Radio Regulations

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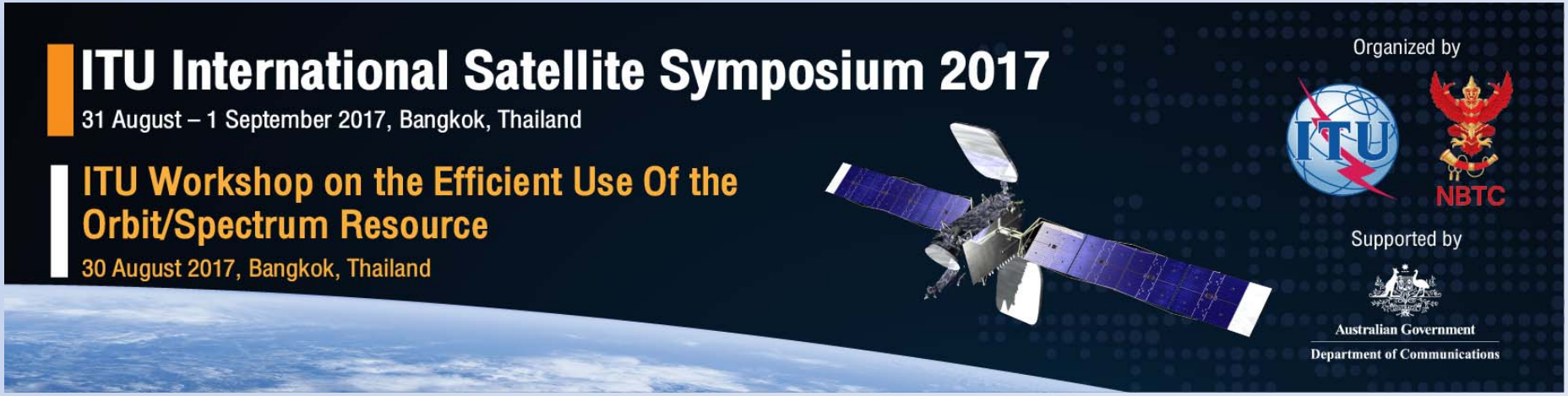
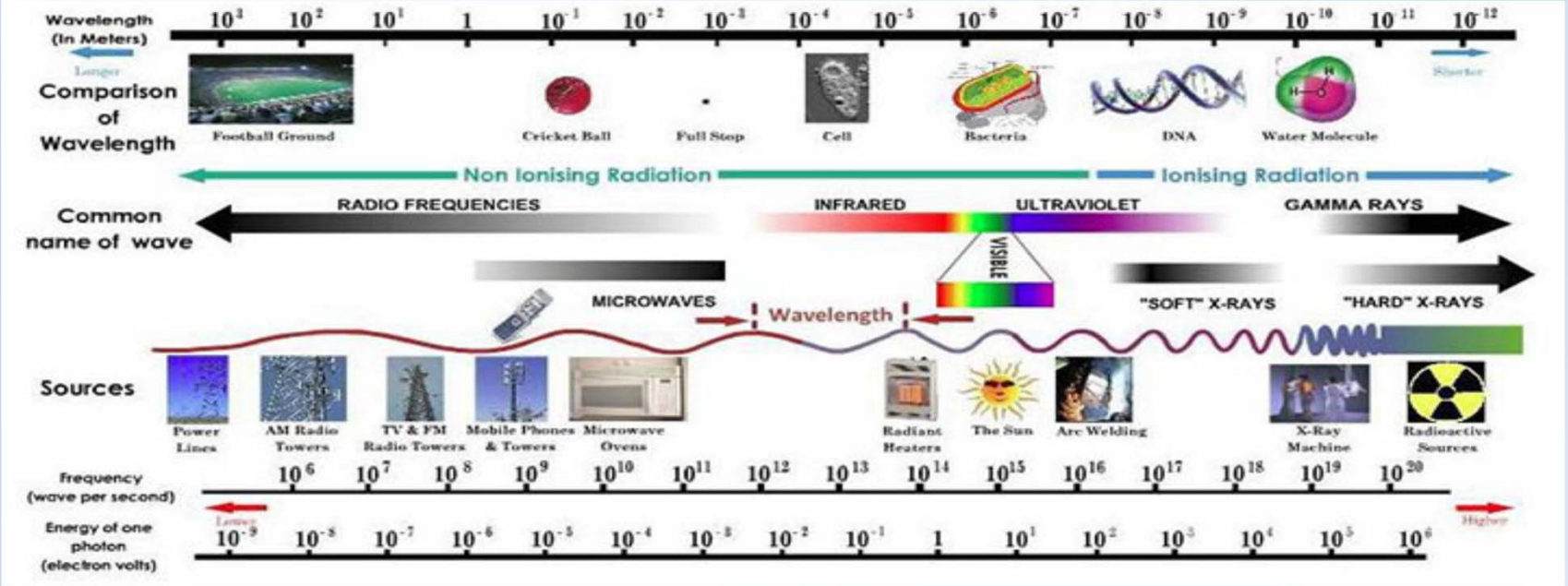


RADIOELECTRIC SPECTRUM

"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."



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

RADIO REGULATIONS, RR

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

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: KEY DEFINITIONS

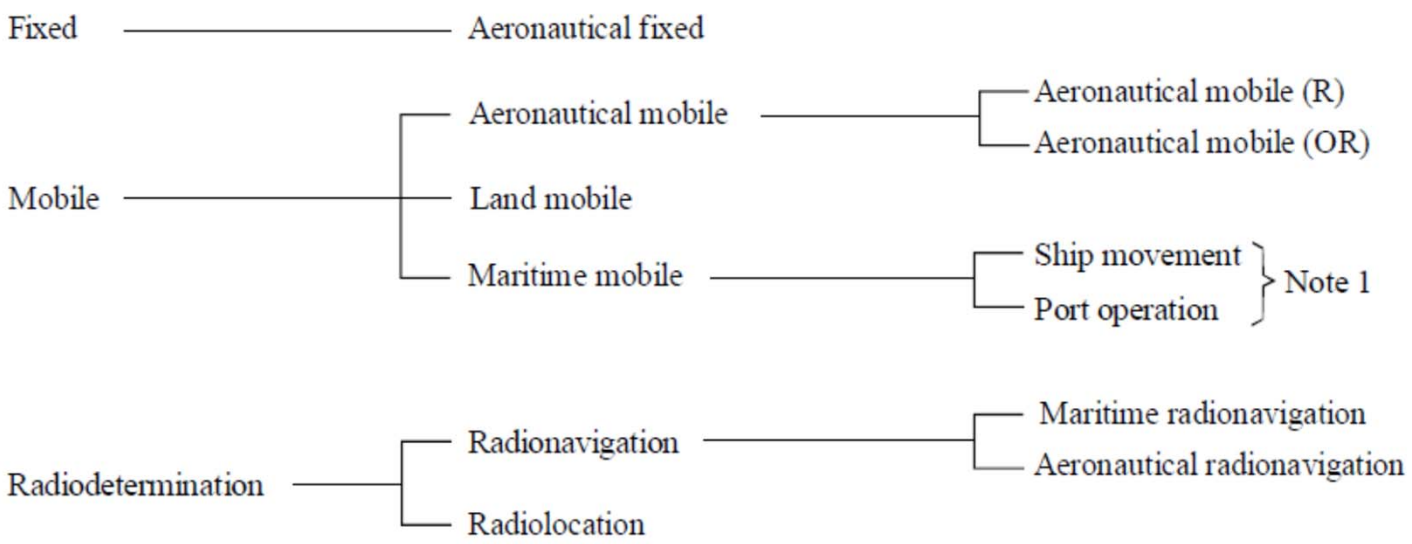
Services and Stations:

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)

RR: RADIO SERVICES

- 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)

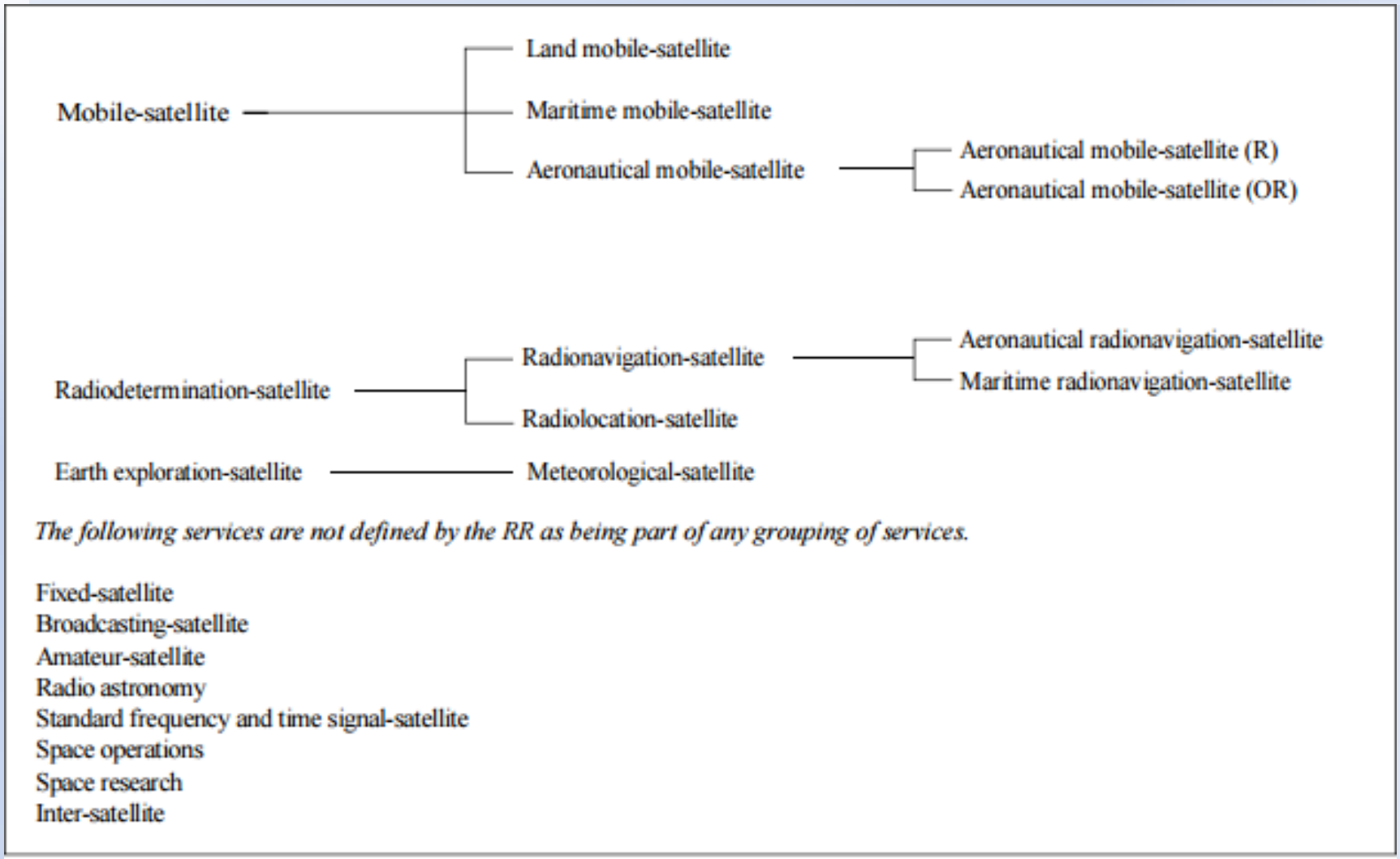


The following services are not defined by the Radio Regulations (RR) as being part of any grouping of services.

Broadcasting
Amateur
Radio astronomy
Meteorological aids
Standard frequency and time signal

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: FREQUENCY MANAGEMENT

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.

Frequency distribution to	French	English	Spanish	Arabic	Chinese	Russian
Services	Attribution (attribuer)	Allocation (to allocate)	Atribución (atribuir)	توزيع (يوزع)	划分	распределение (распределять)
Areas or countries	Allotissement (allotir)	Allotment (to allot)	Adjudicación (adjudicar)	تعيين (يعين)	分配	выделение (выделять)
Stations	Assignation (assigner)	Assignment (to assign)	Asignación (asignar)	تخصيص (يخصص)	指配	присвоение (присваивать)

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

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

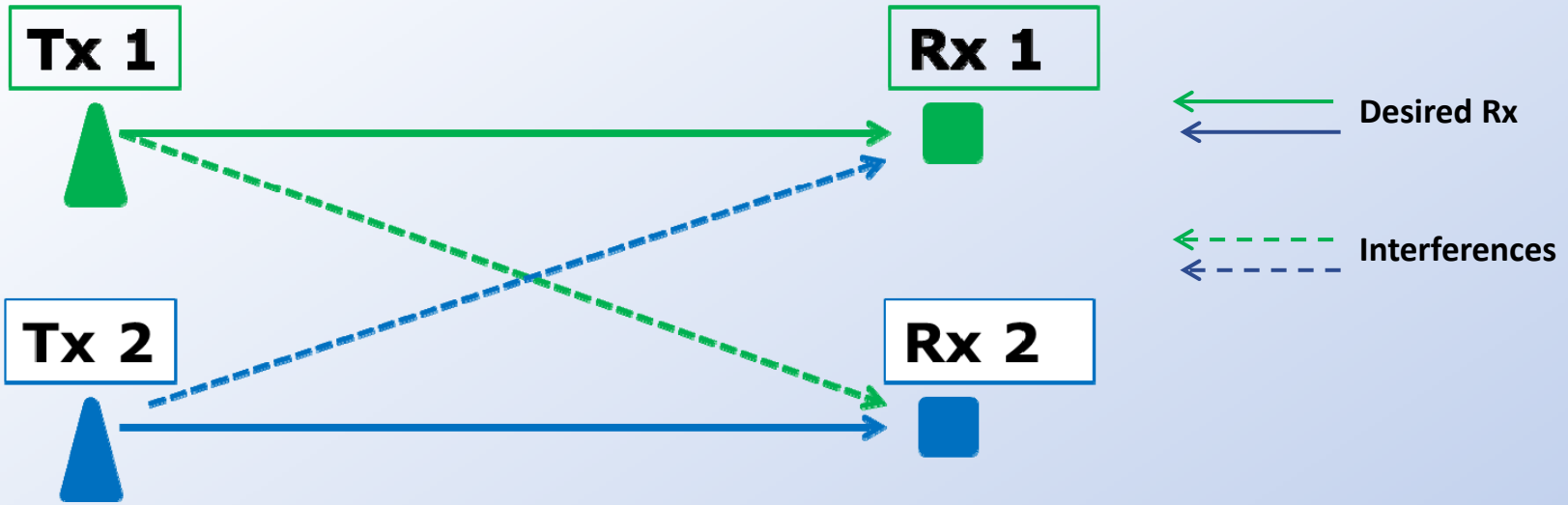
RR, No. 5.516B: bands ***identified**** for use by high-density applications in the fixed-satellite service

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*".

RR: INTERFERENCES

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"

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;

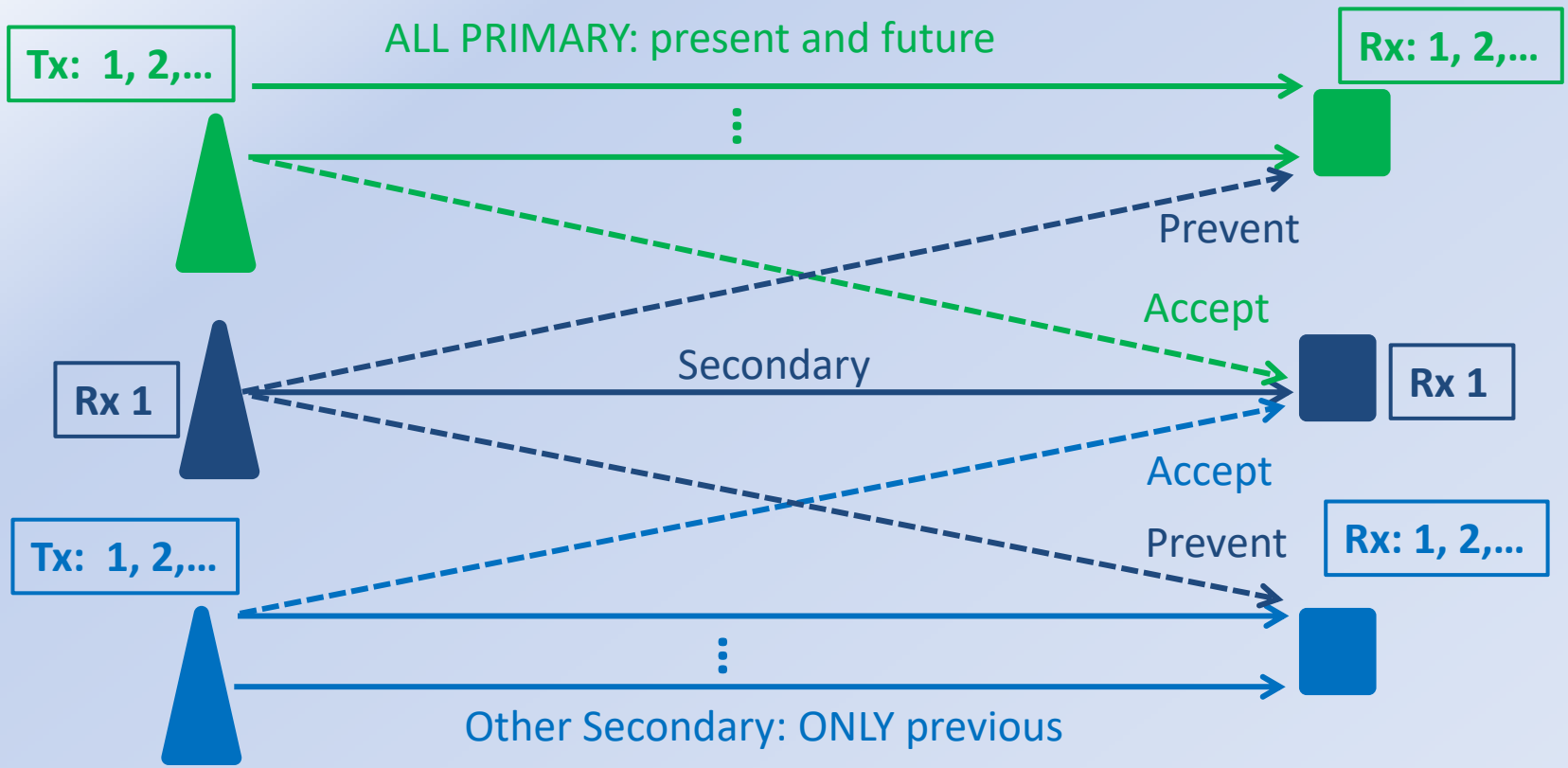
RR, No..30 b) cannot claim protection from harmful interference from stations of a primary service to which frequencies are already assigned or may be assigned at a later date;

*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.:

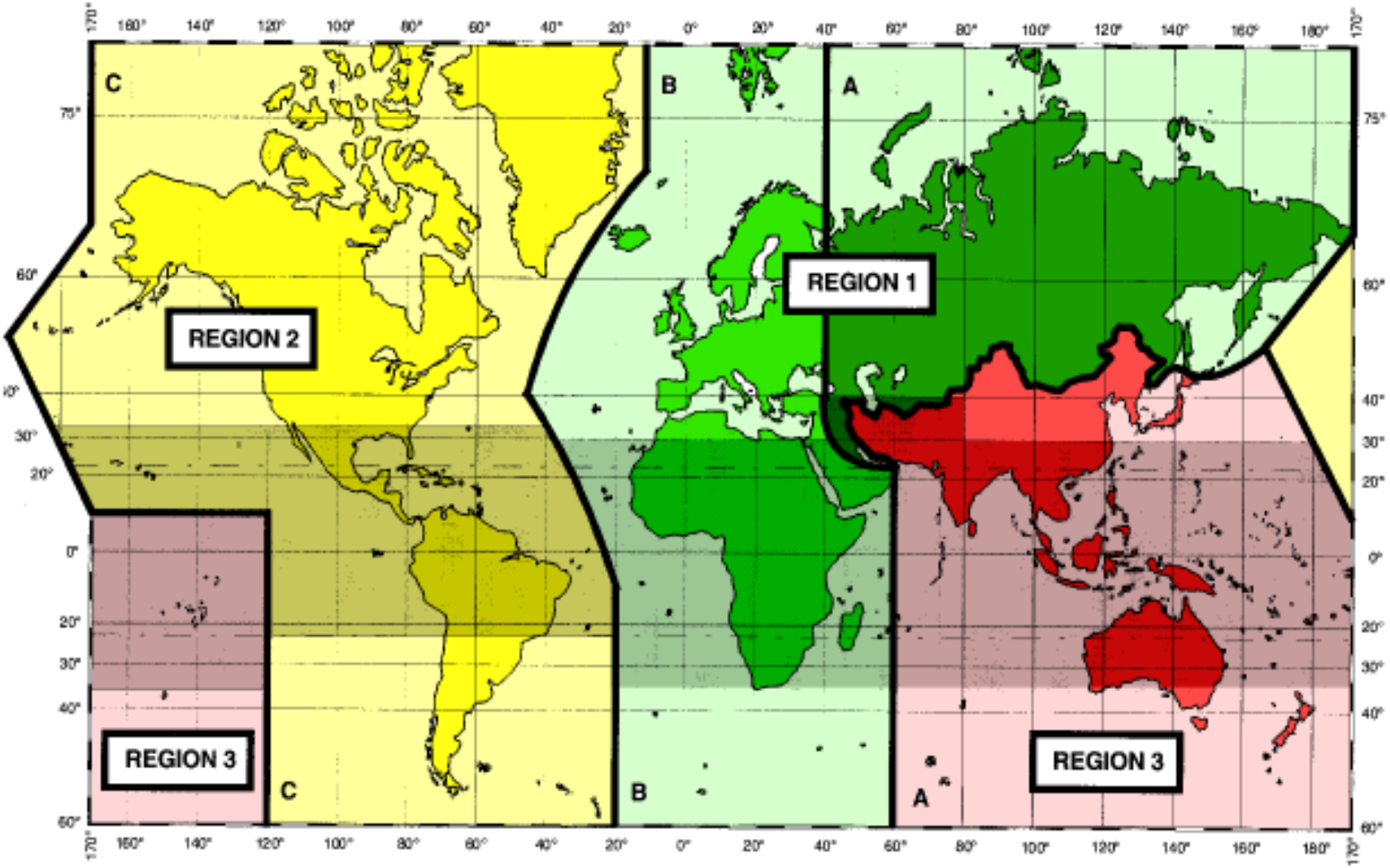
- Primary: متنقلة بحرية 无线电定位
- Secondary: متنقلة بحرية 无线电定位

RADIO REGULATIONS: CATEGORIES OF SERVICES



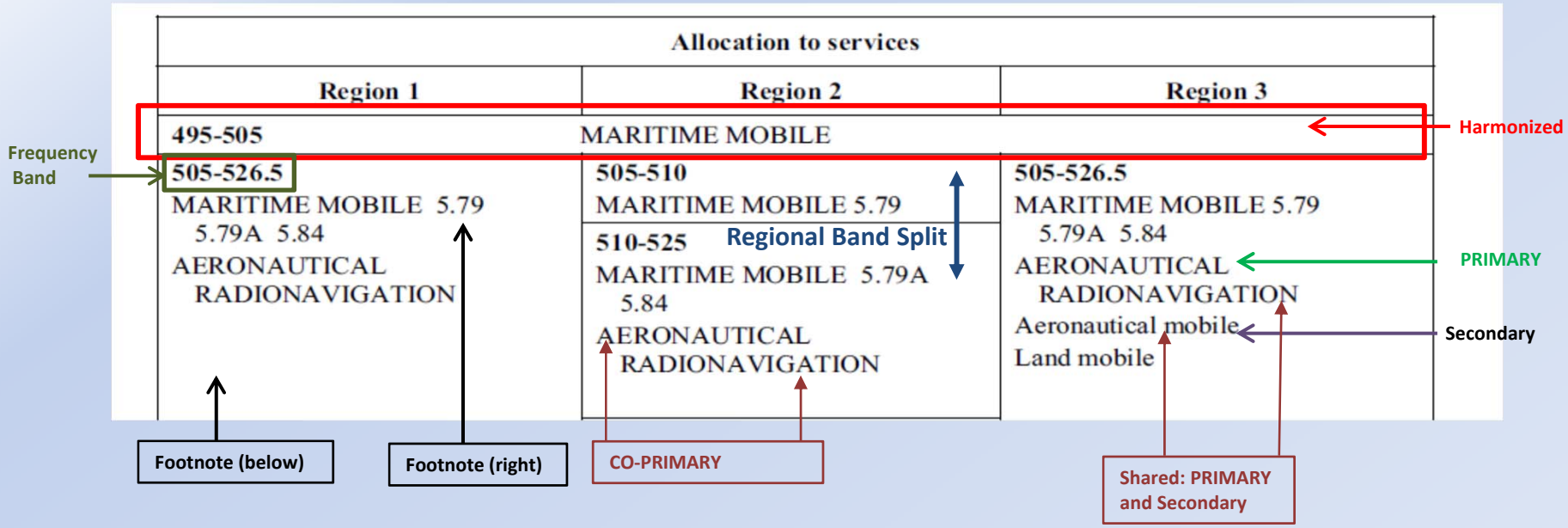
NI/NP: No interference / No Protection

RR REGIONS



RR: Table of Frequency Allocations

Example RR, Art. 5:



RR, Art. 5 Footnotes

1. E.g. *Different Category of Services* than RR, Art. 5 (RR No. 5.32 & 5.33):

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

Art. 5 Footnotes

2. E.g. *Additional allocations* than RR Art. 5 List (RR No. 5.34 to 5.37):

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 + BROADCASTING 5.149 5.176 5.179
	72-73 FIXED MOBILE	
	73-74.6 RADIO ASTRONOMY 5.178	
	74.6-74.8 FIXED MOBILE	

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

RR, Art. 5 Footnotes

3. *Alternative allocations, RR No. 5.38 to 5.41*

47-68 BROADCASTING 5.162A 5.163 5.164 5.165 5.169 5.171	**47-50** FIXED MOBILE	**47-50** FIXED MOBILE BROADCASTING 5.162A
	50-54 AMATEUR 5.162A 5.166 5.167 5.167A 5.168 5.170	FIXED MOBILE BROADCASTING
	54-68 BROADCASTING Fixed Mobile 5.172	**54-68** FIXED MOBILE BROADCASTING 5.162A

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

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)

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

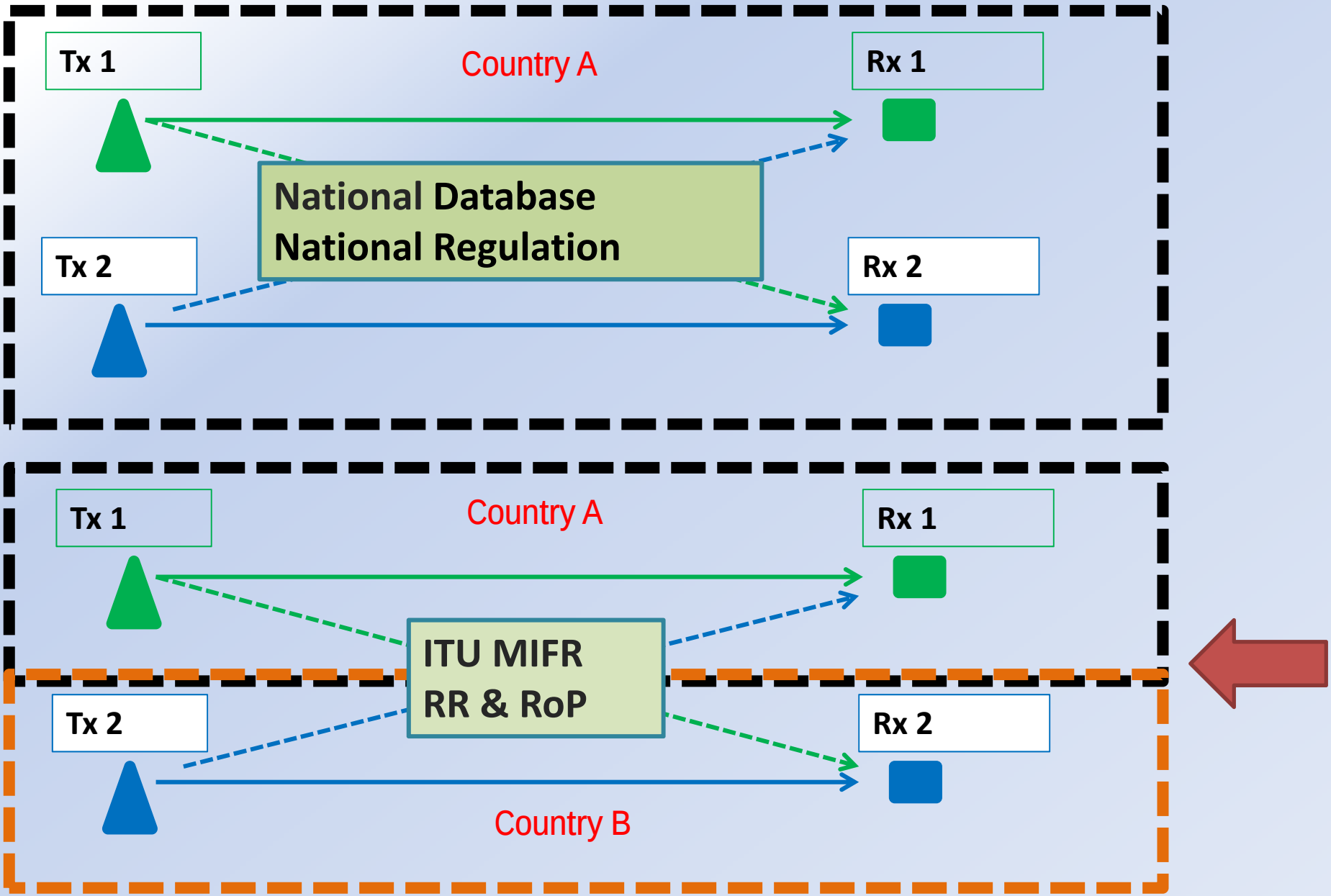
Interference situations need to be objectively analyzed, and measured

- 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 recognition and protection cannot be “in abstract”)

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

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.

RR and Spectrum Management (SM)

Spectrum management goals include:

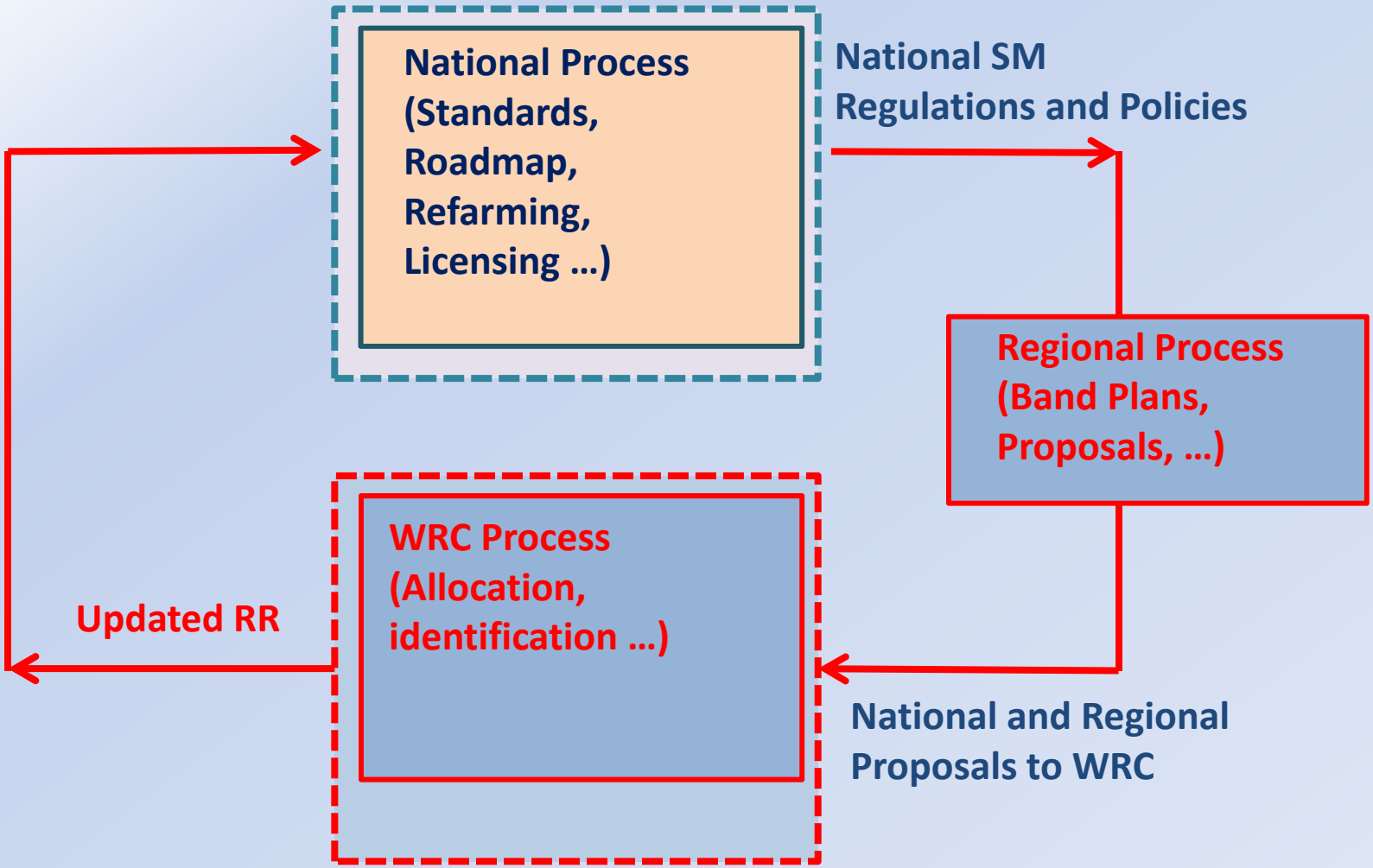
- making the radio spectrum available for government and non-government uses to stimulate social and economic progress
- making efficient and effective use of the spectrum

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

Spectrum Harmonization



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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