Harmful Interference to Space Services

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Space Services Department

ITU HQ Geneva,
5 December, 2018
Topics


2. The Current Situation: Typical cases affecting space services reported to BR

3. ITU Activities and Initiatives to eliminate harmful interference to space services

4. New Challenges

5. SIRRS online application. Exercise.
Study Groups Activities
Compatibility Studies
Development of Recommendations, Reports and Handbooks

Radiocommunication Assembly
World Radiocommunication Conference

Coordination and Notification of Satellite Networks and Earth Stations
Application of the Radio Regulations
→ Provides International Recognition and Protection

Art. 15 and Appendix 10 to RR + ITU-R SM. 2181 / REC RS. 2106:
→ To report a case of Harmful Interference to Radiocomm. Bureau

Radio Regulations Board’s Decisions

**ITU Measures:**

**Preventive**

**Corrective**
Overview of key provisions in the RR:

- Art. 5: Table of Frequency Allocations
- Art. 9: Coordination Procedure of satellite networks
- Art. 11: Notification Procedure of satellite networks
- AP 30, AP30A, AP30B: BSS and FSS plans
- Art. 21: Sharing Scenario between Space and Terrestrial systems (limits on PFD, eirp, minimum elevation angle, etc)
- Art. 22: Sharing scenario between GSO, NGSO (limits on epfd, station keeping, pointing accuracy, off-axis eirp density on Earth Stations)
- Art. 15: Procedure in case of Harmful Interference
- Art. 13.2: Request for assistance in case of Harmful Interference (HI)
- Art. 13.6: BR request Adms clarifications about recorded assignments
- Art. 16: International Monitoring
- Art. 18: Licensing - Identification of Stations
- AP 10 and Report ITU-R SM.2181 (submission of information)
- Specific Provisions to protect a service (e.g. No.5.340 for EESS passive)
- And more...
Schema of Actions in case of Harmful Interference

**Country A**

- **Satellite Operator A**
- **Telecomm. Service Provider A**
- **User 1**
- **User 2**

**Country B**

- **Satellite Operator B**
- **Telecomm. Service Provider B**
- **User X**

**Notifying Administration A**

- **Notifying Administration B**

**Satellite A**

- **Satellite B**

**Wanted Signal**

**Harmful Interference**

= When Communication or Resolution between Adms or Sat.Ops. is not possible

**Settlement of Disputes:** ITU CS 56
- Negotiation, Diplomatic Channels
- Bi / Multi Lateral Treaties

**Compulsory Arbitration**
- (ITU Optional Protocol) - Procedure Art.41 CV

**CS/CV**

- Art. 15 RR
- Art. 13.2 RR

**RRB**

- BR
The Current Situation:

Harmful Interference Reported to BR

Affected Services:

FSS, BSS, MSS, EESS, RNSS, RAS

Affected Freq. Ranges:

- 1.2 GHz
- 1.5 / 1.6 GHz
- 2.2 GHz
- 3/4, 5/6 GHz
- 10-14 GHz
- 17/18 GHz

Satellite GSO Capacity free of Harmful Interference reported to BR = 99.97 %
Extension of the International Monitoring System (IMS)

Plenipotentiary Conference Resolution 186 (Busan, 2014) instructs the Director BR:

“1. to promote access to information, upon request by concerned Administrations, related to satellite monitoring facilities, to address cases of harmful interference in accordance with Article 15 of the Radio Regulations, through Cooperation Agreements referred to under invites the Council above within the budgetary limitations of the Union in order to implement the objectives of this Resolution”.

Scope is focused on resolution of cases of Harmful Interference

- Cooperation Agreement Signed with: Germany, Pakistan, Vietnam, Belarus, Korea, China,

- To be signed soon: Oman, Brazil

- Under discussion: Ukraine, Russia, Japan, Kazakhstan
New Recommendation on Detection and Resolution of radio frequency interference to Earth exploration-satellite service (passive) sensors
ITU-R RS 2106-0 → Approved in July 2017 !!!
Free download → https://www.itu.int/rec/R-REC-RS.2106/en

Rep. ITU-R SM.2424-0 → Approved in June 2018 !!!
Free download → https://www.itu.int/pub/R-REP-SM.2424-2018

Further Activities on going in WP-1C:

Rec. on Carrier ID
(ITU-R S.2062-0. Sept. 2014)
To facilitate rapid identification of an interference source and reduce the time required to clear the interference that occurs unintentionally.
Free Download http://www.itu.int/rec/R-REC-S.2062/en

Rec. on Access Procedures for FSS Occasional Use, Transmissions to GSO Space Stations in 4/6 GHz and 11-12/13/14 GHz FSS Bands.
Free Download http://www.itu.int/rec/R-REC-S.2049-0-201312-I/en
Capacity Building:

- Satellite Communications
- Latest Technologies
- Interference prevention and mitigation
- SmallSats
- Space Monitoring

New Challenges:

- Emerging of UHTS, NGSO Mega Constellation (LEO+MEO+HEO): Launch, deployment, DBIU, Freq.

- Small Satellites: some CubeSat projects are not in compliance with Art. 5 of RR neither notified to ITU

- RFI dynamics is evolving and getting more complex, Radio Regulations follows this trend.

- Risk of Harmful interference is higher

- New Role for NGSO Monitoring (more stations, to/from space)?
Satellite Interference Reporting and Resolution System (SIRRS) - Introduction:

- In Response to RES 186 PP 2014
- Online Platform Connecting 193 Members States
- To Report and Record cases of Harmful Interference affecting Space Services in accordance with Article 15 RR
- To Facilitates exchange of Info among Administrations
- To Allow ITU-BR to obtain accurate information on the spectrum-orbit resource free of harmful interference

Contributors to Administrations:
- Satellite Operators
- Space Agencies
- Space Monitoring Facilities
SIRRS Architecture:

193 Member States !

RES 186 PP-2014
Submission Characteristics:

- Appendix 10 Parameters presented in a format of typical Interfering Scenarios for Space Services (e.g. Uplink, Downlink, EESS(passive), RAS)

- Supplementary Information as attachments:
  - Geolocation Maps
  - Spectrum Plots
  - Report ITU-R SM.2181
  - REC ITU-R RS.2106-0 (passive sensors)

- Flexibility to include future Recommendations, Reports or Additional Information as attachments
Space Services Department

SIRRS

Satellite Interference Reporting and Resolution System

(Release for Official Use as of 1st September 2018)

This online application has been developed by the Radiocommunication Bureau in response to Resolution 155 of ITU Plenipotentiary Conference 2014 with the aim to facilitate Administrations and space stakeholders to report a case of harmful interference affecting space services, to request assistance from the BR, to be informed in case a radio station under their jurisdiction is causing harmful interference to space services of other Administrations, and to exchange all necessary information among the concerned parties involved in the case.

In order to be able to use the system, a user account must be open as indicated below:

Nomination of Administration and Intergovernmental Satellite Organization Managers, Assignment of users.

The Administrations must nominate to the Bureau an Administration Manager role before accessing the system. The assigned manager will then add other users as administration or operator roles for their Administration.

SIRRS has 6 categories of user roles:

1. Administration Manager
2. Administration User
3. Operator Manager
4. Operator User
5. Intergovernmental Satellite Organization Manager
6. Intergovernmental Satellite Organization User

See Circular letter ITU-R CR 428 here for more details on roles. Intergovernmental Satellite Organization Manager and User roles have same treatment than Administration Manager and User respectively.

References:
- Circular Letter CR/435 of 28.08.2018
- Circular Letter CR/428 of 13.05.2018
- List of Administrations’ Focal Points
- Quick Guide for Submitting a Report and Response using SIRRS
- Questions & Answers about SIRRS
- Guide on User’s Account Management

Support:
- SIRRS@itu.int
- TIES Services

Official use since 01 Sept. 2018

URL: https://www.itu.int/en/ITU-R/space/SIRRS

Implemented!

Sign Up Now!

3 Easy Steps to Start

1. Designate Administration Manager
2. Register Administration Manager
3. Let’s submit online

See Circular letter CR/435 here
Steps to Follow:

1) Station Causing Interference

2) Interference Scenario (Uplink, Downlink, RAS, EESS-Passive) and Characteristics of Station Interfered with

3) Affected Frequency Assignment(s)

4) Upload Documents:
   - Correspondences
   - Scan Plot
   - Geolocation Plot
   - Other Forms, Graphs, Analysis, etc
   - Info on Passive Sensors in the Format of REC.ITU-R RS 2106-0
Steps to Follow:

1. Create New Interference Report

   **Report information**
   Ref. Administration: ARG

   **Stations Causing Interference**
   - Add Station

   **Stations Interfered With**
   Interference Scenario:
   - Uplink
   - Downlink
   - Radio Astronomy

   **Frequency Assignments**
   - Add frequency assignment

   **Upload documents**
   - Letter from Affected Administration:
     - Browse...
     - Upload
   - Interference Signal Geolocation Plot:
     - Browse...
     - Upload
   - Interfered and Interfering Signal Scan Plots:
     - Browse...
     - Upload

2. Add Station Causing Interference

   **Characteristics**
   - Station type: Earth
   - Name:
   - Class of Station:

   **Location**
   - Map with coordinates
   - Description:

   **Administration(s) having jurisdiction**
   - Add administration

   **Measured Characteristics**
   - Frequencies:
   - Class of Emission:
   - Bandwidth:
   - Field Strength or Power Flux Density of Interfering Carrier:
   - Polarization:
   - Additional information:
     - Date and Time (UTC) of Interference
     - Nature of Interference:
     - Type of carrier:
       - Analog/Multiplexed Carrier
       - Burst Signal
       - FTV – Clear Carrier
       - Digital Multiplexed Carrier
   - Source:
     - Gross Power
     - Co-Channel
     - Intermodulation
     - Unwanted emissions
     - Interference
     - Adjacent Satellite Interference
     - Adjacent Carrier Interference
     - Satellite Mispointing
     - Unintentional Co-channel Interference
     - Other (please specify)

   **Facility which made the above measurements**
   - Longitude:
   - Latitude:
Proposed Exercises using SIRRS
( homework for tomorrow )
Exercise 1: To Report a case

Uplink Interference due to antenna misspointing

This case and the information shown in the exercise are hypothetical with the sole purpose of getting familiar with the system.
### Step 1: Stations Causing Interference

<table>
<thead>
<tr>
<th>Station type</th>
<th>Earth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Latitud: 49.2015, Long. 9.8427</td>
</tr>
<tr>
<td>Administrations</td>
<td>D</td>
</tr>
<tr>
<td>Measured frequencies</td>
<td>14420.8 MHz</td>
</tr>
<tr>
<td>Class of Emission</td>
<td>3M00G7W</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>3 MHz</td>
</tr>
<tr>
<td>Polarization</td>
<td>H</td>
</tr>
<tr>
<td>Date of interference</td>
<td>22/11/2018</td>
</tr>
<tr>
<td>Type of carrier</td>
<td>1. Digital Modulated Carrier</td>
</tr>
</tbody>
</table>
| Source        | 1. Co-Channel  
|               | 2. Adjacent Satellite Interference |

### Step 2: Stations Interfered With

**Interfering Scenario → Uplink**

<table>
<thead>
<tr>
<th>Station type</th>
<th>Earth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction</td>
<td>TX</td>
</tr>
<tr>
<td>Location</td>
<td>Lat: 45.2116, Long: 1.8447</td>
</tr>
<tr>
<td>Administration</td>
<td>F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Station type</th>
<th>Space &gt; Geo stationary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction</td>
<td>RX</td>
</tr>
<tr>
<td>Location</td>
<td>7</td>
</tr>
<tr>
<td>Administration</td>
<td>F</td>
</tr>
<tr>
<td>Associated ITU name</td>
<td>EUTELSAT 3-7E</td>
</tr>
<tr>
<td>Associated Downlink Frequency</td>
<td>11120.8 MHz</td>
</tr>
<tr>
<td>Associated Downlink Polarization</td>
<td>V</td>
</tr>
</tbody>
</table>
Step 3:

**Affected Frequency Assignments**

<table>
<thead>
<tr>
<th>Assigned frequency</th>
<th>11128 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bandwidth</td>
<td>36 MHz</td>
</tr>
<tr>
<td>Polarization</td>
<td>V</td>
</tr>
<tr>
<td>Service</td>
<td>FSS</td>
</tr>
<tr>
<td>Class of emission</td>
<td>36M0G7W</td>
</tr>
</tbody>
</table>

Step 4:

a) Upload + Letter from Adm1 + Geolocation + Spectrum Plot

b) Type comments in Remarks and Direct Contact Details (you may enter your name)

c) Submit requesting:

   + To Inform Administrations
   + ITU Assistance under No.13.2
   + Authorize Public Access

d) Approve and Submit → Take note of your CASE ID

e) Go to Submitted Reports → Open Report → Download
Exercise 2: To Reply to a Report received from another Administration or BR

a) Go to Reports ➔ Implicated In

b) Find the CASE ID you are interested in ➔ Open Report

c) Click on Reply

d) Add Additional Documents

e) Enter Title and Description of document to Upload

f) Browse and Upload Letter from Adm 2

g) View Submission

h) Approve and Submit

i) Verify that your document was properly added (See in Reply Tab and Uploaded Docs)
Exercise 3:

a) Choose your Administration – Operator and Scenario (Uplink, DownLink, EESS (passive), Radioastronomy) that you wish and create your case

b) Interact with other Administrations and ITU present in the exercise
### Users Convention:

<table>
<thead>
<tr>
<th>Administration</th>
<th>User</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>ITU_ERSC\WRS18_B</td>
<td>wrs18@itu</td>
</tr>
<tr>
<td>India</td>
<td>ITU_ERSC\WRS18_IND</td>
<td>wrs18@itu</td>
</tr>
<tr>
<td>France</td>
<td>ITU_ERSC\WRS18_F</td>
<td>wrs18@itu</td>
</tr>
<tr>
<td>Germany</td>
<td>ITU_ERSC\WRS18_D</td>
<td>wrs18@itu</td>
</tr>
<tr>
<td>Malaysia</td>
<td>ITU_ERSC\WRS18_MLA</td>
<td>wrs18@itu</td>
</tr>
<tr>
<td>USA</td>
<td>ITU_ERSC\WRS18_USA</td>
<td>wrs18@itu</td>
</tr>
<tr>
<td>XXX</td>
<td>ITU_ERSC\WRS18_XXX</td>
<td>wrs18@itu</td>
</tr>
</tbody>
</table>

**Link to Access SIRRS during WRS-18** ➔ [https://www.itu.int/ITU-R/sirrs/external/training](https://www.itu.int/ITU-R/sirrs/external/training)

**Docs in USB key:**

- Space Workshop\Day 3\Interference to Space - SIRRS
- Geolocation
- Spectrum Plot
- Letter Adm 1
- Letter Adm 2
- Letter Adm 3
- Output Report Ex1
Help with the exercises or questions about SIRRS?

Come to Room A
Thursday 6 Dec. 16:30 hs
Thank you!

Questions: SIRRS@itu.int

Please remember to visit the WRS-18 Exhibition located at the entrance of the ITU Montbrilliant building