



Harmful Interference to Space Services

BR-SSD e-Learning Center

Radiocommunication Sector in brief

Strategic Goals:

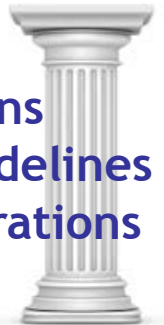
- ✓ Rights of access to the spectrum
- ✓ Efficient use of spectrum
- ✓ Operation free from interference
- ✓ Economies of scale
- ✓ Interoperability and roaming
- ✓ Global harmonization
- ✓ Guidelines for national & regional regulations



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



- I. International Regulations
- II. Global Standards & Guidelines
- III. Assistance to administrations



In other words:

Free-interference operation → Maximize Quality of Service

→ Prevents loss of investment, customers and revenue
by minimizing unusable satellite capacity due to
interference

ITU Constitution (1)



“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)



ITU Constitution (2)



“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.**”

(Article 45)



Radio Regulations:

- ✓ **Intergovernmental Treaty - legal bindings** on all Member states, governing the use of spectrum/orbit resources by administrations

- ✓ Define the **rights** and **obligations** of Member States in respect of the use of these resources
 - Principles of use of orbit/spectrum
 - Allocation of frequency bands and services
 - Procedures and Plans

- ✓ Updated every 3-4 years by **World Radiocommunication Conference, (WRC)**
 - Rights to international recognition
 - Obligations to immediately take necessary actions to stop the signal causing harmful interference



- ✓ Mechanism to ensure free-interference operation
- ✓ Prevents loss of investment, customers & revenue by minimizing unusable capacity due to interference
- ✓ Some key provisions:
 - 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...

- ❑ Had Hoc Group to Plenary was created
- ❑ Some Related Modifications to Radio Regulations:
 - ✓ 11.42 Upon receiving the harmful interference report, the administration responsible for the station using the frequency assignment recorded under No. 11.41 shall immediately eliminate the harmful interference.
 - ✓ 11.42.1 Use the format prescribed in Appendix 10 of the Radio Regulations.
 - ✓ 11.42A:
 - Administrations involved shall cooperate in the elimination of harmful interference
 - may request the assistance of the Bureau,
 - shall exchange relevant technical and operational information required to resolve the issue
 - If HI not resolved, BR report, RRB decide
 - ✓ 15.21 If an administration has information of an infringement of the Constitution, the Convention or the Radio Regulations (in particular Article 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.

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 Distinction between **Deliberate/Intentional** and **Unintended** Interference
- As all RR provisions , may be modified by ITU Member States through WRC

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
- JTG-4-5-6-7 → development of REC on Carrier ID
- Compatibility Studies between FSS and mobile (IMT) in C Band

- Radiocomm. Assembly -15
- World Radiocomm. Conference-15

- 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

Actions being taken by ITU

- I. **Extension of the International Monitoring System**
- II. **Promoting the exchange of experience, cooperation, co-organization and participation in related Fora.**
- III. **Providing Assistance to ITU Members**
- IV. **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. (Approved and Published on Dec. 2013)**
- V. **Development of a Potential New Recommendation on Carrier ID (Expected to be approved by Q3 2014)**
- VI. **Development of an International Registry of Interference to Space Services**



Access Procedures for FSS Occasional Use, Transmissions to GSO Space Stations in 4/6 GHz and 11- 12/13/14 GHz FSS Bands.

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-I/en>

Some Key Verifications:

- I. **Equipment Selection and verification of its conditions.**
- II. **Primary parameters correctly configured:**
 - ✓ ES antenna alignment and Polarization
 - ✓ Frequency, Modulation, BW
 - ✓ Time of Tx
 - ✓ Power Level
- III. **Transmit with Permission Only (Authorization/License)**
- IV. **Follow instructions from your Satellite Operator**
- V. **Special Case of Satellites in Inclined Orbit**
- VI. **Avoiding Retransmission of Nearby RF Signals**
- VII. **Additional Considerations for Auto-Deploy ES**
- VIII. **Full detailed Step by Step process given in REC.**

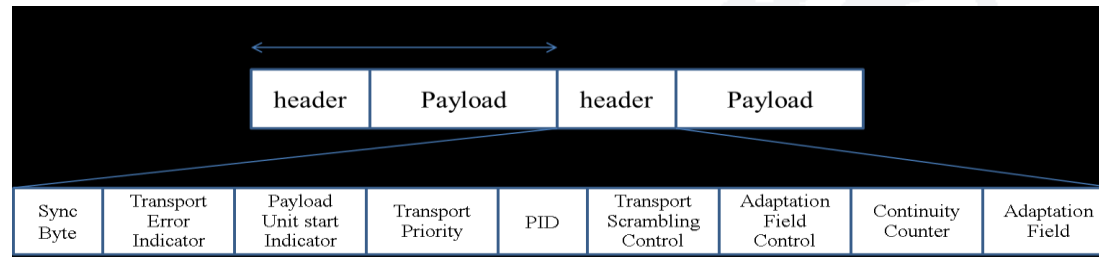
- I. New REC ITU-R [DIGCID] → Under Development in WP-4B
- II. Expected to be approved by Q3 2014
- III. Objective: To facilitate rapid identification of an interference source and reduce the time required to clear the interference that occurs unintentionally.
- IV. Two Methods:
 - a) Network Information Table (NIT) CID
 - b) Spread Spectrum CID

Network Information Table (NIT) CID



To insert the Carrier-ID as a Network Information Table (NIT) frame in the original Transport Stream (TS) packets of the MPEG Stream

Frame structure of TS packets



Content Information

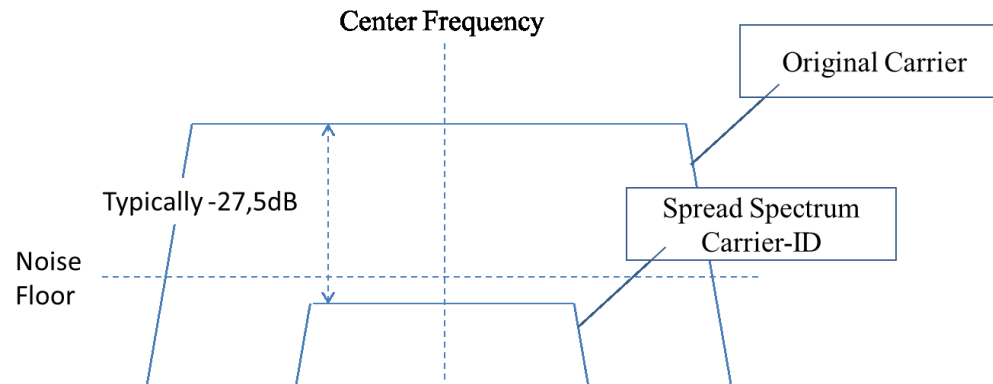
Encoder manufacturer
Encoder serial number
Carrier identifier
Telephone number
Longitude
Latitude
User information

- NIT does not need special equipment, just update Software in modulator or encoder
- Carrier ID not recoverable if TS packets containing NIT are suffering from severe interference or encrypted

Spread Spectrum CID



Carrier-ID with specific carrier information is embedded within the low rate spread spectrum carrier, and then will be sent overlaying the original carrier without adding appreciable noise to the original carrier



- Carrier ID can be recovered even though original carrier is suffering from severe interference
- Requires Modulator to be DVB-CID Compliant, or firmware update or additional equipment.

How to Report a Case of Harmful Interference to ITU ?



I. To submit Letter to BR :

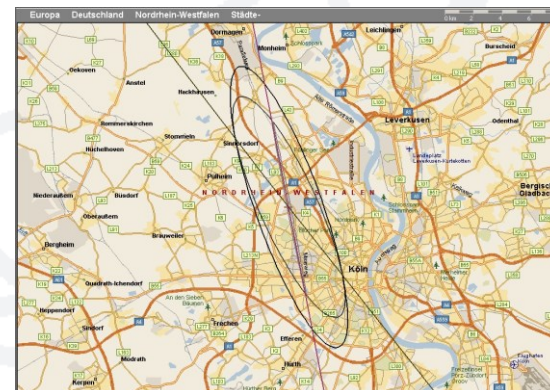
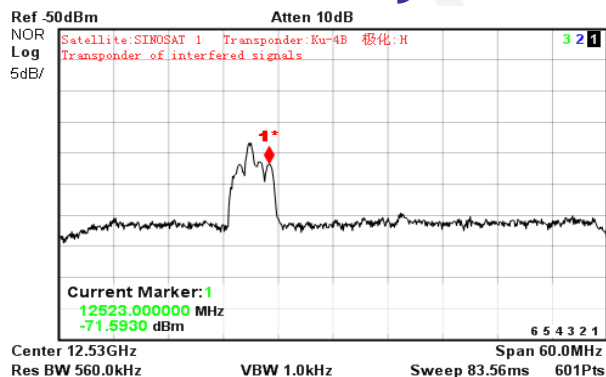
- - For BR Information, or
- - For BR Action, requesting Assistance under No 13.2 of Radio Regulations

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 could be very useful



International Registry of Interference to Space Services (IRISS):

- ✓ **Web Based Application**
 - ✓ Remote access from Fix or Mobile Devices
 - ✓ **Facility to be Alerted when a Case of Harmful Interference is Reported**
 - ✓ Facility to Export/Download Data for Analysis, Statistics, Reports
 - ✓ **Reading Access Restricted to ITU Members**
 - ✓ Submission of Events facilitated and granted to Administrations through a secure connection.
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- ✓ List of Parameters extracted from Report ITU-R SM.2181 and APP10 to RR.
- ✓ Additional Parameters or Information can be considered to be included.
- ✓ Scan Plots, Geolocation Plots, Uplink-Downlink footprints and other Documents in .pdf Format
- ✓ Information to be displayed can be configured at different levels.

Would you like to cooperate ?

Please, provide us with your feedback.

Summary and Key Messages:



- I. Support your Administration to get involved**
- II. Exchange Information, Cooperation**
- III. Follow the ITU Constitution, Radio Regulations**
- IV. Use ITU Recommendations, Standards, Procedures**
- V. Participate in Trainings**
- VI. Participate and Bring your Needs and Proposals to Study Groups and Preparatory Work at Regional and World Meetings in view of the next Conferences.**