

**PRIDA training on Aeronautical Communication Services,  
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# **Measures against harmful interference**

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# OVERVIEW

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MEASURES IN CS, RR AGAINST HARMFUL INTERFERENCE

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EXAMPLES OF CASES REPORTED TO BR

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PROCEDURE ARTICLE 15 TO RESOLVE HARMFUL INTERFERENCE

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INTERNATIONAL MONITORING

# Introduction

- Radio frequency spectrum 8.3 kHz - 3 000 GHz
- Limited natural resource, all countries have equal rights
- Some 40 services in the table of frequency allocations to be operated free of interference
- Various measures in ITU Constitution (CS), Radio Regulations (RR) against harmful interference

# MEASURES AGAINST INTERFERENCE (CS)

## Purposes of the Union (Art. 1)

- Allocate frequency bands and register frequency assignments in order to avoid harmful interference (CS11)
- Coordinate efforts to eliminate harmful interference and to improve the use made of the radio-frequency spectrum (CS12)

# MEASURES AGAINST INTERFERENCE (CS)

## Execution of the Instruments of the Union (Art. 6)

- Administrations apply CS, CV and RR in stations operated by them capable of causing harmful interference, except defence services (CS37)

## Harmful Interference (Art. 45)

- All stations must operate without causing harmful interference to stations which operate in accordance with the RR (CS197)

# MEASURES AGAINST INTERFERENCE (RR)



## Objectives RR (Preamble)

- All stations must operate without causing harmful interference to stations which operate in accordance with the RR (CS197)
- Ensure the availability and protection from interference of the frequencies for distress and safety
- Assist in the prevention and resolution of harmful interference

# DEFINITIONS (RR Art.1)



- **Permissible interference:** Observed or predicted interference which complies with quantitative interference and sharing criteria... (RR1.167)
- **Accepted interference:** Interference at a higher level than permissible interference and which has been agreed... (RR1.168)
- **Harmful interference:** Interference which endangers the functioning of a radionavigation service or safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with Radio Regulations (RR1.169)

# MEASURES AGAINST INTERFERENCE (RR)



## Technical characteristics of stations (Art. 3)

- Equipment of the stations shall conform the RR
- Transmitting stations must conform Appendices 2 and 3

## General rules for assignments (Art. 4)

Assignments shall be made:

- in accordance with the Table of Frequency Allocations and other provisions
- to avoid causing interference to conform assignments
- no derogation, except no interference and no protection
- frequency shall be separated from the limits of the band allocated
- special measures for safety services



# Measures against interference (RR)



## Frequency allocations Table (Art. 5)

- Common frequency allocations to mutually compatible services
- Regulatory/technical conditions (in footnotes)
- Primary and secondary services
  - Secondary service shall not cause harmful interference to primary services
  - Secondary service shall not claim protection from primary services
  - But can claim protection from the same or other secondary services
- Allocations subject to a plan or a coordination procedure

75.2-137.175 MHz

Allocation to services		
Region 1	Region 2	Region 3
75.2-87.5 FIXED MOBILE except aeronautical mobile	75.2-75.4 FIXED MOBILE 5.179	
	75.4-76 FIXED MOBILE	75.4-87 FIXED MOBILE
	76-88 BROADCASTING Fixed Mobile	5.182 5.183 5.188
5.175 5.179 5.187		87-100 FIXED MOBILE BROADCASTING
87.5-100 BROADCASTING	5.185	
5.190	88-100 BROADCASTING	
100-108	BROADCASTING 5.192 5.194	
108-117.975	AERONAUTICAL RADIONAVIGATION 5.197 5.197A	
117.975-137	AERONAUTICAL MOBILE (R) 5.111 5.200 5.201 5.202	
137-137.025	SPACE OPERATION (space-to-Earth) 5.203C 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	
137.025-137.175	SPACE OPERATION (space-to-Earth) 5.203C METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Fixed Mobile except aeronautical mobile (R) Mobile-satellite (space-to-Earth) 5.208A 5.208B 5.209 5.204 5.205 5.206 5.207 5.208	

# MEASURES AGAINST INTERFERENCE (RR)



## Status of frequency assignments (Art. 8)



- Right to international recognition
- Non-conforming assignment

## Coordination of frequency assignments (Art. 9)

- Coordination agreement with administrations before operating

## Notification of frequency assignments (Art. 11)

- Frequencies shall be notified, if capable of causing harmful interference, if used for international radiocommunication, etc.

# MEASURES AGAINST INTERFERENCE (RR)



## Interference (Art. 15)

- Avoid unnecessary transmissions, limit power of stations to necessary level, etc.
- Special consideration to avoiding interference on distress and safety frequencies
- Out-of-band emissions should not cause interference to adjacent bands

## Licences (Art. 18)

- No transmitting station may be established or operated without a licence issued in conformity with the RR

# EXAMPLES OF CASES REPORTED TO BR

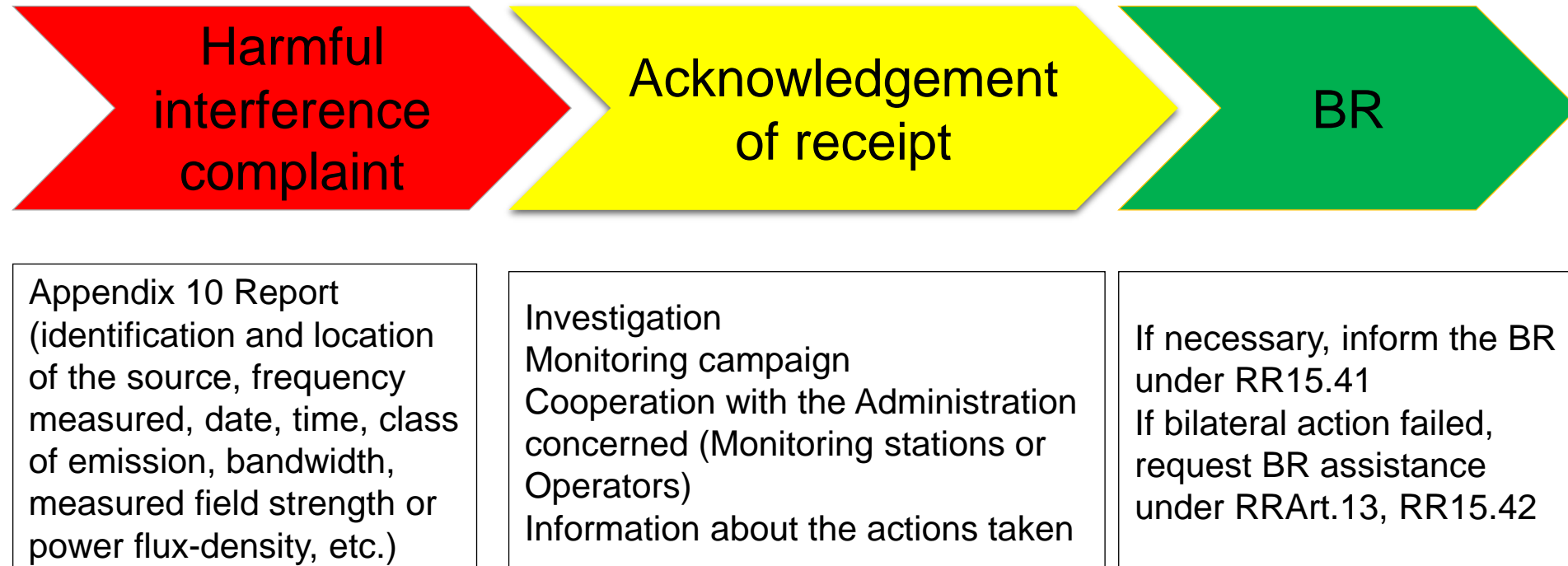
- **No coordination**, operation of non-coordinated assignments
- **Technical**, spurious emissions, excessive transmitting power, etc.
- **Regulatory**, operations in bands not allocated, with different technical parameters, etc.
- **Unauthorised emissions**
- **Unnecessary transmission**, as described in RR15.1

# EXAMPLES OF CASES REPORTED TO BR

- Interference to [aeronautical mobile service \(R\)](#) caused by voice communications, Radars in HF bands
- Interference to [aeronautical mobile service \(OR\)](#) caused by voice communications in HF bands
- Interference to [aeronautical radionavigation service](#) caused by broadcasting stations in band 108-117.975 MHz
- Interference to [aeronautical mobile \(R\) service](#) caused by broadcasting stations in band 117.975-137 MHz
- Interference to [radionavigation-satellite service](#) affecting GPS aircrafts in band 1 559-1 610 MHz, see BR Circular Letter [CR/488](#) dated 8 July 2022



# PROCEDURE TO RESOLVE HARMFUL INTERFERENCE (Section VI of RR Art. 15)



*It is essential that Member States exercise the utmost goodwill and mutual assistance! (RR15.22)*

## Report of harmful interference

(See Article 15, Section VI)

*Particulars concerning the station causing the interference:*

<i>a</i>	Name, call sign or other means of identification	.....
<i>b</i>	Frequency measured	.....
	Date:	.....
	Time (UTC):	.....
<i>c</i>	Class of emission <sup>1</sup>	.....
<i>d</i>	Bandwidth (indicate whether measured or estimated)	.....
<i>e</i>	Measured field strength or power flux-density <sup>2</sup>	.....
	Date:	.....
	Time (UTC):	.....
<i>f</i>	Observed polarization	.....
<i>g</i>	Class of station and nature of service	.....
<i>h</i>	Location/position/area/bearing (QTE <sup>3</sup> ) (WRC-07)	.....
<i>i</i>	Location of the facility which made the above measurements	.....
<i>Particulars concerning the transmitting station interfered with:</i>		
<i>j</i>	Name, call sign or other means of identification	.....
<i>k</i>	Frequency assigned	.....

<sup>1</sup> The class of emission shall contain the basic characteristics listed in Appendix 1. If any characteristic cannot be determined, indicate the unknown symbol with a dash. However, if a station is not able to identify unambiguously whether the modulation is frequency or phase modulation, indicate frequency modulation (F).

<sup>2</sup> When measurements are not available, signal strengths according to the QSA scale should be provided.

<sup>3</sup> See the most recent version of Recommendation ITU-R M.1172. (WRC-07)

<i>l</i>	Frequency measured	.....
	Date:	.....
	Time (UTC):	.....
<i>m</i>	Class of emission <sup>4</sup>	.....
<i>n</i>	Bandwidth (indicate whether measured or estimated, or indicate the necessary bandwidth notified to the Radiocommunication Bureau)	.....
<i>o</i>	Location/position/area	.....
<i>p</i>	Location of the facility which made the above measurements	.....

*Particulars furnished by the receiving station experiencing the interference:*

<i>q</i>	Name of station	.....
<i>r</i>	Location/position/area	.....
<i>s</i>	Dates and times (UTC) of occurrence of harmful interference	.....
<i>t</i>	Bearings (QTE <sup>5</sup> ) or other particulars (WRC-07)	.....
<i>u</i>	Nature of interference	.....
<i>v</i>	Field strength or power flux-density of the wanted emission at the receiving station experiencing the interference <sup>6</sup>	.....
	Date:	.....
	Time (UTC):	.....
<i>w</i>	Polarization of the receiving antenna or observed polarization	.....
<i>x</i>	Action requested	.....

NOTE – For convenience and brevity, telegraphic reports shall be in the format above, using the letters in the order listed in lieu of the explanatory titles, but only those letters for which information is provided should be used. However, sufficient information shall be provided to the administration receiving the report, so that an appropriate investigation can be conducted.

<sup>4</sup> See footnote 1.

<sup>5</sup> See footnote 3.



# BR ASSISTANCE



- BR examines the Appendix 10 Report, status of the assignments, causes of the interference, etc.
- If necessary, BR may also request the cooperation of administrations participating in the International Monitoring
- BR will forward to the administrations its findings and recommendations
- If the interference persists, at the request of the affected administration, BR prepares a report to RRB
- If not resolved despite the RRB's action, the case may be reported to WRC



# INTERNATIONAL MONITORING (IMS) (Art. 16)



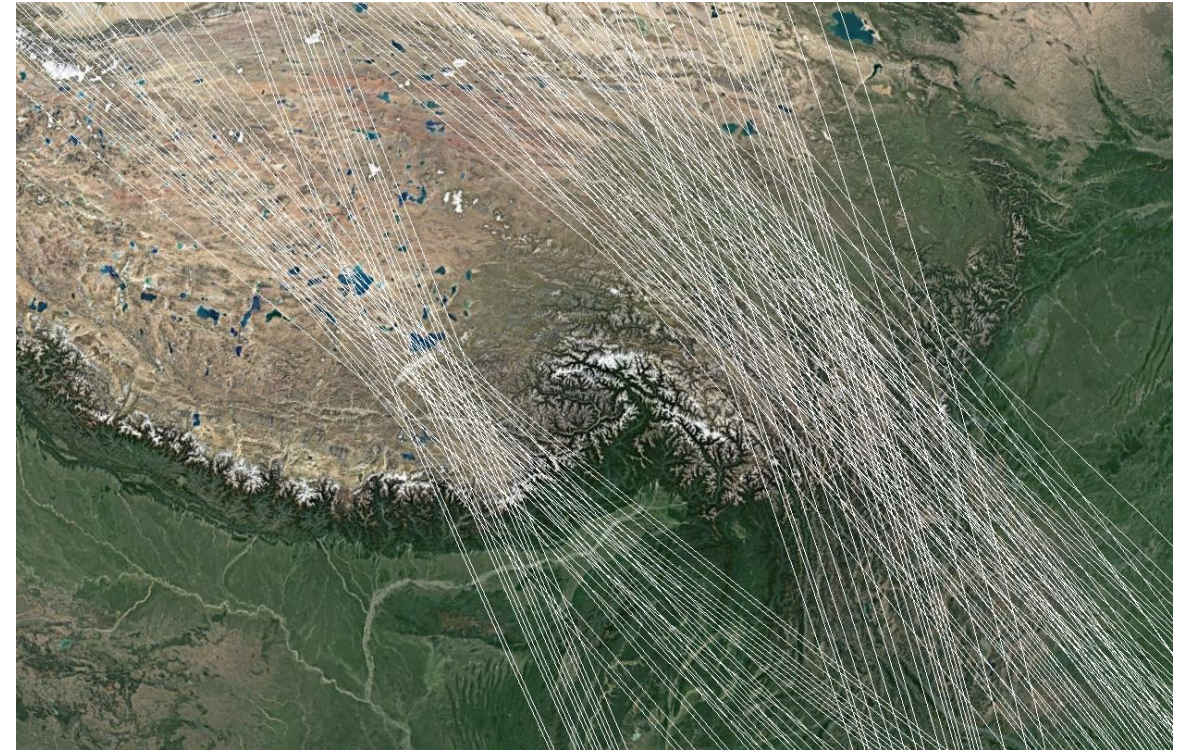
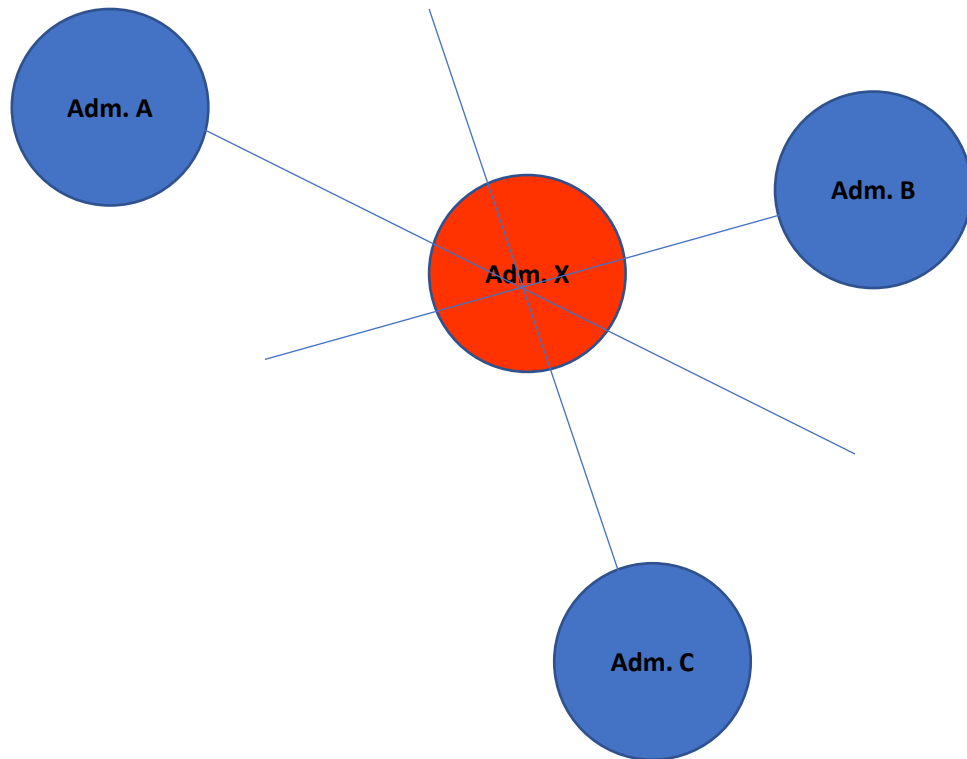
- In the case where an administration has difficulty in identifying a source of harmful interference in the HF bands and asks the assistance of BR
- BR shall request the cooperation of administrations or stations of the international monitoring system (IMS) that may be able to help in identifying the source of harmful interference

# Example of use of the IMS

- Use international monitoring stations to locate the sources of interference
- Out of 10 administrations contacted, 4 accepted to participate in the campaign
- Monitoring period 6 weeks
- Characteristics to be monitored and measured
- Format for reporting the measurement results
- Weekly report

# Example of use of the IMS

Results of the monitoring campaign



# List of International Monitoring Stations (List VIII)

- Monitoring station details, contact addresses, measurements, etc.
- Download free of charge at:  
<https://www.itu.int/pub/R-SP-LN/en>
- Free online search from:  
<https://www.itu.int/mmsapp/MonitoringStation/list>

## List VIII

### List of International Monitoring Stations

2022 edition



# FINAL REMARKS

- Objective of all these measures is to prevent harmful interference
- Bilateral cooperation to resolve harmful interference
- Notify assignments that can cause harmful interference
- Special attention to avoiding interference on distress and safety frequencies
- International Monitoring System may help in case of a harmful interference
- ITU-R Recommendations and Reports

# Thank you!

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