



ITU-D Regional Development Forum for the Arabic Region

“Access to Spectrum, including broadcasting services – trends and technologies”

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International Frequency Allocation and Interference Management Systems

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Rights and Obligations of ITU Member States



- ITU CS, CV and RR are intergovernmental treaties ratified by governments of ITU Member States (MS)
- Governments of ITU MS undertake to
 - apply the provisions in their countries
 - adopt adequate national legislation including essential provisions of ITU international treaties
- ITU CS, CV and RR are oriented mainly towards global or regional matters
- Still in many areas, there is a place for making special arrangements on bi/multi-lateral basis

ITU Constitution and Radio Regulations Basic Principles on Spectrum Use



CS Articles 44 & 45 – RR Preamble

CS 195 (PP-02) (No. 0.2 of the Radio Regulations)

Limit to minimum essential the number of frequencies and the spectrum used. Apply the latest technical advances, "asap"

CS 196 (PP-98) (No. 0.3 of the Radio Regulations)

Radio frequencies and any associated orbits are limited natural resources ⇒ **rational, efficient and economical use**

CS 197 (PP-98) (No. 0.4 of the Radio Regulations)

Not to cause harmful interference to the radio services of other Member States or of recognized or duly authorized operating agencies ⇒ **equitable access**

CS 198 (PP-98) Each Member State undertakes to require the operating agencies which it recognizes ... to observe No. 197

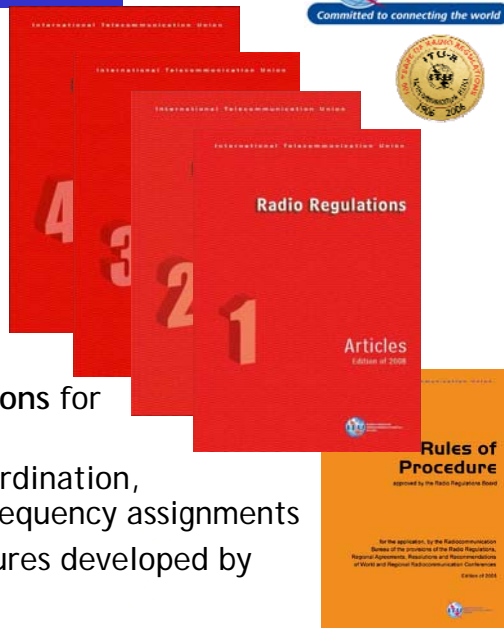
see at: <http://www.itu.int/publ/S-CONF-PLN-2007/en>

see at: <http://www.itu.int/publ/R-REG-RR-2008/en>

The Radio Regulations



- Articles (Volume 1),
 - Appendices (Volume 2),
 - WRC Resolutions and Recommendations (Volume 3),
 - ITU-R Recommendations incorporated by reference (Volume 4).
- Table of Frequency Allocations for all radio services (Article 5)
- Regulatory procedures (coordination, notification, recording) of frequency assignments
- And related Rules of Procedures developed by the Radio Regulations Board



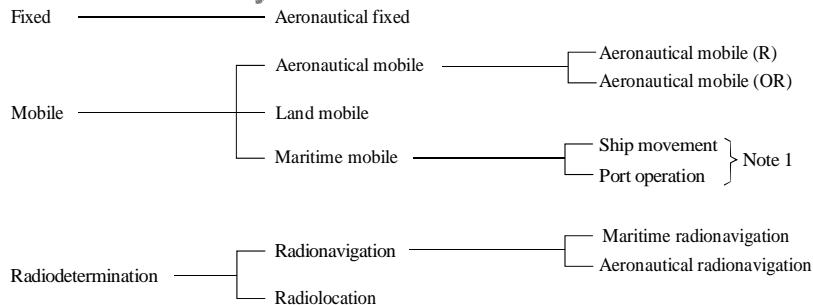
RR Definitions of Radio Services



- **RR Article 1 – Terms and definitions**
 - ✓ *allocation* (of a frequency band) – Table of Freq. Alloc.
 - ✓ *allotment* (of frequency or channel) – Entry in an agreed Plan
 - ✓ *assignment* (of frequency or channel) – Authorization by ADM
- Definitions for more than 40 radio services, e.g.:
ARS, ARSS, BS, BSS, FS, FSS, ISS, EESS/MetAids, MetSat, (L/M/A)MS, (L/M/A)MSS, RDS/RLS-(A/M)RNS, RDSS/RLSS-(A/M)RNSS, SOS, SRS
(meaning of above abbreviations at the end of this presentation)
- Definitions of frequency sharing terminology, e.g.:
 - ✓ *Permissible / Accepted / Harmful interference* (Nos. 1.166 to 1.169)
 - ✓ *Coordination area / contour / distance* (Nos. 1.171 to 1.173)
- RR Article 1 contains also definitions for:
 - ✓ **Radio stations and systems;**
 - ✓ **Operational terms;**
 - ✓ **Characteristics of emissions and radio equipment;**
 - ✓ **Technical terms relating to space.**

Spectrum utilisation of broadly defined services (terrestrial services)

- **Rec. ITU-R SM.1133** provides useful guidance to the utilization of broadly defined services

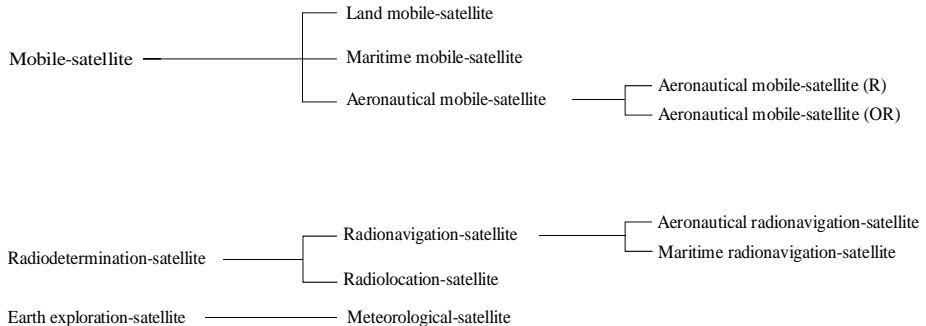


The following services are not defined by the Radio Regulations (RR) as being part of any grouping of services.

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.

Spectrum utilisation of broadly defined 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

Use of broadly defined services (Advantages / Disadvantages)



- Advantages:
 - + can provide a simpler allocation process
 - + can increase flexibility of allocation process
- Disadvantages:
 - complexity of sharing relates to number of services and kind of services subsets of a broadly defined service
 - may not result in higher spectrum efficiency (diff.parameters)
- Other considerations:
 - safety aspects of services should be considered
 - may be applicable in some bands and not in others
 - useful to identify services using “old” vs “new” technologies
 - economical, social, political, technical & operational factors
- See also Rec. ITU-R [SM.1265](#) on National alternative allocation methods

RR Frequency allocations and regulatory procedures

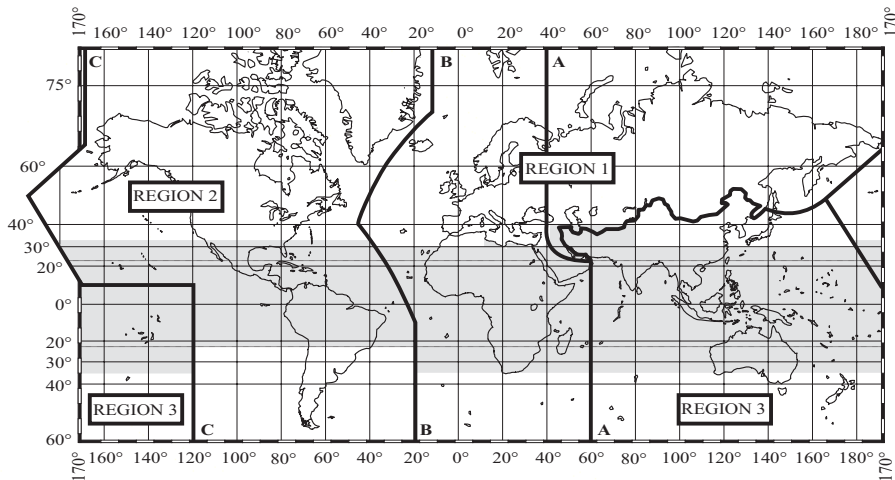


- The **RR is the principal instrument** of the international radio regulatory arrangement
- It is based on the use of **two main concepts**:
 - ✓ **Frequency block allocations** intended for use by defined radio services = **Table of Frequency Allocations** as contained in **RR Article 5**
 - generally provides common frequency allocations to mutually compatible services operating with similar technical characteristics in specific parts of the spectrum
 - is a stable planning environment for administrations, for equipment manufacturers and for users
 - ✓ **Voluntary or obligatory regulatory procedures** (for coordination, notification and recording of assignments) **adapted to the allocation structure and vary from service to service**
- **Objective to obtain international recognition of recorded frequency assignments (RR Article 8)**

RR Frequency allocations structure & associated principles

- Represent a **basis for planning and implementation** of radiocommunication services
- Based on a block **allocation methodology with footnotes**
- Regulated frequency band (**9 kHz - 1 000 GHz**) is **segmented into smaller bands** and **allocated** to over 40 defined **radio services** in the **Table of Frequency Allocations (RR Article 5)**
- Frequency bands are allocated to Radio services on a **primary** or **secondary basis** (the latter shall cause no harmful interference to, nor claim protection from, the former)
- **Footnotes** to the Table of Freq. Alloc. are **used to further specify** how the frequencies are to be assigned or used (country FN)
- Table of Freq. Alloc. is organized into **3 ITU Regions** of the world
- Table of Freq. Alloc. is supplemented by assignment and allotment plans for some bands and services and/or by **mandatory coordination procedures**

3 Regions defined in the RR



The shaded part represents the Tropical Zones as defined in Nos. 5.16 to 5.20 and 5.21.

5-01

Table of Frequency Allocations

Allocation to services		
Region 1	Region 2	Region 3
5 850-5 925 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE 5.150	5 850-5 925 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE Amateur Radiolocation 5.150	5 850-5 925 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE Radiolocation 5.150
5 925-6 700	FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B MOBILE 5.457C 5.149 5.440 5.458	
6 700-7 075	FIXED FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.441 MOBILE 5.458 5.458A 5.458B 5.458C	

Allocations structures

Two types of allocation

➤ *Exclusive allocations*

- ✓ involve **broader international use** of equipment and practices
- ✓ imply the **need to harmonize** relevant operational procedures and technical material in a larger international context
- ✓ in some cases, exclusive allocations are **subject to a Plan** (e.g. in the broadcasting / maritime mobile / aeronautical mobile services or in satellite services)

➤ *Shared frequency allocations*

- ✓ Applied to **maximize the usage** of available spectrum
- ✓ two or more radiocommunication services can effectively utilize the same frequency band
- ✓ **regulatory procedures** based on the use of technical criteria (usually threshold values) intended to identify the countries with which the coordination is to be effected **to obtain an acceptable sharing arrangement**

RR Spectrum Sharing Mechanisms

Two main mechanisms of sharing the spectrum resources

Coordination Approach

Efficiency ⇔ First come, first served for actual requirements

Right acquired through coordination with administrations concerned by actual usage

Continuing responsibility for the networks



RR Article 9 – Coordination
RR Article 11 - Notification

Planning Approach

Equitable access ⇔ Plan for future use

Predetermined frequency spectrum and orbital position
Guarantee of equitable access to the resources for future use by all countries



RR App. 25, 26, 27 – Terr.S Plans
RR App. 30/30A/30B – BSS/FSS

Coordination Procedures

- Basic elements of the international radio regulatory arrangement
- Enables implementation of new radiocommunication systems
- Avoiding harmful interference with the other existing and planned users
- Bilateral/multilateral process, mainly between administrations and based on exchange of information and negotiations

Notification Procedures

- For recording the frequency assignments into the International **Master** Frequency **Register** (MIFR)
- Master Register = reference data on all frequency usage, of frequencies that have international implications

What to do next ?

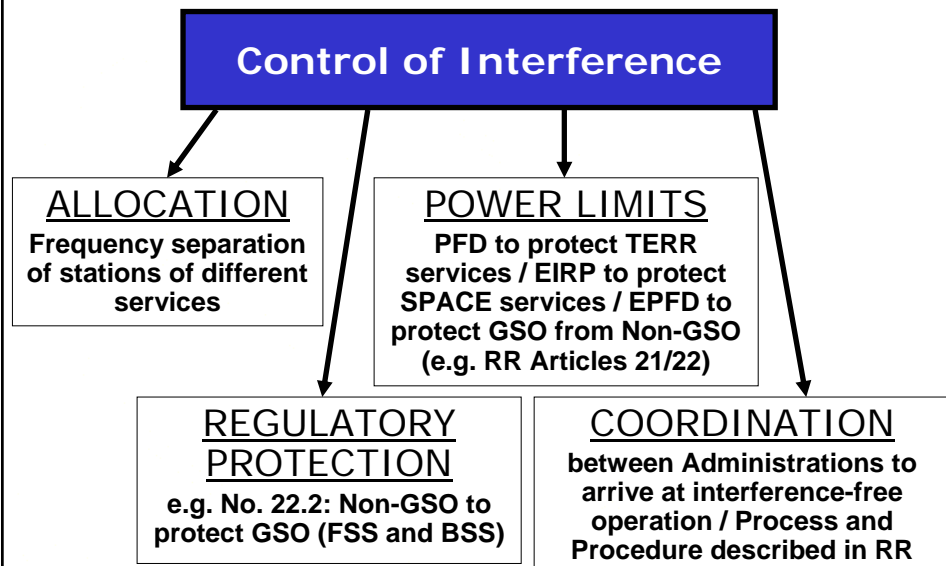
- Keep in touch with licensing authority:
 - ⇒ notify changes in characteristics
- Keep in touch with monitoring authority:
 - ⇒ check the operating characteristics with the notified ones
- Organize monitoring programs:
 - ⇒ Detect operational or technical irregularities in the operation of other administrations' assignments:
 - ⇒ Ensure interference-free operation

Assistance to Administrations

RR No. 7.6 = Specific provisions relating to the provision of **assistance to administrations** in the application of the radio regulatory procedures, in particular to those administrations in need of special assistance

- provision of assistance in applying the procedures of relevant Articles & Appendices
- studies and recommendations in **resolving a case of harmful interference**
- studies and recommendations in resolving a case of alleged contravention or non-observance of the Radio Regulations

Radio Regulation Mechanisms



Case of harmful interference (1)

Procedure in a case of Harmful interference (see CV140 1 & CV173 and RR-Article 15 Section VI)

- 1 - **Communications between concerned administrations**
- **Use RR Appendix 10 information to describe full particulars relating to the case of harmful interference. Data exchanged defined in RR Appendix 10**
- **For space stations, the administration of the interfering stations furnishes upon request current ephemeral data necessary to allow determination of the space stations' positions.**
- **Information has to be exchanged as quickly as possible, may be directly between specially designated stations of the international monitoring system, when it exists and subject to authorization by responsible administrations.**

Case of harmful interference (2)

Procedure in a case of Harmful interference (see CV140 1 & CV173 and RR-Article 15 Section VI)

- 1 - **Communications between concerned administrations (cont'd)**
- **If no solution found, report of irregularity or infringement may be sent to the administration responsible of the interfering station (Section V of RR Article 15 and data in Appendix 9)**
- **May also be copied to a specialized international organization for a particular service, if it exists**
- **If no satisfactory results between concerned administrations, details of the case may be forwarded to the BR for information**

Case of harmful interference (3)

Procedure in a case of Harmful interference (cont'd) (see also Article 13 and Part C of the Rules of Procedure)

(see at <http://www.itu.int/publ/R-REG-ROP/en>)

2 - Communications to the BR, reported to the RRB

- BR assistance may be requested (No. 13.2), leading to a BR report to the RRB with draft recommendations to the administrations concerned
- On that basis and other information from the administrations the RRB will decide on appropriate action.
- In the HF bands, where administration has difficulty in identifying a source of harmful interference and seek BR's assistance, the BR shall request the cooperation of specially designated stations of the international monitoring system (see Article 16)

Case of harmful interference (4)

Data exchanged in a case of Harmful interference

RR Appendix 10 information corresponds to particulars of

- i) *The station causing the interference;*
 - ii) *The transmitting station interfered with and*
 - iii) *The receiving station experiencing the interference,*
- ✓ Name, call sign or other means of identification,
 - ✓ Frequency, Class of emission, Bandwidth,
 - ✓ Field strength or PFD , Polarization,
 - ✓ Location / position / area / bearing,
 - ✓ Location of the facilities making the measurements,
 - ✓ Date, time and nature of interference, and
 - ✓ Action requested

International monitoring (1)

The International Monitoring System (IMS) (RR Article 16)

- Assist, to the extent practicable, in the implementation of the Radio Regulations
 - Ensure efficient and economical use of the radio-frequency spectrum
 - Help in the prompt elimination of harmful interference
- ⇒ WRC-97 recognized the role of monitoring in reducing the apparent congestion in use of the orbit/spectrum resources (see Recommendation 36 (WRC-97))

International monitoring (2)

Monitoring Stations of the IMS (RR Art. 16, Res. ITU-R 23-1)

- Should be able to prepare reports of emissions as recommended in Rec. ITU-R SM.1139 (Section II for Space Radiocom. Services)
- Should carry out measurements in accordance with other relevant ITU-R Recommendations, e.g. SM.337-4 for accuracy of frequency measurements
- Administrations are encouraged to notify new stations to the BR, for Publication in ITU List VIII (Part III for Space Radiocom. Services)

Results supplied by monitoring stations participating in IMS

- May be used to identify emissions not in conformity with the Radio Regulations
- BR records received results and publishes useful data

International monitoring (3)

Sample of monitoring information published for the HF bands

- ✓ Administration code responsible for the monitoring centre
- ✓ Monitoring centre where the observation was made.
- ✓ Frequency measured in kilohertz
- ✓ Day during which the observation was made
- ✓ Month during which the observation was made
- ✓ Starting time of the observed emission
- ✓ Finishing time of the observed emission
- ✓ Field strength measured in dB
- ✓ Identification of the observed emission
- ✓ Administration code responsible for the observed emission
- ✓ Class of station of the monitored emission
- ✓ Occupied bandwidth
- ✓ Class of emission
- ✓ Degrees portion of Longitude
- ✓ East or West Longitude
- ✓ Bearing of the station in degrees
- ✓ Estimated accuracy or the classification of bearing
- ✓ Number of the column containing characteristics which are not in conformity
- ✓ Remarks
- ✓ Minutes portion of Longitude
- ✓ Degrees portion of Latitude
- ✓ North or South Latitude
- ✓ Minutes portion of Latitude

See at <http://www.itu.int/ITU-R/terrestrial/monitoring/index.html>

International monitoring (4)

List of international monitoring stations
= List VIII, 11th Edition recently published,
(on-line at
<http://www.itu.int/pub/R-SP-LN.VIII-2009/en>)



Part I relates to general information on:

- IA - CENTRALIZING OFFICES
- IB - ALPHABETICAL INDEX OF STATIONS

Parts II and III contain particulars of monitoring stations doing measurements for stations of the

- Terrestrial Radiocommunication Services (Part II)
- Space Radiocommunication Services (Part III)

Additional information

- List of some radio service abbreviations

List of some radio service abbreviations (1)

Abbreviations	Radio services	RR definition
AMS	aeronautical mobile service	No. 1.32
AM(R)S	aeronautical mobile (route) service	No. 1.33
AMSS	aeronautical mobile-satellite service	No. 1.35
AMS(R)S	aeronautical mobile-satellite (route) service	No. 1.36
ARNS	aeronautical radionavigation service	No. 1.46
ARNSS	aeronautical radionavigation-satellite service	No. 1.47
ARS	amateur service	No. 1.56
ARSS	amateur-satellite service	No. 1.57
BS	broadcasting service	No. 1.38
BSS	broadcasting-satellite service	No. 1.39
EESS	Earth exploration-satellite service	No. 1.51
FS	fixed service	No. 1.20
FSS	fixed-satellite service	No. 1.21
ISS	inter-satellite service	No. 1.22
LMS	land mobile service	No. 1.26
LMSS	land mobile-satellite service	No. 1.27
MetAids	meteorological aids service	No. 1.50

List of some radio service abbreviations (1)



Abbreviations	Radio services	RR definition
MetSat	meteorological-satellite service	No. 1.52
MMS	maritime mobile service	No. 1.28
MMSS	maritime mobile-satellite service	No. 1.29
MRNS	maritime radionavigation service	No. 1.44
MRNSS	maritime radionavigation-satellite service	No. 1.45
MS	mobile service	No. 1.24
MSS	mobile-satellite service	No. 1.25
RAS	radio astronomy service	No. 1.58
RDS	radiodetermination service	No. 1.40
RDSS	radiodetermination-satellite service	No. 1.41
RLS	radiolocation service	No. 1.48
RLSS	radiolocation-satellite service	No. 1.49
RNS	radionavigation service	No. 1.42
RNSS	radionavigation-satellite service	No. 1.43
SOS	space operation service	No. 1.23
SRS	space research service	No. 1.55

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Thank you for your attention! questions?

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