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GNSS Spectrum Protection: The ITU Framework

GNSS Spectrum Protection: ITU Framework

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International Telecommunication Union

- Based in Geneva, 194 Member states, over 800 private-sector entities and academic institutions, 12 regional and area offices
- Around 700 staff from 90 countries, 6 official languages
- 3 ITU Sectors:
  - **ITU-R Radiocommunication – *spectrum management*, *radio standards***
  - ITU-T Standardization – *standards for wired networks*
  - ITU-D Development – *assistance to developing countries*
- The basic ITU document dealing with radio is **Radio Regulations**



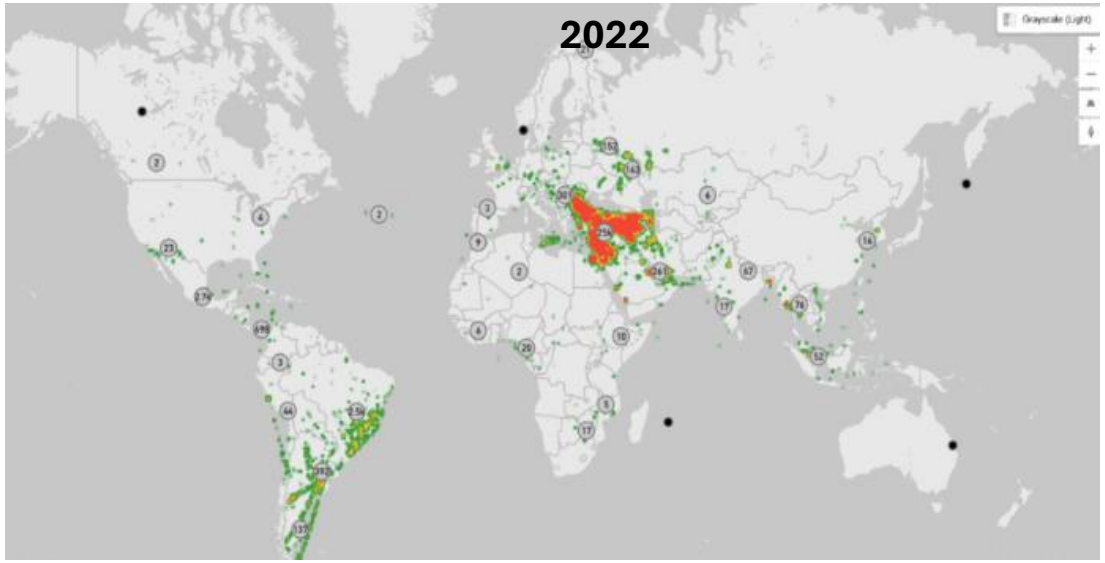


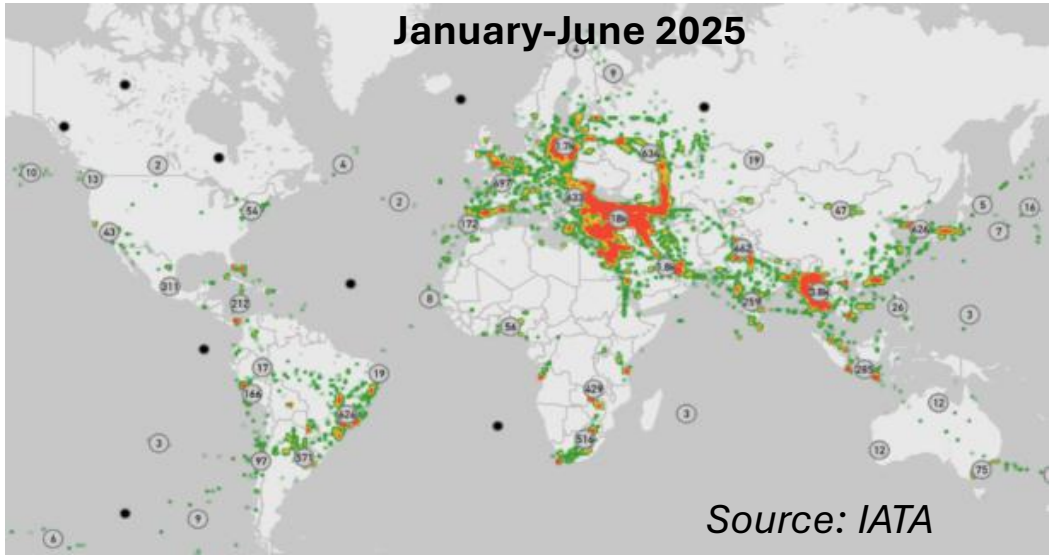
Interference: general aspects

- Radio interference often occurs in various radiocommunication systems
- ***Main reasons for interference:***
  - Technical: deficiency of transmitters, out-of-band emissions, poor receiver filtering, harmonics, antenna issues, nearby electrical equipment…
  - Regulatory: non-coordinated stations, non-compliance with licences, operation on non-allocated frequencies…
  - Intentional interference: jamming and spoofing
- ***352 interference reports received by ITU in 2026. Services affected:***
  - Space services: fixed-satellite, mobile-satellite, earth exploration, radionavigation-satellite, radioastronomy
  - Terrestrial services: aeronautical mobile (HF COM), maritime mobile, TV and sound broadcasting, fixed, cellular communications
- ITU contributes to preventing and resolving harmful interference. Special ITU's concern is about interference to ***safety of life systems***, including *RNSS*.

Evolution of RNSS interference

- Harmful interference to RNSS increased significantly from 2019
- 5 times increase in interference reports to ITU in 2023-2024. Some growth in 2025 and 2026
- Main affected areas: Middle East, North-East Europe, Black Sea region, Korean Peninsula, Central Africa
- 30 administrations involved. Affected RNSS systems : GPS, Galileo, Glonass, COMPASS and QZSS
- Interference affected aircrafts and ships, caused degradation or total loss of service





ITU framework for preventing and resolving interference

ITU Constitution	ITU Radio Regulations	Radio Regulation Board	Radiocommuni-cation Bureau
• Defines rights of countries in spectrum management • Contains high-level provisions on interference	• Allocation concept • Basic provisions on interference • Protection of safety services • Procedure for reporting and resolving interference	• 12 independent elected officials • Clarify application of Radio Regulations • Considers unresolved interference cases	• Treats reports of interference • Maintains interference databases • Assist countries in resolving interference • Cooperates with other organization

Key regulatory provisions on interference

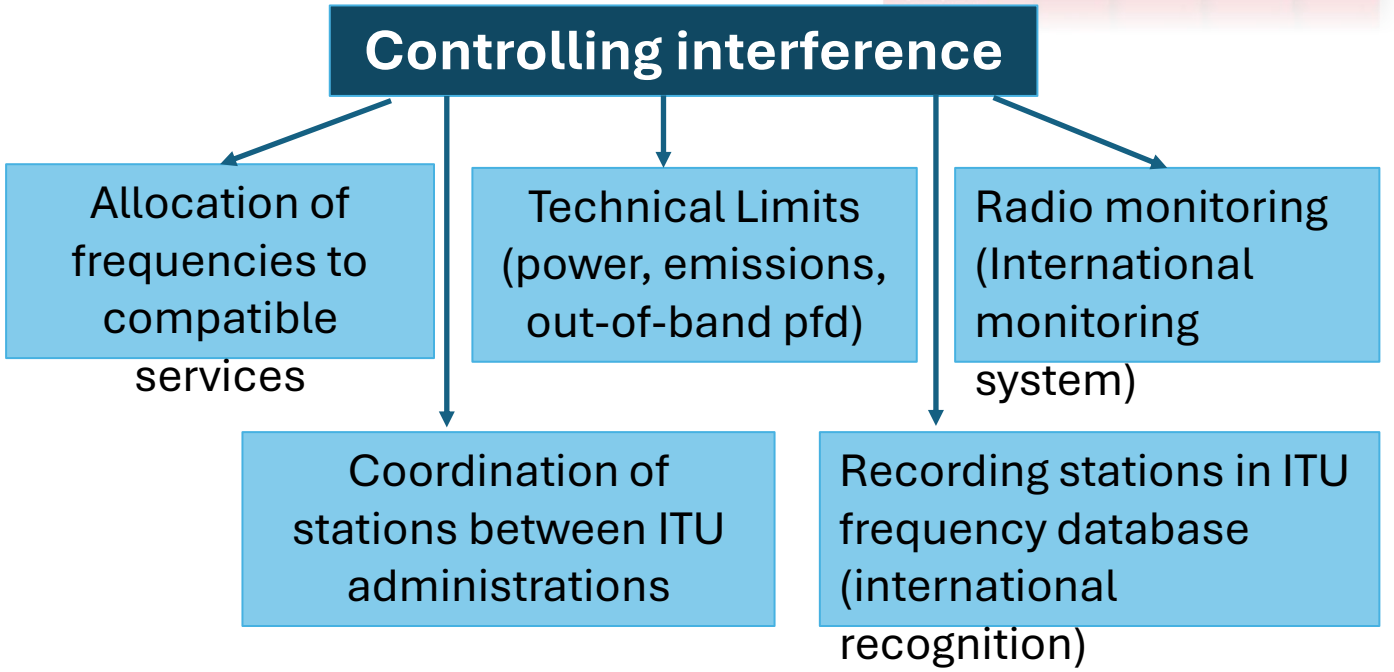
- ***ITU Constitution***
  - CS Art. 45 – stations shall not cause interference to other countries
  - CS Art. 47 – preventing false or deceptive distress, urgency, safety or identification signals
  - CS 191 – absolute priority for safety of life communications
- ***ITU Radio Regulations***
  - RR 4.10 –need for special measures for interference-free operation of safety of life services
  - RR 15.1 – stations are forbidden to carry out unnecessary transmissions (jamming), or superfluous signals, or false or misleading signals (spoofing)
  - RR 15.28: absolute international protection for HF aeronautical comms (AP27)
  - Article 15: procedure in case of interference
- ***World Radiocommunication Conferences***
  - Consideration of specific interference cases, e.g. US-Cuba, Italy- neighbouring countries
  - WRC Resolutions concerning interference, e.g. Resolutions 55, 63, 207 and **676** (**RNSS**)

Radio Regulations and World Radiocommunication Conferences

- RR are an Intergovernmental Treaty containing international rules on use of spectrum and satellite orbits. Mandatory for ITU Member States
- ITU Radio Regulations (RR) were established in **1906**. Being revised during **39** World Radio Conferences (WRC) by ITU administrations
- One of the main RR goals: keep interference to acceptable levels



- To reach this goal, RR have several mechanisms to minimize interference
- However, those mechanisms are not efficient against deliberate interference (jamming, spoofing)



Two types of aviation spectrum

1 Exclusive, global and protected spectrum, mainly for safety services (VHF COM, radioaltimeters, WAIC)

2 Shared, without strong protective measures, (VSAT in C-band, L-band SATCOM, A-ESIMs)



108-117.975	AERONAUTICAL RADIONAVIGATION 5.197 5.197A

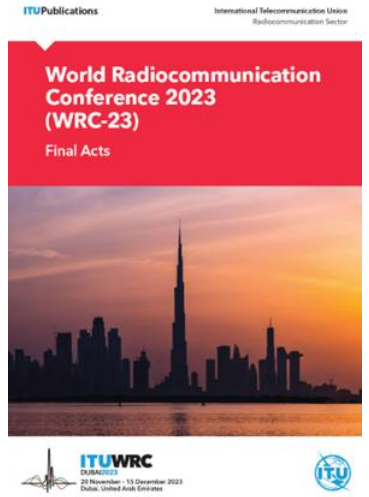
4 200-4 400	AERONAUTICAL MOBILE (R) 5.436 AERONAUTICAL RADIONAVIGATION 5.438 5.437 5.439 5.440



12.75-13.25	FIXED FIXED-SATELLITE (Earth-to-space) 5.441 5.496A (ESIMs) MOBILE Space research (deep space) (space-to-Earth)

Spectrum allocated to RNSS is global and has safety of life nature,
but it is not immune to intentional interference

Actions by WRCs - Resolution 676 (WRC-23)



- WRC-23 adopted Resolution 676 on prevention and mitigation of harmful interference to RNSS in 1 164-1 215 MHz and 1 559-1 610 MHz bands
- Through this Resolution WRC-23 decided to:
  - 1. Apply measures to avoid the proliferation, circulation and operation of unauthorized transmitters cauing interference to RNSS
  - 2. Take actions to prevent and mitigate interference to RNSS without prejudice to the right of administrations to deny access to RNSS, for security or defence purposes:
    - 2.1 encourage collaboration between spectrum regulators, enforcement authorities and RNSS aeronautical and maritime and other stakeholders
    - 2.2 encourage cooperation between aeronautical, maritime, security authorities, spectrum regulators, to address interference risks to RNSS that may stem from the activities of these security authorities;
  - 3. Report cases of harmful interference to RNSS, in accordance with Article 15
- To note: resolves 2 recognizes administrations rights to deny access to RNSS for reasons of security or defence -> implicit authorization of jamming in certain cases

Administration's rights and obligations
(in relation to Resolution 676 (WRC-23)

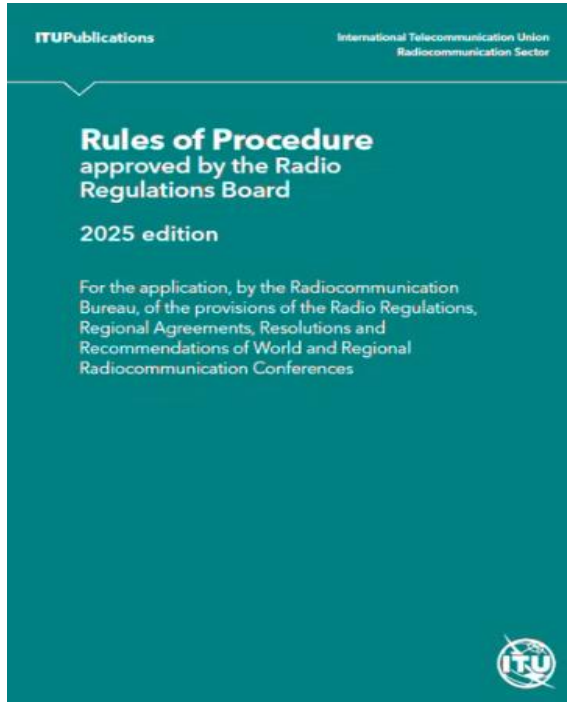
Administration's rights to regulate, stop or suspend telecommunications		Administration's obligations to prevent and stop interference	
Preamble to ITU Constitution	recognizes the sovereign right of each State to regulate its telecommunication	CS Article 45	stations shall not cause interference to other countries
CS ARTICLE 34 Stoppage of Telecommunications	Member States reserve the right to stop and cut off telecommunication appearing dangerous to security or contrary to laws	CS Article 47	preventing false or deceptive distress, urgency, safety or identification signals
CS Article 35 Suspension of Telecommunications	Member States reserve the right to suspend the international telecommunication service	RR 15.1	stations are forbidden to carry out unnecessary transmissions, or superfluous signals, or false or misleading signals

Conclusion of the November 2024 meeting of Radio Regulations Board (RRB):

Resolution 676 (WRC-23), and its resolves 2 should be understood in the context of the provisions of Articles 45, 47 and 48 of the ITU Constitution, and Article 15 of the Radio Regulations

Actions by ITU's Radio Regulations Board (RRB)

- RRB - 12 independent elected officials, 3 meetings per year
- RRB approves Rules of Procedure clarifying RR, considers unresolved interference cases, performs other tasks
- In 2024 – 2026 RRB considered several cases of RNSS interference and made recommendations
- RRB's March 2025 meeting decided to:
  - urge Administrations to abide to ITU CS and RR
  - urge Administrations to cooperate in resolution of cases of interference to RNSS
  - instruct the Bureau to make publicly available a summary of cases in a dedicated webpage
  - Bureau to convene bilateral/multilateral meetings with Administrations concerned



Actions by the Radiocommunication Bureau

- ***Assistance in resolving harmful interference to RNSS, examples:***
  - Letter to DPRK in April 2016 (coordinated with ICAO, IMO) to stop interference to RNSS of KOR (1007 aircraft affected by jamming).
  - Regular treatment of RNSS interference reports via BR's SIRRS (Satellite Interference Reporting and Resolution System)
  - Assistance in organization of multilateral meetings on RNSS interference, e.g., for some Middle East countries in July 2025 and Baltic region countries in March 2026
- ***Collaboration with other international organizations***
  - ITU-ICAO-IMO join statement on protecting RNSS from interference in March 2025, calling the Member States to:
    - *protect RNSS from interference*
    - *reinforce resilience of systems relying on RNSS*
    - *retain sufficient conventional navigation infrastructure for contingency purposes*
    - *increase collaboration of telecom, aviation, maritime, defence, enforcement authorities*
    - *report RNSS interference cases to appropriate authorities and BR*



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