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| **Document Title:** Working Document Towards a Preliminary Draft New Recommendation: Minimizing Interference from non-GSO Satellites at RAS Stations  |
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| **Purpose/Objective:** To facilitate coexistence between non-GSO satellites and RAS stations by addressing best practices for mitigating interference from unwanted emissions. |
| **Abstract:** Following Resolves 1 and 2 of WRC-27 Agenda Item 1.16, this new Recommendation addresses unwanted emissions and aggregate interference from non-GSO satellites into primary RAS bands in general. This new Recommendation will build upon the information and studies provided in Report 7D/128 Annex 1 and 7D/128 Annex 13 to provide strategies for recommended best practices to minimize interference. |

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| **Minimizing Interference from non-GSO Satellites at RAS Stations****Introduction**This contribution is a new Recommendation to address unwanted emissions and aggregate interference from non-GSO satellites into primary RAS bands. It builds upon the information and studies provided in Report 7D/128 Annex 1 and 7D/128 Annex 13 to provide strategies for recommended best practices to minimize interference at RAS stations, including those in Radio Quiet Zones (RQZs).**Attachment:** 1 |

ATTACHMENT

RECOMMENDATION ITU-R RA.[RAS-NGSO]

# **Minimizing Interference from non-GSO Satellites at RAS Stations**

Scope

This Recommendation provides information and guidance regarding methods and best practices with which interference from unwanted emissions from non-GSO satellite systems into RAS can be mitigated and minimized, as well as provide information for coexistence measures between non-GSO satellite and RAS systems.

Keywords

Radio astronomy, fundamental physics, atomic and molecular transitions, continuum emission, atmospheric transparency

The ITU Radiocommunication Assembly,

considering

a) that the development of radio astronomy has led to major technological advances, particularly in receiving techniques and to improved knowledge of fundamental radio-noise limitations of great importance to radiocommunication, and promises further important results;

b) that the advancement of radio astronomy requires the protection of certain frequency bands from interference;

c) that the number of non-geostationary-satellite orbit (non-GSO) satellite launches has increased in recent years and even more launches are planned for the next decade;

d) that a Radio Quiet Zone (RQZ) is defined to be any recognized geographic area within which the usual spectrum management procedures are modified for the specific purpose of reducing or avoiding interference with radio telescopes, thereby maintaining the required standards for quality and availability of observational data, as defined in Report ITU-R RA.2259;

e) that aggregate emissions from single and multiple non-GSO satellite systems may cause interference to the radio astronomy service (RAS), even in RQZs, which may be challenging to resolve with only national regulations;

f) that aggregate emissions from single and multiple non-GSO satellite systems may cause damage to hardware used for radio astronomy;

g) that non-GSO satellite systems are being considered for future use as part of terrestrial networks under the mobile-satellite service (MSS);

h) that a number of administrations have implemented regulations to establish RQZs which may not be applicable to satellite operations;

i) that the 2023 Radiocommunication Assembly instructed ITU Radiocommunication Sector (ITU-R) Study Group 7 to facilitate information sharing to enable better coordination between satellite operators and RAS sites, including the creation of an international database of Radio Quiet Zone data by the Radiocommunication Bureau to inform about radio quiet zones established by administrations;

noting

a) that Recommendation ITU-R RA.769 provides thresholds for the non-GSO satellite interference received through the far side lobes of radio astronomy telescopes;

b)that Recommendation ITU-R RA.1031 addresses the protection of radio astronomy in shared bands;

c) that Recommendation ITU-R RA.1513 provides the acceptable levels of data loss to radio astronomy observations and percentage-of-time criteria resulting from degradation by interference for frequency bands allocated to the RAS on a primary basis;

d) that Recommendation ITU-R M.1583 provides the calculations for interference between non-GSO MSS or radio navigation-satellite service (RNSS) and radio astronomy telescope sites;

e) that Recommendation ITU-R S.1586 provides the method for calculating unwanted emission levels produced by a non-GSO FSS at radio astronomy sites;

f) that Report ITU-R RA.[RAS-NGSO] contains examples for coexistence measures to be considered for coordination agreements between RAS and non-GSO operators;

recommends

1 Cooperation between non-GSO satellite operators and RAS operators.

2 Administrations should enter characteristic information of their quiet/coordination zones for information/sharing purposes into the appropriate ITU-R database.

3 RAS operators should take steps towards developing more resilience to non-GSO satellite constellations, including evaluating hardware robustness, improving detection and protection systems, and improving data sharing for telescope use..

4 RAS operators should monitor interference at their site(s) to identify preferential timing for observations, when such timing is possible.

5 non-GSO operators use best practices to minimize interference to RAS by minimizing unwanted emissions from their systems.