



ITU Role, Regulations and Actions to prevent and resolve harmful interference to Space Services

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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 ?

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

193 Member States
+700 Sectors members,
Associates, Academia

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

“All stations...must be established and operated in such a manner as **not to cause harmful interference to the radio services** ... of other member states or recognized operating agencies or other duly authorized operating agencies, which carry on a radio service, and which operate **in accordance with the provisions of the Radio regulations.**” (CS197)

Each Member State is responsible to ensure that the stations licensed (RR Art-18) by them (CS 198) shall not cause harmful interference to radio services of other member states



Article 1 of RR: Definitions



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.

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*.

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).

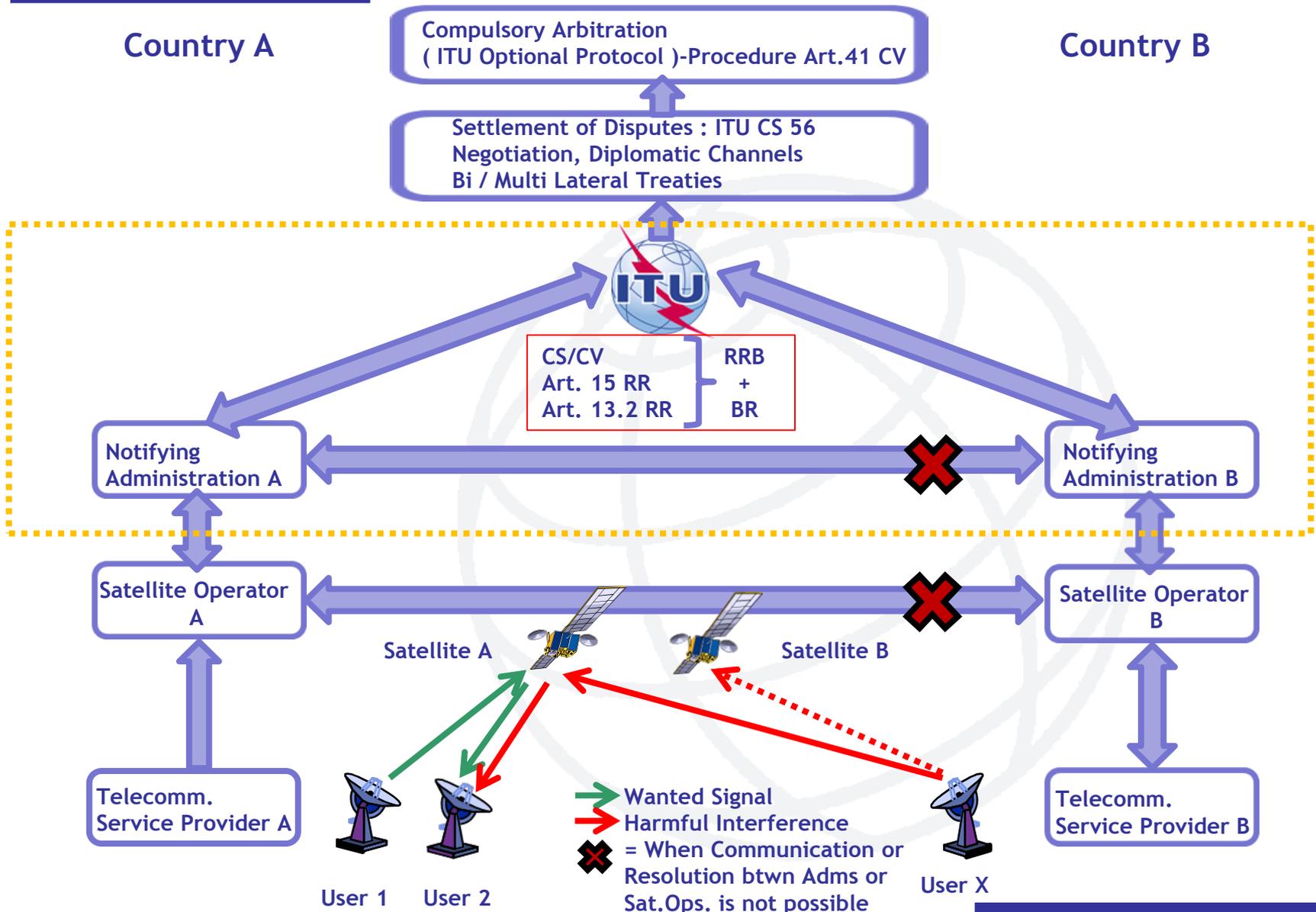
- No difference between intended or unintended
- No exact level

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)
- And more...

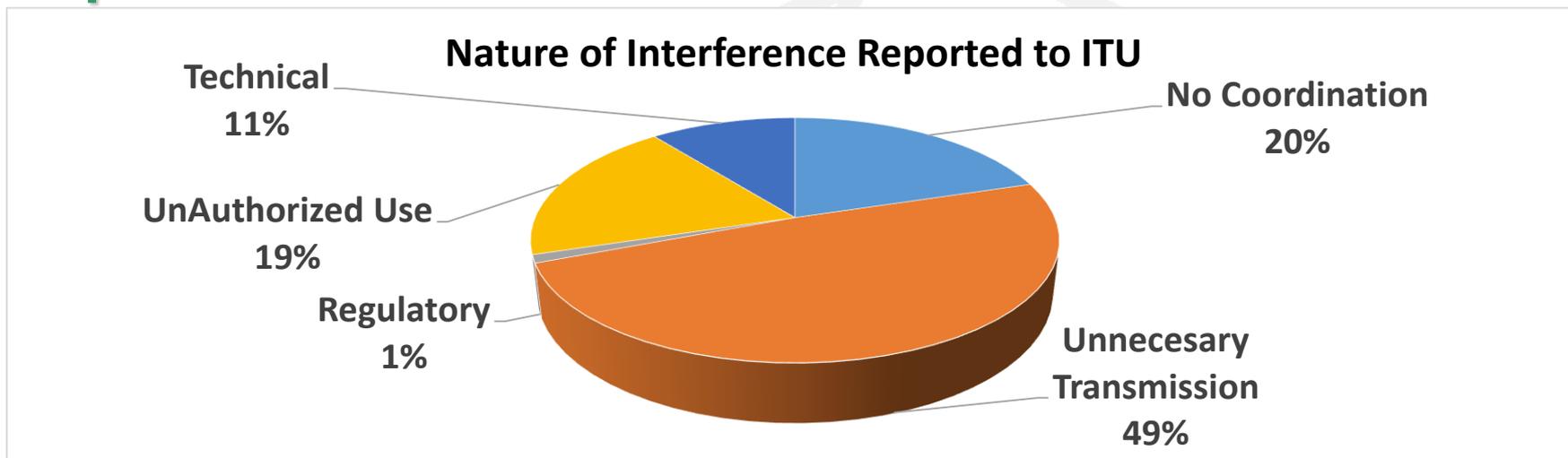


Schema of Actions in case of Harmful Interference



The Current Situation

Statistics on Harmful Interference: Satellite Capacity free of Harmful Interference reported to BR = 99.97 %



- ❑ Statistics are based on Information and Statements provided by Notifying Administrations Reporting the Cases to the Bureau
- ❑ One Case of Harmful Interference Reported to BR may involve several short or long time occurrences.

Source: BR Director's Report to WRC-15 (Annex 2 to Addendum 1 to Doc.4)

Definitions used for Statistics Purposes

Nature of Interference:

1. No coordination :

It concerns all the cases of harmful interference caused by the operation of non-coordinated frequency assignments

2. Unauthorized use:

Accessing transponders without having the required authorization either deliberately or by mistake

3. Unnecessary transmission:

Cases of harmful interference as described in RR15.1:

“All stations are forbidden to carry out unnecessary transmissions, or the transmission of superfluous signals, or the transmission of false or misleading signals...”

In case of space services, typically, it refers to harmful interference caused by a high power CW carrier.

4. Technical:

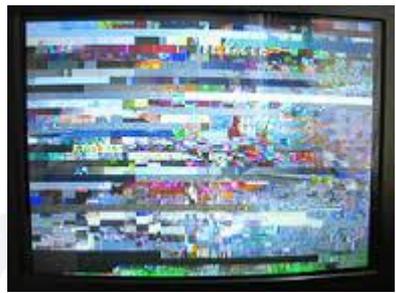
Spurious emissions, excessive transmitting power, transmitting stations that are not in conformity with frequency tolerances, miss-pointing of antennas associated to earth stations, cross-polarization interference, transponder saturation, etc.

5. Regulatory:

Out-of-band operations

Harmful Interference Reported to BR

From 2011 to 2016

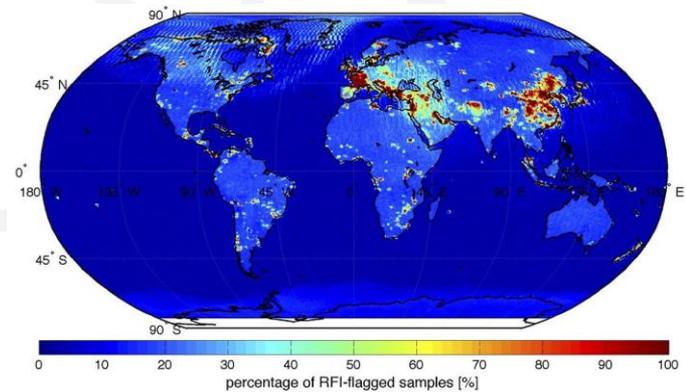


Affected Services:

- Fixed Satellite Service
- Broadcasting Satellite Service
- Mobile Satellite Service
- Earth Exploration Sat. Serv.
- Radionavigation Sat. Serv.

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

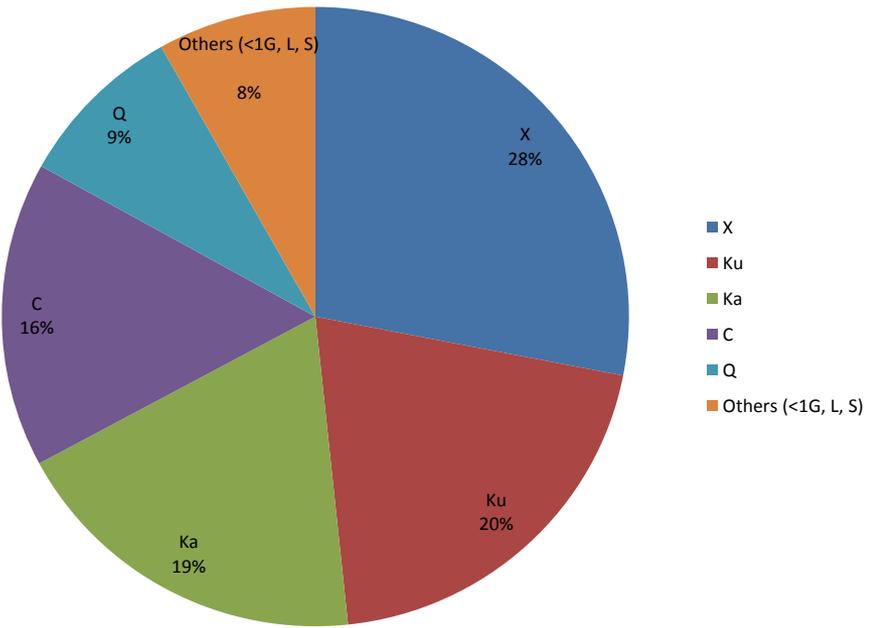


Installations of National Defence Services in Space

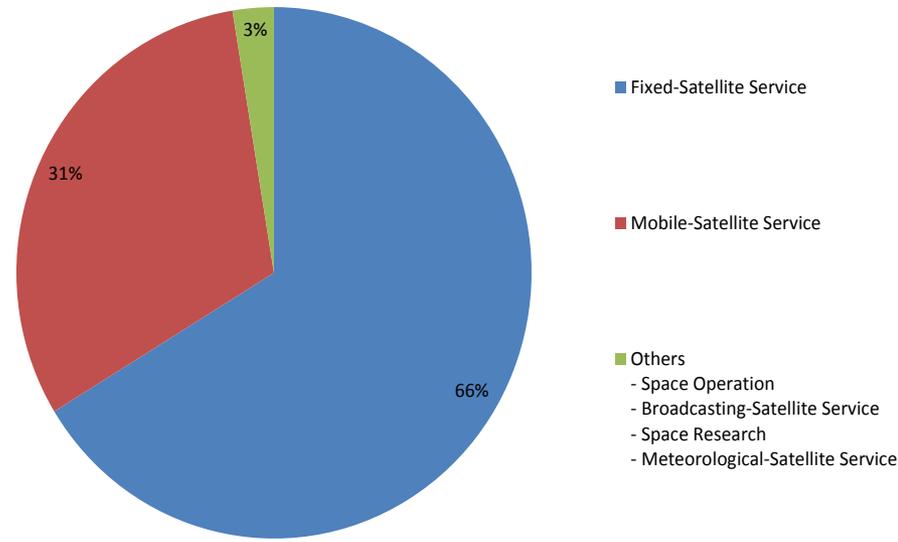
- So far **15** ADM (AUS, B, CHN, D, F, I, IND, J, LUX, MEX, RUS, THA, TUR, UAE, USA) have requested application of CS ART 48 by stating that the use of their satellite networks was for the purpose of *national defence, military or governmental use*.
- This comprises **120** satellite networks across **62** unique orbital positions

Source: BR Director's Report to WRC-15 (Annex 1 to Addendum 2 to Doc.4 Rev.1)

Distribution of bands (assignments under Article 48)



Distribution of services (assignments under Article 48)





Installations of National Defence Services in Space

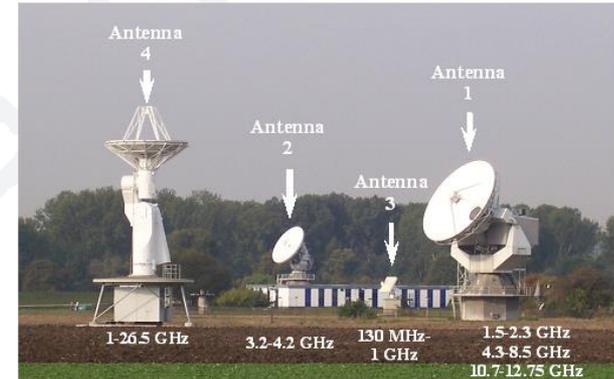
- Member States retain their *entire freedom* with regard to military radio installations (Art 48 CS 203)

 - These installations *must*, so far as possible, *observe*
 - ✓ statutory *provisions* relative to giving assistance in case of distress and to the measures to be taken *to prevent HI*
 - ✓ the provisions of the *Regulations (types of emission and the frequencies* to be used, according to the nature of the service) performed by such installations (Art 48 CS 203)
-

Extension of the Int'l Monitoring System

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

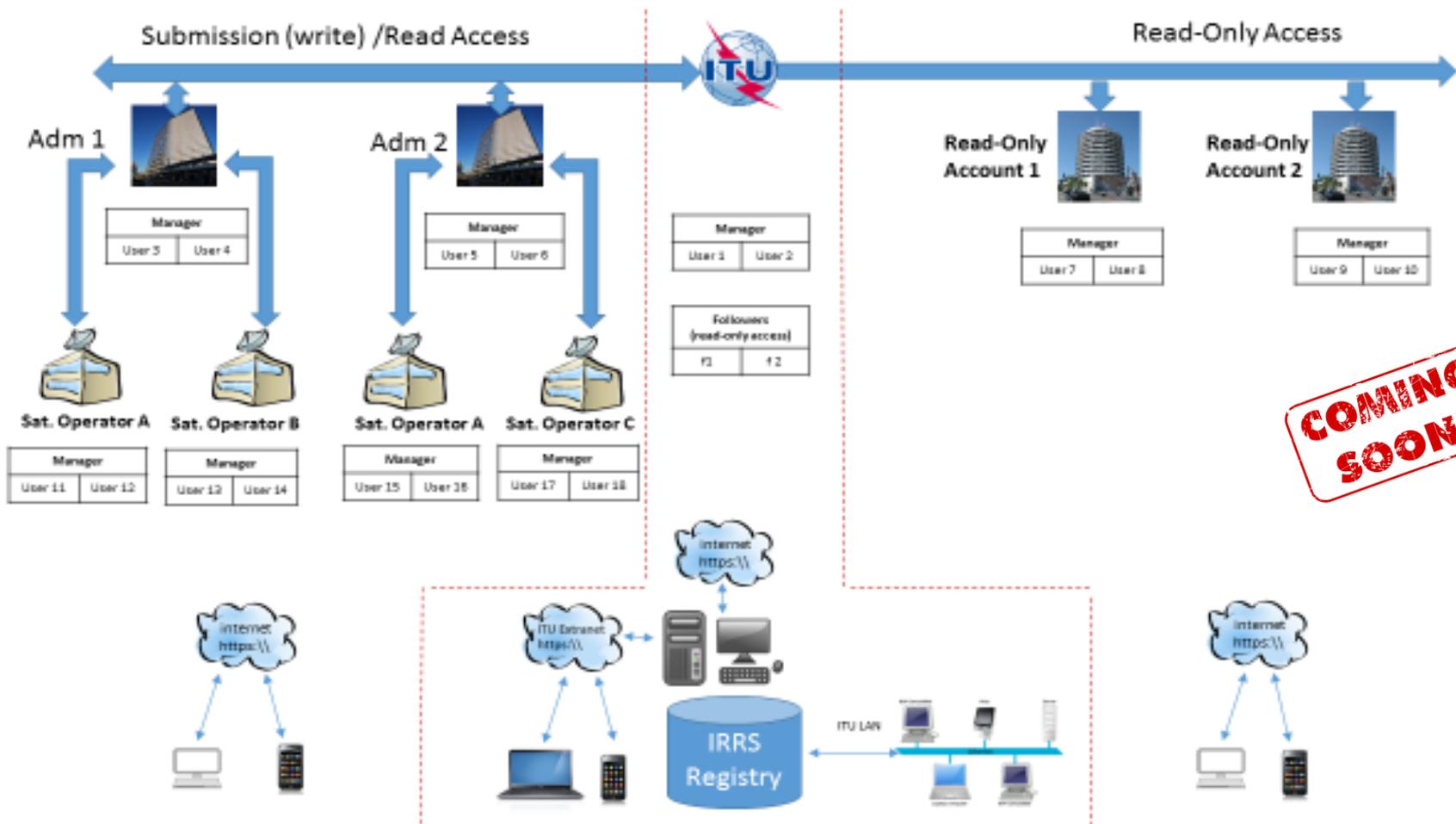
→ Under discussion: Brazil, Ukraine, Russia, Japan, Kazakhstan, Korea



Interference Resolution and Reporting System

193 Member States !

RES 186 PP-2014, endorsed by WRC-15



COMING SOON!

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.



ITU International Satellite Symposium 2016 Interference- Free Satellite Frequency Spectrum: Myth or Reality in 2016

- ✓ Latest technologies to mitigate and geolocate interference
- ✓ Space Monitoring
- ✓ Impact to Broadcasting and Science Services
- ✓ Cybersecurity, Radionavigation
- ✓ Regulations



Free download of documents → <http://www.itu.int/go/ITU-R/SISS-2016>

Summary and Key Messages:



- I. ITU plays a leading role to ensure interference-free environment for space services
- II. ITU CS, CV, RR provides an Stable and Transparent technical-regulatory framework for the use of spectrum-orbit resources
- III. Member States' cooperation and exchange of information among parties is essential
- IV. Only continuous synergistic actions by all sectors of Space Community can guarantee a minimum level of interference is kept.

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Thank You !