

Harmful Interference to Space Services

Space Law Certificate Course 2017

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17 October 2017, London

London Institute of Space Policy and Law

Topics

- 1 International Regulatory Framework and Procedures applicable to cases of Harmful Interference (HI) to Space Services**
- 2 Typical Cases**
- 3 ITU actions to combat HI to Space Services**
- 4 Summary and Key Messages**

ITU Constitution (CS), Article 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, Article 45

Harmful Interference

“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

ITU Radio Regulations (RR)

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

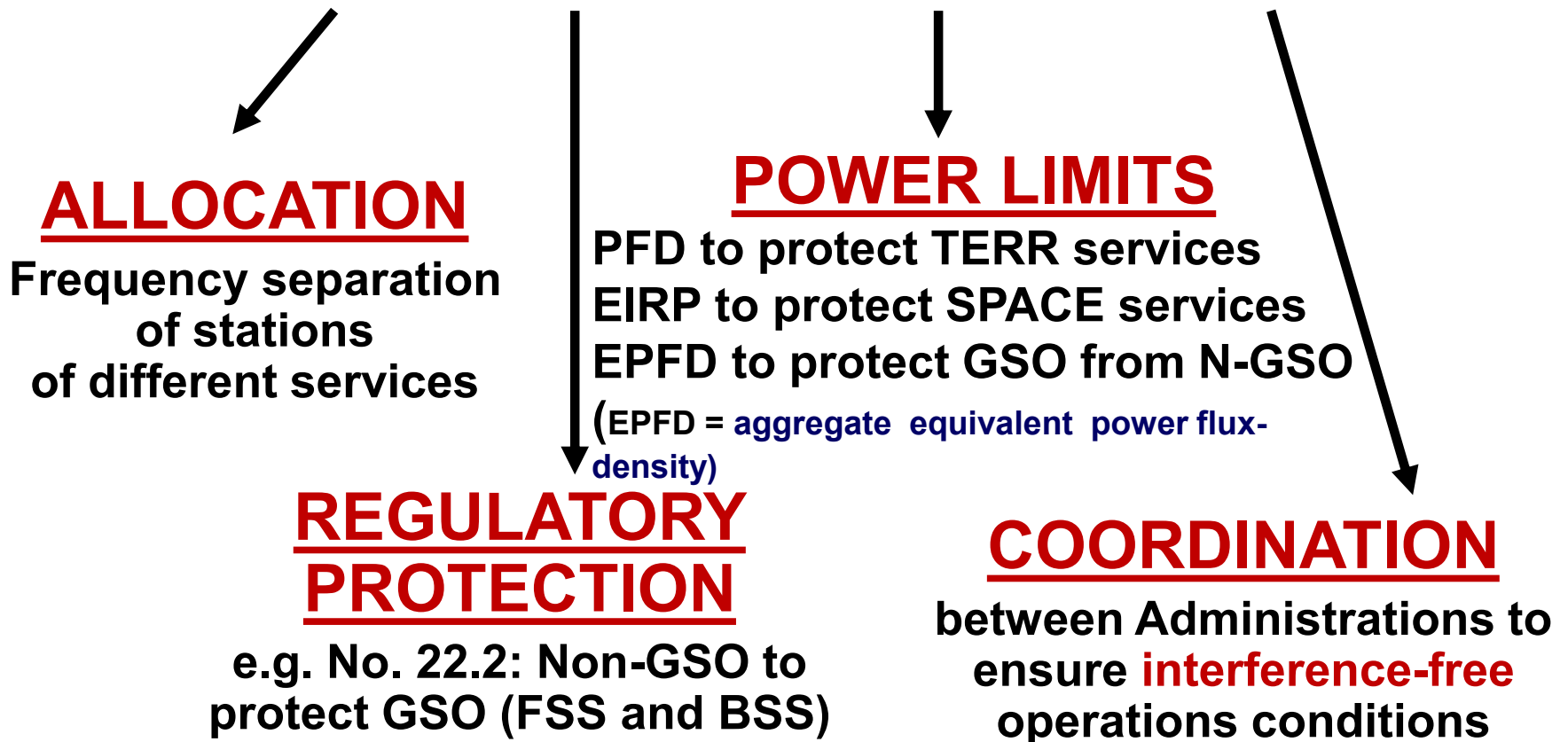
- ✓ Define the **rights** and **obligations** of Member States in respect of the use of these resources
 - Principles of use of orbit/spectrum
 - Allocation of frequency bands and services
 - Procedures and Plans

- ✓ 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

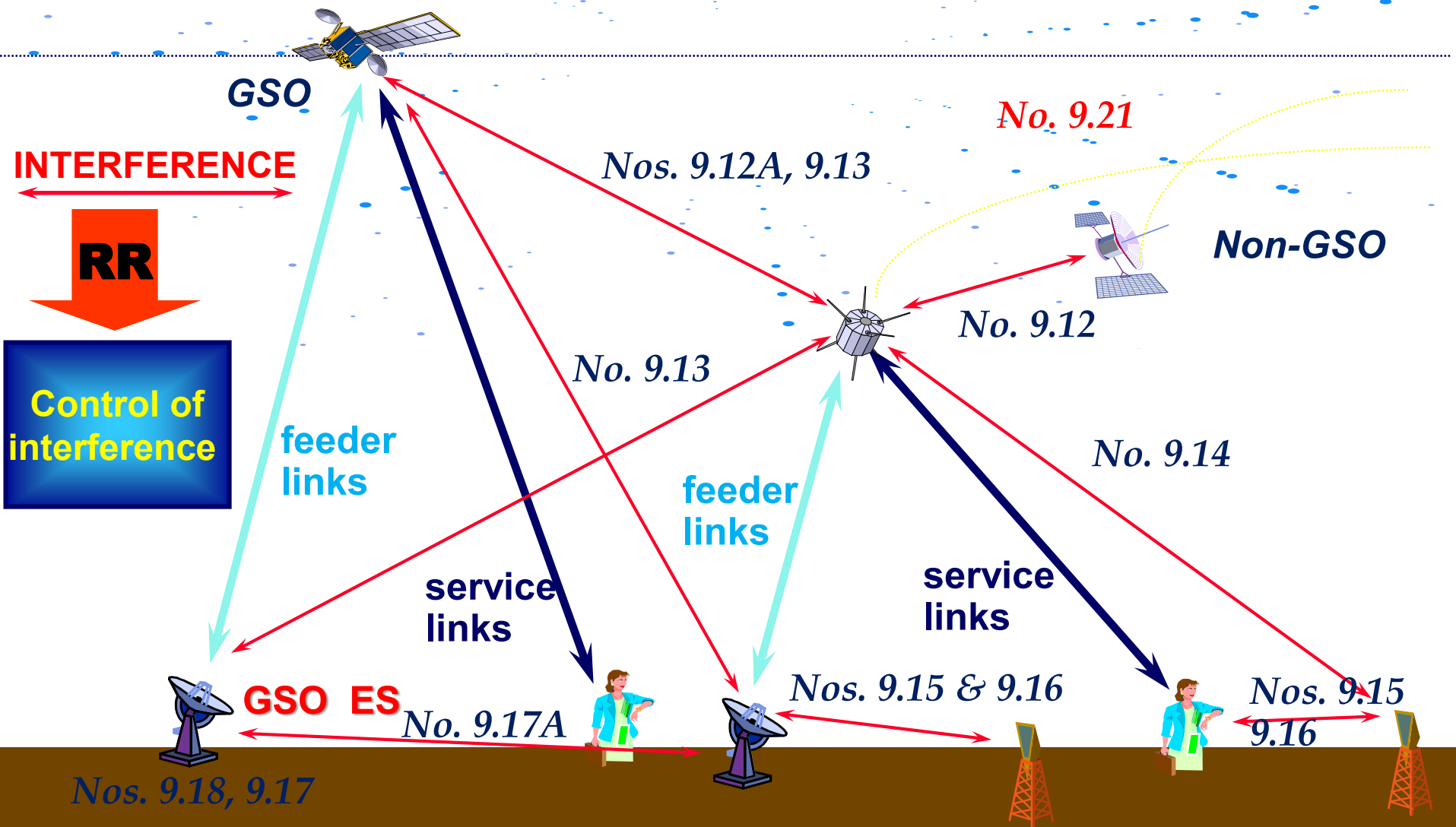


RR Mechanisms to control HI

Control of Interference



Article 9 Coordination provisions



Harmful Interference in the Radio Regulations

RR 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 (RR1.167) to Accepted Interference (RR1.168) and then Harmful Interference**
- **No real Enforcement Mechanism apart from Art.56 CS (*Settlement of Disputes*) and Optional Protocol**

RR Article 15 - Interferences

- 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**

Section I – Interference from Radio Stations

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 (except as provided for in Article 19).

Section V – Reports of Infringements

No.15.21 §13 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.

How to Report a Case of Harmful Interference to ITU ?

I. To submit Letter to BR :

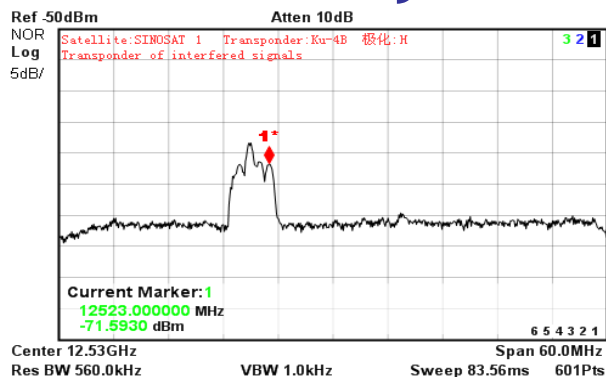
- For BR Information, or
- For BR Action, requesting Assistance under No 13.2

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

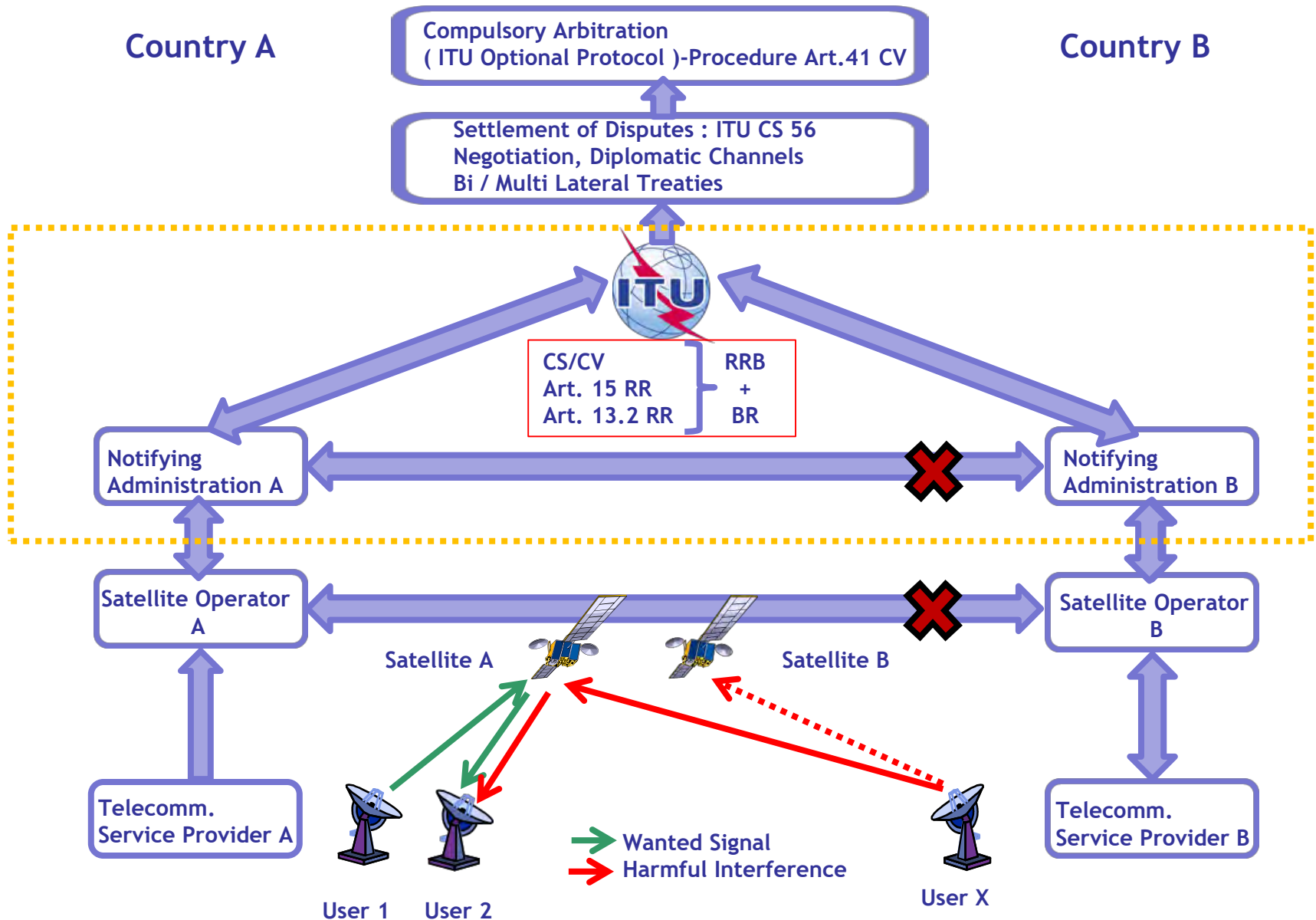
III. Appendix 10 to RR

IV. ITU-R Report 2181

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

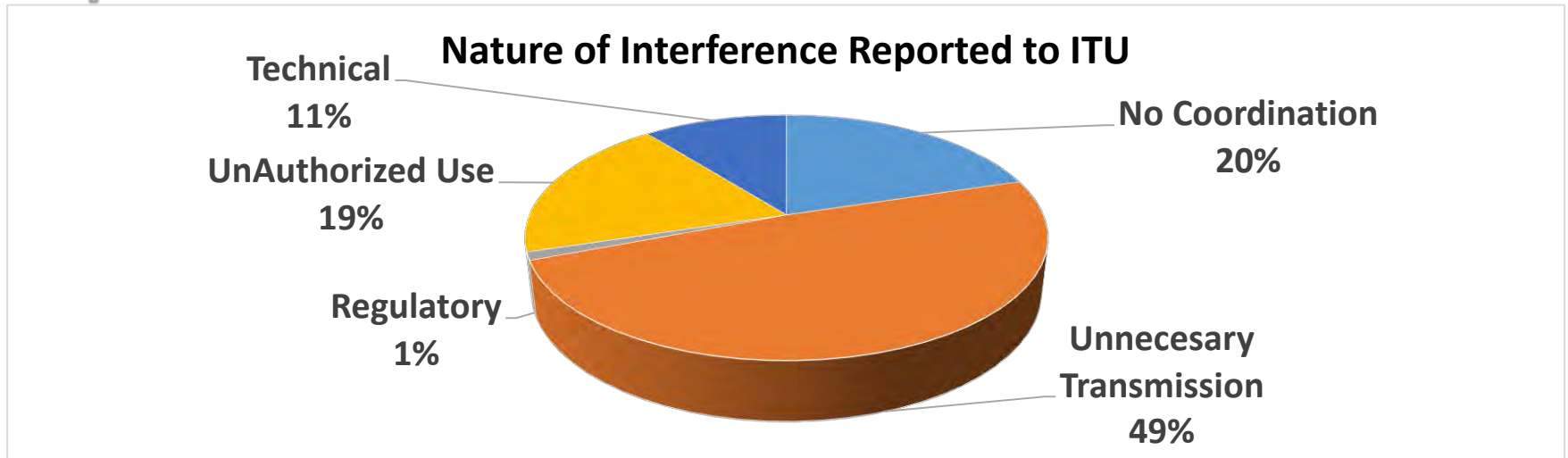


Schema of Actions in case of Harmful Interference



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.

Summary and Key Messages

- I. ITU plays a key role to ensure *interference-free* operations of space services
- II. Member States' Goodwill, 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*

Harmful Interference to Space Services

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ORBIT/SPECTRUM INTERNATIONAL REGULATORY FRAMEWORK Challenges in the 21st century

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Global Space Industry in 2015
\$ 335.3 billion



Source: SSIR 2016 Tauri Group

Global Impact and Usage



Satellite Radio



Corporate networks



Maritime communication



Earth Observation



National Security & Defense



E-learning



Agriculture



Cellular Backhaul



Telemedicine



Aviation Security



SNG



VSAT



Internet



Disaster Relief



Global Flight Tracking

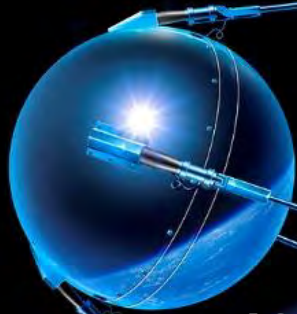


DTH



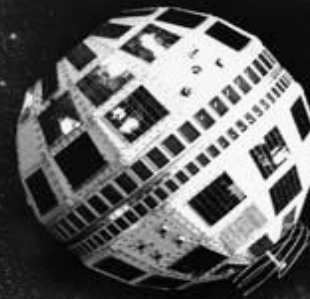
Satnav





1957 .. 1965
Development of
communication satellites

© D. van Ravenswaay



TELSTAR
First television pictures,
telephone calls, and fax
images, and provided the first
live transatlantic television feed

SPUTNIK 1 (Спúтник-1)

First artificial Earth satellite launched on
4th October 1957 with
external radio antennas to broadcast
radio pulses



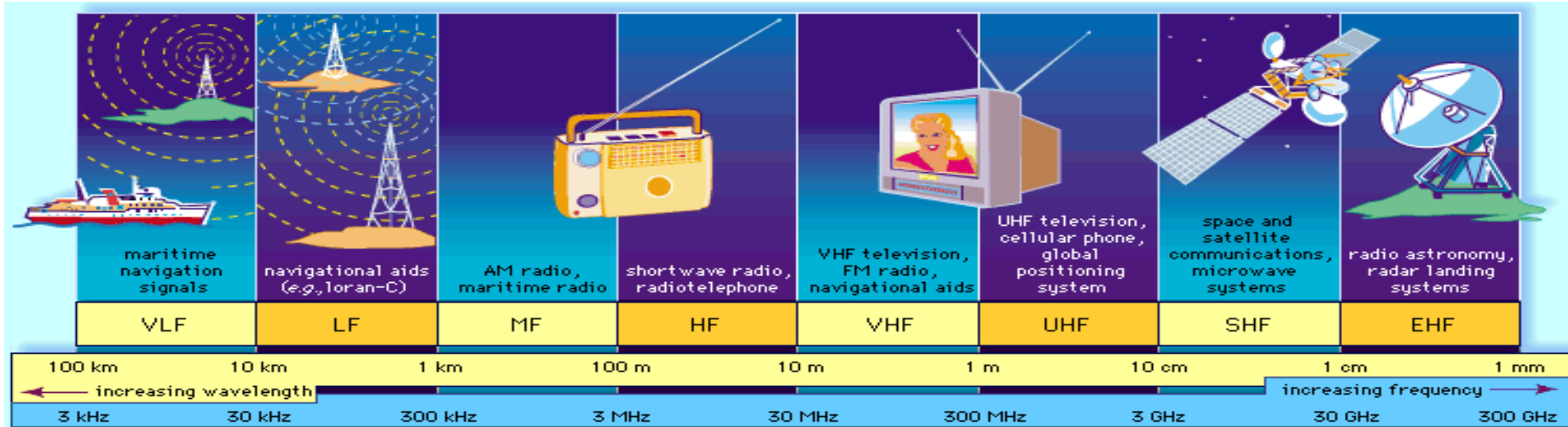
2016



2016

FREQUENCY SPECTRUM

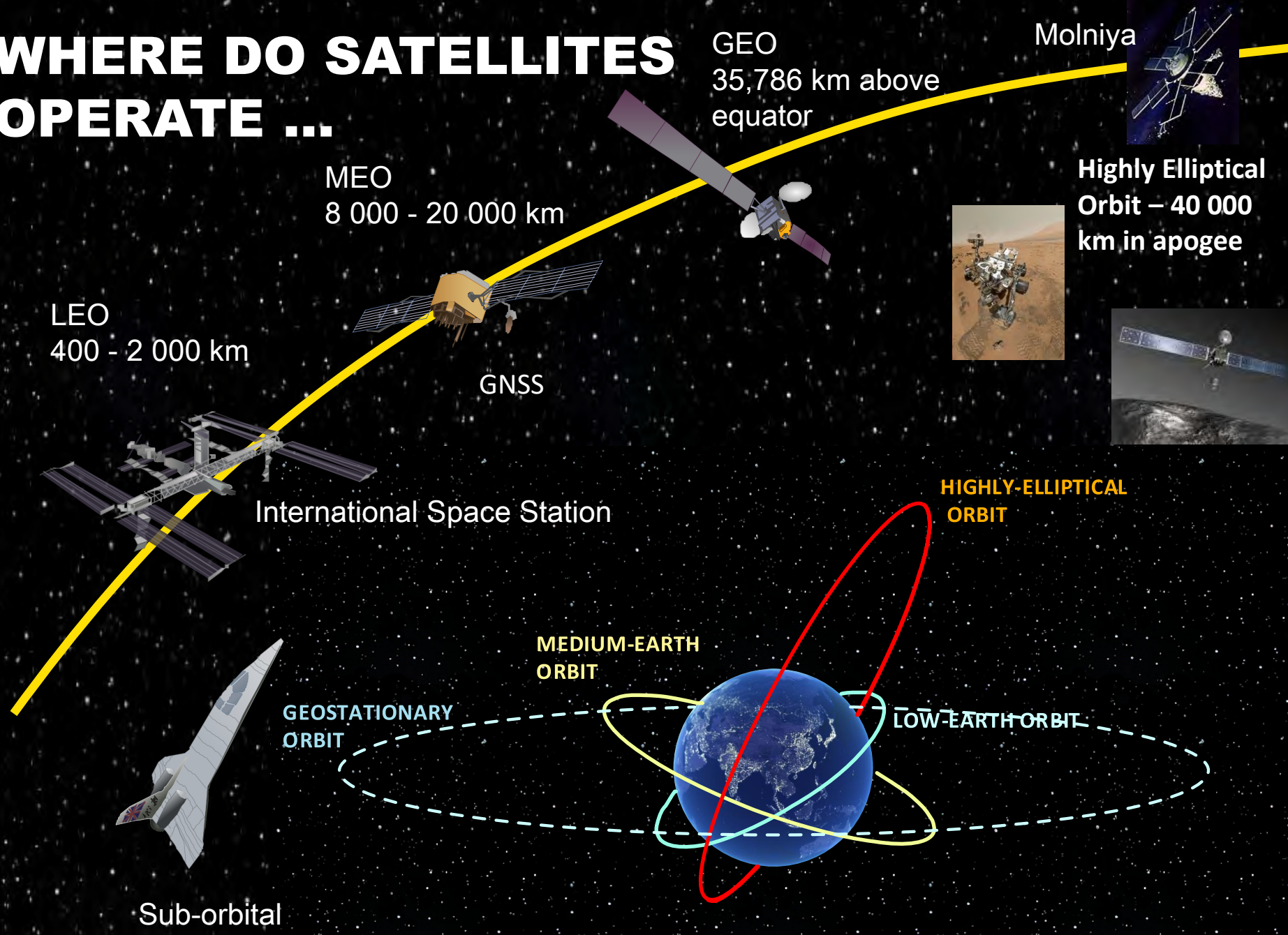
Limited natural resource



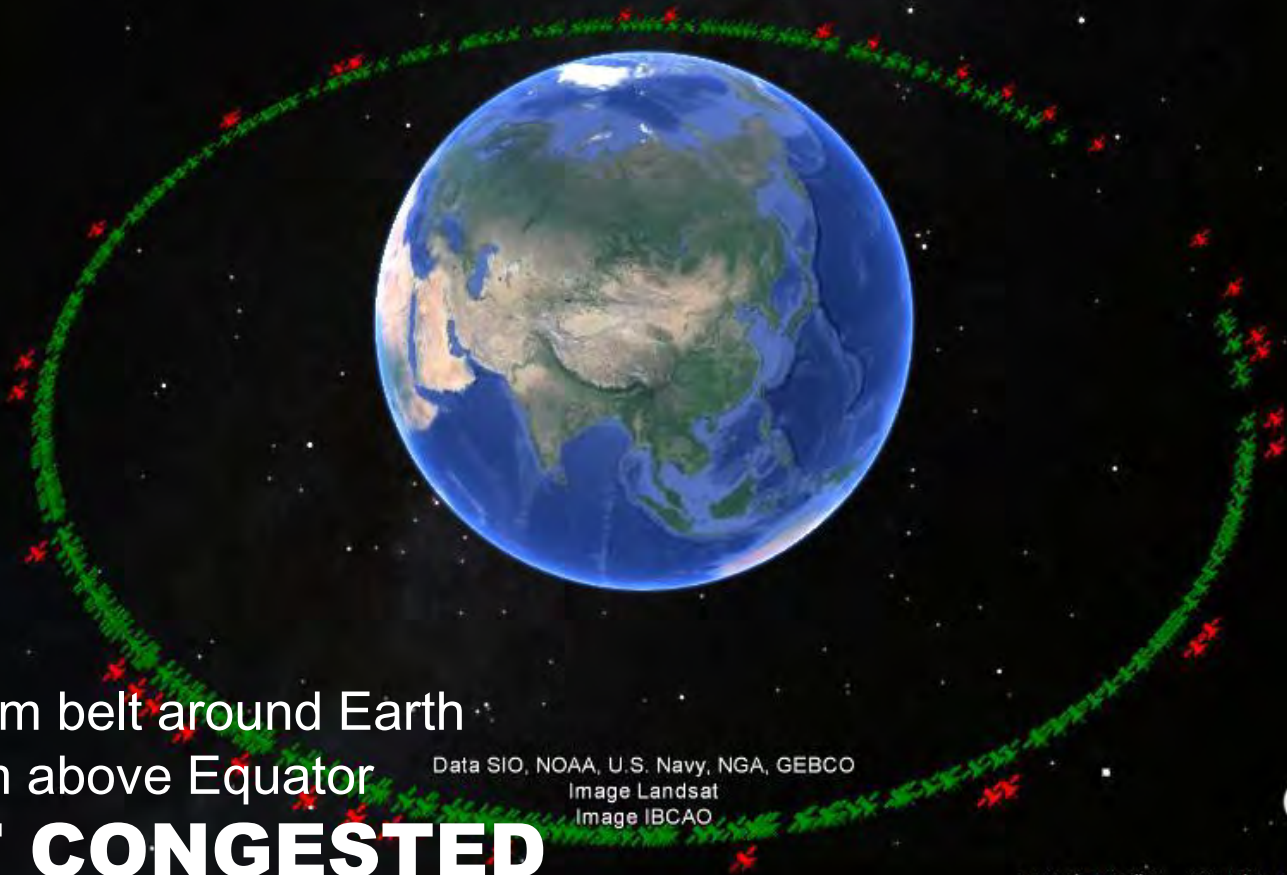
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1.467 GHz to 1.492 GHz	1.518 GHz to 1.675 GHz	1.97 GHz to 2.69 GHz	3.4 GHz to 7.025 GHz	10.7 GHz to 14.5 GHz	17.3 GHz to 30 GHz
Satellite Audio Broadcasting to fixed and mobile units	Civilian Mobile-Satellite Services (two-way)	Satellite television & radio broadcasting to mobiles + two-way mobile services	Fixed-Satellite television, & data services (including broadcasting)	Fixed-Satellite television & data services (including broadcasting)	Fixed-Satellite television & data services (including broadcasting)

WHERE DO SATELLITES OPERATE ...



GEOSTATIONARY SATELLITE ORBIT RESOURCE



265 000 km belt around Earth
36 000 km above Equator

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat
Image IBCAO

.. YET CONGESTED

Google earth

40°15'51.80" N 96°30'01.41" E eye alt 33599.81 km



1963

Extraordinary Administrative Radio Conference to allocate frequency bands for space radiocommunication purposes

ITU CONSTITUTION (Art.1)

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



ITU Constitution

(Art.44)

Radio frequencies &
satellite orbits are limited
natural resources

Rational, Efficient,
Economical Use

Equitable Access

RADIO REGULATIONS

- Intergovernmental Treaty 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
- Recording of a frequency assignment in the Master Register (MIFR) provides international recognition



RADIO REGULATIONS

- Updated every 3-4 years by World Radiocommunication Conference (WRC)
- Complemented by Rules of Procedure, revised by Radio Regulations Board (RRB)

1. Harmonize global spectrum to create economies of scale, roaming and interoperability

3. Creating certainty requires consensus: time, efforts and patience

PURPOSE

2. Create regulatory certainty for a multi-trillion dollars industry playing an increasingly important role in the development of our societies



UN

Outer Space instruments
on space objects

Free “exploration & use” under
international law

States
Responsibility & licensing
Jurisdiction & control

States
Registration OOSA

States
Liable for damage



ITU

Instruments
on radio frequencies

Equitable access & rational use of
spectrum under international law

States
Must license trans. radio stations
Shall not cause harmful interf.

States
API...CR/C...MIFR

No liability clause

SHARING ORBIT/SPECTRUM RESOURCE

1. COORDINATION APPROACH

- First come, first served
- Rational, Efficient, Economical Use
- Rights acquired through coordination with administrations concerning actual usage
- Efficient spectrum/orbit management
- Dense/irregular orbital distribution of space stations

2. PLANNING APPROACH

- Plan for future use
- Equitable Access
- Congestion of GSO
- Frequency/orbital position plans
- For future use by all countries
- Predetermined orbital position & frequency spectrum



International Recognition
Registration in **MIFR**

KEY POINTS

- Natural limited resources to be shared and regulated: orbit & radiofrequency spectrum
- Legal framework: UN Outer Space Treaty, ITU CS/CV, RR, RoP, Recs
- ITU CS/Articles 44 & 45:
 - To avoid harmful interference
 - To ensure efficient, rational, equitable and economical use
- Radio Regulations: Allocation, registration, interference free operation
- Radio Regulations constantly being improved

FREE ONLINE ACCESS

- The ITU Constitution
 - <http://www.itu.int/pub/S-CONF-PLEN-2015>
- World Radiocommunication Conference (WRC)
 - <http://www.itu.int/ITU-R/go/wrc/en>
- ITU-Radio Regulations @ 2016
 - <https://www.itu.int/pub/R-REG-RR/en>
- ITU-R Recommendations
 - <http://www.itu.int/publ/R-REC/en>
- Preface to the BR IFIC (Space services)
 - <http://www.itu.int/ITU-R/go/space-preface/en>

MERCI !

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*ITU RADIO REGULATIONS
and LICENSING
related to
SMALL SATELLITES*

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LICENSING Questions

- **Why do small satellites need licensing ?**
- **Details about licensing – who, where, what?**

International Legal Framework for Space Services

Non-governmental space activities (OST, ART VI)

- **Responsibility of the State for *continuing supervision* of any space activities in order to guarantee:**
 - Security
 - Safety
 - Reliability
 - Safeguard of national interests/foreign policy
 - Financial health (e.g. annual reports)
 - Compliance with debris mitigation /environmental standards
- ✓ ***Application of Telecommunication law (licensing) applies also to any space activities***

International Legal Framework for Space Services

Who is the competent Licensing authority?

- Government - Ministry (*Administration*)
- National Telecommunication Regulatory Authority (*Regulator*)

Radio Regulations (RR)

The ITU RR

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



RR

ART 18 - LICENSING

18.1 *No transmitting station* may be established or operated by a private person or by any enterprise *without a licence* issued in an appropriate form and in conformity with the provisions of these Regulations *by or on behalf of the government of the country to which the station in question is subject*

RR

ART 18 - LICENSING

18.6 The government which issues a *licence shall indicate* therein in clear form *the particulars of the station*, including its name, call sign, as well as the general characteristics of the installation

18.10 The holder of the certificate [*licence*] *shall comply with the provisions of these Regulations* applicable to licence holders

LICENSING

Amateur-satellite

Before issuing a licence, the Regulatory authority

- ***verifies*** that the satellite project is in accordance of the Articles and other provision of the RR related to the Amateur-satellite service, particularly
 - ART **1** (Nos. **1.56 -1.57**)
 - ART **5** (frequency bands for ***Amateur-satellite service***) and
 - ART **25** (provision related to ***Amateur-satellite service***)

LICENSING

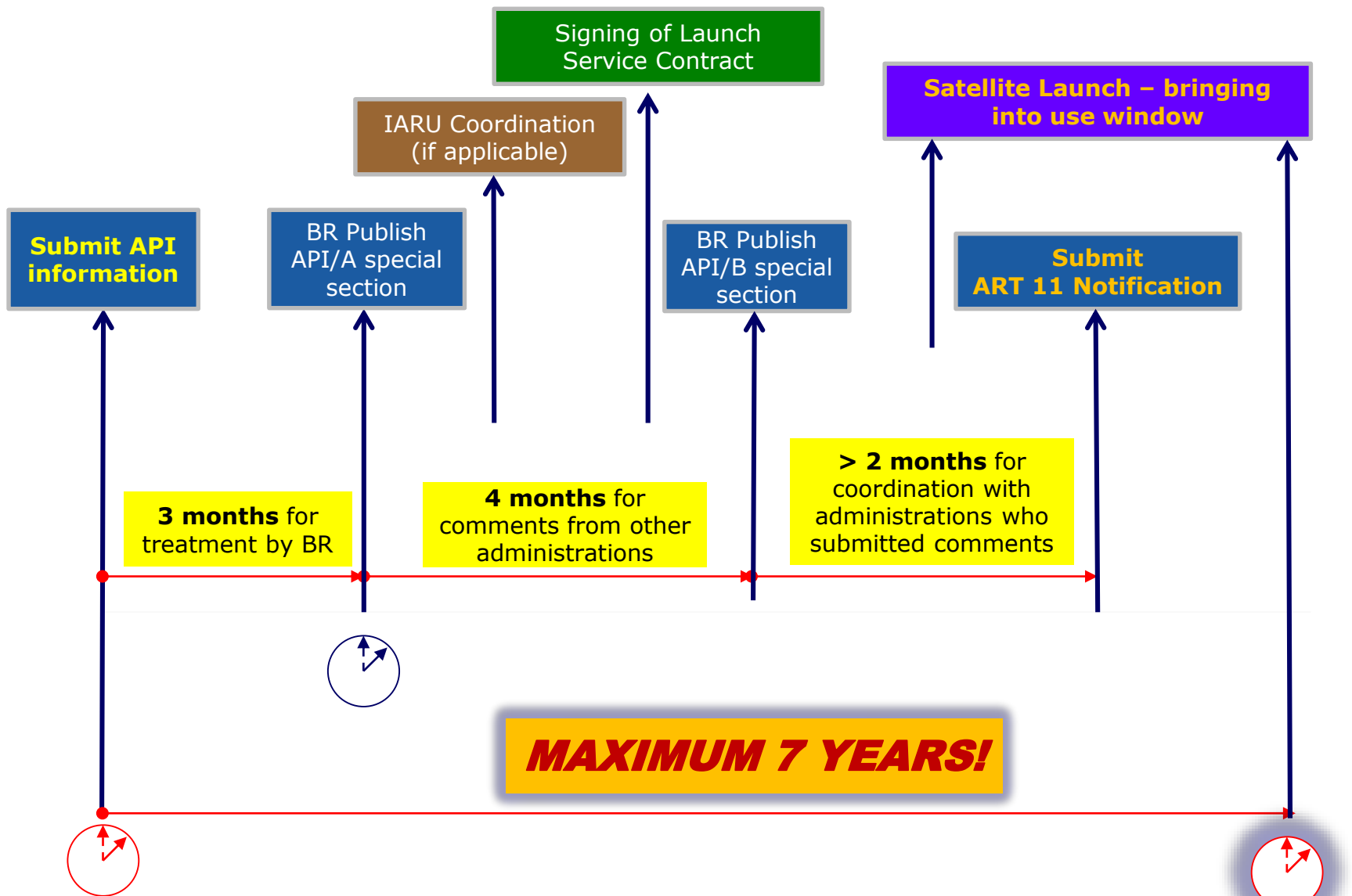
Amateur-satellite

Before issuing a licence, the Regulatory authority

- **checks** if the satellite operator is operating a telemetry and command ground station(s) fulfilling

RR No. 22.1 - Space stations shall be fitted with devices to ensure immediate cessation of their radio emissions by telecommand, whenever such cessation is required under the provisions of these Regulations.

Small satellite regulatory time limits



LICENSING related to SMALL SATELLITES

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