

# The ITU & Spectrum Management



**1957**



First satellite Sputnik 1

# 1959

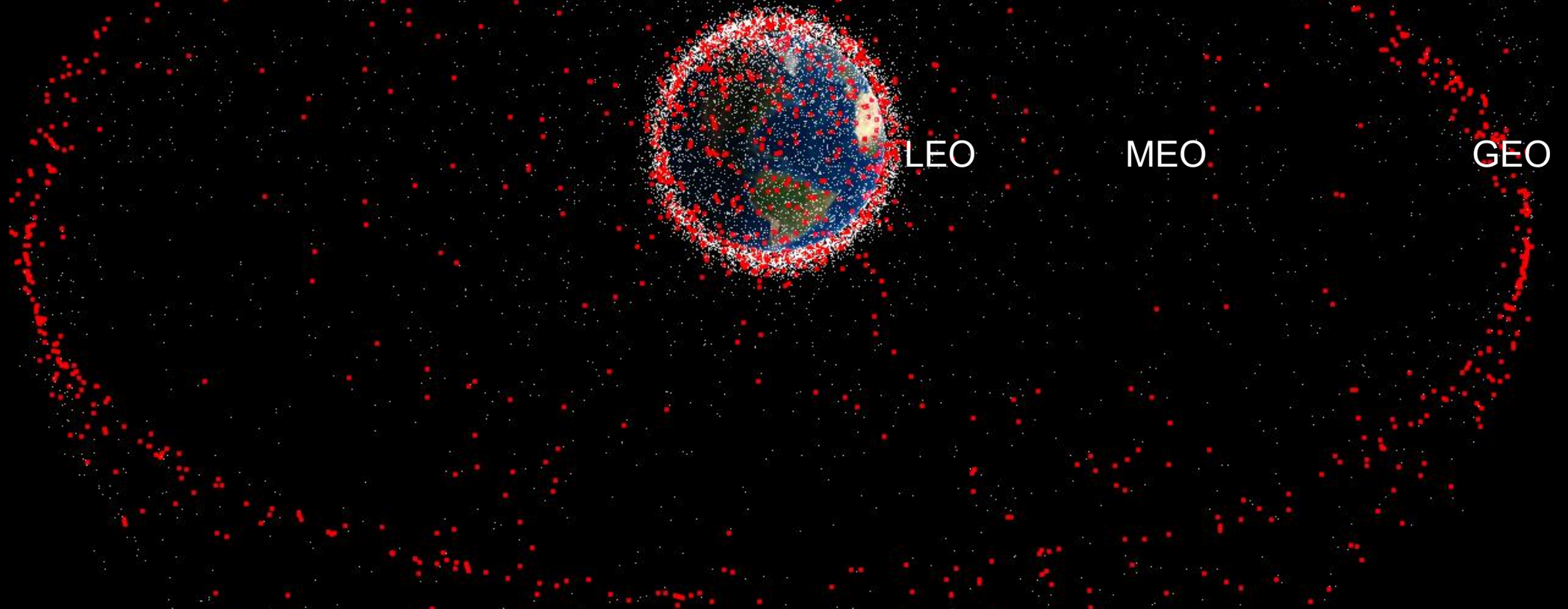
Administrative Radio Conference  
defined space service

# 1963

Extraordinary Administrative  
Radio Conference allocated  
frequency bands for space



# 2021

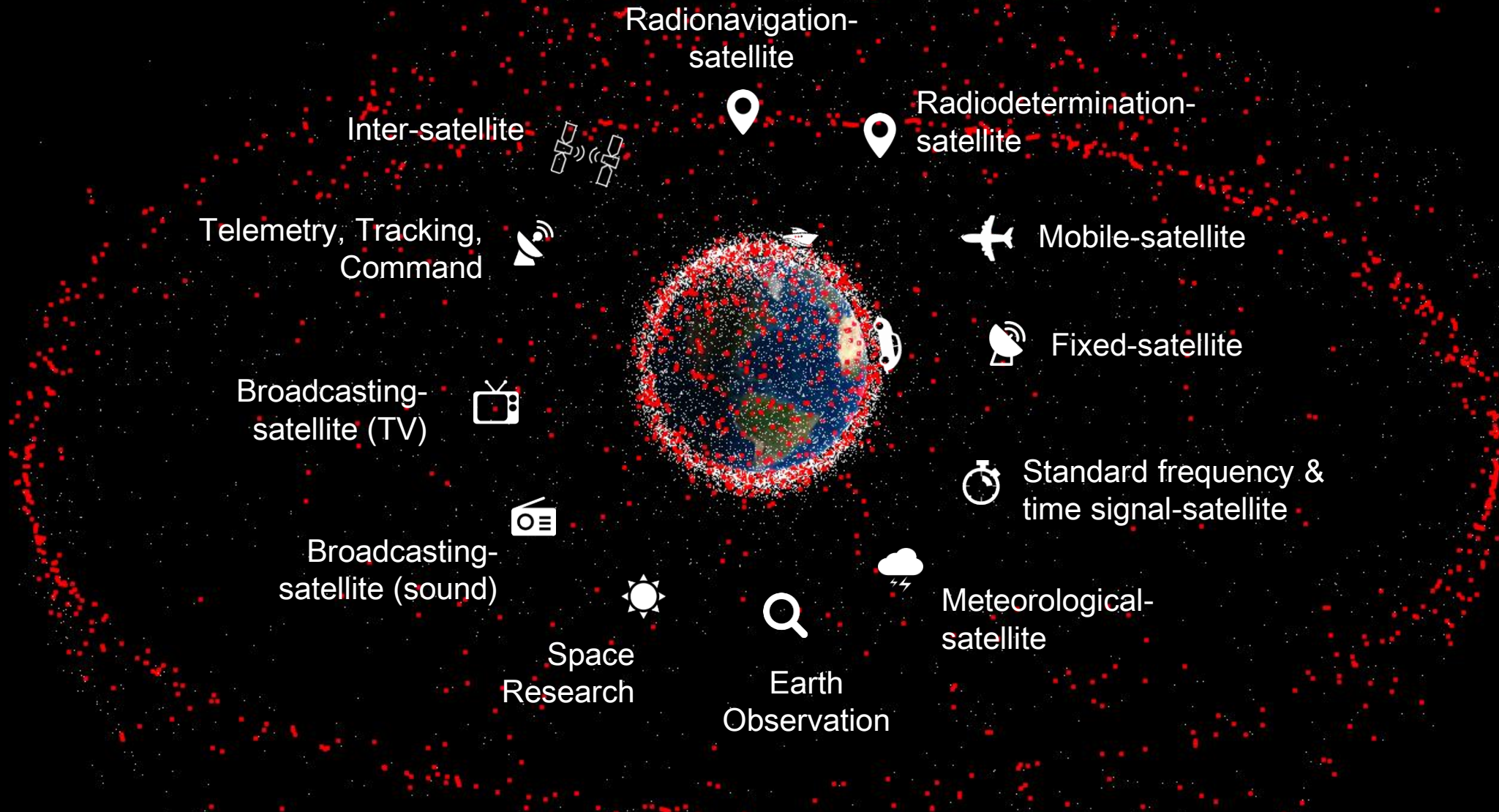


LEO

MEO

GEO

# 2021



2021

Degrades, obstructs, or interrupts  
radiocommunication services

# **HARMFUL INTERFERENCE**

Endangers function of safety services  
including radionavigation



**ITU**



**RR**



**RNSS**



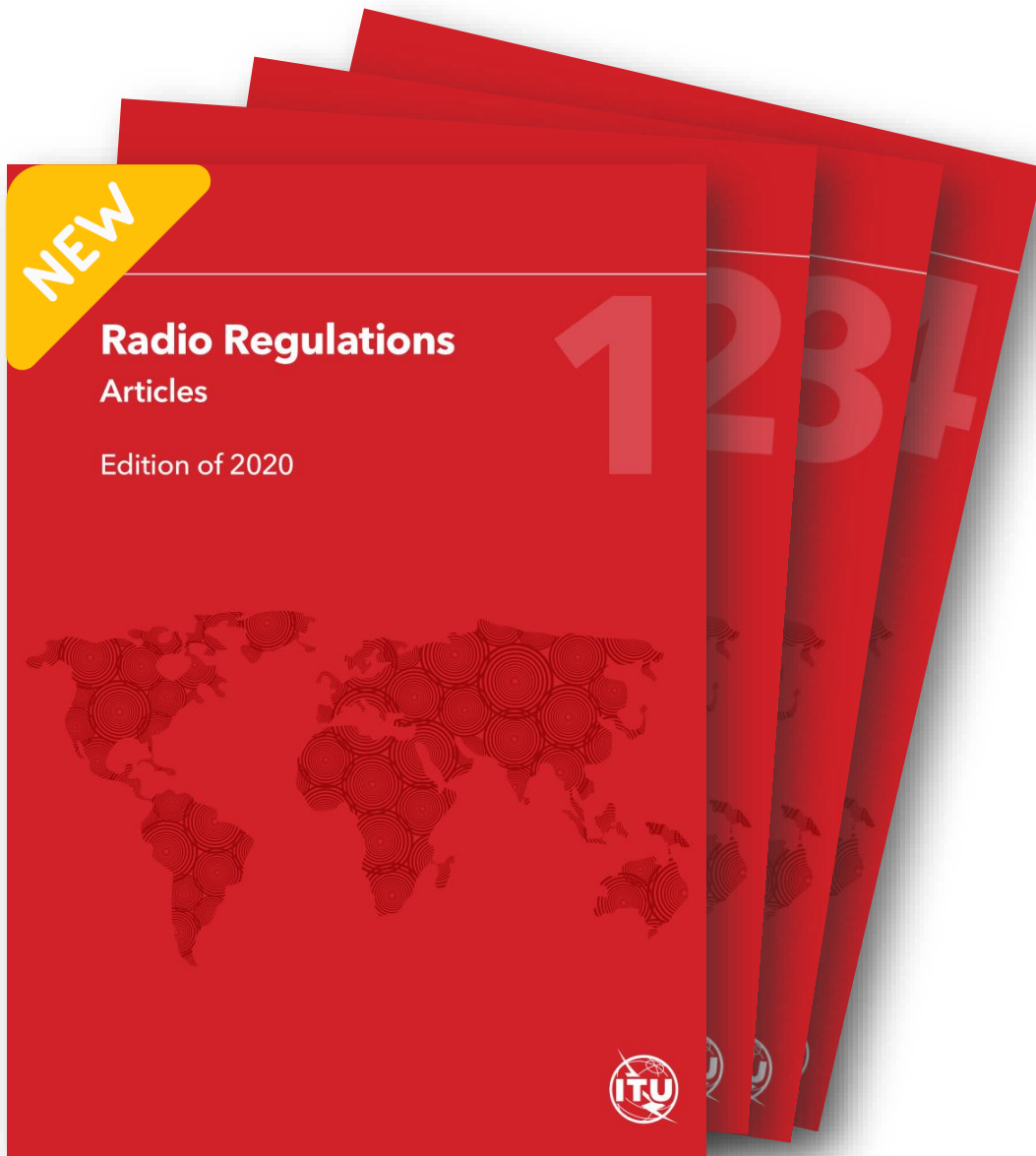
**WRC**



## International Telecommunication Union

- Since 1865
- UN Agency for ICTs
- 193 Member States
- HQ in Geneva, Switzerland
- 3 Bureaus/Sectors - **ITU-R**, ITU-T, ITU-D
- ITU Constitution, Convention, **Radio Regulations**
- Manages global allocation of radio-frequency spectrum & satellite orbits





# RADIO REGULATIONS

- To facilitate access/use of spectrum & orbit
- To ensures rational, equitable, efficient and economical use of spectrum
- To not cause harmful interference
- To exercise the utmost goodwill and mutual cooperation

RR Nos. 0.3, 0.4, 0.6, 7.8, 15.22



# RADIO REGULATIONS

- Since 1906
- International treaty
- Define rights & obligations
- Updated every 4 years by WRC
- Balance between stability vs innovation



**ALLOCATION**

**POWER LIMITS**

**COORDINATION**

**HARMFUL INTF**

Frequency & services

Article 5



# Radionavigation-Satellite Service (RNSS)

... to determine the position, velocity and/or other characteristics by radio waves propagation properties involving the use of one or more space stations for the purpose of radionavigation

Nos. 1.9, 1.41, 1.43 of Article 1 of Radio Regulations

Member States recognize that the safety aspects of radionavigation ... require special measures to ensure their freedom from harmful interference ...

No. 4.10 of Article 4 of Radio Regulations

## Frequency &amp; services

Article 5

Table of Frequency Allocation (RR Art.5)

Allocation to services		
Region 1	Region 2	Region 3
<b>1 164-1 215</b>	AERONAUTICAL RADIONAVIGATION 5.328 RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.328B 5.328A	
<b>1 215-1 240</b>	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.328B 5.329 5.329A SPACE RESEARCH (active) 5.330 5.331 5.332	
<b>1 240-1 300</b>	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.328B 5.329 5.329A SPACE RESEARCH (active) Amateur 5.282 5.330 5.331 5.332 5.335 5.335A	
<b>1 559-1 610</b>	AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) 5.208B 5.328B 5.329A 5.341	

Secondary  
(No interference to &  
no protection from PRIMARY)

Footnotes

Services &amp; direction of transmission

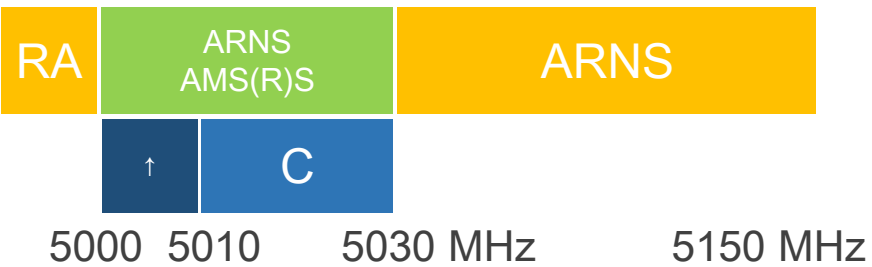
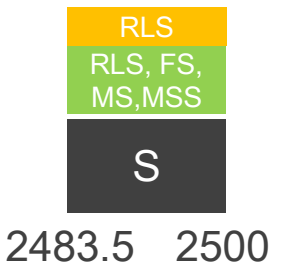
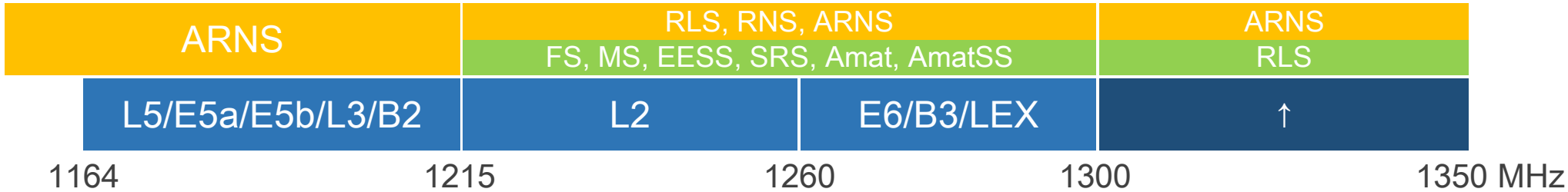
Footnotes with conditions

**5.328A** Stations in the radionavigation-satellite service in the band 1 164-1 215 MHz shall operate in accordance with the provisions of Resolution **609 (Rev.WRC-07)** and shall not claim protection from stations in the aeronautical radionavigation service in the band 960-1 215 MHz. No. **5.43A** does not apply. The provisions of No. **21.18** shall apply. (WRC-07)

Frequency & services

Article 5

960



- RNSS Radionavigation-Satellite Service
- RDSS Radiodetermination-Satellite Service
- AmatS Amateur Service
- AmatSS Amateur-Satellite Service
- AMS(R)S Aeronautical Mobile-Satellite (Route) Service
- ARNS Aeronautical Radionavigation Service
- EESS Earth-Exploration Satellite Service
- FS Fixed Service
- MS Mobile Service
- MSS Mobile-Satellite Service
- MMSS Maritime Mobile-Satellite Service
- RLS Radiolocation Service
- RNS Radionavigation Service
- RA Radioastronomy Service
- SRS Space Research Service

ALLOCATION

POWER LIMITS

COORDINATION

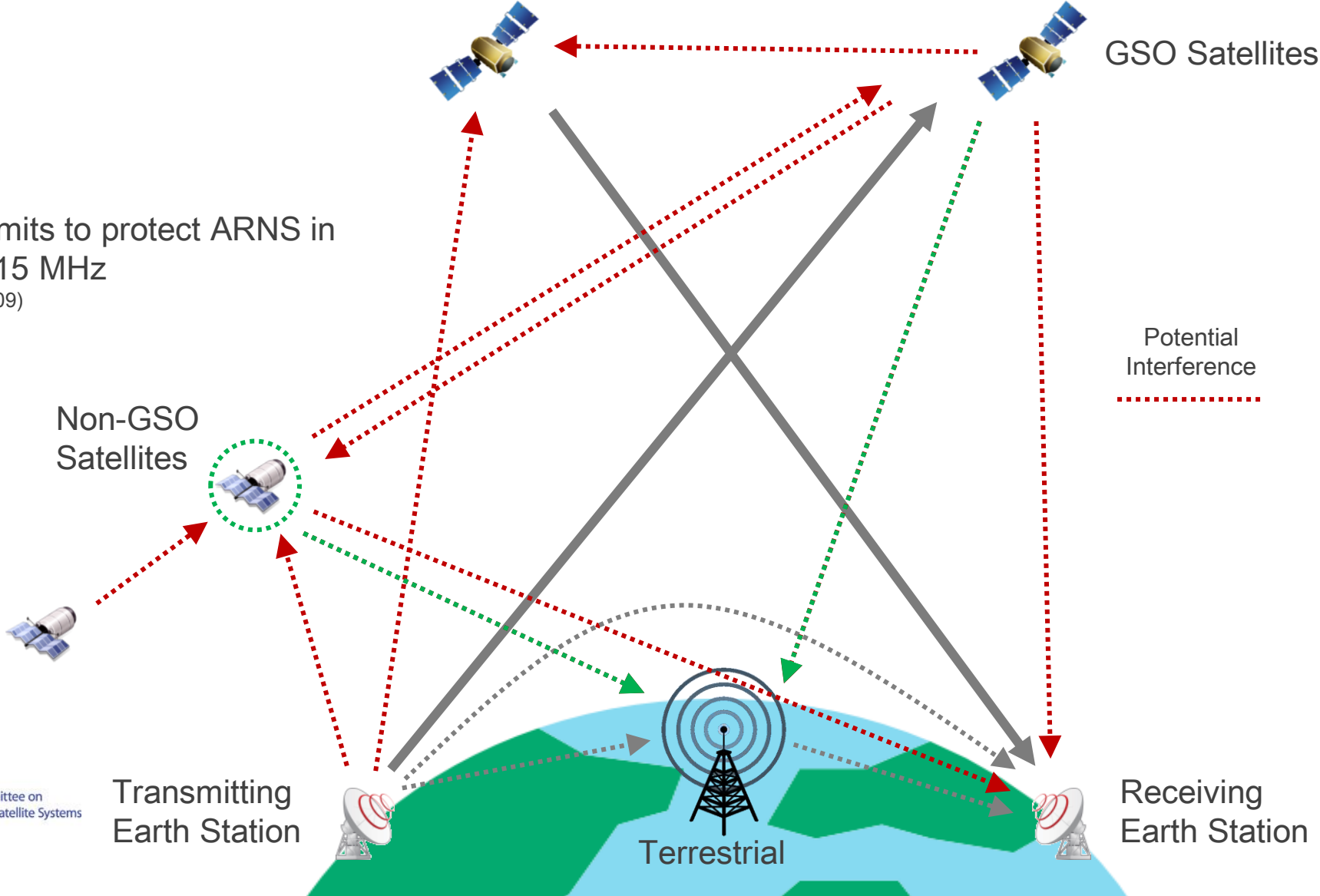
HARMFUL INTF

PFD, EIRP, EIRP density, off-axis

EIRP, EPFD, min. antenna sizes

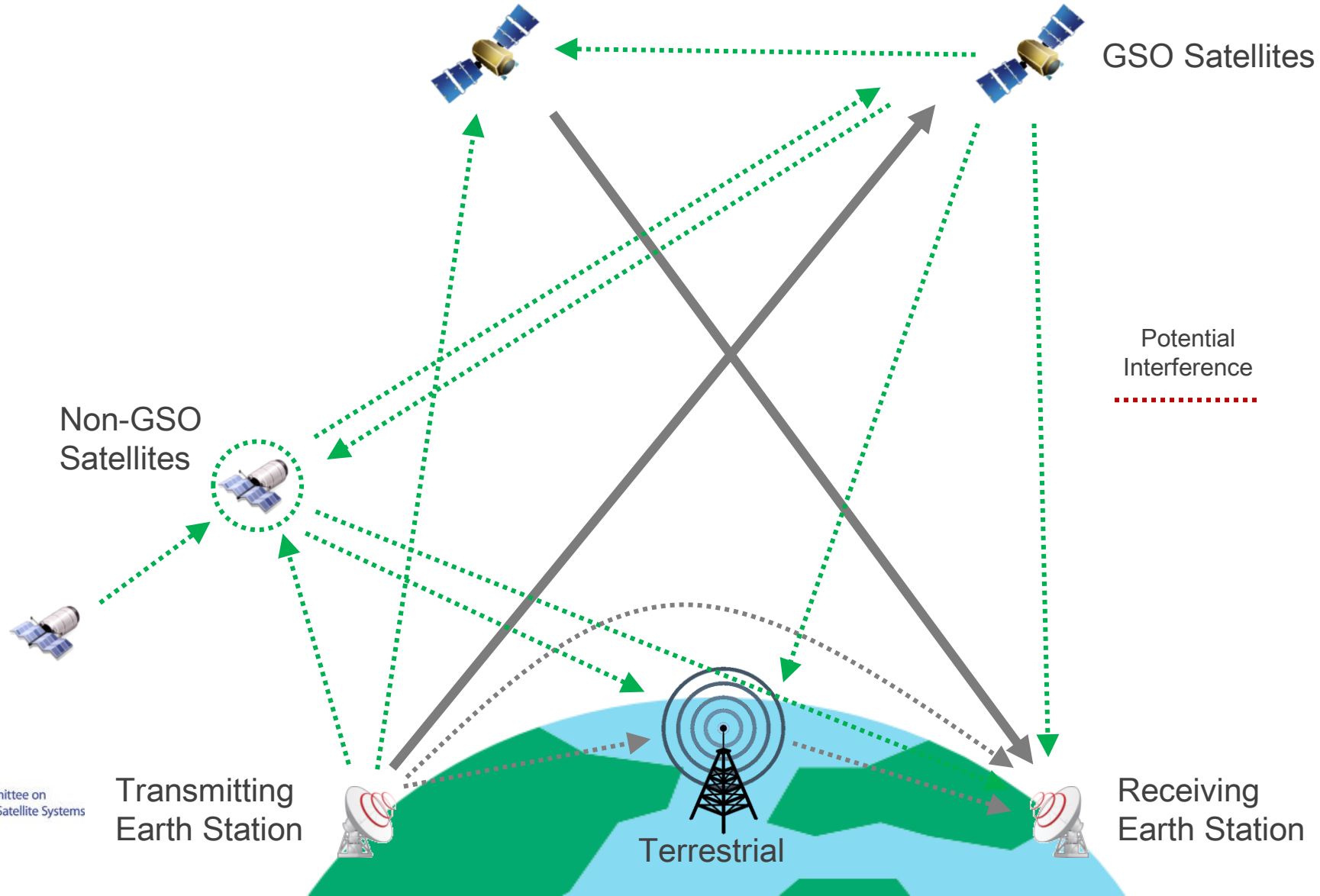
Articles 5 footnotes, 21, 22 , Resolutions etc.

EPFD Limits to protect ARNS in 1164-1215 MHz (Resolution 609)



Negotiations for interference-free operations,  
notification & recording in Master Register (MIFR)

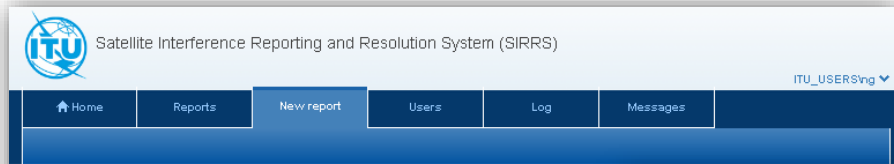
Articles 9, 11





## Reporting harmful interference

Article 15, Appendix 10



Two screenshots of the SIRRS 'Create New Interference Report' form. The left screenshot shows the 'Report information' section with fields for Title, Ref. Administration (set to ITU), Stations Causing Interference (with an 'Add Station' button), Stations Interfered With (with an 'Interfering Scenario' dropdown), and Frequency Assignments (with an 'Add frequency Assignment' button). The right screenshot shows the 'Documentum ref.' section with a table for 'Stations Causing Interference' and a table for 'Stations Interfered With'. A red arrow points from the right screenshot towards the text on the right.

**Report information**

Title:

Ref. Administration:

**Stations Causing Interference\***

Add Station

**Stations Interfered With\***

Interfering Scenario:

**Frequency Assignments\***

Add frequency Assignment

**Documentum ref.**

**Stations Causing Interference**

StationId	
Station type	
Location	
Administrations	
Measured frequencies	
Bandwidth	
Field Strength or Power Flux Density of Interfering Carrier	
Polarization	
Facility which made the above measurements	
Date of interference	
Type of carrier	
Source	

**Stations Interfered With**

Station type	
Direction	
Name	
Administration	
Associated ITU name	



Report harmful interference to ITU/BR (RR Art. 15):

- for info, or
- for assistance (RR No. 13.2), or
- to exchange info with up to 193 Administrations

[www.itu.int/ITU-R/space/sirrs](http://www.itu.int/ITU-R/space/sirrs)

# WRC-23

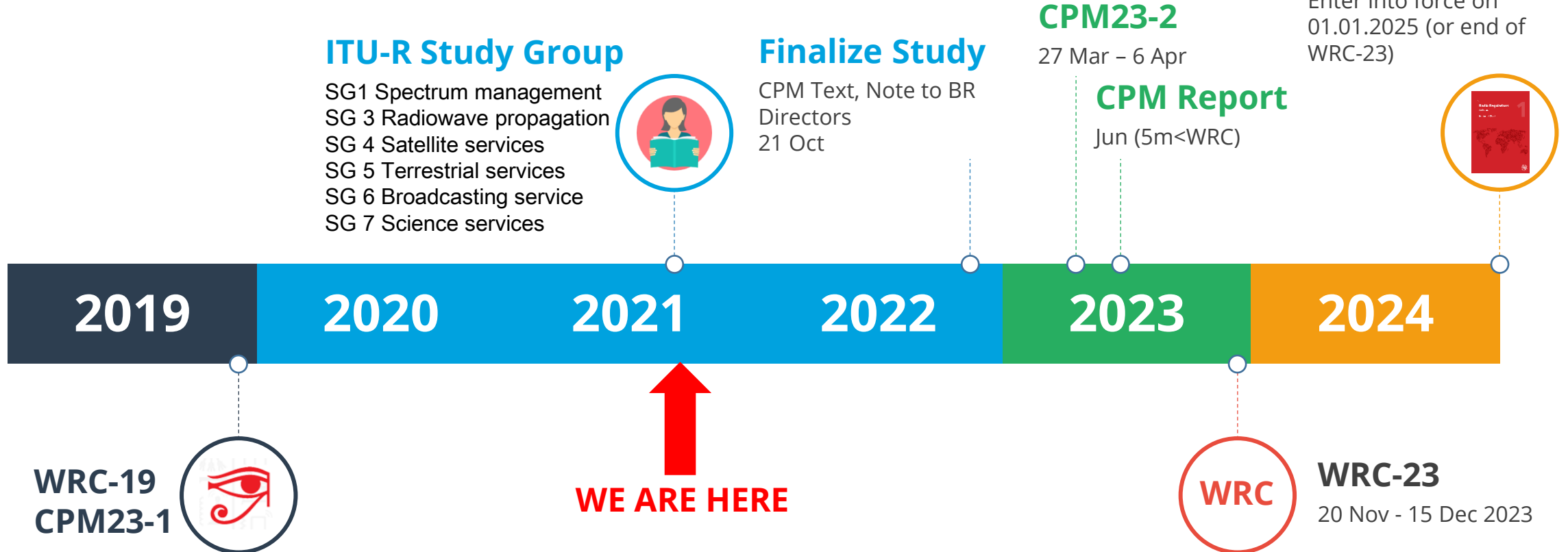
- World Radiocommunication Conference
- Updates Radio Regulations
- Agreement by consensus
- 4 weeks every 4 years
- 20 Nov – 15 Dec 2023 in UAE



# WRC-23 CYCLE

## Updated Radio Regulations

Enter into force on 01.01.2025 (or end of WRC-23)



# KEY TAKEAWAYS



## ITU

Manages global allocation of spectrum/orbits



## RR

Contains rights & obligations in using spectrum/orbits



## RNSS

Needs measures to ensure freedom from harmful interference



## WRC

Updates the RR

# International Telecommunication Union



[www.itu.int](http://www.itu.int)



## Guidance on ITU-R Recommendations

RNSS systems/networks operating in 1 & 5GHz: [Rec. ITU-R M.1901-2](#)

(Note: 1GHz = 1164-1215, 1215-1300, 1559-1610 MHz & 5GHz = 5000-5010/5010-5030 MHz)

### Inter-system Interference

Coordination methodology for 1 & 5GHz:  
[Rec. ITU-R M.1831-1](#)

### Interference evaluation method / RNSS Protection/Spectrum monitoring

Pulsed interference 1GHz:

[Rec. ITU-R M.2030](#) & [Rep. ITU-R M.2220-1](#)

Cont. interf. 1 & 5GHz: [Rec. ITU-R M.1318-1](#)

Spurious emission 1GHz from IMT: **PDNReport  
ITU-R M. [IMT-RNSS]**

Spectrum monitoring: [Rep. ITU-R SM.2454-0](#)

### RNSS Receivers or Earth Stations

Characteristics & protection criteria for  
interference analysis

1164-1215 MHz: [Rec. ITU-R M.1905-1](#)

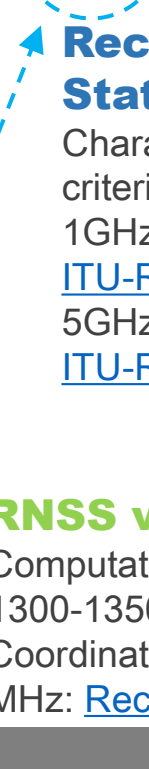
1215-1300 MHz: [Rec. ITU-R M.1902-2](#)

1559-1610 MHz: [Rec. ITU-R M.1903-1](#)

5010-5030 MHz: [Rec. ITU-R M.2031-1](#)

1GHz: **DNReport ITU-R M. [RNSS\_Rcv\_Char]**

**Transmitting RNSS Space Station** Description & technical characteristics of GLONASS, GPS, GALILEO, COMPASS, QZSS, IRNSS, etc. in 1GHz: [Rec. ITU-R M.1787-4](#) & 5GHz: [Rec. ITU-R M.2031-1](#)  
RNSS Applications in 1GHz: [Rep. ITU-R M.2458-0](#), in 5GHz [Rep. ITU-R M.2219](#)



### Protection of ARNS

from all RNSS in 1164-1215 MHz - Assessing Max EPFD: [Rec. ITU-R M.1642-2](#) and protection criteria: [Rec. ITU-R M.1639-1](#)



DME/TACAN



### RNSS vs RA

Interference calculation NGSO RNSS vs RA: [Rec. ITU-R M.1583-1](#)

### Receiving RNSS Space Station

Characteristics & protection criteria for interference analysis  
1GHz (Space-to-space): [Rec. ITU-R M.1904-1](#)  
5GHz (Earth-to-space): [Rec. ITU-R M.1906-1](#)

### RNSS vs ARNS/RLS

Computation of separation distance in 1300-1350 MHz: [Rec. ITU-R M.1584](#)  
Coordination distance in 5000-5010 MHz: [Rec. ITU-R M.1582](#)