

ICG Experts Meeting: Global Navigation Satellite Systems Services
16 December 2015, UN VIC, Vienna, Austria

Harmful Interference (HI) *related to* ***Space services***

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Radiocommunication Sector (ITU-R)

Strategic Goals:

- ✓ Rights of access to the spectrum
- ✓ Efficient use of spectrum
- ✓ Operation free from interference
- ✓ Economies of scale
- ✓ Interoperability and roaming
- ✓ Global harmonization
- ✓ Guidelines for national & regional regulations



- GOOD QUALITY
AND LESS COSTLY EQUIPMENT
- MORE FAVORABLE INVESTMENT
ENVIRONMENT (CLEAR & STABLE)

- 
- Two white classical columns supporting the list of regulatory goals.
- I. International Regulations
 - II. Global Standards & Guidelines
 - III. Assistance to administrations

In other words:

- Interference Free operation → Maximize Quality of Service, Safety of life services
→ Prevents loss of investment, customers and revenue
by minimizing unusable satellite capacity due to
interference

ITU Constitution (CS)



“The Union shall effect **allocation of bands** of the radio-frequency spectrum, the **allotment of radio frequencies** and the **registration of radio frequency assignments** and, for space services, of any associated orbital position in the geostationary-satellite orbit or any associated characteristics of satellite in other orbits, in order **to avoid harmful interference** between radio stations of different countries.”

(Article 1, par.11)





Infringement of the ITU CS, CV or RR

CS - ARTICLE 45 - Harmful Interference

1. **CS 197-** *All stations, whatever their purpose, **must be established and operated in such a manner as not to cause harmful interference to the radio services or communications of other Member States** or of recognized operating agencies, or of other duly authorized operating agencies which carry on a radio service, and which operate in accordance with the provisions of the Radio Regulations*
2. **CS 199 -** *Further, the Member States recognize the necessity of taking all practicable steps to prevent the operation of electrical apparatus and installations of all kinds from causing harmful interference to the radio services or communications mentioned in No. 197 above*

Infringement of the ITU CS, CV or RR



1. *Not necessarily harmful interference*
2. Representations relating to infringement committed by a station shall be made to the administration of the country having jurisdiction over the station by the administrations which detect it.(No. 15.20 of the RR)
3. If an administration has information of an infringement of the CS, the CV or the RR (*in particular ART 45 of the Constitution and No. 15.1 of the RR*) committed by a station under its jurisdiction, the administration shall ascertain the facts and take the necessary actions (No. 15.21)

Article 15 - Interferences



- **WRC-12** reaffirmed that intended harmful interference represent infringements and that Member States under the jurisdiction of which the signals causing this harmful interference are transmitted have *the obligation to take the necessary actions*

No. **15.1** § 1 *All stations are forbidden to carry out unnecessary transmissions, or the transmission of superfluous signals, or the transmission of false or misleading signals, or the transmission of signals without identification*

No. **15.21** §13 If an administration has information of an infringement of the Constitution, the Convention or the Radio Regulations (in particular ART 45 of the Constitution and No. 15.1 of the Radio Regulations) *committed by a station under its jurisdiction, the administration shall ascertain the facts, and take the necessary actions.*

Harmful Interference in the Radio Regulations



1. No **1.166** *interference*: The effect of unwanted energy due to one or a combination of *emissions*, *radiations*, or inductions upon reception in a *radiocommunication* system, manifested by any performance degradation, misinterpretation, or loss of information which could be extracted in the absence of such unwanted energy
2. No **1.167** *permissible interference*: Observed or predicted *interference* which complies with quantitative *interference* and sharing criteria contained in the ITU RR or in ITU-R Recommendations or in special agreements as provided for in the ITU RR
3. No **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.

No. 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 (CS1003).”

- **No Distinction** between **Deliberate/Intentional** and **Unintended** Interference
- **No specific level** to define from **Permissible Interference** (No.1.167) to **Accepted Interference** (No.1.168) and then **Harmful Interference** (No.1.169)
- **No real Enforcement Mechanism** apart from **ART.56 CS** (*Settlement of Disputes*) and **Optional Protocol**

Control of Interference

ALLOCATION

Frequency separation
of stations
of different services

POWER LIMITS

PFD to protect TERR services
EIRP to protect SPACE services
EPFD to protect GSO from N-GSO
(EPFD = aggregate equivalent power flux-density)

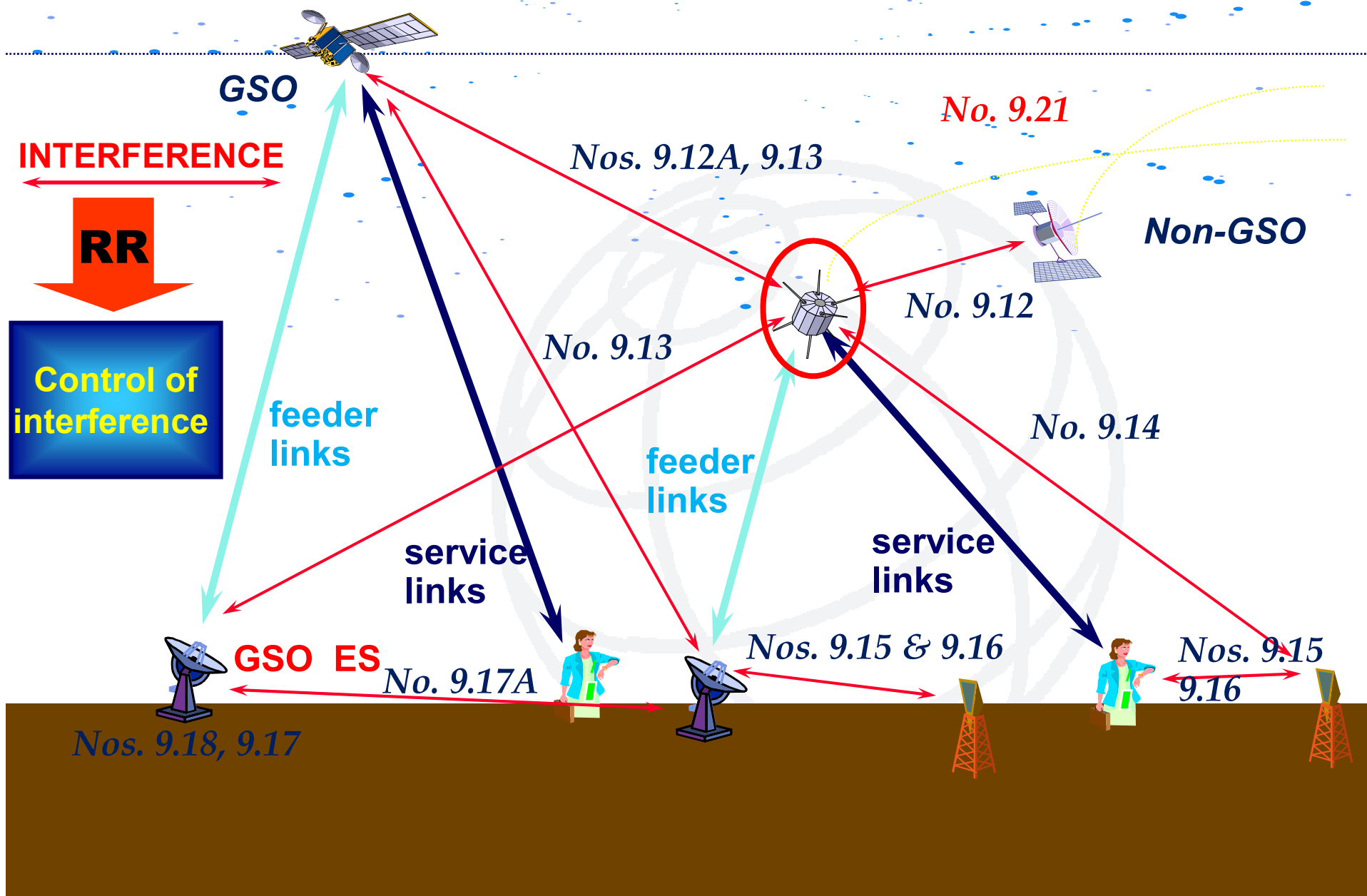
REGULATORY PROTECTION

e.g. No. 22.2: Non-GSO to
protect GSO (FSS and BSS)

COORDINATION

between Administrations to
ensure **interference-free**
operations conditions

Article 9 Coordination provisions



Measures against HI (1/4)

1. **No. 4.3** Any new assignment or any change of frequency or other basic characteristic of an existing assignment *shall be made in such a way as to avoid causing harmful interference to assignments recorded in the MIFR* in accordance with the Table of Frequency Allocations (ART 5) and the other provisions of the RR;
2. **No. 4.4** Administrations *shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations (ART 5) or the other provisions of the RR,* except on the express condition that such a station shall not cause harmful interference to, and shall not claim protection from harmful interference caused by, a station operating in accordance with the provisions of the Constitution, the Convention and the Radio Regulations

Measures against HI (2/4)

PRIMARY and secondary services (Nos. 5.23 – 5.31)

1. PRIMARY service

2. *Secondary service*

- ✓ shall cause no harmful interference to, nor claim protection from, the PRIMARY service;
- ✓ can claim protection from harmful interference from stations of the same or other secondary services.

Measures against HI (3/4)

- **Right to international recognition (No. 8.3)**
 1. *Any frequency assignment recorded in the Master Register (MIFR) with a favourable finding* with respect to the Table of Frequency Allocations and other provisions of the RR shall have the right to ***international recognition and protection***
 2. This right means that other administrations *shall take it into account when making their own assignments, in order to avoid harmful interference*

Measures against HI (4/4)

➤ Non-conforming assignment (Nos. 8.4 & 8.5)

1. A frequency assignment shall be known as a non-conforming assignment when it is not in accordance with the Table of Frequency Allocations or the other provisions of the RR
2. Recorded in the MIFR for information purposes only if the administration states that it shall be operated under the conditions that:
 - ✓ it shall cause no harmful interference to, nor claim protection from, other stations operating in accordance with the Table of Frequency Allocations or the other provisions of the RR;
 - ✓ it shall eliminate harmful interference if caused to a station operating in accordance with the Table of Frequency Allocations and other provisions of the RR.

ITU-R General Measures against HI



From early stages of planning to final operational phase:

Preventive:

- Study Groups 4,7,1,WP-4A,WP-4B,WP-4C → New REC Access Procedures for FSS GSO Occasional Use
→ New REC on Carrier ID
→ Compatibility Studies between FSS and mobile (IMT) in C Band
- JTG-4-5-6-7
- RA-15
- WRC-15
- Coordination and Notification of Satellite Networks and Earth Stations, Application of the Radio Regulations → Provides International Recognition and Protection

Corrective:

- Article 15 and Appendix 10 to RR + ITU-R SM. 2181:
→ To report a case of Harmful Interference to the Bureau
- Radio Regulations Board's Decisions

How to Report a Case of Harmful Interference to ITU ?

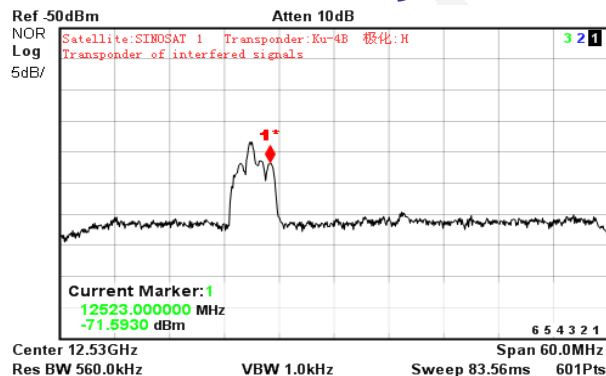
1. To submit Letter to BR :

1. For BR Information, or
2. For BR Action, requesting Assistance under No 13.2

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

- a. Appendix 10 to RR
- b. ITU-R Report 2181

3. If possible, Geolocation Information and Scan Plots could be very useful



Actions being taken by ITU



1. Extension of the International Monitoring System
2. Promoting the exchange of experience, cooperation, co-organization and participation in related Fora
3. Providing Assistance to ITU Members
4. Development of new ITU-R REC....
5. *Development of an International Registry of Interference to Space Services (IRISS)*

International Registry of HI to Space Services (IRISS)

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

“2 to continue taking action to maintain a database on cases of harmful interference, reported in accordance with relevant provisions of the Radio Regulations and in consultation with Member States concerned; “

➤ **Main characteristics of this project:**

- ✓ *Web Based Application*
- ✓ To Facilitate communication between parts involved in a case of HI with the aim to resolve the case
- ✓ Facility to be Alerted when a Case of Harmful Interference is Reported

WRC-15 decision



- **Endorsed PP-2014 Resolution 186 with Positive feedback, suggestions, comments.**
- **To support continuous SW development and implementation of SIRRS by BR**
- **Encouraged Administrations to use it**

Summary and Key Messages



1. ITU Radio Regulations plays a **key role** to ensure **interference-free** operations of radiocommunication services
2. Member States' Goodwill, cooperation and exchange of information among parties is essential
3. *Only continuous synergistic actions by all sectors of Terrestrial and Satellite Community can guarantee a minimum level of interference is kept*