



**World Radiocommunication Conference (WRC-23)**  
Dubai, 20 November - 15 December 2023



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**PLENARY MEETING**

**Addendum 27 to  
Document 6241-E  
9 October 2023  
Original: English**

## **African Common Proposals**

### **PROPOSALS FOR THE WORK OF THE CONFERENCE**

#### **Agenda item 10**

10 to recommend to the ITU Council items for inclusion in the agenda for the next world radiocommunication conference, and items for the preliminary agenda of future conferences, in accordance with Article 7 of the ITU Convention and Resolution **804 (Rev.WRC-19)**,

## PART 1

### **to consider the results of ITU-R studies and decide on the spectrum usage of the 37.5-42.5 GHz (space-to-Earth), 42.5 – 43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) frequency bands for the fixed-satellite service for equitable access to these frequency bands**

#### **Background**

The Plenipotentiary Conference 2022 (PP-22) in Bucharest adopted Resolution 219 on sustainability of the radio-frequency spectrum and associated satellite-orbit resources used by space services. Its considering c) indicates that the available radio-frequency spectrum and associated orbit resources are limited and must be shared among all nations.

This PP-22 Resolution 219 (Bucharest, 2022) decides to resolve to instruct the Radiocommunication Assembly, as a matter of urgency, to perform the necessary studies through relevant ITU Radiocommunication Sector (ITU-R) study groups on the issue of the increasing use of radio-frequency spectrum and associated orbit resources in non GSO orbits and the long-term sustainability of these resources, as well as on equitable access to, and rational and compatible use of, the GSO and non-GSO orbit and spectrum resources, consistent with the objectives of Article 44 of the Constitution.

Article 44 of the ITU Constitution states that “In using frequency bands for radio services, Member States shall bear in mind that radio frequencies and any associated orbits, including the geostationary-satellite orbit, are limited natural resources and that they must be used rationally, efficiently and economically, in conformity with the provisions of the Radio Regulations, so that countries or groups of countries may have equitable access to those orbits and frequencies, taking into account the special needs of the developing countries and the geographical situation of particular countries.”

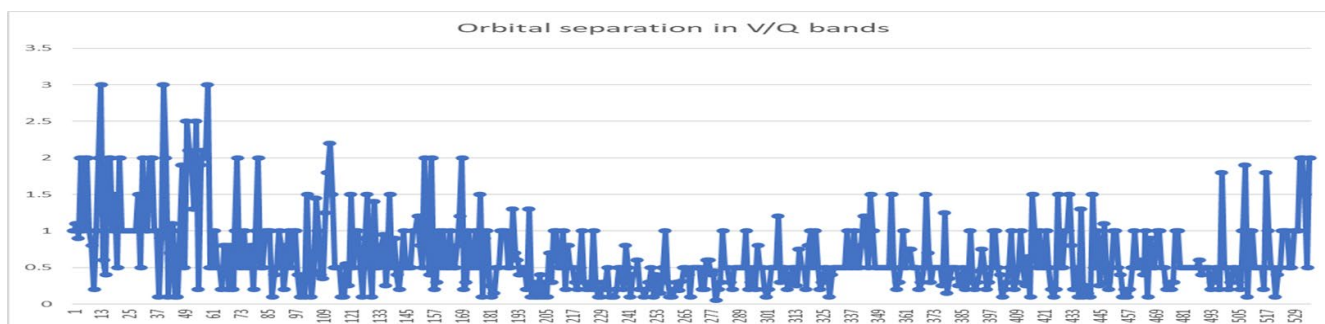
The 37.5-42.5 GHz (space-to-Earth), 42.5 – 43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) frequency bands have been allocated to the fixed-satellite service on a primary basis.

- WRC-19 Agenda item 1.6: to consider the development of a regulatory framework for non-GSO FSS satellite systems that may operate in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), in accordance with Resolution 159 (WRC-15);
- WRC27 preliminary agenda item 2.2: to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary space stations in the fixed-satellite service, in accordance with Resolution 176 (WRC-19);

However, none of these agenda items address the equitable access in these frequency bands. The current procedure is based on “first-come-first-served” principle, contrary to certain portions of the 4/6/10/11/12/13/14/17 GHz frequency bands, in which there are measures to ensure equitable access.

Statistics presented by the Bureau to a workshop organized by African countries shows heavily filed by GSO networks in these frequency bands as indicated below.

V/Q GSO submissions	No. Adm	Min Orbital Separation (deg.)	Max Orbital Separation (deg.)
1206	47	0	3



## Proposals

In view of the above, an agenda item for WRC-27 is proposed below by African member states with the draft of a WRC Resolution in order to meet the objective of Article 44 of the ITU Constitution as well as PP-22 Resolution 219 (Bucharest, 2022) on the equitable access to fixed-satellite service in the 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) frequency bands. Using the template provided in Annex 2 of Resolution **804 (Rev.WRC-19)**, the proposal is appended as follows.

**ADD AFCP/6241A27/1**

**DRAFT NEW RESOLUTION [AFCP-GSO FSS V/Q BANDS EQUITABLE ACCESS] (WRC-23)**

**Studies of technical and regulatory provisions for fixed-satellite services satellite networks/systems in the frequency bands 37.5-42.5 GHz (space-to-Earth), 42.5 – 43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) for equitable access to these frequency bands**

The World Radiocommunication Conference (Dubai, 2023),

*considering*

- a) that in the frequency ranges at 4/6/10/11/12/13/14/17/20/30/40/50 GHz, there are allocations of fixed-satellite service (FSS) and/or broadcasting-satellite service (BSS) on a primary basis;
- b) that a portion of frequency spectrum in the frequency ranges at 4/6/10/11/12/13/14/17 GHz has been used to develop planned space services as contained in Appendices **30, 30A** and **30B**;
- c) that the additional regulatory measures for the enhancement of equitable access included in Resolution **553 (Rev. WRC-15)** in the frequency band 21.4-22 GHz in Regions 1 and 3;
- d) that all countries have equal rights in the use of both the radio frequencies allocated to various space radiocommunication services and geostationary-satellite orbit and other satellite orbits for these services;
- e) that accordingly, a country or a group of countries having satellite filings in fixed-satellite service in 30/40/50 GHz frequency bands need to take all practical measures to facilitate the use of new space systems by other countries or groups of countries;
- f) that the Plenipotentiary Conference 2022 adopted Resolution 219 (Bucharest, 2022) on sustainability of the radio-frequency spectrum and associated satellite-orbit resources used by space services,

*considering further*

that a priori planning for FSS networks/systems in 37.5-42.5 GHz (space-to-Earth), 42.5 – 43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) is not necessary and should be avoided as it freezes access according to technological assumptions at the time of planning and then prevents flexible use taking into account of real world demand and technical developments,

*recognizing*

- a) that Articles 12 and 44 of the ITU Constitution lays down the basic principles for the use of the radio-frequency spectrum and the geostationary-satellite and other satellite orbits, taking into account the needs of developing countries;
- b) that the “first-come first-served” concept can restrict and sometimes prevents access to and use of certain frequency bands and orbit positions;
- c) that relative disadvantage for developing countries in coordination negotiations due to various reasons such as a lack of resources and expertise;

d) that Resolution 2 (**Rev.WRC-03**) resolves that “the registration with the Radiocommunication Bureau of frequency assignments for space radiocommunication services and their use do not provide any permanent priority for any individual country or groups of countries and do not create an obstacle to the establishment of space systems by other countries”,

*recognizing further*

- a) that to date, there has been no technical and regulatory measures for equitable access to frequency bands 30/40/50 GHz in the fixed-satellite service;
- b) that there are many GSO FSS submissions in the frequency bands 30/40/50 GHz, which prevents access to these frequency bands by developing countries,

*resolves*

1 to invite ITU Radiocommunication Sector to study the technical and regulatory measures for FSS satellite networks/systems in the frequency bands 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) for equitable access to these frequency bands and to complete these studies in time for WRC-27;

2 to invite WRC-27 to review the results of the studies and decide on the usage of the frequency bands 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) for equitable access to these frequency bands by FSS satellite networks/systems;

*invites the 2027 World Radiocommunication Conference*

to consider the results of the above studies in *invites the ITU Radiocommunication Sector* and take necessary actions, as appropriate,

*invites administrations*

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

**Reasons:** To supplement the inclusion of this new agenda item for WRC-27.

## ANNEX TO PART 1

<p><b>Subject:</b></p> <p>to consider the results of ITU-R studies and decide on the spectrum usage of the 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) frequency bands for the fixed-satellite service for equitable access to these frequency bands.</p>	
<p><b>Origin:</b> African member states</p>	
<p><b>Proposal:</b></p> <p>to consider the results of ITU-R studies and decide on the spectrum usage of the 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) frequency bands for the fixed-satellite service for equitable access to these frequency bands.</p>	
<p><b>Background/reason:</b></p> <p>The new agenda item aims to ensure the equitable access to the 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) frequency bands for the fixed-satellite service.</p> <p>Contrary to the frequency ranges at 4/6/10/11/12/13/14/17/20 GHz, in which there are technical and regulatory measures to ensure the equitable access in response to Article 44 of the ITU Constitution, in the frequency ranges at 30/40/50 GHz, to date, there have been no such technical and regulatory measures.</p> <p>The “first-come first-served” concept and the number of GSO filings as well as NGSO filings submitted to date would prevent access to these 30/40/50 GHz frequency bands by developing countries.</p>	
<p><b>Radiocommunication services concerned:</b></p> <p>FSS</p>	
<p><b>Indication of possible difficulties:</b></p> <p>None foreseen</p>	
<p><b>Previous/ongoing studies on the issue:</b></p> <p>Previous WRCs have adopted technical and regulatory provisions for equitable access by the GSO FSS and BSS in the frequency ranges at 4/6/10/11/12/13/14/17/20 GHz.</p>	
<p><b>Studies to be carried out by:</b></p> <p>ITU-R SG-4</p>	<p><b>with the participation of:</b></p> <p>Administrations and ITU-R Sector Members</p>
<p><b>ITU-R Study Groups concerned:</b></p> <p>None (to be confirmed)</p>	

<b><i>ITU resource implications, including financial implications (refer to CV126):</i></b> This proposed agenda item will be studied as part of the regular ITU-R procedures and planned budget.	
<b><i>Common regional proposal: Yes/No</i></b>	<b><i>Multicountry proposal: Yes/No</i></b> <b><i>Number of countries: -</i></b>
<b><i>Remarks</i></b>	

## PART 2

**ADD AFCP/6241A27/2**

DRAFT NEW RESOLUTION [AFCP-RADIO QUIET ZONES (RQZ)] (WRC-23)

**Consideration of regulatory provisions necessary to protect Radio Astronomy operating in Radio Quiet Zones from radio frequency interference caused by non-GSO satellites operating as large constellations.**

The World Radiocommunication Conference (Dubai, 2023),

*considering:*

- a) that Radio Astronomy is a pivotal scientific discipline that has played a crucial role in unravelling the mysteries of the cosmos.
- b) that the frequency bands allocated to Radio Astronomy in the Radio Regulations are limited and the allocated bandwidth represents only a partial fulfilment of the requirements of the service.
- c) that Radio Astronomy significantly benefits from access to frequency bands not allocated to radio astronomy in restricted geographical areas.
- d) that some transmissions from spacecraft can introduce problems of interference to radio astronomy and that these cannot be avoided by choice of site for an observatory or by local protection.
- e) that a number of administrations have made major investments to establish radio quiet zones (RQZs) as geographic areas where significant portions of the radio spectrum are nationally managed for radio astronomy.
- f) that RQZ have been established by interested national administrations and restrictions are not applicable to satellite operations.
- g) that recent technological developments of satellites operating as large constellations in the non-geostationary orbit pose a significant risk of interference to Radio Astronomy stations operating in RQZs;
- h) that previously satellite constellations rarely exceeded 100 units, which could be seen as a difference between normal and large constellations;
- i) that, even without being part of one constellation, large amount of satellites operating in same frequency range in same or nearby geographical area at the same time have potential for creating harmful interference for radio astronomy stations;
- j) that the scientific integrity and potential of radio astronomy should not be compromised by advancements in other sectors;



- k) that the possible impact of large satellite constellations on astronomy has been recognised and is currently being discussed in the United Nations Committee on Peaceful Uses of Outer Space (UN COPOUS) under the name “Dark and Quiet Skies”;
- l) that the impact of large satellite constellations on radio astronomy has been recognised by the International Astronomical Union by creating the Centre for the Protection of the Dark and Quiet Sky from Satellite Constellation Interference (IAU CPS).

*recognizing:*

- a) that Article 29.12 of the Radio Regulations highlights the susceptibility of Radio Astronomy to harmful interference from space borne transmitters.
- b) that the spectral requirements for Radio Astronomy are fulfilled by its primary and secondary allocations as well as national arrangements under the provision of No 4.4 of the Radio Regulations and the implementation of RQZs.
- c) that the current regulatory provisions and procedures for space services do not contemplate possible protection of radio astronomy stations located in national radio quiet zones;
- d) that multiple satellite constellation operating in the same frequency band may increase the total level of interference due to aggregation of signal powers.
- e) that the levels of regulatory protection for Radio Astronomy in the RQZ is different for each Administration, leading to inconsistent protection measures.

*noting:*

- a) that Report ITU-R RA.2259 contains characteristics of national radio quiet zones and measures to establish them;
- b) that there is no formal definition of RQZ, in Report ITU-R RA.2259-1, it is meant to be any recognised geographic area within which the usual spectrum management procedures are modified for the specific purpose of reducing or avoiding interference to radio telescopes, thereby maintaining the required standards for quality and availability of observational data.
- c) that Recommendation ITU-R RA.769 contains protection criteria for radio astronomy allocated bands;
- d) That Recommendations ITU-R RA.1031 addresses the protection of radio astronomy in shared bands

*resolves to invite the ITU Radiocommunication Sector:*

1. to consider defining the term “Radio Quiet Zone” in the Radio Regulations.
2. to conduct studies on possible coordination methods between NGSO systems and radio astronomy stations in frequency ranges protected by national Radio Quiet Zones
3. to develop a common regulatory framework that will provide for the international recognition of radio quiet zones and protect them from harmful interference;

4. to consider changes to the Radio Regulations, related ITU-R Recommendations and Reports or creating new ITU-R Recommendations and Reports that may be necessary to implement such a regulatory framework;
5. to complete this work in time for consideration at the next World Radiocommunication Conference;

*invites administrations:*

to participate actively in the development of a common regulatory framework by submitting contributions to the ITU Radiocommunication Sector

*invites the 2027 World Radiocommunication Conference:*

to examine, on the basis of the results of studies by the ITU-R, the possibility of establishing a regulatory framework for national administrations to establish internationally recognized radio quiet zones.

*instructs the Secretary-General*

to bring this Resolution to the attention of the international and regional organizations concerned.

## ANNEX 1 TO PART 2

### **Proposal :**

ATU proposes a new agenda item for WRC-27 to consider possible regulatory and technical methods to protect RAS observations at established national Radio Quiet Zones from NGSO satellite systems with large number of satellites.

### **Background/reason**

Radio astronomy is an essential tool for studying the universe, its structure and evolution and to test theories in extreme environments that are impossible to recreate on Earth. Furthermore, radio astronomy is also used for more concrete purposes as Geodesy (through the VLBI network) or to study the atmosphere and the space weather. Usually, radio astronomy deals with extremely faint signals (typically several orders of magnitude below the noise floor), which require highly sensitive systems and large integration times to be properly detected.

The bands allocated to radio astronomy in terms of Article of ITU-R Table of frequency allocation allow the observations of cosmic phenomenon in their static format. When the phenomenon changes, normally a wider observational bandwidth is required and such leverage cannot be afforded within Article 5 of the RR. In order to meet these bandwidth requirements and enhance radio astronomy observations, Administrations establishes specific sites called “Radio Quiet Zones” to limit the amount of radiocommunication activities and reduce interference. These areas allow astronomers to observe much wider bands without a getting harmful interference. Until recently only terrestrial sources of interference were considered, but technology is rapidly evolving and measures are necessary to protect radio astronomy RQZ from air-borne harmful interference.

Recent introduction of NGSO satellite systems with a very large number of satellites has created a risk of getting harmful interference. Unlike static (from an observer’s perspective) GSO systems, which could be avoided by RAS stations by pointing away from the geostationary arc, NGSO satellites could appear in any part of the sky, subject to receiver's site location and satellite’s orbital inclination. Furthermore, from a terrestrial observer’s point of view the 3D space in space is seen as a 2D surface, increasing the apparent density of satellites.

Reducing the risk of interference to RAS, especially of receiver saturation or blockage, requires appropriate coordination between NGSO system operators and RAS station personnel. While there are already some private initiatives for mitigation measures coming from industry, a unified approach to regulatory and technical measures will help continue operating radio astronomy observatories and preserving one of the oldest scientific disciplines in human history.

**Common regional proposal: Yes**

**Remarks**

## ANNEX 2 TO PART 2

**Subject:** Protection of the Radio Astronomy Service (RAS) from large constellations of NGSO satellites at specific sites called Radio Quiet Zones.

**Origin:** African Telecommunications Union

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**Proposal :**

*To consider possible regulatory and technical methods to protect the access to the radio spectrum for Radio Astronomy Service stations located in radio quiet zones considering the increasing deployment of large constellations of NGSO satellites.*

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**Background/reason :**

*The large number of low Earth orbit (LEO) constellations of NGSO satellites, deployed and planned, presents a unique challenge to the radio astronomy service (RAS) which in some cases is conducted in isolated areas, nationally designated as “radio quiet zones”.*

*Report ITU-R RA.2259 “Characteristics of radio quiet zones” was developed in 2012 and updated in 2021. This Report has introduced the term “radio quiet zones” to the ITU-R documentation and provided characteristics relevant to these unique zones on Earth and details on their implementation.*

*While the issue of radio astronomy sites’ protection within these zones from terrestrial sources is commonly seen as a national issue, the growing amount of NGSO satellite systems on Low Earth Orbit introduces a new threat for radio astronomy on a global scale. The strong signals received by radio astronomy stations can cause harmful interference, as well as receiver saturation and blockage, having significant impact on radio astronomy observations, including reducing sensitivity, resolution, and accuracy of radio telescopes.*

*Some satellite operators have already approached radio astronomers in their attempts to provide necessary protection in a sense of shared responsibility for advancing scientific progress and preserving one of the scientific fields most relying on proper spectrum management. Nevertheless, a unified approach and a common set of regulations would ensure that such behaviour would be not only an initiative of some stakeholders, but a common rule contributing to the RAS protection on a global scale. It should be further noted that often Administrations establishing Radio Quiet Zones and filing these NGSO satellite systems are different, which further makes it less possible to be solved on a national basis.*

*Given the above it is necessary to develop, internationally, adequate regulatory and technical measures for RAS protection in Radio Quiet Zones. The existing protection of the RAS within radio quiet zones is not sufficient when considering large constellations of NGSO satellites and deserve further study.*

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**Radiocommunication services concerned :**

*Radio Astronomy Service, Fixed Satellite Service, Mobile Satellite Service, Inter-Satellite Service*

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**Indication of possible difficulties :**

*The need to develop proper regulatory and technical measures and carry out sharing and compatibility studies, as appropriate*

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**Previous/ongoing studies on the issue :**

*Report ITU-R RA.2259 defines radio quiet zones and provides relevant characteristics, which could be used as a basis. Previous studies on compatibility between FSS NGSO satellite systems and radio astronomy stations were performed by the Electronic Communications Committee (ECC report 271). Also the UN Committee on the Peaceful Uses of Outer Space (UN COPUOS) is discussing the protection of the dark and quiet sky for science and society, which includes the effects on radio astronomy with due consideration of the respective mandates of the ITU-R and UN COPUOS.*

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**Studies to be carried out by:**

**with the participation of :**

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<i>Study Group 7 (Working party 7D)</i>	<i>Study Group 4</i>
<b><i>ITU-R Study Groups concerned:</i></b>	
<i>Study Group 1</i>	
<b><i>ITU resource implications, including financial implications (refer to CV126):</i></b>	
<i>None, everything will be carried out within framework of current Study Groups and their Working Parties.</i>	
<b><i>Common regional proposal : Yes</i></b>	<b><i>Multicounty proposal: No</i></b>
	<b><i>Number of countries :</i></b>

***Remarks***

**Reasons:** It is proposed to open a new agenda item for WRC-27 due to the active development of NGSO systems with large number of satellites which increase the probability of RAS stations getting harmful interference.

## PART 3

**ADD AFCP/6241A27/3**

**DRAFT NEW RESOLUTION [AFCP-FSS IN 13.75-14 GHZ] (WRC-23)**

**Studies on possible revision of sharing conditions for the frequency band 13.75-14 GHz to enable efficient use of the band by uplink FSS earth stations, including earth stations using smaller antenna sizes**

The World Radiocommunication Conference (Dubai, 2023),

*considering*

- a) that WARC-92 added an allocation to the fixed-satellite service (FSS) (Earth-to-space) in the band 13.75-14 GHz;
- b) that WRC-03 modified Nos. **5.502** and **5.503** which, among other things, enabled the use of earth station antennas having minimum diameter limitation of 1.2m for geostationary (GSO) FSS networks while retaining a minimum antenna diameter of 4.5m for non-geostationary (non-GSO) FSS systems;
- c) that Nos. **5.502** and **5.503** also contain power flux-density, e.i.r.p. and e.i.r.p. density limits to be observed by stations;
- d) that there is a great congestion in the GSO arc and there is a need to ensure that orbit and spectrum resources are used efficiently and rationally to facilitate introduction of new satellite networks, in particular those of new satellite operators;
- e) that since WRC-03, there has been a significant development of GSO FSS networks where small earth station antennas are seen increasingly used;
- f) that there has been a significant increase of non-GSO systems operating in the 10-15 GHz range for FSS with small diameter earth station antennas and the limitations imposed by Nos. **5.502** and **5.503** may not match with the characteristics of modern non-GSO FSS systems;
- g) that there is a lack of uplink bandwidth in the 13-15 GHz range that can be used efficiently, including by small diameter earth station antennas, globally to feed the downlink capacity in the 10-13 GHz range;
- h) that this band is shared with the radiolocation service under the conditions set out in No. **5.502**;
- i) that the space research service has a secondary allocation in this band and the relevant sharing conditions are provided in No. **5.503**;
- j) that for GSO space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 shall operate on an equal basis with stations in the FSS; after that date, new GSO space stations in the space research service will operate on a secondary basis;
- k) that until those GSO space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 cease to operate in

this band, the band 13.77-13.78 GHz is shared with the space research service under the conditions set out in No. **5.503**;

*l)* that, in some countries, the band is also allocated to the fixed service and the mobile service (Nos. **5.499** and **5.500**) and to the radionavigation service (No. **5.501**);

*m)* that improving operating conditions for earth stations in the 13.75-14 GHz band will help meet the evolving needs for satellite applications and enable efficient and rational use of the frequency bands in 13-15 GHz (Earth-to-space) and 10-13 GHz (space-to-Earth) ranges,

*considering further*

*a)* that studies are required to identify possible regulatory changes to meet the growing requirements for spectrum that can be used efficiently by GSO and non-GSO FSS uplink earth stations in the 13-15 GHz range, including by smaller diameter earth station antennas;

*b)* that in consideration of revising sharing conditions for the 13.75-14 GHz band, there is a need to determine appropriate co-existence conditions between other services sharing the band with their current characteristics and applications and uplink FSS earth stations, in particular noting RR Nos. **5.502** and **5.503**,

*resolves to invite ITU-R*

to conduct studies, in time for consideration by WRC-27, on possible revisions to the sharing conditions in the frequency band 13.75-14 GHz to facilitate efficient use of the band by uplink GSO and non-GSO FSS earth stations, including use of earth stations with smaller antenna sizes,

*invites the 2027 World Radiocommunication Conference*

to consider the results of the above studies in *resolves to invite ITU-R* and take necessary actions, as appropriate.

## ANNEX TO PART 3

**Subject:** Review the technical and regulatory conditions of the frequency band 13.75-14 GHz to enable efficient use of the band by uplink geostationary and non-geostationary FSS earth stations, including the use of smaller earth station antenna sizes.

**Origin:** ATU

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**Proposal:**

*To review the usage of the frequency band 13.75-14 GHz and study for possible revisions to the constraints in RR Nos. 5.502 and 5.503, in accordance with Resolution [AFCP-FSS IN 13.75-14 GHz] (WRC-23), to enable efficient use of the band by uplink geostationary and non-geostationary FSS earth stations, including FSS earth stations using smaller antenna sizes.*

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**Background/reason:**

*The fixed-satellite service (FSS) has seen a big increase in the number of operational satellite networks and use of orbit and spectrum resources over the last decades. Moreover, the use of smaller FSS earth stations at frequencies around 10-15 GHz has also been witnessed an ascending trend with the deployment of satellites providing large throughput and broadband connections. For all three ITU-R Regions, there is a significant mismatch between the uplink and downlink bandwidth in the frequency range 10-15 GHz, not subject to RR Appendices 30, 30A or 30B, that can efficiently be used to provide services by smaller geostationary and non-geostationary FSS earth station antennas, e.g. HTS or broadband user terminals and news gathering etc. The frequency band 13.75-14 GHz was allocated globally by WARC-92 for FSS, but with limitations introduced in RR Nos. 5.502 and 5.503 to enhance compatibilities with other services. WRC-03 modified these footnotes 20 years ago, but still such that efficient use of smaller geostationary and non-geostationary FSS uplink earth station antennas in this frequency band is not allowed, and the pfd limitations at sea impose severe constraints in the areas to deploy the earth stations. The system characteristics and their associated usage and application requirements in this frequency band have changed over the last decades, along with the operational characteristics of the other services allocated to the band. Therefore, based on the evolving needs for the efficient use of the frequency band 13.75-14 GHz for smaller uplink geostationary and non-geostationary FSS earth station antennas, identification of possible alternative sharing conditions for this band is required to meet the emerging demands for satellite applications in the FSS.*

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**Radiocommunication services concerned:**

*Services in the frequency band 13.75-14 GHz.*

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**Indication of possible difficulties:**

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**Previous/ongoing studies on the issue:**

Previous studies undertaken during the WRC-03 study period.

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<b><i>Studies to be carried out by:</i></b> <i>ITU-R WP 4A as responsible group</i>	<b><i>with the participation of:</i></b> <i>Other relevant WPs, Administrations, Sector Members</i>
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***ITU-R study groups concerned:***  
*SG 4, 5 and 7*

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***ITU resource implications, including financial implications (refer to CV126):***

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<b><i>Common regional proposal: Yes</i></b>	<b><i>Multicountry proposal: N/A</i></b> <b><i>Number of countries: N/A</i></b>
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***Remarks***

## PART 4

MOD AFCP/6241A27/4

### DRAFT REVISION OF RESOLUTION 176 (REV.WRC-23)

#### **Use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary or non-geostationary space stations in the fixed-satellite service**

The World Radiocommunication Conference (Dubai, UAE, 2023),

*considering*

- a)* that the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) are globally allocated on a primary basis to the fixed-satellite service (FSS) and that existing regulatory and technical procedures between GSO FSS networks and non-GSO FSS systems in those frequency bands apply;
- b)* that there is an increasing need for mobile communications, including global broadband satellite services, and that some of this need can be met by allowing aeronautical and maritime earth stations in motion (ESIMs) to communicate with FSS space stations operating in the frequency bands 37.5-40.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space);
- c)* that in the FSS, there are geostationary-satellite (GSO) networks and non-geostationary (non-GSO) systems operating and/or planned for near-term operation in the frequency bands allocated to the FSS in the frequency range 37.5-51.4 GHz;
- d)* that some administrations have already deployed, and plan to expand their use of, ESIMs with operational and future GSO FSS networks;
- e)* that GSO FSS networks and non-GSO FSS systems in the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) are required to be coordinated and notified in accordance with the provisions of Articles 9 and 11;
- f)* that the frequency bands 37.5-39.5 GHz, 40.5-42.5 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz are also allocated to several other services on a primary basis, the allocated services are used by a variety of different systems in many administrations, and these existing services and their future development should be protected without undue constraints;
- g)* the need to encourage the development and implementation of new technologies in the FSS at frequencies above 30 GHz,

*recognizing*

- a)* that Article 21 contains power flux-density (pfd) limits for GSO and non-GSO FSS;
- b)* that Nos. 22.5L and 22.5M of Article 22 specify the applicable limits for a non-GSO system in the FSS in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) to protect

geostationary-satellite orbit; and that Resolution **769 (WRC-19)** and Resolution **770 (WRC-19)** shall also apply;

- c)* that advances in technology, including the use of tracking techniques, allow ESIMs to operate within the characteristics of fixed earth stations of the FSS;
- d)* that WRC-15 adopted No. **5.527A** and Resolution **156 (WRC-15)** related to ESIMs;
- e)* that WRC-19 adopted No. **5.517A** and Resolution **169 (WRC-19)** related to ESIMs communicating with GSO FSS networks in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz;
- f)* that Resolution **173 (WRC-19)** calls for studies for use of the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by earth stations in motion communicating with non-GSO space stations in the FSS;
- g)* that ESIMs addressed by this Resolution are not to be used for safety-of-life applications;
- h)* that the frequency bands 40.5-42 GHz (space-to-Earth) in Region 2, 47.5-47.9 GHz (space-to-Earth) in Region 1, 48.2-48.54 GHz (space-to-Earth) in Region 1, 49.44-50.2 GHz (space-to-Earth) in Region 1 and 48.2-50.2 GHz (Earth-to-space) in Region 2 are identified for use by high-density applications in the FSS (No. **5.516B**);
- i)* that the provisions of No. **5.550B** apply;
- j)* that the use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by a non-geostationary-satellite system in the FSS is subject to the application of the provisions of No. **9.12** for coordination with other non-GSO;
- k)* that the frequency bands 37-40 GHz, 40.5-43.5 GHz are available for high-density applications in the fixed service (No. **5.547**);
- l)* that the pfd in the frequency band 42.5-43.5 GHz produced by any GSO space station in the FSS (space-to-Earth) or the broadcasting-satellite service (BSS) operating in the frequency band 42-42.5 GHz shall not exceed, at the site of any radio astronomy station, the values listed in No. **5.551I**;
- m)* that the allocation of the spectrum for the FSS in the frequency bands 42.5-43.5 GHz and 47.2-50.2 GHz for Earth-to-space transmission is greater than that in the frequency band 37.5-39.5 GHz for space-to-Earth transmission in order to accommodate feeder links to broadcasting satellites, and administrations are urged to take all practicable steps to reserve the frequency band 47.2-49.2 GHz for feeder links for the BSS operating in the frequency band 40.5-42.5 GHz (No. **5.552**);
- n)* that the allocation to the fixed service in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz is designated for use by high-altitude platform stations, and the use of the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz is subject to the provisions of Resolution **122 (Rev.WRC-19)** (No. **5.552A**);
- o)* that the use of the frequency bands 47.5-47.9 GHz, 48.2-48.54 GHz and 49.44-50.2 GHz by the FSS (space-to-Earth) is limited to GSO satellites (No. **5.554A**);
- p)* that the pfd in the frequency band 48.94-49.04 GHz produced by any GSO space station in the FSS (space-to-Earth) operating in the frequency bands 48.2-48.54 GHz and 49.44-50.2 GHz shall not exceed  $-151.8$  dB(W/m<sup>2</sup>) in any 500 kHz band at the site of any radio astronomy station (No. **5.555B**);

q) that, in the frequency bands 49.7-50.2 GHz, 50.4-50.9 GHz and 51.4-52.6 GHz, Resolution **750 (Rev.WRC-19)** applies, and Nos. **5.338A**, **5.340** and **5.340.1** apply among other provisions of the Radio Regulations;

r) that the fixed and mobile services are allocated on a primary basis in the frequency bands 37.5-42.5 GHz and 47.2-50.2 GHz on a global basis;

s) that the frequency band 37.5-38 GHz is allocated to the space research service (SRS) (deep space) in the space-to-Earth direction and the frequency band 40.0-40.5 GHz is allocated to the SRS and the Earth exploration-satellite service (EESS) in the Earth-to-space direction on a primary basis;

t) that the frequency bands 37.5-40.5 GHz and 38-39.5 GHz are also allocated to the EESS in the space-to-Earth direction on a secondary basis;

u) that the frequency band 50.2-50.4 GHz is allocated on a primary basis to the EESS (passive) and SRS (passive), which need to be adequately protected;

v) that all allocated services in these frequency bands should be taken into account,  
*resolves to invite the ITU Radiocommunication Sector*

1 to study the technical and operational characteristics of aeronautical and maritime ESIMs communicating with GSO and non-GSO space stations that plan to operate within FSS allocations in the frequency bands 37.5-39.5 GHz, 40.5-42.5 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz;

2 to study sharing and compatibility between aeronautical and maritime ESIMs communicating with GSO and non-GSO space stations in the FSS in the frequency bands 37.5-39.5 GHz, 40.5-42.5 GHz, 47.2-50.2 GHz\* and 50.4-51.4 GHz\* and stations of existing services allocated in these frequency bands and, where appropriate, in adjacent frequency bands, in order to ensure protection of, and not impose undue constraints on, those services;

3 to develop, for different types of ESIM, technical conditions and regulatory provisions for their operation, taking into account the results of the studies above;

4 to ensure that the technical and operational measures and the possible regulatory changes established in accordance with this Resolution shall not affect the relevant provisions related to the protection of GSO networks from non-GSO FSS systems,

*invites the 2027 World Radiocommunication Conference*

to consider the results of the above studies and take necessary actions, as appropriate, provided that the results of the studies referred to in *resolves to invite the ITU Radiocommunication Sector* are complete and agreed by the radiocommunication study groups.

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\* For the frequency bands 47.2-50.2 GHz and 50.4-51.4 GHz, sharing and compatibility studies for aeronautical ESIM should take into account all necessary steps to protect the terrestrial services to which the frequency band is allocated to.

## ANNEX TO PART 4

**Subject: NGSO and GSO ESIM in the FSS bands 37.5-39.5 GHz (space-to-Earth), 39.5-40.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space)**

**Origin:** ATU

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***Proposal:***

Study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-40.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by earth stations in motion communicating with geostationary and non-geostationary space stations in the fixed-satellite service, in accordance with Resolution **176 (Rev.WRC-23)**

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***Background/reason:***

The ITU-R has addressed aeronautical and maritime earth stations in motion (ESIM) operating with GSO FSS satellites at several previous WRCs, which have adopted technical and regulatory regimes to allow such operations. In the Radio Regulations, Resolution **902 (WRC-03)**, and relevant parts of Resolutions **156 (WRC-15)** and **169 (WRC-19)** define technical and regulatory rules to allow GSO FSS networks to communicate with ESIM to provide broadband communications.

WRC-23 agenda item 1.16 aims to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the some of the frequency bands between 17.7 and 30 GHz by non-GSO FSS earth stations in motion, while ensuring due protection of existing services in those frequency bands, in accordance with Resolution **173 (WRC-19)**. Studies done under WRC-23 agenda item 1.16 indicate that the same frequency band can be used by both GSO and non-GSO systems to provide connectivity for ESIM.

While Resolution **176 (WRC-19)** was developed for GSO only, enhancements in antenna and terminal technology have enabled the usage of the frequency bands 50/40 GHz for both GSO FSS networks and non-GSO FSS systems.

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***Radiocommunication services concerned:***

Fixed, Mobile, Broadcasting, Broadcasting-satellite, Mobile-satellite, Fixed-satellite, Radio Astronomy, Space Research, Space Research (passive), Earth Exploration-satellite and Earth Exploration-satellite (passive)

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***Indication of possible difficulties:***

N/A

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***Previous/ongoing studies on the issue:***

None

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***Studies to be carried out by:***

ITU-R WP 4A as responsible group

***with the participation of:***

Other relevant WPs, Administrations, Sector Members

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***ITU-R study groups concerned:***

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*SG 4, SG1, SG5, SG6, SG7*

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***ITU resource implications, including financial implications (refer to CV126):***

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***Common regional proposal: Yes***

***Multicountry proposal: N/A***

***Number of countries: N/A***

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***Remarks***

None

## PART 5

**ADD AFCP/6241A27/5**

### DRAFT NEW RESOLUTION [AFCP-FSS IN 51.4-52.4 GHZ] (WRC-23)

#### **Studies relating to the use of frequency band 51.4-52.4 GHz by to enable use by gateway earth stations transmitting to non-geostationary FSS satellite orbit systems (Earth-to-space)**

The World Radiocommunication Conference (Dubai, 2023),

*considering*

- a) that satellite systems are increasingly being used to deliver broadband services and can help enable universal broadband access;
- b) that next-generation fixed-satellite service (FSS) technologies for broadband will increase speeds, with faster rates expected in the near future;
- c) that technological developments such as advances in spot-beam technologies and frequency reuse are used by the FSS in spectrum above 30 GHz to increase the efficient use of spectrum;
- d) that fixed-satellite applications in spectrum above 30 GHz, such as feeder links, should be easier to share with other radiocommunication services than high-density fixed-satellite service (HDFSS) applications,

*recognizing*

- a) the need to protect existing services when considering frequency bands for possible additional allocations to any service;
- b) that the frequency band 51.4-52.4 GHz is allocated to fixed and mobile services, which will need to be protected, and is available for high-density applications in the fixed service as indicated in No. **5.547**;
- c) that Report ITU-R S.2461 includes studies on the spectrum needs for additional FSS spectrum in the Earth-to-space direction for both geostationary-satellite orbit (GSO) FSS networks and non-GSO FSS systems in the frequency band 51.4-52.4 GHz;
- d) that WRC-19, pursuant to Resolution **162 (WRC-15)**, allocated the frequency band 51.4-52.4 GHz to the FSS (Earth-to-space) on a primary basis, and also adopted No. **5.555C** which limited the use of the FSS allocation to geostationary satellite networks;
- e) that the need for additional uplink spectrum in the frequency range 50 GHz for non-GSO FSS gateway use continues,

*resolves to invite ITU-R*

to conduct, and complete in time for WRC-27:

- 1 sharing and compatibility studies with current and planned stations of existing primary services, including in adjacent bands as appropriate, including protection of fixed and mobile services, to determine the suitability of revising the primary allocations to the FSS in the frequency band 51.4-52.4 GHz to enable use by gateway earth stations of non-GSO FSS systems (Earth-to-space);

2 compatibility studies between NGSO FSS (E-s) gateway stations and systems operating in the passive frequency band 52.6-54.25 GHz;

3 studies regarding the protection of GSO FSS networks and associated gateway earth stations from the emissions of non-GSO FSS systems and associated gateways,

*instructs the Director of the Radiocommunication Bureau*

to report on the results of the ITU-R studies to WRC-27,

*invites administrations*

to participate actively in these studies by submitting contributions to ITU-R.

**Reasons:** To conduct studies with a view to revising the allocation to the FSS (Earth-to-space) in the frequency band 51.4-52.4 GHz, and associated regulatory provisions, to enable use by non-GSO FSS systems and associated gateways on a primary basis.



## ANNEX TO PART 5

**Subject:** To study and develop technical, operational and regulatory measures, as appropriate, to support use of the frequency band 51.4-52.4 GHz fixed-satellite service (Earth-to-space) frequency band for gateway earth stations operating with non-geostationary-satellite orbit FSS systems.

**Origin:** ATU

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***Proposal:***

To enable the establishment of spectrum allocation and associated regulatory provisions to support in specific frequency bands, non-geostationary gateway operations in the fixed-satellite service;

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***Background/reason:***

The need for additional FSS spectrum in the frequency range 50 GHz for non-GSO FSS gateway uplinks was established in partial response to agenda item 9.1 issue 9.1.9 for WRC-19 in Report ITU-R S.2461. These studies included the need for spectrum for both non-GSO and GSO FSS networks. The spectrum needs for GSO were successfully addressed by the allocation by WRC-19 to GSO feeder links. Now, it is time for the ITU-R to consider expanding the use of the FSS (Earth-to-space) frequency band at 51.4-52.4 GHz to address the spectrum needs of non-GSO FSS networks in accordance with the spectrum needs identified in Report ITU-R S.2461. Other services, including GSO FSS gateway uplinks, will be taken into account in the studies, and the analysis will consider the possibility of sharing with existing uses of the band.

This proposal provides a means for recognizing in the Radio Regulations gateway stations communicating with non-geostationary space stations in the fixed-satellite service in specific frequency ranges in accordance with Resolution [AFCP-FSS IN 51.4-52.4 GHZ] (WRC-23);

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***Radiocommunication services concerned:***

Fixed-satellite service, Fixed Service, Mobile Service, Radio Astronomy Service, Earth Exploration Satellite Service (passive)

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***Indication of possible difficulties:***

None foreseen

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***Previous/ongoing studies on the issue:***

V band studies for the operation of GSO gateways stations.

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***Studies to be carried out by:***

ITU-R WP 4A as responsible group

***with the participation of:***

Other relevant WPs, Administrations, Sector Members

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***ITU-R study groups concerned:***

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*SG 4, 5 and 7*

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*ITU resource implications, including financial implications (refer to CV126):*

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*Common regional proposal: Yes*

*Multicountry proposal: N/A*

*Number of countries: N/A*

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*Remarks*

## PART 6

**ADD AFCP/6241A27/6**

**DRAFT NEW RESOLUTION [AFCP-MSS IN 2 010-2 025 MHz & 2 200-2 215 MHz (S-E)] (WRC-23)**

**Potential new and amended frequency allocations to the mobile-satellite service in the frequency bands 2 010-2 025 MHz (Regions 1 and 3) and 2 200-2 215 MHz**

The World Radiocommunication Conference (Dubai, 2023),

*considering*

- a) that demand for mobility communications has driven an increasing demand for mobile-satellite services (MSS), extending connectivity beyond the bounds of terrestrial networks;
- b) that recent developments in semiconductor design have facilitated the integration of mobile-satellite connectivity into consumer cellular equipment, significantly increasing the market of potential users of MSS services;
- c) that the range of MSS applications has expanded many fold since the last MSS allocations were made at WARC-92 and WRC-95;
- d) that Report ITU-R M.2218 estimated the spectrum requirement for MSS broadband between 240 MHz and 355 MHz,

*recognizing*

- a) that mobile satellite systems implementing various applications, including data applications, to the communities in remote and underserved areas require additional spectrum;
- b) that the growing demand for mobile application including MSS application induces a constant increase in traffic to the point of congesting the spectrum, and results in a need for spectrum resources to continue long-term MSS services operations;
- c) that the development of smart phones with the capability of accessing mobile satellite systems is resulting in an unexpected growth in new traffic demand;
- d) that some existing satellite allocations may be adapted to provide further MSS capacity,

*resolves to invite the ITU Radiocommunication Sector*

to complete, for WRC-27, studies of possible new allocations to the mobile-satellite service in the frequency bands 2010-2025 MHz (Regions 1 and 3) and 2 200-2 215 MHz, taking into account sharing, compatibility, and protection of existing allocations in the referenced bands,

*invites the 2027 World Radiocommunication Conference*

to consider, on the basis of the studies conducted under *resolves to invite the ITU Radiocommunication Sector* above, appropriate allocations and associated regulatory conditions for the mobile-satellite service while ensuring the protection of existing primary services,

*invites administrations*

to participate in the studies by submitting contributions to the ITU-R.



## ANNEX TO PART 6

**Subject: Mobile-Satellite Service in the frequency bands 2 010-2 025 MHz (Regions 1 and 3) and 2 200-2 215 MHz**

**Origin:** ATU

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***Proposal:***

To study potential new and amended frequency allocations to the Mobile-Satellite Service (MSS) in the frequency bands 2 010-2 025 MHz (Earth to space) in Regions 1 and 3, and 2 200-2 215 MHz (space to Earth) globally.

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***Background/reason:***

Over the last decade, the increasing interest in MSS has been clear through the growing number of filings in the Radiocommunication Bureau for GSO MSS and NGSO MSS systems from various ITU administrations. The need for additional MSS spectrum comes to no surprise, since the total existing spectrum allocated for MSS is small compared with that of other radiocommunication services.

Allocating additional spectrum to the MSS is necessary to address the increasing demand for mobile satellite applications (and satellite mobility generally), direct-to-device connectivity and to avoid spectrum shortfall and crowding in lower bands. MSS can provide coverage to underserved and remote areas and support evolving technologies. Therefore, it is essential and timely to examine frequency bands for possible new MSS allocations, considering evolving technology.

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***Radiocommunication services concerned:***

Fixed Service, Mobile Service, Radio Astronomy Service, Earth Exploration Satellite Service, Space Research Service, Space Operation Service

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***Indication of possible difficulties:***

None foreseen

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***Previous/ongoing studies on the issue:***

***Studies to be carried out by:***

*ITU-R WP 4C as responsible group*

***with the participation of:***

*Other relevant WPs, Administrations, Sector Members*

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***ITU-R study groups concerned:***

*SG 4, 5 and 7*

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***ITU resource implications, including financial implications (refer to CV126):***

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***Common regional proposal: Yes***

***Multicountry proposal: N/A***

***Number of countries: N/A***

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***Remarks***