

ECSL/IISL Symposium
Vienna, Austria - 24 March 2014

ITU RADIO REGULATIONS and **SMALL SATELLITES**

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Committed to connecting the world

ITU in brief

Committed to Connecting the World



- ✓ Founded on 17 May 1865



5 Elected Officials

- ✓ 193 Member States,
> 700 Sector Members , Associates
& Academia
- ✓ 750 staff & 100 nationalities
- ✓ Annual budget = US\$180,000,000

<http://www.itu.int>

Leading United Nations agency for *Information and Communication Technologies (ICTs)*



4 regional offices, 8 area offices
HQ in Geneva, Switzerland

Purpose of the Union

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“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.”

*"To ensure **rational, equitable, efficient** and **economical** use of the radio frequency spectrum by all radiocommunication services - including those using the geostationary satellite orbit or other satellite orbits - and to carry out studies on radiocommunication matters"* (ITU CS 78 & 196)

ITU Radio Regulations

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- 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 immediatly take necessary actions to stop the signal causing harmful interference***



- Procedures



- + Efficient use of spectrum
- + Equitable access
- + Opportunity to resolve interference before operation
- + Prevents loss of investment, customers & revenue by minimizing unusable capacity due to interference

Propagation of Radio waves



- Laws of physics
- Radio waves *do not stop at national borders*

Interference



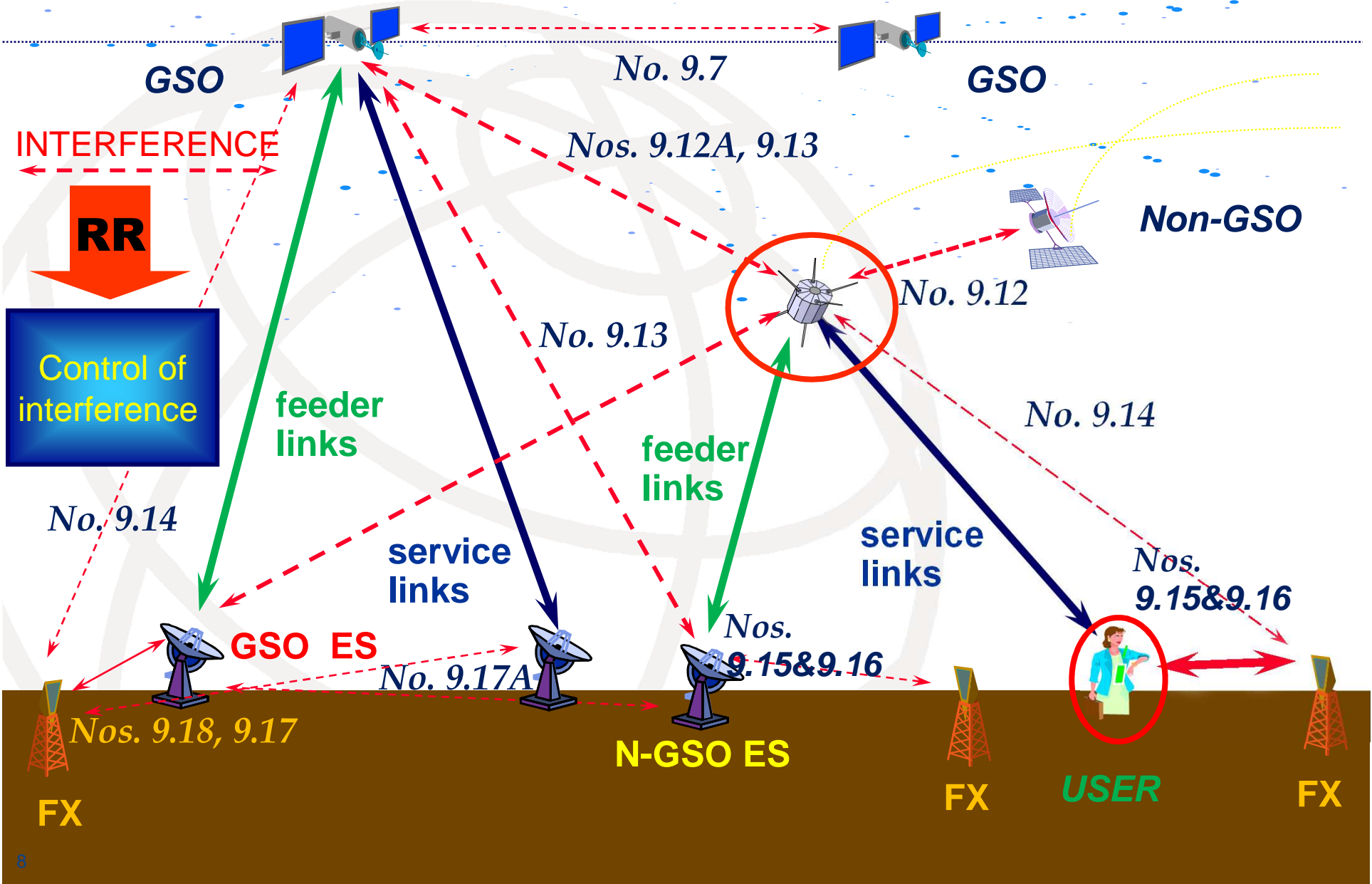
- *Possible* between radio stations of *different countries* and/or different services
- This risk is *high* in Space Radiocommunications

Radio Regulations

- One of its main purposes - *Interference-free operation of Radiocommunications*

Non-GSO Interference

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To ensure equitable access and control interference by

ALLOCATION

Frequency separation of stations of different services

COORDINATION

between Administrations to ensure interference-free operations conditions

POWER LIMITS/ REGULATORY

PFD to protect TERR services / EIRP to protect SPACE services / EPFD to protect GSO from Non-GSO/ Non-GSO to protect GSO (No. 22.2)

MONITORING

International monitoring system

RECORDING

In the Master International Frequency Register (**MIFR**)
International recognition

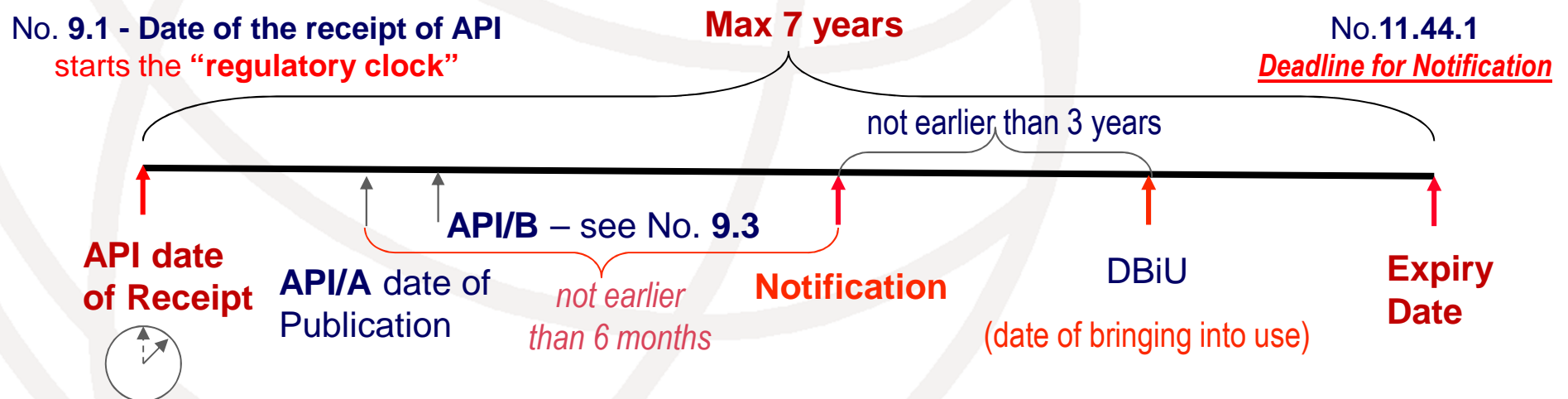


What need to be notified

- **Any** frequency assignments of transmitting and receiving earth and space stations **shall be notified** to the Bureau (No.11.2) if:
 - Capable of causing harmful interference; or
 - Used for international radiocommunication; or
 - Subject to coordination procedure of Article 9; or
 - **Seeking to obtain international recognition; or**
 - Non conforming assignment under No. 8.4 seeking to be recorded into **MIFR** for information purposes only

When to notify? -1

- No. 9.1 of the RR stipulates that **before initiating any action under Article 11 (Notification)** in respect of frequency assignments for a satellite network, *an administration shall send to the Bureau* a general description of the network for **API** publication *not earlier than seven years* and preferably *not later than two years* before the planned *date of bringing into use (DBiU)* of the satellite network or system
- API phase is **obligatory**
- No priority in being first to start API
- Starts the ***“regulatory clock”*** for notification



When to notify? - 2

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- *The International Amateur Radio Union (IARU) informed the Bureau about recently revised forms and procedures applying to coordination of small satellites using frequency in bands allocated to the amateur and amateur satellite services.*
- *The IARU has been coordinating the frequencies for satellite operation within these bands for both amateur radio satellites and experimental satellites.*
- *In order to assist with the satellite coordination and notification process and obligations of administrations/satellite operators, IARU is requiring the API/A Special section reference be included in the small satellite project request submitted to the IARU for coordination*
- **The Bureau welcomes this initiative reminding administrations/satellite operators about their rights and obligations described in the RR related satellite coordination and notification process and finding a solution for any potential harmful interference or coordination issues with administrations in the shared bands where the amateur-satellite service has a secondary status**

Free on-line ITU-R help & documents

➤ **ITU Radio Regulations @ 2012:**

<http://www.itu.int/pub/R-REG-RR-2012>

➤ **Support to Amateur-Satellite service:**

<http://www.itu.int/en/ITU-R/space/Pages/SupportAmateur.aspx>

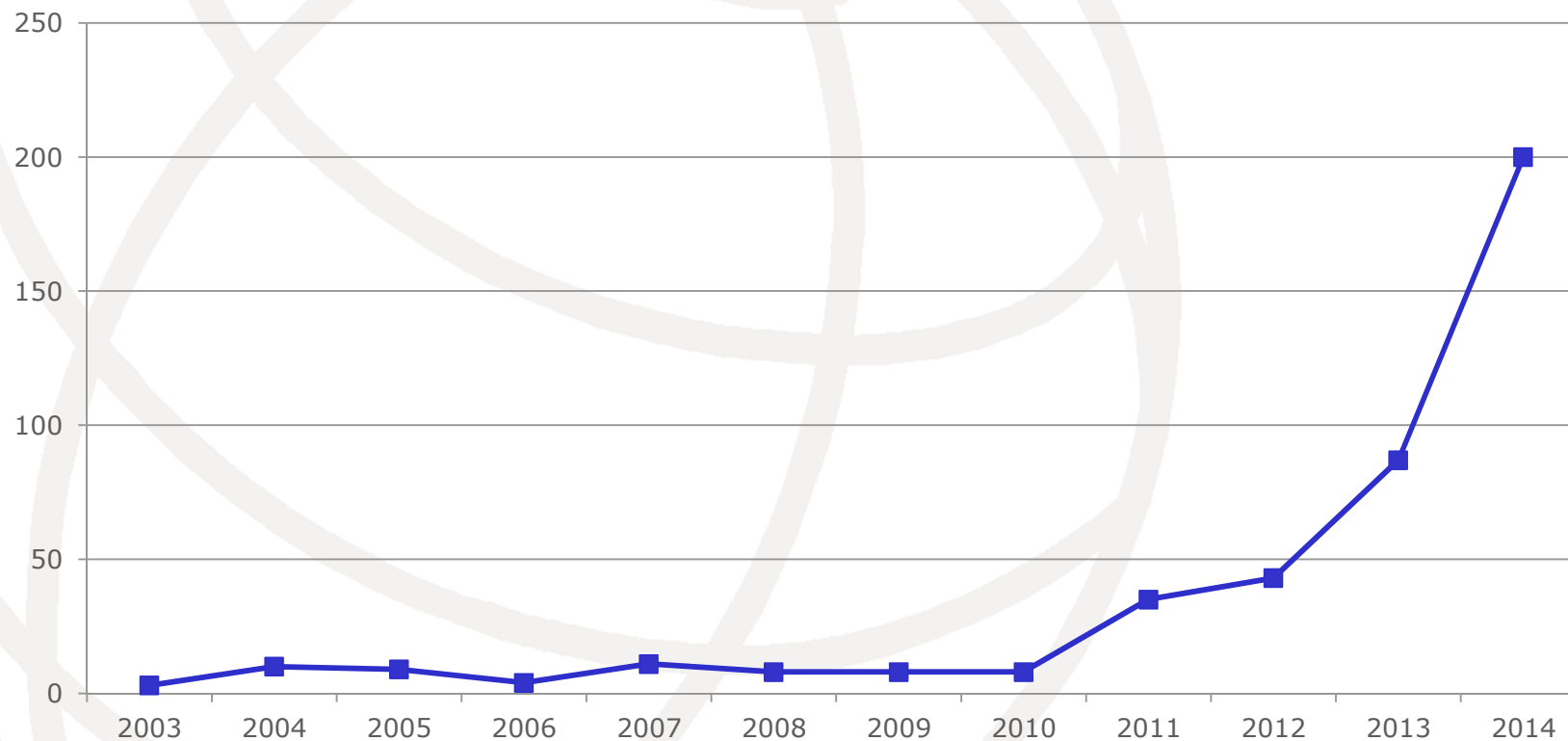
➤ **ITU-R Recommendations:**

<http://www.itu.int/publ/R-REC/en>

Small satellites

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014 JAN- FEB
Number of small sat API	3	10	9	4	11	8	8	8	35	43	87	35

Number of small satellite Advance Publication Information (API) publications by the Bureau per year with a ***prevision for year 2014*** based on API publications in JAN-FEB 2014 period



- **Most** of the “small” satellite networks are declared under **Amateur-satellite service** - class of station **EA**, using frequency bands allocated to **EA** as a PRIMARY service or operation is authorized under No. **5.282** (*non interference operation*)
- **Some** advance “small” satellites with a camera or a sensor on board use for high speed data download are also operating in the part of the S band allocated to **space** research service (EH) and for TT&C use EA frequency bands
- New generation “small” satellites with advance sensors are also using frequency bands allocated to **land-mobile (EU)** or earth exploration (**EW**) **satellite service**
- ***ITU-R Statistics shows clearly that not all “small” sat operators are following the mandatory provisions of the RR***

- *Relevant provisions of the RR concerning the rights and obligations of ITU Member States in regard to the establishment and operation of small satellite networks* (for more info see ITU-R **CR/303**)
- “Small” satellite systems (also class of station **EA**) - as all other satellite services, are subject to the frequency assignment notification and recording procedures (**ART 11**)
- No. **9.1** of the RR stipulates that before initiating any action under **ART 11** in respect of frequency assignments for a satellite network, an administration **shall send** to the Bureau a general description of the satellite network for advance publication (**API**)

Preliminary Agenda WRC-18

Resolution **757** (WRC-12)

Regulatory aspects for nano- and picosatellites

*resolves to invite **WRC-18***

to consider *whether modifications to the regulatory procedures for notifying satellite networks are **needed*** to facilitate the deployment and operation of nano- and pico satellites,
and ***to take the appropriate actions***

Regulatory aspects for nano- and pico satellites

invites ITU-R

- *to examine the procedures for notifying space networks and consider possible modifications to enable the deployment and operation of nanosatellites and picosatellites, taking into account the short development time, short mission time and unique orbital characteristics*

invites administrations and Sector Members

- *to participate actively in the studies by submitting contributions to ITU-R*

➤ *How to participate in these studies?*

- Contact your national Telecommunication Regulatory body

- For more information please visit the BR SSD support page at:
<http://www.itu.int/en/ITU-R/space/Pages/SupportAmateur.aspx>

Characteristics and spectrum requirements of satellite systems using nano and pico satellites

- The ITU Radiocommunication Assembly, ***decides*** that in the ITU-R WP7B following Questions should be studied:
 1. What are the distinctive characteristics of nano and pico satellites and satellite systems in terms of their use of the radio spectrum as defined by data rates, transmissions time and bandwidths?
 2. Taking into account such distinctive characteristics, what are the spectrum requirements for nano and pico satellite systems?
 3. Under which radiocommunication services can satellite systems using nano and pico satellites operate?

For more info see **ITU-R WP7B** studies:

<http://www.itu.int/en/ITU-R/study-groups/>

- In order to assist with the preparation of small satellite filings, the ITU BR has prepared **for the delegates of the LST-14** a **Small satellite CD-ROM** including:
 - all presentations,
 - tutorials,
 - BR software,
 - filing samples and
 - a complete non-GSO satellite database.

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Merci!

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