



# ITU International Satellite Symposium 2017

## Harmful Interference to Space Services

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# Topics

- 1 ITU Role in preventing and resolving Harmful Interference**
- 2 Overview of Procedures and main provisions applicable to Space Services**
- 3 The Current Situation, Statistics and Typical Cases of harmful interference reported to BR**
- 4 ITU actions to combat Harmful Interference to Space Services**
- 5 Summary and Key Messages**



# Radiocommunication Sector

**Main Strategic Goal → To ensure Interference-Free Operation**

**Why ?**

- To Maximize Quality and Availability of Service
- To Prevent loss of investment, customers and revenue by minimizing unusable satellite capacity due to interference
- To guarantee a Successful Mission

**How ?**

193 Member States  
+700 Sectors members,  
Associates, Academia

- I. International Regulations (CS, CV, RR)
- II. Global Standards & Guidelines
- III. Assistance to administrations



# ITU Measures

## Preventive:

- 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

## Corrective:

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

- Radio Regulations Board's Decisions



# Overview of key provisions in the RR:

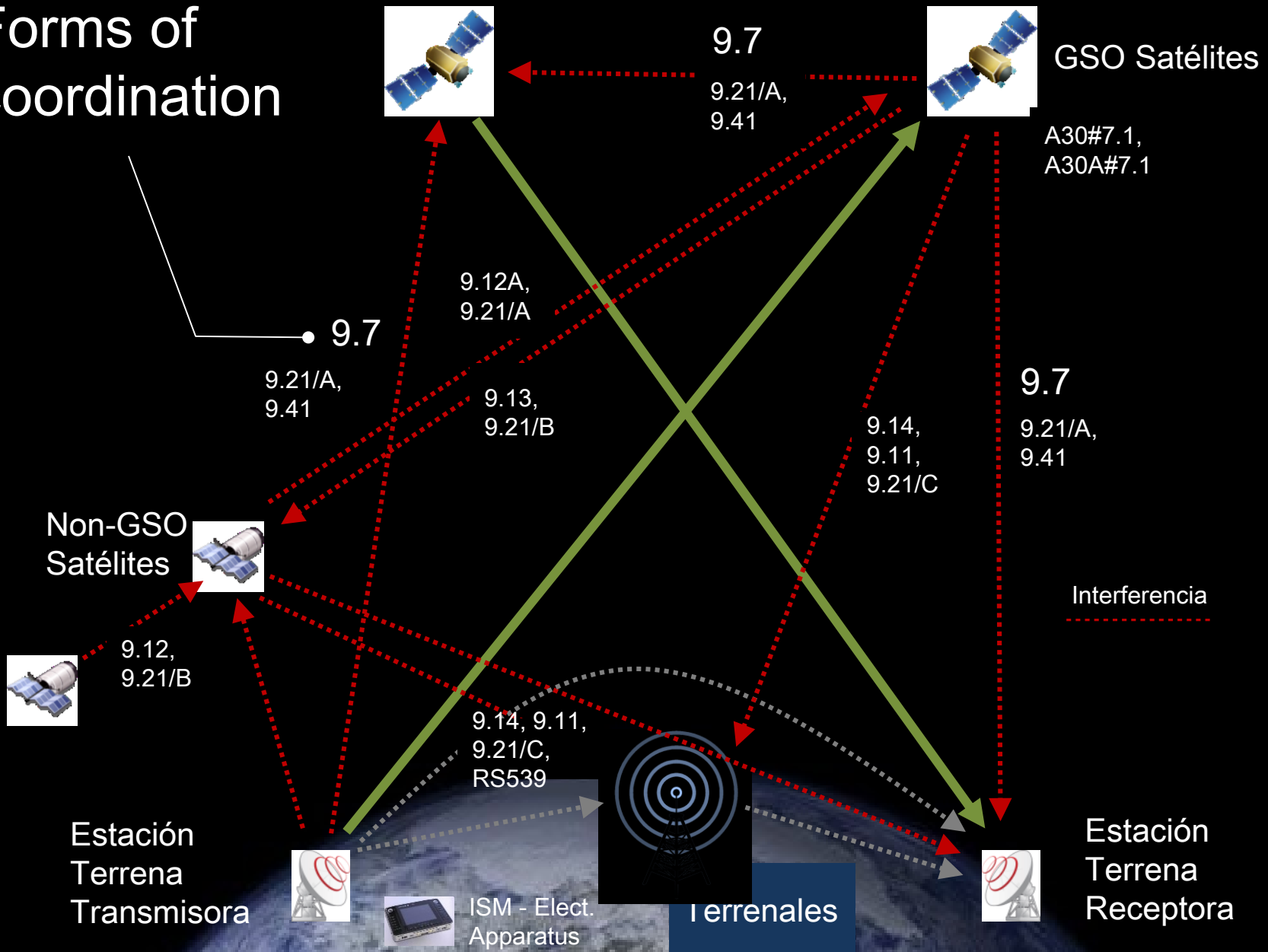
- Art. 5: Table of Frequency Allocations
- Art. 9: Coordination Procedure of satellite networks
- Art. 11: Notification Procedure of satellite networks
- AP 30, AP30A, AP30B: BSS and FSS plans
- Art.21: Sharing Scenario between Space and Terrestrial systems  
(limits on PFD , eirp, minimum elevation angle, etc )
- Art.22: Sharing scenario between GSO, NGSO  
(limits on efpd , 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 )
- And more...



# To Control Level of Interference



## Forms of coordination





# The Current Situation

## Harmful Interference Reported to BR

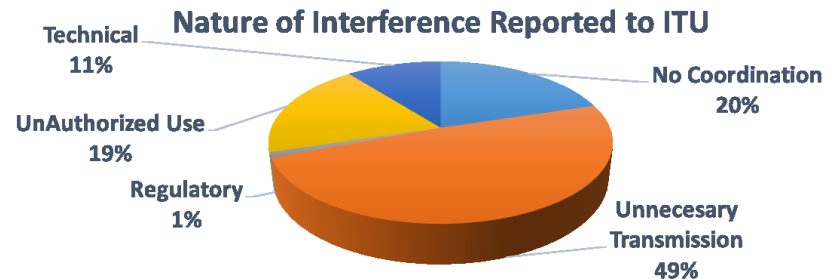
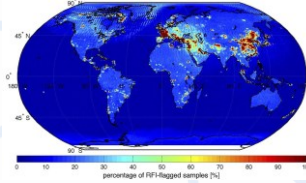
From 2011 to 2016

### Affected Services:

FSS, BSS, MSS, EESS, RNSS

### 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





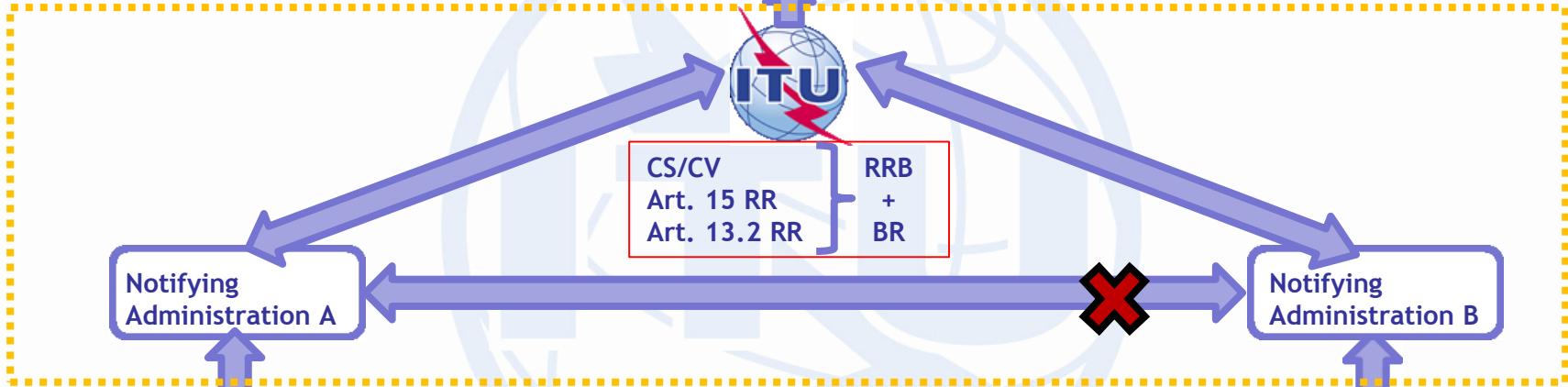
# Schema of Actions in case of Harmful Interference

Country A

Country B

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

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



CS/CV Art. 15 RR Art. 13.2 RR	RRB + BR
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Notifying Administration A

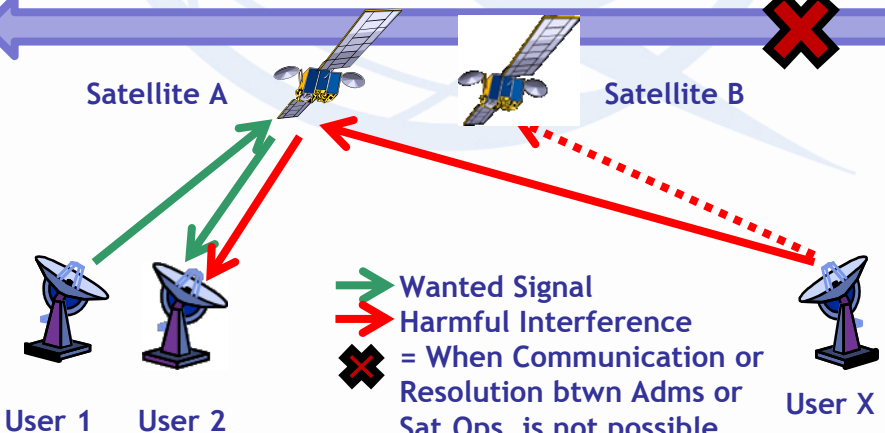
Notifying Administration B

Satellite Operator A

Satellite Operator B

Telecomm. Service Provider A

Telecomm. Service Provider B



- ➔ Wanted Signal
- ➔ Harmful Interference
- ⊗ = When Communication or Resolution btwn Adms or Sat.Ops. is not possible





# How to Report a Case of Harmful Interference to ITU ?

Today

## I. To submit Letter to BR :

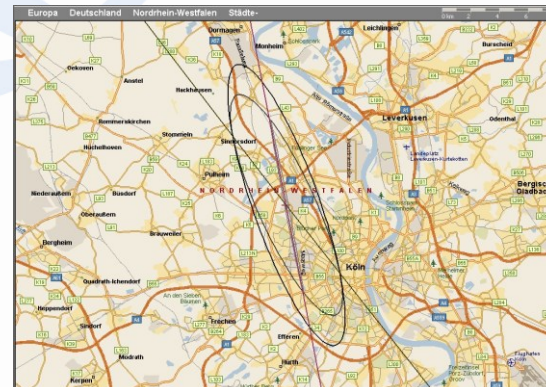
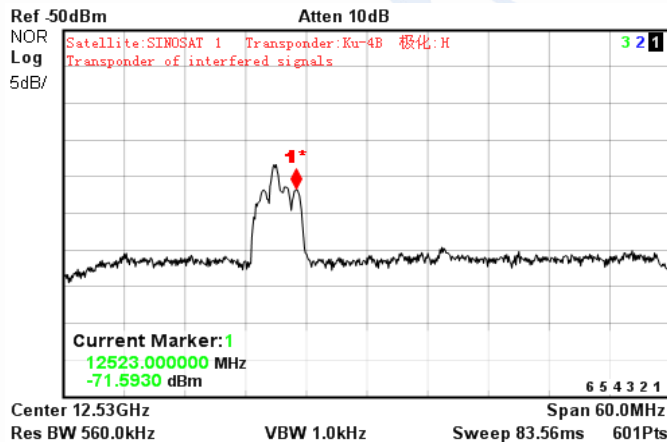
- - For BR Information, or
- - For BR Action, requesting Assistance under No 13.2 of Radio Regulations

## II. In both cases the information to be submitted is described in:

## III. Appendix 10 to RR

## IV. ITU-R Report 2181

## V. If possible, Geolocation Information and Scan Plots

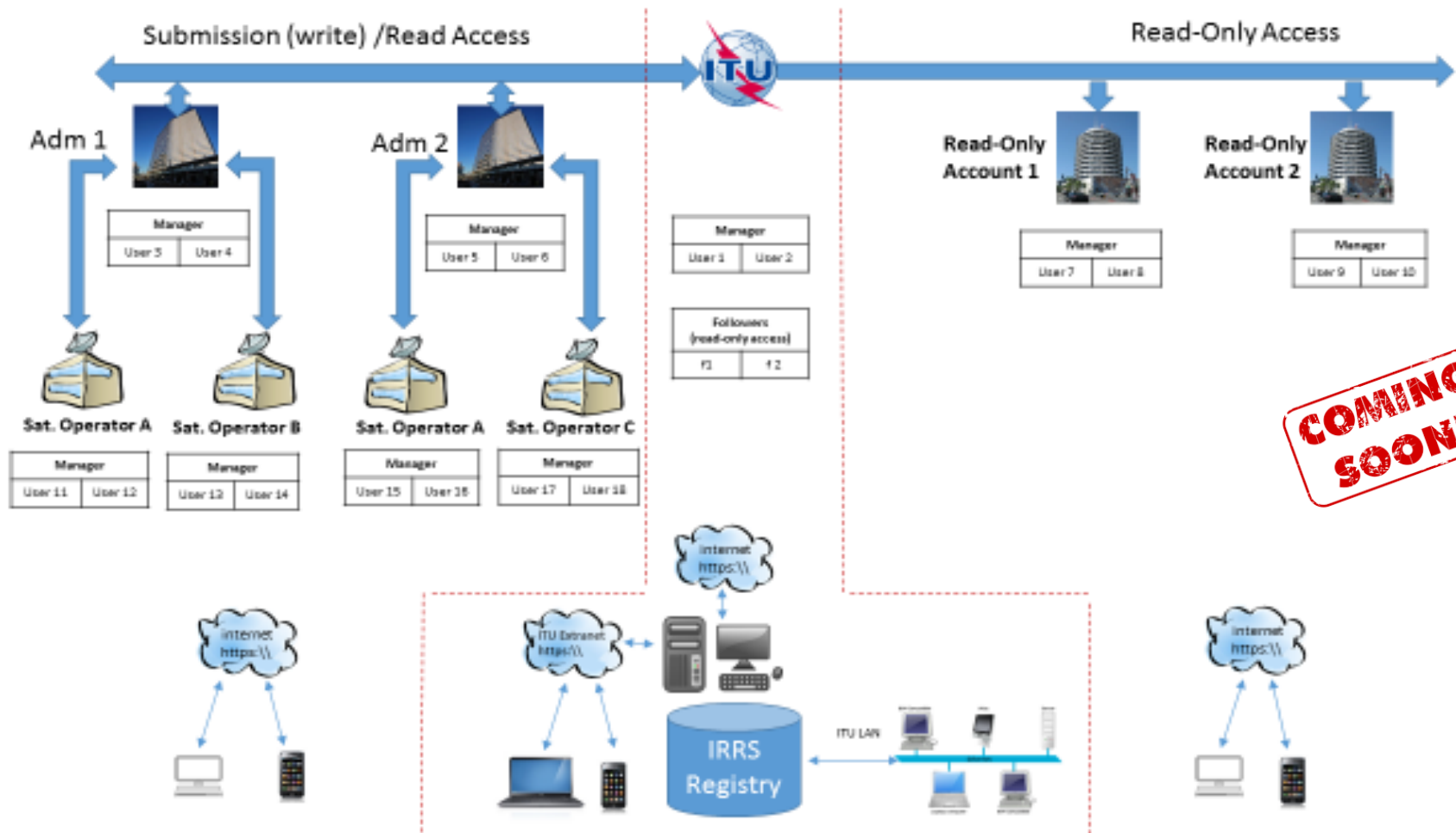




# Satellite Interference Reporting and Resolution System (SIRRS)

193 Member States !

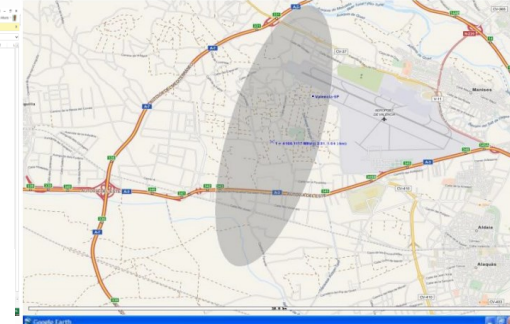
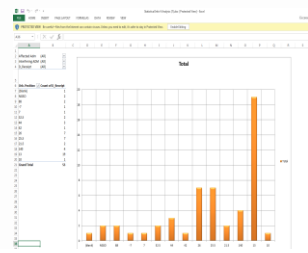
RES 186 PP-2014





# Summary + Uploaded Documents and High Quality Images

# SIRRS



## Affected Frequency Assignments

Assigned frequency	14.020000 GHz
Bandwidth	36.000000 MHz
Polarization	H
Service	FSS

## Upload documents

Title	Letter from Affected Administration
File name	<a href="#">Letter.docx</a>

Title	Interference Signal Geolocation Plot
Date of receipt	17/11/2016 15:30:00
File name	<a href="#">Geolocation.pdf</a>

Title	Interfered and Interfering Signal Scan Plots
Date of receipt	17/11/2016 15:30:55
File name	<a href="#">Scan Plot.pdf</a>

Title	Info on Passive Sensors and NGSO Orbits
Date of receipt	17/11/2016 15:31:05
File name	<a href="#">Report HI Passive Sensors.pdf</a>

Title	Format Report 2181
Description	Additional Info
Date of receipt	17/11/2016 15:32:34
File name	<a href="#">Additional Info REP-SM.2181.docx</a>

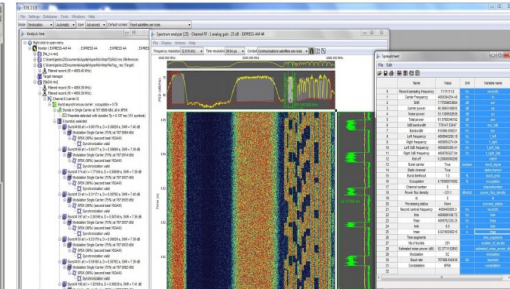
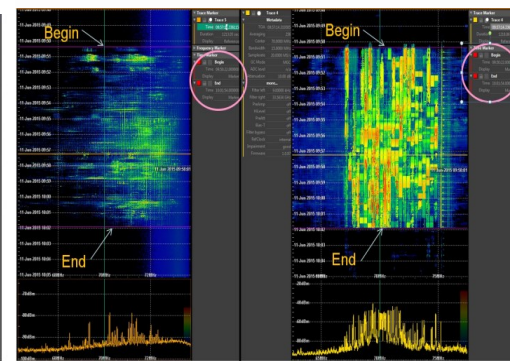
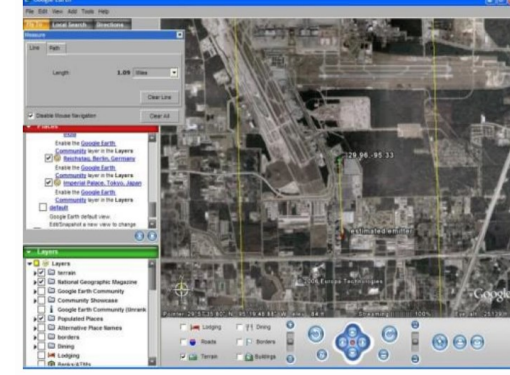
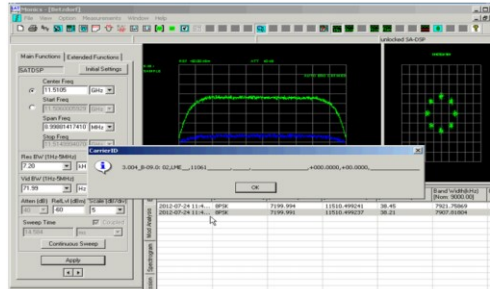
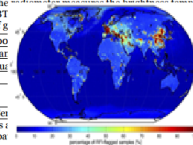
Title	Statistical Info
Description	To be used for Analysis
Date of receipt	17/11/2016 15:34:26
File name	<a href="#">Statistical Info 4 Analysis.xlsx</a>

## Remarks

Please call Urgently to : +54 11 4585 2369. Thanks !

## 2. Particulars concerning the PASSIVE SENSOR experiencing the harmful interference

<b>Satellite</b>	Soil Moisture and Ocean Salinity (SMOS) satellite	
<b>Mission description</b>	SMOS is an Earth Observation mission lead by the European Space Agency (ESA) with participation of CNES (France) and CDTI (Spain). The main scientific objectives of SMOS are to perform global observations of soil moisture over land and sea-surface salinity over oceans.	
<b>Mission website</b>	<a href="http://www.esa.int/Our_Activities/Observing_the_Earth/SMOS">http://www.esa.int/Our_Activities/Observing_the_Earth/SMOS</a>	
<b>Launch date</b>	2 November, 2009	
<b>Orbital data</b>	Type	LEO sun-synchronous
	Mean altitude (km)	728
	LST at ascending node	06:00
	Inclination (deg)	98.44deg
	Eccentricity	0.001
Repeat period, days		149-day repeat cycle with 3-day sub-cycle
<b>Sensor information</b>	Type	Passive microwave 2-D interferometric radiometer using aperture synthesis.
	Swath (km)	100
	Spatial resolution (km)	Var
	Polarisation	Dual
<b>Frequency of operation</b>	1400 – 1427 MHz	
<b>Type of service</b>	Earth Exploration Satellite Service	
<b>Relevant ITU Radio-Regulations</b>	RR No. 5.340 (All emissions ; Resolution 750 on the Compa active services)	

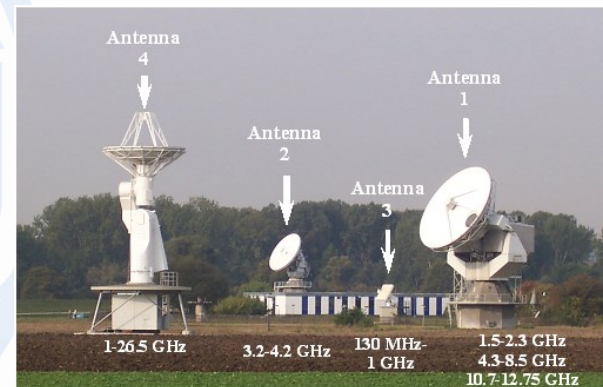




# Extension of the International Monitoring System (IMS)

Recent 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”.



→ Cooperation Agreement Signed with:  
*Germany, Pakistan, Vietnam, Belorussia*

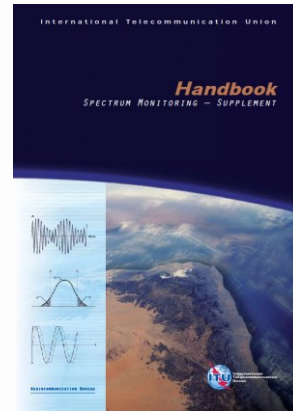
→ Under discussion: Brazil, Ukraine,  
Russia, Japan, Kazakhstan, Korea



# ITU-R Recommendations, Handbooks

Development of a **New 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. (ITU-R S.2049, Dec. 2013)

This Recommendation is intended to provide some **easy-to-follow practices** to enable OU operators to transmit to geostationary space stations without interfering with other users on the target satellite or with users on any other nearby satellites.



**Free Download:**

<http://www.itu.int/rec/R-REC-S.2049-0-201312-l/en>



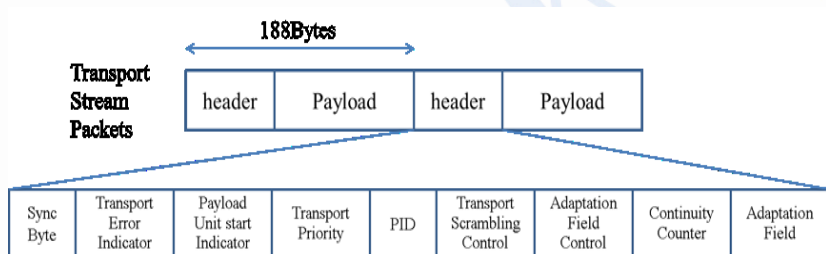
# ITU-R Recommendations, Handbooks

## Development of a **New Recommendation on Carrier ID** (ITU-R S.2062-0. Sept.2014)

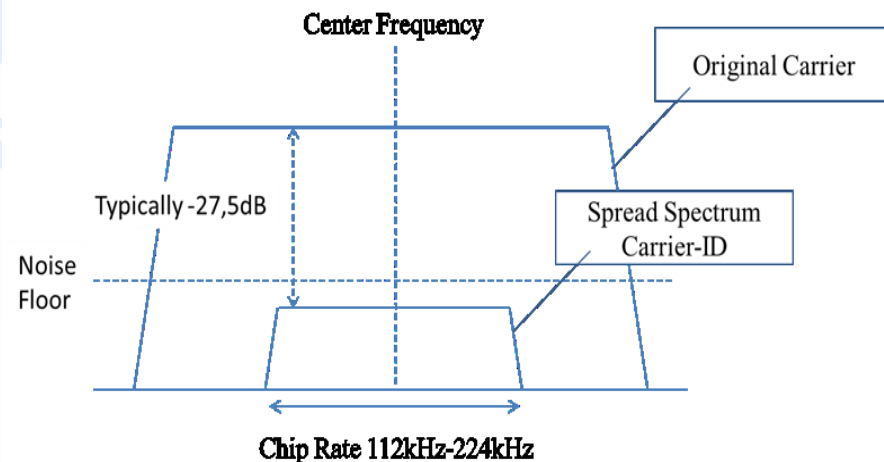
Objective: To facilitate rapid identification of an interference source and reduce the time required to clear the interference that occurs unintentionally.

### 2 Methods:

#### Network Information Table (NIT)



#### Spread Spectrum CID



**Free Download**

<http://www.itu.int/rec/R-REC-S.2062/en>



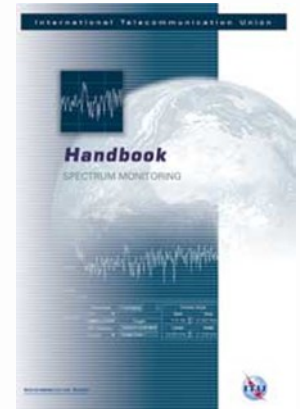
# ITU-R Recommendations, Handbooks

Further Activities on going in:

## WP-1C

Development of a Preliminary Draft New ITU-R Report on **Measurement Techniques and New Technologies for Satellite Monitoring**

Annex 9 to Doc.1C/169 (WP1C Chairman's Report) → <http://www.itu.int/md/R12-WP1C-C-0169/en>



## WP-7C

New Recommendation on **Detection and Resolution** of radio frequency **interference** to Earth exploration-satellite service **(passive) sensors**

Administrative Circular CACE/809. Approval process by 10 July 2017

Doc.SG7/24 → <https://www.itu.int/md/R15-SG07-C-0024/en>



# Further Actions taken by ITU

- I. To raise awareness of the impact of Harmful Interference to Space Services
- II. To disseminate information on Technical and Regulatory Solutions
- III. To Promote the exchange of experience, cooperation, and participation in related Fora.







# Summary and Key Messages:

- I. ITU plays a leading role to ensure interference-free operations of space services
- II. Member States' cooperation and exchange of information among parties is essential
- III. Only continuous synergistic actions by all sectors of Satellite Community can guarantee a minimum level of interference is kept.



# ITU International Satellite Symposium 2017



**Thank You !**