earth station:** A station located either on the Earth's surface or within the major portion of the Earth's atmosphere and intended for communication:

- with one or more space stations; or
- with one or more stations of the same kind by means of one or more reflecting satellites or other objects in space.

**1.69 land station:** A station in the mobile service not intended to be used while in motion.

RR	English	Français	Español	tip
1.62	Terrestrial Station	Station de Terre	Estación Terrenal	not Space
1.63	Earth Station	Station Terrienne	Estación Terrena	link Earth <--> Space
1.69	Land Station	Station Terrestre	Estación Terrestre	not Maritime nor Aeronautical



# RR: Radio Stations and Systems

**1.66 fixed station:** A station in the fixed service

**1.85 broadcasting station:** A station in the broadcasting service.

**1.67 mobile station:** A station in the mobile service intended to be used while in motion or during halts at unspecified points.

**1.73 land mobile station:** A mobile station in the land mobile service capable of surface movement within the geographical limits of a country or continent

**1.77 ship station:** A mobile station in the maritime mobile service located on board a vessel which is not permanently moored, other than a survival craft station.

**1.83 aircraft station:** A mobile station in the aeronautical mobile service, other than a survival craft station, located on board an aircraft



# RR: Services and Stations

RR defines 41 radio services (Vol. I, Section III: 1.20 to 1.60). They can be grouped according to several parameters, such as:

1. **Link:** Earth (Earth-Earth), Space (Earth <--> Space, Space-Space)
2. **Service area:** land (land), sea (maritime), air (aeronautical)
3. **User Profiles:**
  - Public Correspondence : fixed, mobile communications, broadcasting
  - Specialized: aeronautics; maritime, meteorological; observation of the Earth; scientific time standard; astronomy; safety; specials etc

The RR defines 53 radio stations (Vol. I, Section IV: 1.61 to 1.115). They can be grouped according to the same parameters of the radio services

53 kinds of stations and 41 kinds of services: some stations simultaneously involve more than one service



# RR: Services and Stations

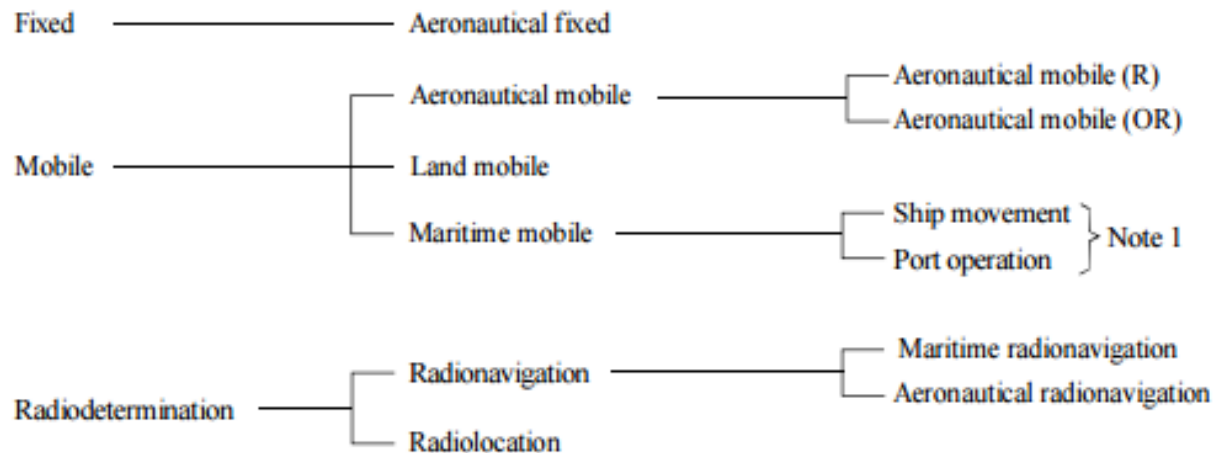
Some “*by default*” implications:

1. **All** radiocommunication services refer to terrestrial radiocommunication unless otherwise stated (RR 1.19) e.g. Fixed is terrestrial; Fixed-Satellite is Space link
2. Fixed services are placed on Land: links between fixed stations placed on Land (dry masses)
3. Broadcast services are placed on Land: links between Broadcast stations and Receivers placed on Land (dry masses)
4. Fixed-Satellite and Broadcast-satellite services are also mainly intended to Land Area; mostly of satellite footprints also cover seas (but are not maritime services) and airspaces (but are not aeronautical services):
5. Mobile services applies for all Areas, unless otherwise stated: a) Land Mobile; b) Maritime Mobile; c) Aeronautical Mobile. E.g.: Mobile except aeronautical mobile: it covers both Land Mobile and Maritime Mobile
6. Maritime and Aeronautical are always Mobile
7. Fixed Stations might link Mobile Services: links between Base Station (Fixed) and Mobile Station)



# RR: RADIO SERVICES

## Terrestrial services



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

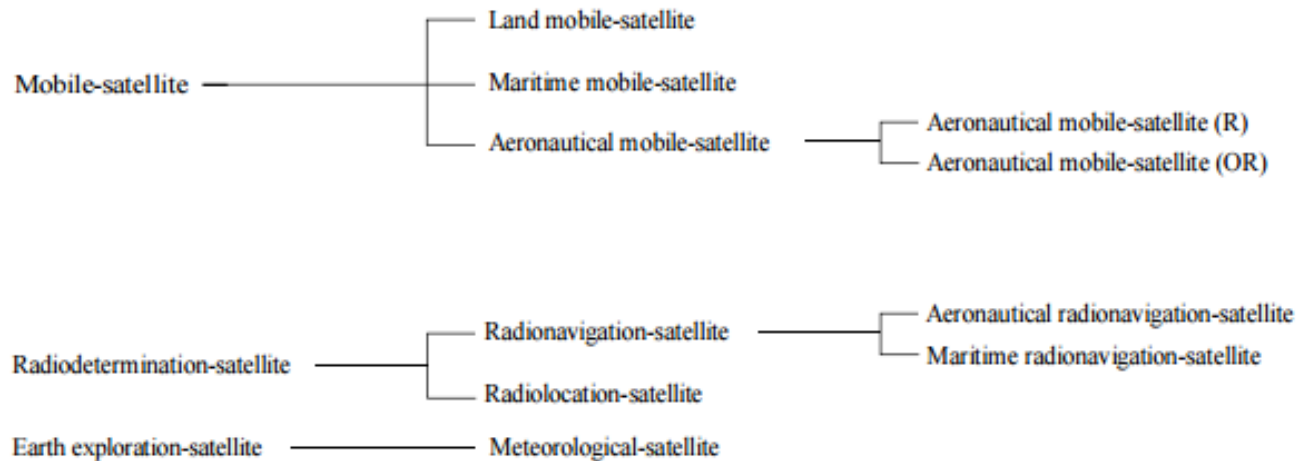
- Broadcasting
- Amateur
- Radio astronomy
- Meteorological aids
- Standard frequency and time signal

*Note 1 - The ship movement and port operation services are not subject to any table allocations. They are referred to in RR Appendix 18.*



# RR: RADIO SERVICES

## Space services



*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: Other concepts

**1.60 special service:** A radiocommunication service, not otherwise defined in this Section, carried on exclusively for specific needs of general utility, and not open to public correspondence.

**1.15 industrial, scientific and medical (ISM) applications (of radio frequency energy):** Operation of equipment or appliances designed to generate and use locally radio frequency energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of telecommunications.

ISMs are not strictly a radio service, and because of that they do not have frequency Allocations; they rather have "designations" through footnotes, with their explicit associated restrictions



**15.13** *Administrations shall take all practicable and necessary steps to ensure that radiation from equipment used for industrial, scientific and medical applications is minimal and that, outside the bands designated for use by this equipment, radiation from such equipment is at a level that does not cause harmful interference to a radiocommunication service and, in particular, to a radionavigation or any other safety service operating in accordance with the provisions of these Regulations*



# RADIO REGULATIONS

**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, 5.280 (some R1):** Bands **designated** for industrial, scientific and medical (ISM) applications.

**RR, No. 5.552A:** Bands **designated** for use by high Altitude Platform Stations (HAPS)

**RR, No. 5.516B:** bands **identified**\* for use by High-Density applications in the fixed-satellite service (also named: High Throughput Satellites, HTS)

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

\*: 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*”.





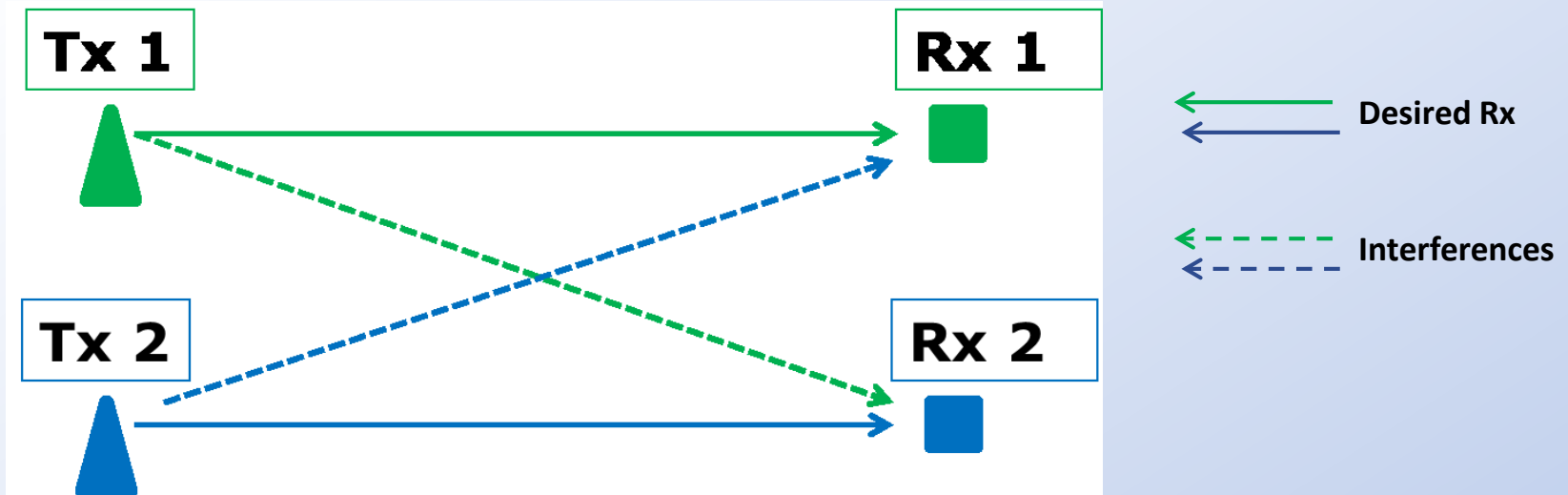
# RADIO REGULATIONS: IMT Bands

All footnotes related to IMT indicates that:

*the band X MHz is identified for International Mobile Telecommunications (IMT). 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*

Band (MHz)	Bandwidth (MHz)	Footnotes identifying Bands for IMT
450-470	20	5.286AA
698-960	262	5.313A, 5.317A
1710-2025	315	5.384A, 5.388
2110-2200	90	5.388
2300-2400	100	5.384A
2500-2690	190	5.384A
3400-3600	200	5.430A, 5.432A, 5.432B, 5.433A

**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: CLASSES OF INTERFERENCES

**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”*



## **CS: harmful interference (Art. 45)**

**197** 1 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 Member States 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 the Radio Regulations.

**198** 2 Each Member State undertakes to require the operating agencies which it recognizes and the other operating agencies duly authorized for this purpose to observe the provisions of No. 197 above.

**199** 3 Further, the Member States recognize the necessity of taking all practicable steps to prevent the operation of electrical apparatus and installations of all kinds from causing harmful interference to the radio services or communications mentioned in No. 197 above

## **RR Art. 15: Interferences**

Section I – Interference from Radio Stations

Section II – Interference from electrical apparatus and installations of any kind except equipment used for industrial, scientific and medical applications

Section III – Interference from equipment used for industrial, scientific and medical applications

Section IV – Tests

Section VI – Procedure in a case of harmful interference

Section V – Reports of Infringements



## RR: FREQUENCY MANAGEMENT (Sect. II)

**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.*

\* Regulators commonly refers to it as: International Table of Frequency Allocations, IFTA, to easily remind its links to their respective national counterpart: National Table of Frequency Allocations, NFTA



# RR: FREQUENCY MANAGEMENT

**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.

Allocations are granted to Radiocommunications Services

Assignments are granted to Radiocommunications Stations

RR in general does not deal with Assignments\*, because it is an sovereign and autonomous right of administrations

However, national Station Assignments shall be consistent with its NTFA and also the RR (No. 4.4) e.g.: assignment of a TV Station, only into a band allocated to Broadcasting Services

\* Due to their inherent international coverage nature, some services in some bands need that their allotment be also accompanied by an international assignment of their associated stations (so called: Planned Bands, contained on Vol. 2: Appendices)

**NOTE:** Most of dictionaries display the expressions “Allocation” and “Assignment” as being synonymous; in the context of Spectrum Management and Regulation they are different.



# RR: Allocations vs. Assignments

**Allocations**: granted to Radiocommunication Services

**Asigments**: granted to radiocommunication Stations

Generally speaking, the RR does not deal with assignments\*: sovereign and autonomous right of administrations. But the national assignments to the respective stations must be in accordance with their CNAF and also with the RR (Article 4.4), e.g. : allocation of a television channel, only in a band allocated to the broadcasting services

\* Due to its international nature, some services in some bands require that the award also be accompanied by an international assignment of its associated stations (Planned services, contained in Vol. 2: Appendices)

***Art. 4.4:*** *Administrations of the Member States shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations in this Chapter or the other provisions of these Regulations, except on the express condition that such a station, when using such a frequency assignment, shall not cause harmful interference to, and shall not claim protection from harmful interference caused by, a station operating in accordance with the provisions of the Constitution, the Convention and these Regulations.*



# RADIO REGULATIONS PRINCIPLES

RR is technically neutral, hence, it

1. Does allocate frequency bands to radiocommunication services
2. Does not allocate to specific applications
3. Does not allocate to particular technologies
4. Does not define users profile

e.g.: allocation can be made to: “*mobile*” (*service*; by default: terrestrial, land)

- not specifically to :

- a) cellular networks (*application*)
- b) GSM, LTE, Wimax, etc. (*technology*)
- c) Official/commercial/particular use





# Radio Regulations (RR)

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# Frequency Bands

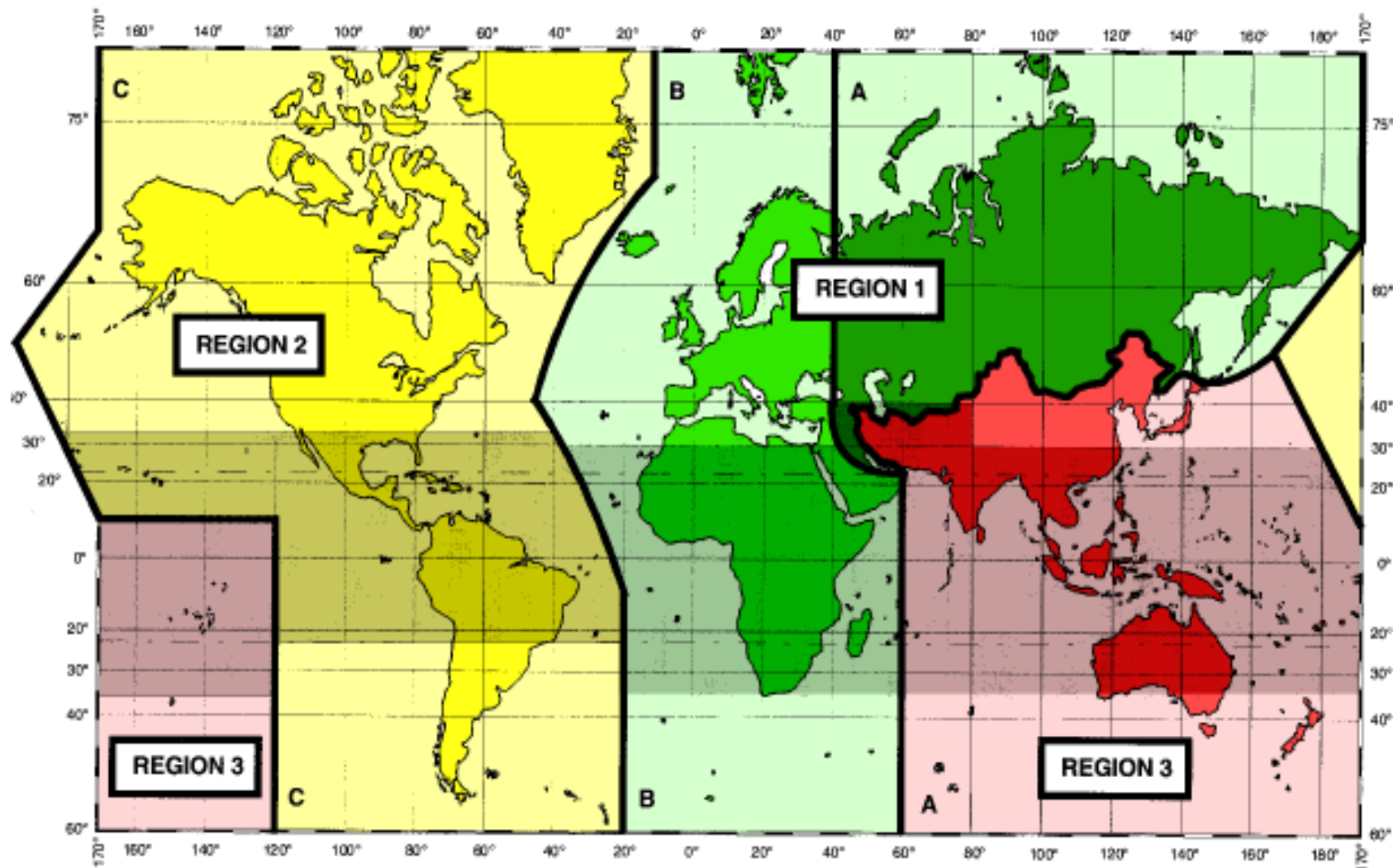
Número de la banda	Símbolos (en inglés)	Gama de frecuencias (excluido el límite inferior, pero incluido el superior)	Subdivisión métrica correspondiente	Abreviaturas métricas para las bandas
4	VLF	3 a 30 kHz	Ondas miriamétricas	B.Mam
5	LF	30 a 300 kHz	Ondas kilométricas	B.km
6	MF	300 a 3 000 kHz	Ondas hectométricas	B.hm
7	HF	3 a 30 MHz	Ondas decamétricas	B.dam
8	VHF	30 a 300 MHz	Ondas métricas	B.m
9	UHF	300 a 3 000 MHz	Ondas decimétricas	B.dm
10	SHF	3 a 30 GHz	Ondas centimétricas	B.cm
11	EHF	30 a 300 GHz	Ondas milimétricas	B.mm
12		300 a 3 000 GHz	Ondas decimilimétricas	

NOTA 1: La «banda N» (N = número de la banda) se extiende de  $0,3 \times 10^N$  Hz a  $3 \times 10^N$  Hz.

NOTA 2: Prefijos: k = kilo ( $10^3$ ), M = mega ( $10^6$ ), G = giga ( $10^9$ ).



# RR REGIONS





# RR: Table of Frequency Allocations

**5.25 a)** services the names of which are printed in “**capitals**” (example: FIXED); these are called “primary” services;

**5.26 b)** services the names of which are printed in “normal characters” (example: Mobile); these are called “secondary” services (see Nos. 5.28 to 5.31).

**5.48 3)** Within each of the categories specified in Nos. 5.25 and 5.26, services are listed in alphabetical order according to the French language. The order of listing does not indicate relative priority within each category.

**5.50 5)** The footnote references which appear in the Table below the allocated service or services apply to more than one of the allocated services, or to the whole of the allocation concerned. (WRC-2000)

**5.51 6)** The footnote references which appear to the right of the name of a service are applicable only to that particular service.



# CATEGORY OF SERVICES

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. 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;

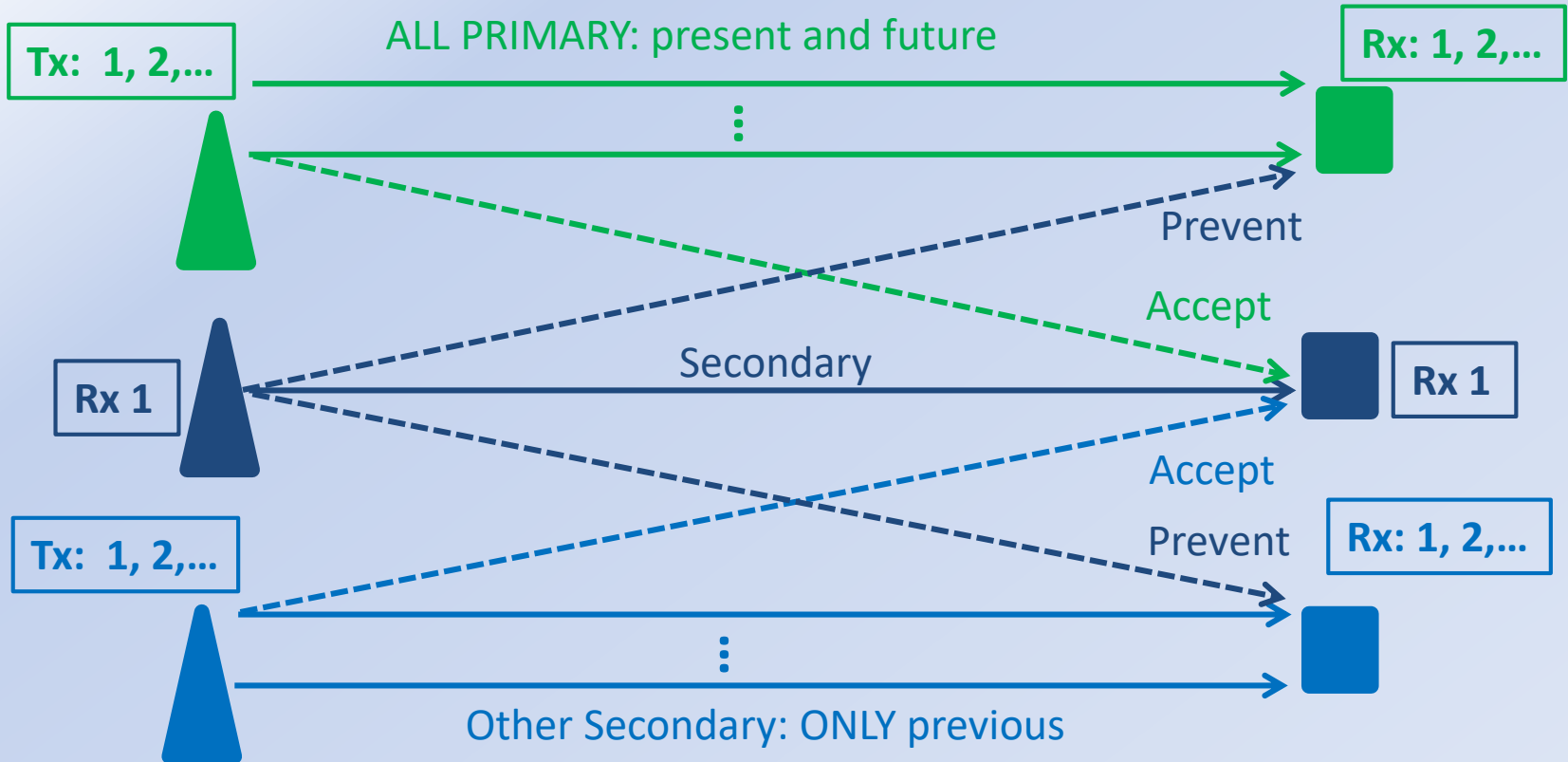
**RR, No. 5.31** c) can claim protection, however, from harmful interference from stations of the same or other secondary service(s) to which frequencies may be assigned at a later date\*\*  
(\*\*first in time, first in right)

\* 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



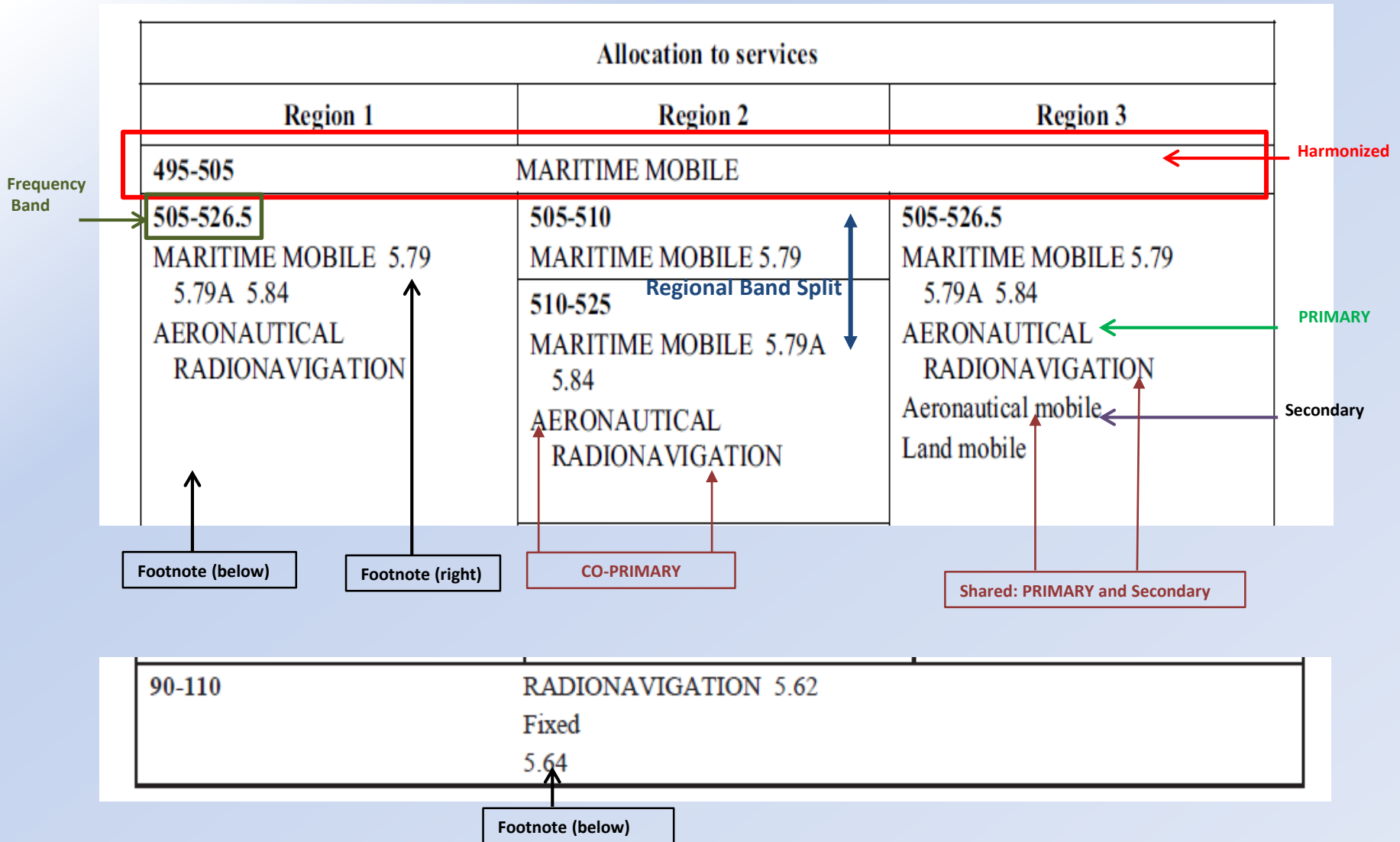
# RADIO REGULATIONS: CATEGORIES OF SERVICES



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



# RR: Table of Frequency Allocations





# Footnotes format

Footnote shall indicate:

- Area or countries
- Frequency range (could be all or a part of concerned band)
- Type of allocation change (different category; additional; alternative)
- Services to modify
- Restriction?

## Case 1: no restriction

**5.88 Additional allocation:** in China, the band 526.5-535 kHz is also allocated to the aeronautical radionavigation service on a secondary basis.

## Case 2: with restriction

**5.190 Additional allocation:** in Monaco, the band 87.5-88 MHz is also allocated to the land mobile service on a primary basis, subject to agreement obtained under No. 9.21.\*





# Footnotes Restriction

## Sub-Section IIA – Requirement and request for coordination

**9.6** Before an administration notifies to the Bureau or brings into use a frequency assignment in any of the cases listed below, it shall effect coordination, as required, with other administrations identified under No. 9.27:

.....

9.21 p) for any station of a service for which the requirement to seek the agreement of other administrations is included in a footnote to the Table of Frequency Allocations referring to this provision.



# Different Category of Service

**5.32 4)** Where a band is indicated in a footnote of the Table as allocated to a service “on a secondary basis” in an area smaller than a Region, or in a particular country, this is a secondary service (see Nos. 5.28 to 5.31).

**5.33 5)** Where a band is indicated in a footnote of the Table as allocated to a service “on a primary basis”, in an area smaller than a Region, or in a particular country, this is a primary service **only** in that area or country.



# Different Category of Service

137-137.025	SPACE OPERATION (space-to-Earth)	
	METEOROLOGICAL-SATELLITE (space-to-Earth)	
	MOBILE-SATELLITE (space-to-Earth)	5.208A 5.208B 5.209
	SPACE RESEARCH (space-to-Earth)	
	Fixed	
	Mobile except aeronautical mobile (R)	
	5.204 5.205 5.206 5.207 5.208	FIXED MOBILE

**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)

**Same Services  
Different Categories**



# Additional Allocations

## 5.34 Additional allocations

**5.35 1)** Where a band is indicated in a footnote of the Table as “also allocated” to a service in an area smaller than a Region, or in a particular country, this is an “additional” allocation, i.e. an allocation which is added in this area or in this country to the service or services which are indicated in the Table (see No. 5.36).

**5.36 2)** If the footnote does not include any restriction on the service or services concerned apart from the restriction to operate only in a particular area or country, stations of this service or these services shall have equality of right to operate with stations of the other primary service or services indicated in the Table.

**5.37 3)** If restrictions are imposed on an additional allocation in addition to the restriction to operate only in a particular area or country, this is indicated in the footnote of the Table



# Additional Allocations

68-74.8 FIXED MOBILE except aeronautical mobile       5.149 5.175 5.177 5.179	68-72 BROADCASTING Fixed Mobile 5.173	68-74.8 FIXED MOBILE  <b>+ BROADCASTING</b>
	72-73 FIXED MOBILE	
	73-74.6 RADIO ASTRONOMY 5.178	
	74.6-74.8 FIXED MOBILE	
		5.149 5.176 5.179

**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)

**Additional Services**



# Alternative Allocations

## 5.38 Alternative allocations

**5.39 1)** *Where a band is indicated in a footnote of the Table as “allocated” to one or more services in an area smaller than a Region, or in a particular country, this is an “alternative” allocation, i.e. an allocation which replaces, in this area or in this country, the allocation indicated in the Table (see No. 5.40).*

**5.40 2)** *If the footnote does not include any restriction on stations of the service or services concerned, apart from the restriction to operate only in a particular area or country, these stations of such a service or services shall have an equality of right to operate with stations of the primary service or services, indicated in the Table, to which the band is allocated in other areas or countries.*

**5.41 3)** *If restrictions are imposed on stations of a service to which an alternative allocation is made, in addition to restriction to operate only in a particular country or area, this is indicated in the footnote.*



# Alternative Allocations

47-68 BROADCASTING	47-50 FIXED MOBILE	47-50 FIXED MOBILE BROADCASTING 5.162A
	50-54 <del>AMATEUR</del> 5.162A 5.166 5.167 5.167A 5.168 5.170	
	54-68 BROADCASTING Fixed Mobile 5.162A 5.163 5.164 5.165 5.169 5.171	54-68 FIXED MOBILE BROADCASTING 5.162A

FIXED  
MOBILE  
BROADCASTING

**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)

Different Services



Replaces the allocation indicated in the Table



# Bands Harmonization

## NOT HARMONIZED ALLOCATION:

1. **Different Services by Region:** not global scale for terminals; harder border coordination (Regions edges)
2. **Several Primary Services:** countries might adopt different primary services, harder border coordination intra RR Region
3. **Primary and Secondary Services:** countries might allocate services on a different basis onto his territory; international coordination becomes more complex
4. **National Footnotes:** national particular exemptions, with all the above inconvenient





# Bands Harmonization

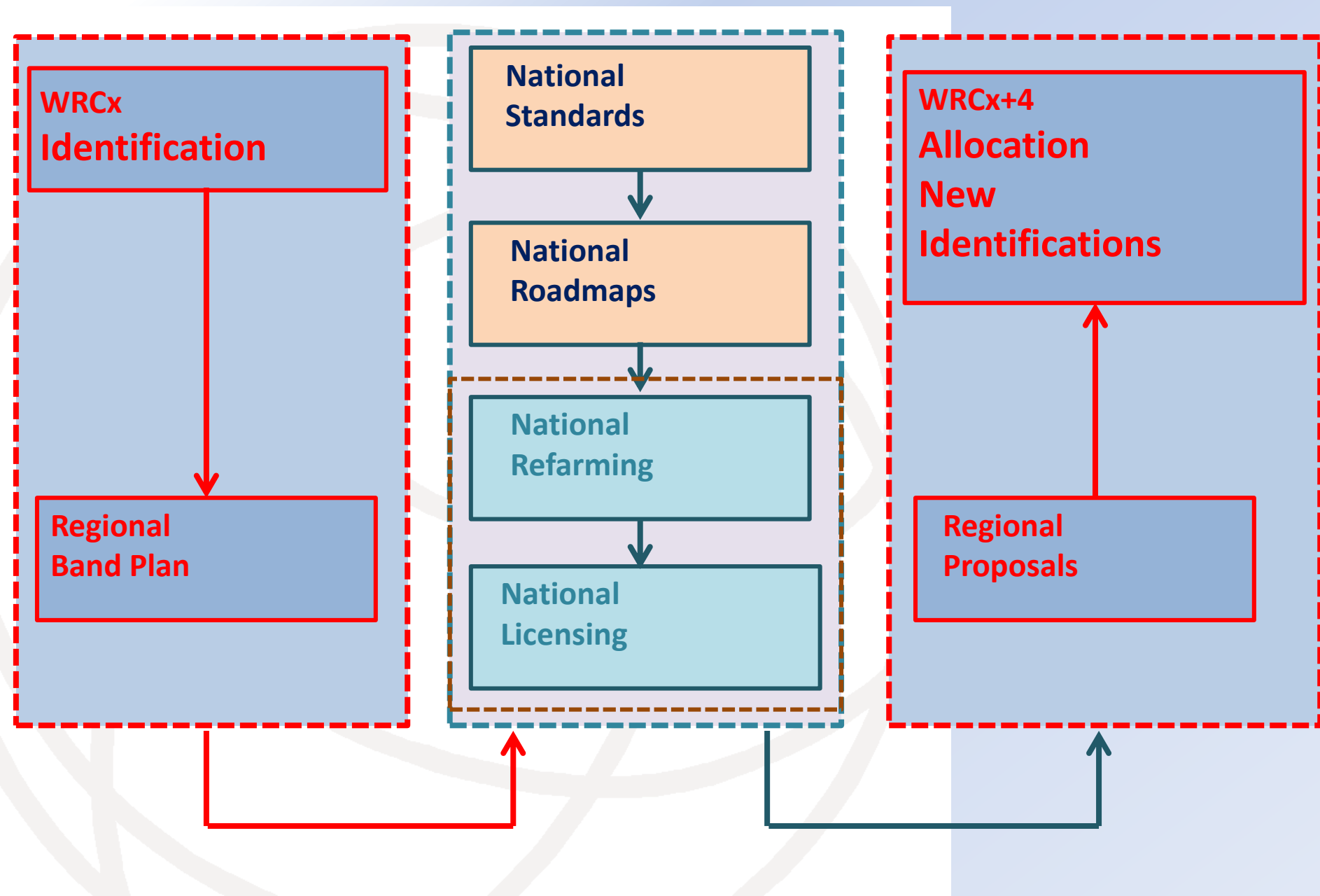
- Harmonized utilization of spectrum by different nations is an essential need to support international roaming, to facilitate interconnection and to provide more economical radiocommunication services,
- Frequency bands can be utilized at same point, in same time, almost once while there could be more than one demand for utilization,
- Uncoordinated electromagnetic radiation of individual and independent spectrum users increase interferences matters

**Global Harmonization:** Ultimate goal (as possible); RR Recommendation 34: 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 the Resolution 26 (Rev.WRC-07);



# Spectrum Harmonization





# 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**



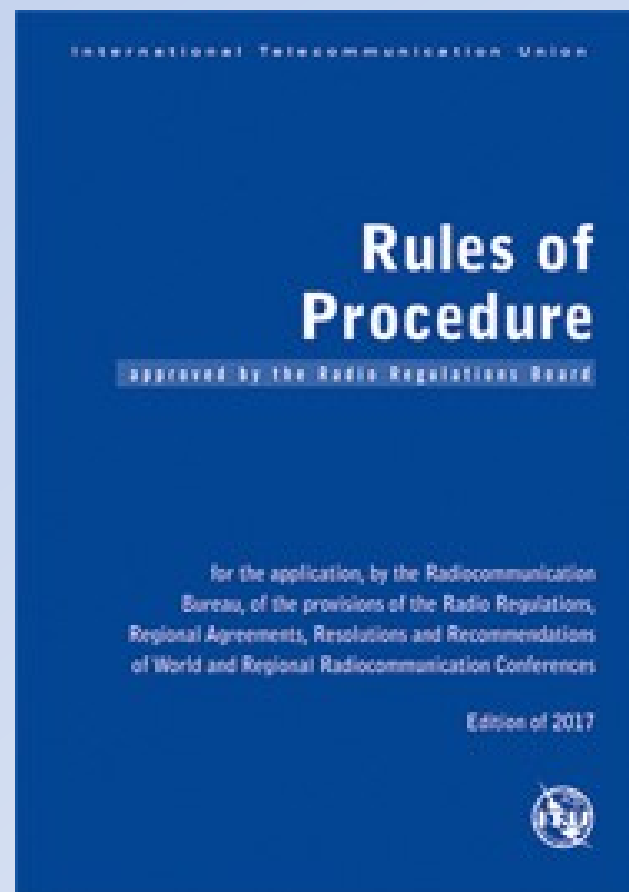
# ITU-R Rules of Procedure

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>





# Example RR & RoP bounds

## *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 adjoining are allocated.

## *it shall be followed the associated procedure (RoP)*

**4.5**

1 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.

1.1 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**.

1.2 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.





# ITU-R Rules of Procedure

RoP are to be used by administrations and the BR in applying the Radio Regulations. The RoP have three main parts:

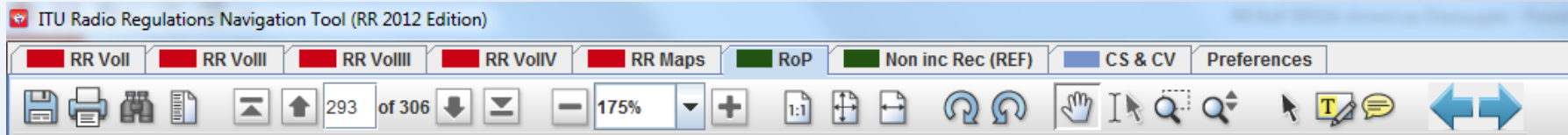
- **Part A:** Rules relating to a provision of the **Radio Regulations**, or a limited number of them
- **Part B:** Rules relating to a process such as the technical examinations
- **Part C:** Rules relating to internal working methods of the Radio Regulations Board (RRB)



# Radio Regulations Navigation Tool

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,
- ITU-R Recommendations cited but not incorporated by reference in the Radio Regulations.



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

The updated version of this Tool (RR 2016) will be available in 1Q17



# Art 5 Viewer

The Frequency Attribution Table Analyzer (RR5FATViewer) is an independent application (off line) that provides a mechanism to use, consult and analyze electronically the Frequency Attribution Table and its associated notes, as they appear in Article 5 of the Radio Regulations. The software is equipped with several tools and utilities that allow, among other things, to track and compare the evolution of the Main Table of Article 5 and its associated footnotes (since the 2001 edition) and for the extraction of the International Plan of Frequency Assignments. "for a specific geographical area (country).

The screenshot displays the 'Art 5 Viewer' application window. The title bar reads 'Article 5 of the Radio Regulations (RR5) - Table of Frequency Allocations (RR 2016 Edition)'. The menu bar includes 'Allocations to services', 'Footnotes', 'Preferences', 'Tools', and 'Help'. The toolbar contains various icons for file operations and navigation. The main content area is titled 'Main Table Allocations to Services' and features three tabs for 'Region 1', 'Region 2', and 'Region 3', all of which are currently selected. A date filter is set to 'As of 15/11/2018' and a 'Frequency Band' dropdown is set to 'Below 110 kHz'. The interface is divided into three columns corresponding to the regions. Each column shows a table of frequency allocations. For Region 1, the table for 'Below 8.3 kHz' is '(Not allocated)'. The table for '8.3 - 9 kHz' lists 'METEOROLOGICAL AIDS (passive) 5.54A 5.54B 5.54C' and 'Additional: 8.3 - 9 kHz'. For Region 2, the table for '8.3 - 9 kHz' lists 'METEOROLOGICAL AIDS (passive) 5.54A 5.54B 5.54C'. For Region 3, the table for '8.3 - 9 kHz' lists 'METEOROLOGICAL AIDS (passive) 5.54A 5.54B 5.54C' and 'Additional: 8.3 - 9 kHz'. Below each table, there are sections for 'FIXED', 'MOBILE', and 'RADIONAVIGATION'.





# Radio Regulations (RR)

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5. **RR and National Spectrum Management**



# STATIONS REGISTRATION

Stations protection cannot be “in abstract”

Stations shall be duly registered, with all their technical parameters, and other issues:

- Nationally: National Spectrum Users Database
- Internationally: ITU Master Innal. 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



# STATIONS REGISTRATION

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 protection cannot be “in abstract”)



## MIFR provisions (RR Art. 8)

**RR, No.8.1.** International rights and obligations of administrations in respect to frequency assignments shall be derived from the recording of those in the Master International Frequency Register (Master Register) or from their conformity, where appropriate, with a plan

**RR, No. 8.3.** Frequency assignments recorded in the Master Register with a favourable finding have the right to international recognition

**RR, No. 8.4** A frequency assignment shall be known as a non-conforming assignment when it is not in accordance with the Table of Frequency Allocations or the other provisions of these Regulations.

**RR, No. 8.5** If harmful interference to the reception of any station whose assignment is in accordance with No. 11.31 is actually caused by the use of a frequency assignment which is not in conformity with No. 11.31, the station using the latter frequency assignment must, upon receipt of advice thereof, immediately eliminate this harmful interference



# MIFR: what to notify?

1. Any frequency assignment (new entry or change of one recorded on the **MIFR; RR, No. 11.1**) relating to a transmitting station and to its associated receiving stations :
  - a) *Capable of causing harmful interference to any service of another administration* (**RR, No. 11.3**)
  - b) *Used for International radiocommunication* (**RR, No. 11.4**)
  - c) *Subject to world or regional frequency allotment or assignment plan which does not have its own notification procedure* (**RR, No. 11.5**)
  - d) *Subject to the Art. 9 coordination procedure* (**RR, No. 11.6**)
  - e) *Requesting international recognition* (**RR, No. 11.7**)
  - f) *Non-conforming assignments\*: for information only* (**RR, No. 11.8**):
2. Receiving earth station or space station
3. Receiving HAPS stations in Fixed service in some Bands (**RR, Nos. 5.543A & 5.52A**)
4. Land station for reception from mobile stations
  - Involved Transmitting Stations: if apply any case from a) to f)
  - Involved Receiving Stations: if apply b) c) and e)
5. Used for reception of a radio astronomy station (if desired; **RR, No. 11.12**)

\* *Its operation shall not cause harmful interference to, and not claim protection from* (RR, No. 8.4)



## MIFR: what NOT to notify?

1. Assignments involving specific frequencies which are prescribed by RR for common use by terrestrial stations of a given service (RR, No. 11.13)\*
2. Assignments to (RR, No. 11.14):
  - a) Ship stations
  - b) Mobile stations of other services
  - c) Stations in amateur service
  - d) Earth stations in amateur-satellite service
  - e) Broadcasting Stations subject to a seasonal planning (Frequency range: 5900 to 26100 KHz; RR, Art. 12)

\* Entered in MIFR directly by BR; consolidated table published in the Preface to the BR IFIC (RR, Chapter VI)



# BRIFIC

The BR International Frequency information Circular (**BR IFIC**) is intended to provide information on the frequency assignments/allotments submitted by administrations to the BR for recording in the Master International Frequency Register (MIFR) and Plans.

The BR IFIC is published once every two weeks by the BR (**RR, Nos. 20.1 to 20.6 and 20.15**). The BR IFIC is issued in the 6 UN languages: Arabic, Chinese, English, French, Russian and Spanish.

Due to the large volume of data, the BR IFIC is published in two parts: Terrestrial Services and Space Services. BR IFIC web sites:

- Terrestrial: <http://www.itu.int/en/ITU-R/terrestrial/brific/Pages/default.aspx>
- Space: <http://www.itu.int/en/ITU-R/space/Pages/brificMain.aspx>



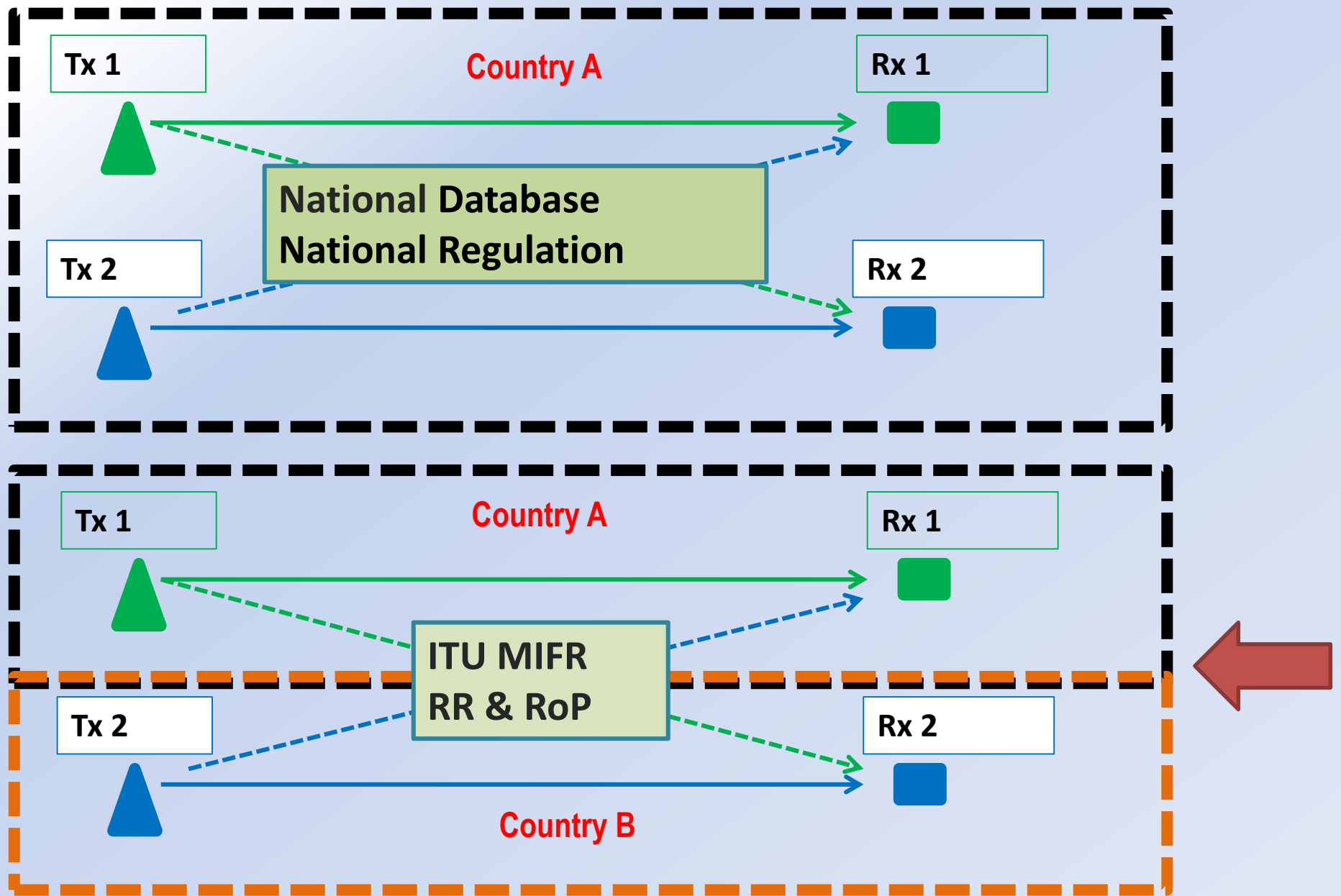
## BRIFIC CONTENT

- Preface: It contains basic guidelines for its use
- The BR IFIC is a reference publication for Frequency Managers.
- List of Assignments recorded in the MIFR with a favourable finding have the right to international recognition (RR, No. 8.3).
- Acknowledgement of receipt for the notifying administration.
- Coordination with administrations of neighbouring countries.
- One copy of the BR IFIC is distributed free of charge to every administration
- It is essential to consult the BR IFIC regularly.





# STATIONS COORDINATION





# LICENSES

## **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 (however, see Nos. 18.2, 18.8 and 18.11).

**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*.  
*(NI/NP)*

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.



# “Unlicensed Devices”

Every “unlicensed device” shall be pre set-up to obey its ruling specifications, enabling to operate without adjustments performed by its final user before or during operation. They are commonly labeled as “*X compliant*” to indicate to buyers its alignment with concerned ruling.

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

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)

As they are not protected and shall not interfere, they are not registered on Spectrum Users Databases: National, or International (MIFR)



# Microsatellites

They are space stations, and subject to international regulations

## **Radiocommunication space station:**

Subject to the provisions of the **ITU Radio Regulations**

## **Object thrown into space:**

Subject to the provisions of the **Space Law Treaties of the Commission for the Peaceful Uses of Outer Space (COPUOS)**

The monitoring of these standards allows these projects, and the states involved, their harmonious operation without causing, or being affected by, risks to other existing systems.



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# RR and Spectrum Management (SM)

Spectrum management is a combination of administrative and technical activities for efficient utilization of spectrum by users without causing harmful interference in their service area.

Main 3 layers:

- 1. Planning:** Defining the use of different bands: Allocations to services
- 2. Licensing:** Authorizing of emissions, and technical conditions: Assignments to Stations (Licenses)
- 3. Monitoring & Enforcement:** Verifying the use of spectrum in conformity with licenses conditions; preventive and corrective measures

Spectrum cannot be confined to a given territory, then international matter shall be considered; furthermore, international harmonization entails many advantages for national management and spectrum users ecosystem



# RR and Spectrum Management (SM)

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

[http://web.itu.int/dms\\_pay/itu-r/opb/hdb/R-HDB-21-2015-PDF-E.pdf](http://web.itu.int/dms_pay/itu-r/opb/hdb/R-HDB-21-2015-PDF-E.pdf)





# RR AND NATIONAL SPECTRUM MANAGEMENT

**RR** is applied on the international context; for national issues, each country should apply its national framework.

National spectrum regulations use to “replicate” RR concepts provisions, adopting them into their legal framework, including:

## - **Allocations:**

**IFTA** is based on “technologic neutrality basis”.

NTFA, shall be consistent with **ITFA** in particular his Region, and footnotes including that country

NFTA may include channeling Plans. They are free to associate allocations to applications and/or technologies

## - **Licenses(assignments):**

Authorizations to stations, fixing specific conditions, as; RF Power, coverage. Also regulatory and financial conditions, as: timeline terms, spectrum fees, etc.

A Spectrum Users Database shall storage and process Licensing information (duly tuned with NTFA); this Database shall be consistent with **MIFR**, in special with stations potentially interfering/being interfered to/from stations under jurisdiction of other countries

All stations shall be licensed prior to operate (**RR, Art. 18**)



# RR and Spectrum Management Layers

	National	International
<b>Legal Framework</b>	National Spectrum Laws	ITU Radio Regulations, RR
<b>1. Planing</b>	National table of Frequency Allocations, NFAT	International Table of Frequency Allocations, ITFA (RR, Art. 5)
<b>2. Licensing</b>	National Spectrun Users Database	Master International Frequency Register, MIFR (RR, Art. 8)
<b>3.a. Monitoring</b>	National Monitoring System	International Monitoring System (RR, Art. 16)
<b>3.b. Enforcement</b>	National Regulators	ITU Radiocommunications Bureaux, BR
	National Courts	ITU Radio Regulations Board, RRB

Every SM Layer has both a National and International facet

Every national Layer shall be consistent with the its International pair

*ITU has not legal tools to force compliance of RRB decisions...*



# 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!**

**Further info:**

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