|  |  |  |
| --- | --- | --- |
| A picture containing text, clipart  Description automatically generated | ASIA-PACIFIC TELECOMMUNITY | **Document No:** |
| **The 5th Meeting of the APT Conference Preparatory**  **Group for WRC-23 (APG23-5)** | **APG23-5/OUT-39**  **(Rev.2)** |
| 20 – 25 February 2023, Busan, Republic of Korea | 25 February 2023 |

Working Party 5

**PRELIMINARY VIEWs on WRC-23 agenda item 10 (Satellite, AEROnautical and maritime issues)**

**Agenda Item 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)***

# 1. Background

Agenda item 10 requests WRC-23 to recommend to the Council items for inclusion in the agenda for WRC-27, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention and Resolution **804 (Rev.WRC-19)**.

The principles for development of agendas of WRCs are included in Annex 1 of Resolution 804 (Rev. WRC-19) that encourage regional and interregional coordination on the subjects to be considered in the preparatory process for the WRC, in accordance with Resolution 72 (Rev.WRC-19) and Resolution 80 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, with a view to addressing potentially difficult issues well before a WRC.

The principles also encourage to include, to the extent possible, agenda items that are prepared within regional groups, taking into account the equal right of individual administrations to submit proposals for agenda items.

WRC-19 has established the preliminary agenda for WRC-27 which includes 13 preliminary agenda items (see Resolution **812 (WRC-19)**).

Further agenda items for WRC-27 are considered in APG23-4 and APG23-5 based on inputs from the APT Members.

This document is related to the following topics under WRC-23 Agenda Item 10:

a) Preliminary agenda items 2.2(MOD), 2.3, 2.4(MOD), 2.5, 2.7, 2.8, 2.10(MOD), 2.11 and 2.13 contained in Resolution **812 (WRC-19)**,

b) New proposed items for possible inclusion in WRC-27agenda:

* Review the usage and sharing conditions of 13.75-14 GHz to enable efficient use of the band by uplink geostationary and non-geostationary FSS earth stations
* Spectrum allocation and associated regulatory provisions to support use of the 51.4-52.4 GHz FSS (Earth-to-space) frequency band for gateway earth stations operating with non-GSO FSS systems on a primary basis
* Consider a new primary allocation to the fixed-satellite service in the space-to-Earth direction in 17.3-17.7 GHz in Region 3
* to consider the development of a regulatory framework for non-GSO FSS satellite systems, to ensure the protection of GSO FSS and BSS networks as well as the long-term sustainability, the equitable access, and rational and compatible use of the non-GSO orbital and spectrum resources
* Studies towards potential new allocations to the MSS for satellite component of IMT in the frequency bands identified for IMT and/or allocated to MS below 7 GHz
* Consider technical and regulatory measures to ensure coexistence between SAR in the EESS (active) and radiodetermination service in 9 200-10 400 MHz
* Review and update regulatory provisions for sharing between non-GSO systems and GSO networks in the portions of 14/11 GHz and 30/20 GHz frequency bands in which Article 22 epfd limits apply

# 2. Documents

Following documents are received to this APG23-5 for WRC-23 agenda item 10:

* Input Documents: APG23-5/[12(THA)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-12_Thailand-WP5-Preliminary_Views_on_WRC-23_Agenda_Items_9.1_TOPIC_B_and_10.docx), [21Rev1(J)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-21_Japan-WP5-Preliminary_View_on_WRC-23_Agenda_Item_10.docx)(Annex 2), [30(IND)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-30_India_WP5-Preliminary_Views_on_WRC_23_Agenda_Items_2_4_9.1Topic_b_and_10.docx), [42(IRN)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-42_Iran-WP5-Preliminary_View_on_WRC_23_Agenda_Item_10.docx)(related parts), [49(SNG)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-49_Singapore-WP5-Preliminary_View_on_WRC_23_Agenda_Item_10.docx), [62(AUS)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-62_Australia-WP5-Preliminary_View_on_WRC-23_Agenda_Item_10.docx)(related parts), [67(KOR)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-67_Rep_of_Korea-WP5-Preliminary_Views_on_WRC-23_Agenda_Items_9.1Topic_b_and_10.docx)(Section 2.2), [71(PNG)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-71_Papua_New_Guinea-WP5-Preliminary_View_on_WRC-23_Agenda_Item_10.docx), [85(Tonga)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-85_Tonga-WP5-Preliminary_View_on_WRC-23_Agenda_Item_10.docx), [92Rev1(CHN)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-92_China-WP5-Preliminary_Views_on_WRC-23_Agenda_Items_2_4_9.1Topic_b_and_10.docx)(Sections 2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.2.1, 2.2.2);
* Information Documents: APG23-5/[1(WMO)](https://www.apt.int/sites/default/files/2023/01/APG23-5-INF-01_WMO_Position_on_WRC-23_Agenda.docx), [11(Co-Chairs)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-11_Brief_on_AI10.docx), [38(BR)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-38_ITU_Conference_Proposal_Interface_and_Proposal_Management_web_tools_for_CPM23-2_and_WRC-23.pdf), [39(CEPT)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-39_Status_of_CEPT_preparation_for_WRC-23_and_RA-23.pdf), [43(CITEL)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-43_CITEL_preparation_for_WRC-23.pdf).

# 3. Summary of discussions

## Summary of APT Members’ views

### 3.1.1 Thailand - Document APG23-5/[INP-12](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-12_Thailand-WP5-Preliminary_Views_on_WRC-23_Agenda_Items_9.1_TOPIC_B_and_10.docx)

Thailand supports preliminary agenda item 2.3 for WRC-27 listed in Resolution **812 (WRC-19)**.

Thailand supports an establishment of a new WRC-27 agenda item for ITU-R study to review the use of the frequency band 13.75-14 GHz (Earth-to-space) by the geostationary fixed-satellite service (GSO FSS) and accordingly revise RR Nos. **5.502** and **5.503**, taking into account protection of the existing services allocated on a primary basis in the same frequency band and, as necessary, adjacent frequency bands.

### Japan - Document APG23-5/[INP-21Rev1](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-21Rev.1_Japan-WP5-Preliminary_View_on_WRC-23_Agenda_Item_10.docx)

Japan supports the preliminary agenda item 2.10 (VHF maritime frequencies in Appendix **18**). In addition, Japan considers that MF/HF issues may be combined with this preliminary agenda item.

### India - Document APG23-5/[INP-30](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-30_India_WP5-Preliminary_Views_on_WRC_23_Agenda_Items_2_4_9.1Topic_b_and_10.docx)

India supports the inclusion of a WRC-27 Agenda Item to review the usage of the band 13.75-14 GHz and study for possible revisions to the sharing conditions indicated in RR Nos. **5.502** and **5.503**, in accordance with draft Resolution [13.75-14 GHz GSO and NGSO FSS] (WRC-23), to enable efficient use of the band by uplink GSO and NGSO FSS earth stations.

India supports the inclusion of a WRC-27 Agenda Item that studies and defines the technical and operational measures as well as the necessary regulatory provisions, in order to facilitate the use of the 51.4-52.4 GHz frequency band allocated to the FSS (Earth-to-space) by gateway earth stations of non-geostationary systems.

### Iran (Islamic Republic of) - Document APG23-5/[INP-42](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-42_Iran-WP5-Preliminary_View_on_WRC_23_Agenda_Item_10.docx)

The Administration of Iran (Islamic Republic of) proposes the following draft APT Views and Preliminary APT Common Proposals (PACP) for consideration by WRC-23 under Agenda Item 10 be considered at APG23-5 meeting.

APT Members are of the view that the volume of the agenda of a WRC and the workload of the preparatory work needed to be kept at a manageable level and that issues that can be resolved under the standing agenda items of WRCs or through the regular activities of ITU-R should not be converted into separate agenda items of WRCs.

Further discussion is needed at the next APG meeting to develop APT Common Proposals on WRC-27 preliminary agenda items contained in Resolution **812 (WRC-19)** using the following Table (See Attachment 1 to this Document). In this Table, the WRC-27 preliminary agenda items indicated with "Low Priority" and even "Medium Priority" could be postpended to WRC-31 based on the distribution of workload between future WRCs.

### Singapore - Document APG23-5/[INP-49](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-49_Singapore-WP5-Preliminary_View_on_WRC_23_Agenda_Item_10.docx)

Singapore supports the following items be included in the agenda of WRC-27:

* Review the usage and sharing conditions of the band 13.75-14 GHz to enable efficient use of the band by uplink geostationary FSS earth stations, including FSS earth stations using smaller antenna sizes

Singapore supports to conduct ITU-R study regarding possible relaxation RR 5.502 and RR 5.503 on the band 13.75 – 14 GHz band for GSO networks for the next WRC-27 study cycle as detailed in input paper [APG23-4/INP-44](https://www.apt.int/sites/default/files/2022/08/APG23-4-INP-44_China_WP5_Preliminary_Views_on_WRC-23_Agenda_Items_2_4_9.1Topic_b_and_10.docx). In addition, Singapore would like to include NGSO systems into the above ITU-R study proposal.

* Consider a new primary allocation to the fixed-satellite service in the space-to-Earth direction in the frequency band 17.3-17.7 GHz in Region 3

The detailed consideration and proposal for this new agenda item is included in the Attachment 1. The draft new Resolution is contained in the Attachment 2. The template for submission of proposals for agenda items based on Annex 2 to Resolution 804 (Rev.WRC-19) is included in the Attachment 3. APG23-5 is invited to include this proposed new preliminary agenda for WRC-27 in APT preliminary views.

* Spectrum allocation and associated regulatory provisions to support use of the 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 on a primary basis

A new preliminary agenda item to be included in the agenda for WRC-27 is being proposed: Spectrum allocation and associated regulatory provisions to support use of the 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 on a primary basis.

### Australia - Document APG23-5/[INP-62](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-62_Australia-WP5-Preliminary_View_on_WRC-23_Agenda_Item_10.docx)

* Australia does not support an APT Common Proposal for a new WRC-27 agenda item that intends to relax the limits set out in RR No. **5.502**, on the basis that there has been no change to protection requirements for the radiolocation service that initially informed those limits.
* Modification of preliminary WRC-27 agenda item 2.2, to include non-geostationary space stations. With the detailed consideration and proposal for this modification included in Attachment 2 and the draft revised Resolution contained in Attachment 3.
* Australia is considering to support preliminary WRC-27 agenda item 2.13.
* Australia considers a new primary allocation to the fixed-satellite service in the space-to-Earth direction in the frequency band 17.3-17.7 GHz in Region 3.

### Korea (Republic of) - Document APG23-5/[INP-67](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-67_Rep_of_Korea-WP5-Preliminary_Views_on_WRC-23_Agenda_Items_9.1Topic_b_and_10.docx)

Korea supports the following items for inclusion in the agenda of WRC-27:

Review the usage and sharing conditions of the band 13.75-14 GHz to enable efficient use of the band by uplink geostationary FSS earth stations, including FSS earth stations using smaller antenna sizes

Considering the band is also allocated to radiolocation service globally in a primary status and many Administrations currently use this band mainly for public purpose. The current conditions for the FSS earth stations in the band 13.75-14 GHz to ensure the protection of the existing services including radiolocation service were adopted at WRC-03.

It is proposed that APG23-5 discuss the major differences between the technical characteristics of the FSS earth stations and the radio stations of victim services considered at WRC-03, and the existing characteristics. Through this discussion, APG23-5 may consider the necessity of this issue for consideration at WRC-27.

### Papua New Guinea - Document APG23-5/[INP-71](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-71_Papua_New_Guinea-WP5-Preliminary_View_on_WRC-23_Agenda_Item_10.docx)

Papua New Guinea supports to conduct ITU-R study regarding possible relaxation of RR 5.502 and RR 5.503 on the band 13.75 – 14 GHz band for GSO networks for the next WRC-27 study cycle as detailed in in its input document.

### Tonga (Kingdom of) - Document APG23-5/[INP-85](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-85_Tonga-WP5-Preliminary_View_on_WRC-23_Agenda_Item_10.docx)

Tonga proposes a new Agenda Item for WRC-27 to review and update the regulatory provisions for spectrum sharing between non-GSO systems and GSO networks in the portions of the 14/11 GHz and 30/20 GHz frequency bands in which Article **22** epfd limits apply. The work should aim at defining a sharing framework, similar to that developed by WRC-19 under **No** **22.5L** and **No** **22.5M**, that ensures equitable and efficient spectrum sharing between non‑GSO systems and GSO networks.

### China (People's Republic of) - Document APG23-5/[INP-92Rev1](https://www.apt.int/sites/default/files/2023/02/APG23-5-INP-92Rev.1_China-WP5-Preliminary_Views_on_WRC-23_Agenda_Items_2_4_9.1Topic_b_and_10.docx)

A) New preliminary agenda items for WRC-27

1) Update of the proposal on GSO FSS in the 13.75-14 GHz

*to review the usage and sharing conditions of the band 13.75-14 GHz to enable efficient use of the band by uplink geostationary (GSO) FSS earth stations, including FSS earth stations using smaller antenna sizes*.

It is noted that the services, system characteristics and their associated usage and application requirements in the frequency band 13.75-14 GHz might have changed over the last decades. In addition, the use of smaller FSS earth stations at frequencies around 10-15 GHz has been witnessed an ascending trend with the deployment of satellites providing large throughput and broadband connections. Therefore, it is important and essential to include an item in the WRC-27 agenda to review the usage and sharing conditions of the band 13.75-14 GHz to enable efficient use of the band by uplink geostationary FSS earth stations, including FSS earth stations using smaller antenna sizes.

2) non-GSO MSS for satellite component of IMT

*Studies towards potential new allocations to the mobile satellite service (MSS) for satellite component of IMT in the frequency bands identified for IMT and/or allocated to MS below 7 GHz.*

In recent years, with the extensive network deployment of IMT systems all over the world, broadband and high-speed communication services for end users have been provided in densely populated areas. However, the deployment of IMT network is restricted by many factors such as geographical environment and operation and maintenance costs, and it is therefore uneconomical or even infeasible to deploy IMT base stations in the remote area. How to bridge the digital division by meeting the demand for broadband Internet communication services of individual users in these areas pose a serious issue to achieve the UN sustainable development goal. The non-geostationary-satellite (non-GSO) system in the mobile-satellite service (MSS) is one of the effective means to make up for the insufficient coverage of the above ground mobile communication system. At present, there is limited frequency bands allocated to mobile-satellite service below 7 GHz which can’t meet the requirement of the development of 6G. In order to realize the construction of space and terrestrial integrated systems, it is proposed to conduct studies and consider possible additional allocations to mobile-satellite service in the frequency bands identified for IMT and/or allocated to MS below 7 GHz, with the view to introduce non-GSO system for satellite component of IMT.

3) Technical and regulatory measures to ensure coexistence between spaceborne SAR and RDS in 9.2-10.4GHz

*Technical and regulatory measures to ensure coexistence between spaceborne synthetic aperture radars (SAR) in the Earth exploration-satellite service (active) and radiodetermination service in 9 200-10 400 MHz frequency bands.*

WRC-07 and WRC-15 extended the allocations to Earth exploration-satellite service (active) from 9 500-9 800 MHz to 9 200-10 400 MHz, which is shared with the radiodetermination service, including radiolocation and radionavigation services. The sharing and compatibilities studies conducted in ITU-R showed that the radars would be affected by spaceborne SAR with interference levels significantly exceed the specified I/N threshold value of I/N = -6 dB, and the time percentage of the occurrence of the interference would be low if the number of spaceborne SAR stations is limited.

During recent years, with the advancement of technology and the reduction of manufacturing cost, more and more SAR satellites were launched and operated, which is far beyond the expectations in WRC-07 and WRC-15 study cycles. In addition, the system parameters of SAR satellites also changed from the past study cycles. These changing situations would lead the coexistence between SAR satellites and radiodetermination service becomes more difficult than before. And it will probably result in harmful interference to radiodetermination radars happen more and more frequently and become a significant problem among administrations in the future.

Therefore, it is necessary to conduct studies on the technical and regulatory measures to ensure coexistence between spaceborne synthetic aperture radars (SAR) in the Earth exploration-satellite service (active) and radiodetermination service in 9 200-10 400 MHz frequency bands with the aim to facilitate the operation of both side systems.

4) Development of a regulatory framework for non-GSO FSS satellite systems

*to consider the development of a regulatory framework for non-geostationary-satellite (non-GSO) FSS satellite systems, to ensure the protection of GSO FSS and BSS networks operating co-frequency in the frequency bands above as well as the long-term sustainability, the equitable access, and rational and compatible use of the non-GSO orbital and spectrum resources.*

In recent years, the number of non-GSO satellites launched and operated has grown explosively, which has triggered a preemption of radio-frequency spectrum and associated orbit resources in outer space. On the one hand, it would cause potential interference to the GSO systems. And on the other hand, considering the limited available radio-frequency spectrum and associated orbit resources, the subsequent development of space services in developing countries is seriously affected. This situation has been recognized by ITU, and the Plenipotentiary Conference (Bucharest, 2022) have approved a new resolution to establish the principle of equitable utilization and promote the sustainability of the radio-frequency spectrum and associated orbit resources used by space services.

Therefore, it is necessary to conduct studies on the technical measures and regulatory frameworks to ensure that the protection of GSO systems and the limited non-GSO spectrum and associated orbit resources can be equally accessed and rationally and compatibly used among all countries.

B) Preliminary agenda items listed in Resolution 812 (WRC-19)

1) FSS ESIM in 40/50GHz (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)***

This Administration is of the view that the existing services operating in the same and adjacent bands should be fully protected, in particular the EESS (passive) and SRS (passive), which need to be adequately protected. The implementation of aeronautical and maritime ESIM should not impose constrains to the International Mobile Telecommunications (IMT) system in the 40/50GHz frequency bands in accordance with relevant footnotes.

2) Space-to-space links (preliminary agenda item 2.8)

*to study the technical and operational matters, and regulatory provisions, for space-to-space links in the frequency bands [1 525-1 544 MHz], [1 545-1 559 MHz], [1 610-1 645.5 MHz], [1 646.5‑1 660.5 MHz] and [2 483.5-2 500 MHz] among non-geostationary and geostationary satellites operating in the mobile-satellite service, in accordance with Resolution* ***249 (WRC‑19)****;*

This Administration is of the preliminary view that the frequency bands 1 518-1 525MHz and 1 668-1 675 MHz, which are allocated to mobile-satellite service on a primary basis, should be studied in this agenda item.

## 3.2 Summary of issues raised during the meeting

It was raised out that currently the only criteria to identify an administration with which coordination is needed to be effect with respect to a non-GSO satellite system in the Radio Regulations is frequency overlap, which is not sufficient to identify if the incumbent services are affected or not. For this kind of non-GSO satellite system applications, no reply from potentially affected administrations within 4 months of the publication of the frequency assignments of the non-GSO satellite system means agreement were given to the non-GSO satellite system, which is not sufficient for the protection of incumbent services.

**3.2.1 Studies towards potential new allocations to the MSS for satellite component of IMT in the frequency bands identified for IMT and/or allocated to MS below 7 GHz**

Several issues were raised during the discussion:

* that there is a need to describe/define the new MSS for IMT satellite component which need further study.
* the potential interference to the border area of neighboring countries should also be addressed, considering administrations may use different frequency bands identified to IMT.
* the previous ITU-R studies should be considered, noting WRC-12 studied the potential additional allocation to MSS and NOC to RR.

**3.2.2 Review and update regulatory provisions for sharing between non-GSO systems and GSO networks in the portions of 14/11 GHz and 30/20 GHz frequency bands in which Article 22 epfd limits apply**

One input contribution on topic non-GSO protection GSO in 11/14 and 20/30GHz was intensively discussed at APG23-5.

Some APT Members support further study on this topic.

Some other APT Members have the view that no further consideration on this topic is needed.

# APT Preliminary View(s)

## The following sections, excluding section 4.7, are forwarded to APG23-6 for information purposes only.

## 4.1 Review the usage and sharing conditions of 13.75-14 GHz to enable efficient use of the band by uplink geostationary and non-geostationary FSS earth stations

APG23-5 received proposals to include an item in the agenda of WRC-27 to review the usage and [sharing conditions/constraints] of the frequency band 13.75-14 GHz as stipulated in Radio Regulations Nos. **5.502** and **5.503**. APT Members agreed to forward this topic to the next APG meeting for further consideration (See Attachment 2 to this Document).

## 4.2 Spectrum allocation and associated regulatory provisions to support use of the 51.4-52.4 GHz FSS (Earth-to-space) frequency band for gateway earth stations operating with non-GSO FSS systems on a primary basis

APT Members agreed to forward this topic to the next APG meeting for further consideration (See Attachment 3 to this Document).

## 4.3 Consider a new primary allocation to the fixed-satellite service in the space-to-Earth direction in 17.3-17.7 GHz in Region 3

APT Members agreed to forward this topic to the next APG meeting for further consideration provided that measures are taken to protect all other services operating in the band in accordance with the Radio Regulations and particularly the BSS in all Regions.

## 4.4 to consider the development of a regulatory framework for non-GSO FSS satellite systems, to ensure the protection of GSO FSS and BSS networks as well as the long-term sustainability, the equitable access, and rational and compatible use of the non-GSO orbital and spectrum resources

APT Members agreed to forward this topic to the next APG meeting for further consideration (See Attachment 7 to this Document).

## 4.5 Studies towards potential new allocations to the MSS for satellite component of IMT in the frequency bands identified for IMT and/or allocated to MS below 7 GHz

APT Members agreed to forward this proposal to the next APG Meeting for further consideration (See Attachment 5 to this Document).

## 4.6 Consider technical and regulatory measures to ensure coexistence between SAR in the EESS (active) and radiodetermination service in 9 200-10 400 MHz

APT Members agreed to forward this topic to the next APG meeting for further consideration (See Attachment 6 to this Document).

## 4.7 Review and update regulatory provisions for sharing between non-GSO systems and GSO networks in the portions of 14/11 GHz and 30/20 GHz frequency bands in which Article 22 epfd limits apply

None (See Attachment 8 to this Document).

## 4.8 Preliminary agenda items 2.3, 2.5, 2.7, 2.8, 2.11 and 2.13 contained in Resolution 812 (WRC-19)

APT Members agreed that further consideration is needed at the next APG meeting to develop APT views and preliminary APT common proposals (PACPs) on WRC-27 preliminary agenda items 2.3, 2.5, 2.7, 2.8, 2.11 and 2.13 contained in Resolution **812 (WRC-19)** (See Attachment 1 to this Document).

## Preliminary agenda item 2.2

APT members are considering modifications to Resolution **176 (WRC-19)** (See section 3 of Attachment 1) to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the potential 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 (A-ESIM and M-ESIM) communicating with geostationary and non-geostationary space stations in the fixed satellite service, while making sure that other allocated services are protected in accordance with Resolution **176** **[(Rev.WRC-23)][[1]](#footnote-1)**.

## Preliminary agenda item 2.4

APT Members agreed to forward the proposed modifications to this item and its supporting Resolution to the next APG meeting for further consideration (See section 4 of Attachment 1).

## Preliminary agenda item 2.10

APT Members support the modifications to this item 2.10 and to its supporting Resolution **363 (WRC-19)** (See section 5 of Attachment 1), if WRC-23 agreed this item be included in the agenda of WRC-27.

# 5. Other View(s) from APT Members

None.

# 6. Issues for Consideration at Next APG Meeting

APT Members are invited to contribute the APG23-6 meeting on agenda item 10 to update the APT views and develop PACPs on future agenda items.

**6.1** With respect to §4.1 above (proposed new items), APT Members are invited to carefully examine the proposed new items in §4.1 for consideration and also propose new items and to prepare APT preliminary views and proposals on WRC-23 Agenda item 10.

**6.2** With respect to §4.2 above (Resolution **812 (WRC-19)**), APT Members are invited to submit input contributions on preliminary agendas for WRC-27 contained in Resolution **812 (WRC-19)**, by using Attachment 1 to this document.

# 7. Views from Other Organisations

## 7.1 Regional Groups

**7.1.1 ASMG** - **Document APG23-4/INF-21**

ASMG administrations support the principle of Resolution 812, which aims to set the agenda items for the upcoming radiocommunication conference, to provide administrations with sufficient time for to examine the topics that intended to be included in the work of the next conferences.

Urge the Arab administrations to state the topics to be included in the next conference agenda items.

**7.1.2 ATU - Document APG23-3/INF-39**

ATU supports, as a matter of principle, the topics/subjects which will allow for rational and efficient use of the radio frequency spectrum and consistent with ATU’s long-term objectives for spectrum management to be included in WRC-27 agenda. In addition, ATU supports the consideration of items that are of international and regional importance, which can be effectively addressed through the WRC-23, and which are likely to be resolved within the available time and resources.

**7.1.3 CEPT - Document APG23-5/INF-39**

CEPT is currently supporting the following preliminary Agenda items:

* 2.1 - Radiolocation service 275 - 700 GHz. Resolution 663 (WRC-19) to be modified
* 2.2 - Aeronautical and Maritime ESIM. Resolution 176 (WRC-19) to be modified to cover also NGSO and land ESIM
* 2.4 - PFD and EIRP limits for 71-76 GHz/81-86 GHz. Resolution 775 (WRC-19) to be modified
* 2.6 - Space weather sensors. Follow-up on Resolution 657 (WRC-19).
* 2.11 - EESS (Earth-to-space) 22.55-23.15 GHz. Resolution 664 (WRC-19) to be modified
* 2.12 - 694-960 MHz removal of limitation of aeronautical mobile. Resolution 251 (WRC-19) to be modified.

In replacement of preliminary agenda item 2.5, CEPT is supporting the following proposals for new agenda items:

* Protection of the EESS (passive) in bands covered by RR No. 5.340 above 86 GHz
* Protection of RAS above 76 GHz from active space services

In addition, CEPT is supporting the following proposal for a new agenda item:

* FSS (Earth-to-space) 51.4 -52.4 GHz for gateway earth stations NGSO.

**7.1.4 CITEL - Document APG23-5/INF-43**

Preliminary Proposal (PP)

* **ESIM:** To study the viability of 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) y 50,4-51,4 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary or no geostationary space stations in the fixed satellite service, and in any case, define the regulatory and technical considerations to promote its use.

One Administration supports including item 2.2 (RESOLUTION 812 (WRC-19)) in the agenda of WRC-27 and broadening the scope of Resolution 176 (WRC-19) to facilitate the rollout of ubiquitous broadband connection of the earth stations in motion (ESIMs) 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) for the purpose of verifying the feasibility of operating GSO and non-GSO satellites to allow and facilitate the rollout of critical services to be shared with the other services allocated and identified in said frequency bands. This Administration also supports studying and developing the technical and operational measures to ensure that other services allocated in the band shall be protected.

* **52 GHz**: To study the viability of the use of the frequency band 51.4 – 52.4 GHz by no geostationary satellite systems in the fixed satellite service, and in any case, define the regulatory and technical considerations to promote its use.

One Administration supports the inclusion of a WRC-27 Agenda Item that studies and defines the technical and operational measures as well as the necessary regulatory provisions, in order to facilitate the use of the 51.4-52.4 GHz frequency band allocated to the fixed-satellite service (Earth-space) by master earth stations of non-geostationary systems.

**7.1.5 RCC - Document APG23-5/INF-45**

The RCC consider the following new agenda items of WRC-27:

* New allocation on a secondary basis of the radio frequency bands 3000-3100 MHz and 3300-3400 MHz for the EESS (active).
* Regulatory and technical methods to ensure equitable access and rational use of non-GSO orbital resources and associated radio spectrum;
* New allocations below 10GHz for the satellite component of International Mobile Telecommunications (IMT)

The RCC do not objects inclusion to the WRC-27 Agenda the following items: 2.4, 2.5 and 2.11 as in Resolution 812 (WRC-19).

The RCC objects inclusion to the WRC-27 Agenda the following items: 2.9 and 2.10 as in Resolution 812 (WRC-19).

## 7.2 International Organisations

**7.2.1 WMO** - **Document APG23-5/INF-01**

| **Preliminary agenda for WRC-27 listed in Resolution 812 (WRC-19)** | **WMO Position** |
| --- | --- |
| 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)**; | that any WRC-27 Agenda item dealing with ESIM in the 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) should take due account of the need to protect space science services allocations (SRS, EESS, EESS (passive)) in the considered bands and the adjacent bands. |
| 2.4 the introduction of power flux-density (pfd) and equivalent isotropically radiated power (e.i.r.p.) limits in Article **21** for the frequency bands 71-76 GHz and 81-86 GHz in accordance with Resolution **775 (WRC‑19)**; | WRC-27 Preliminary Agenda Items 2.4, 2.5 and 2.7 address the frequency bands 71–76 GHz and 81–86 GHz. If WRC-23 agrees to the inclusion of agenda items 2.4 or 2.7 on the WRC-27 Agenda, then agenda item 2.5 would consequentially need to be included.  Any of these preliminary agenda items, if placed on the WRC-27 Agenda, would need to take into account the protection of the EESS (passive) allocation in the frequency band 86–92 GHz.  WMO supports the inclusion of agenda item 2.5 in the Agenda for WRC-27. |
| 2.5 the conditions for the use of the frequency bands 71-76 GHz and 81-86 GHz by stations in the satellite services to ensure compatibility with passive services in accordance with Resolution **776 (WRC‑19)**; |
| 2.7 to consider the development of regulatory provisions for non-geostationary fixed-satellite system feeder links in the frequency bands 71-76 GHz (space-to-Earth and proposed new Earth-to-space) and 81-86 GHz (Earth-to-space), in accordance with Resolution **178 (WRC‑19)**; |
| 2.11 to consider a new Earth exploration-satellite service (Earth-to-space) allocation in the frequency band 22.55-23.15 GHz, in accordance with Resolution **664 (WRC‑19)**; | WMO supports inclusion of this preliminary agenda item on the Agenda for WRC-27 taking into account existing space research and inter-satellite allocations. |
| 2.13 to consider a possible worldwide allocation to the mobile-satellite service for the future development of narrowband mobile-satellite systems in frequency bands within the frequency range [1.5-5 GHz], in accordance with Resolution **248 (WRC-19)**; | WMO is of the view that this preliminary agenda item requires further refinement and a narrower scope to avoid difficulties encountered similar to those under WRC-23 AI 1.18. WMO is also of the view that given the results of studies completed under WRC-23 AI 1.18, the band 1 675–1 710 MHz should not be reconsidered. |

WMO supports the inclusion of the following item on the WRC-27 Agenda

Agenda Item 1.xx: *to consider, based on the results of ITU-R studies, possible regulatory measures regarding the protection of the Earth exploration-satellite service (passive) in frequency bands above 86 GHz from unwanted emissions of active services.*

Frequency bands allocated to EESS (passive) are of prime interest for WMO. Resolution **750** was approved at WRC-07, to ensure compatibility between the EESS (passive) and relevant active services, in the frequency bands covered by RR No **5.340**. However, some frequency bands, covered by RR No **5.340**, are not yet included in this Resolution. The objective of this proposed WRC-27 Agenda item is to elaborate regulatory provisions in order to ensure the long-term EESS (passive) usage in bands not yet covered by Resolution **750**.

# Attachment 1

**Preliminary agenda items for WRC-27 contained in Resolution 812 (WRC-19)**

1. **APT preliminary views on preliminary agenda for WRC-27 listed in Resolution 812 (WRC-19)**

*[Editor’s note: Following table is forward to APG23-6 as a working document for further consideration.]*

| **Preliminary agenda for WRC-27 listed in Resolution 812 (WRC-19)** | **Responsible Group in ITU-R** *(See Addendum 1 to CA/251)* | **Priority for APT and reason** | **Preliminary Views**  [Support/Objection/MOD] |
| --- | --- | --- | --- |
| 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)**; | SG 4 |  | **IRN (APG23-5/INP-42):** Under consideration. It is necessary to see the results under WRC-23 agenda items 1.15, 1.16 and 1.8.  **AUS (APG23-5/INP-62):** MOD to include non-geostationary space stations.  **CHN (APG23-5/INP-92R1)**: the existing services operating in the same and adjacent bands should be fully protected, including EESS (passive), SRS (passive) and IMT. |
| 2.3 to consider the allocation of all or part of the frequency band [43.5-45.5 GHz] to the fixed-satellite service, in accordance with Resolution **177 (WRC‑19)**; | SG 4 |  | **CHN (APG23-4/INP-44)**: Considering the view  **Thailand (APG23-5/INP/12)** : support.  **IRN (APG23-5/INP-42):** Under consideration. |
| 2.4 the introduction of power flux-density (pfd) and equivalent isotropically radiated power (e.i.r.p.) limits in Article **21** for the frequency bands 71-76 GHz and 81-86 GHz in accordance with Resolution **775 (WRC‑19)**; | SG 4/SG 5 | **IRN**: High  (For inclusion in the agenda of WRC-27) | **CHN (APG23-4/INP-44):** Considering the view  **IRN (APG23-5/INP-42):** Support |
| 2.5 the conditions for the use of the frequency bands 71-76 GHz and 81-86 GHz by stations in the satellite services to ensure compatibility with passive services in accordance with Resolution **776 (WRC‑19)**; | WP 7C | **IRN**: Low Priority | **CHN (APG23-4/INP-44)**: Considering to support  **IRN (APG23-5/INP-42):** doesn't object to this item, taking into account that items 2.4, 2.5 and 2.7 are related to the same frequency bands 71-76 GHz and 81-86 GHz and therefore priority of issues should be considered based on the workload of ITU-R. |
| 2.7 to consider the development of regulatory provisions for non-geostationary fixed-satellite system feeder links in the frequency bands 71-76 GHz (space-to-Earth and proposed new Earth-to-space) and 81-86 GHz (Earth-to-space), in accordance with Resolution **178 (WRC‑19)**; | SG 4 | **IRN**: Low Priority | **CHN (APG23-4/INP-44):** Considering the view  **IRN (APG23-5/INP-42):** doesn't object to this item, taking into account that items 2.4, 2.5 and 2.7 are related to the same frequency bands 71-76 GHz and 81-86 GHz. |
| 2.8 to study the technical and operational matters, and regulatory provisions, for space-to-space links in the frequency bands [1 525-1 544 MHz], [1 545-1 559 MHz], [1 610-1 645.5 MHz], [1 646.5‑1 660.5 MHz] and [2 483.5-2 500 MHz] among non-geostationary and geostationary satellites operating in the mobile-satellite service, in accordance with Resolution **249 (WRC‑19)**; | SG 4 | **IRN**: Low Priority | **CHN (APG23-5/INP-92R1):** the frequency bands 1 518-1 525MHz and 1 668-1 675 MHz, which are allocated to mobile-satellite service on a primary basis, should be studied in this agenda item  **IRN (APG23-5/INP-42):** Under consideration. |
| 2.10 to consider improving the utilization of the VHF maritime frequencies in Appendix **18**, in accordance with Resolution **363** **(WRC‑19)**; | SG 5 | **IRN**: Medium Priority | **CHN (APG23-4/INP-44):** Support  **IRN (APG23-5/INP-42):** could support this item  **Japan (APG23-5/INP-21):** MOD to consider channeling arrangements in the MF maritime mobile band and Appendix **17** |
| 2.11 to consider a new Earth exploration-satellite service (Earth-to-space) allocation in the frequency band 22.55-23.15 GHz, in accordance with Resolution **664 (WRC‑19)**; | WP 7B | **IRN**: No Priority | **CHN (APG23-4/INP-44):** Support  **IRN (APG23-5/INP-42):** objection |
| 2.13 to consider a possible worldwide allocation to the mobile-satellite service for the future development of narrowband mobile-satellite systems in frequency bands within the frequency range [1.5-5 GHz], in accordance with Resolution **248 (WRC-19)**; | SG 4 | **IRN**: Low priority | **CHN (APG23-4/INP-44):** Considering the view  **IRN (APG23-5/INP-42):** doesn't object to this item in order to finalize the ITU-R studies under WRC-23 Agenda Item 1.18 at WRC-27. IRN believes that decision on this topic should be considered under WRC-23 agenda item 1.18. Resolution **248 (WRC-19)** needs to be modified in order to be fully clear and without any ambiguity. The frequency bands for relevant ITU-R studies need to be finalized.  **AUS (APG23-5/INP-62):** Considering to support |

1. **New Resolution on agenda for the 2027 World Radiocommunication Conference**

*[Editor’s note: this section was developed in APG23-5. It will be reviewed in APG23-6.]*

RESOLUTION [ASP/AI10] (WRC‑23)

Agenda for the 2027 World Radiocommunication Conference

The World Radiocommunication Conference (Dubai, 2023),

…

resolves

to recommend to the Council that a WRC be held in 2027 for a maximum period of four weeks, with the following agenda:

1 on the basis of proposals from administrations, taking account of the results of WRC‑23 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the frequency bands under consideration, to consider the following items and take appropriate action:

….

1.x introduction of power flux-density (pfd) and equivalent isotropically radiated power (e.i.r.p.) limits in Article **21** of the Radio Regulations for satellite services (FSS, MSS, and BSS) to protect the fixed service in the frequency bands 71-76 GHz and 81-86 GHz in accordance with Resolution **775 (WRC‑23)**;

1.x improving the utilization of the VHF maritime frequencies in Appendix **18**, in accordance with Resolution **363** **(WRC‑23)**;

1. **Modification to preliminary agenda 2.2**

*[Editor’s note: this section was developed in APG23-5 without detailed discussion. It will be reviewed in APG23-6.]*

**Background**

*[Editor’s note: the background part will be reviewed and simplified in APG23-6.]*

Studies done under WRC-19 Agenda Item 1.5 and under WRC-23 Agenda Item 1.16 indicate that the same (Ka) frequency band can be used by both GSO and non-GSO systems to provide connectivity for ESIM, while ensuring due protection of existing services in those frequency bands**.**

Resolution **176 (WRC-19)** calls for studies on the use of the 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) frequency bands by aeronautical and maritime earth stations in motion communicating with geostationary space stations in the fixed-satellite service. While Resolution **176 (WRC-19)** was developed for GSO only, enhancements in antenna and terminal technology have enabled the usage of the 50/40 GHz frequency bands for both GSO FSS networks and non-GSO FSS systems. Non-GSO satellite constellations in these frequency bands enable the provision of broadband connectivity for a variety of applications and with increased flexibility/security and decreased latency. More of such non-GSO systems are planned to be deployed to meet the increasing consumer demand for access to broadband connectivity, regardless of location. One service area of noticeable growth for non-GSO systems is to provide broadband connectivity to users on-board vessels and aircraft.

Technical and operational issues and regulatory provisions for the operation of non-GSO FSS satellite systems in these frequency bands to ensure protection of GSO satellite networks has been addressed in WRC-19 under Resolution **159 (WRC-15)** having as a result a stable regulatory framework developed through Resolutions **769 (WRC-19)** and **770 (WRC-19)** as well as provisions as outlined in Nos. **22.5L** and **22.5M** of the Radio Regulations. Therefore Resolution **176 (WRC-19)** is proposed for modification at WRC-23 to facilitate deployment of broadband connectivity to ESIM in the 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) frequency bands to enable ESIM communicating with both GSO and non-GSO satellites, while making sure that other allocated services are protected.

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 space stations and non-geostationary space stations in the fixed-satellite service**

The World Radiocommunication Conference (Dubai, 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-satellite (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 and non-GSO FSS systems;

*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;

j) that the frequency band 37-43.5 GHz, or portions thereof, is identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT) (No. **5.550B**);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 or non-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/m2) 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[[2]](#footnote-2)\* 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.

1. **Modification to preliminary agenda 2.4**

*[Editor’s note: this section was developed in APG23-5 without detailed discussion. It will be reviewed in APG23-6.]*

**Background**

APG23-5 received proposals to modify item 2.4 of the preliminary agenda of WRC-27 as included in Resolution **812 (WRC-19)** and inclusion of that item in the agenda of WRC-27. It was agreed that the modified text of item 2.4 and its supporting Resolution as given in Attachment 1 to this document be forwarded to the next APG meeting for further consideration with a view to be included in the PACPs.

Draft Revision of RESOLUTION 775 (WRC‑23)

Determining power flux-density (pfd) and equivalent isotropically radiated power (e.i.r.p.) limits for satellite services (FSS, MSS, and BSS) to protect the fixed service   
in the frequency bands 71-76 GHz and 81-86 GHz

The World Radiocommunication Conference (Dubai, 2023),

considering

*a)* that WRC‑2000 made a number of different allocation changes to the frequency bands 71-76 GHz and 81-86 GHz based on the requirements known at the time;

*b)* that the frequency bands 71-76 GHz and 81-86 GHz are allocated on a primary basis, among other services, to the fixed service globally;

*c)* that the frequency band 71-76 GHz is also allocated to the fixed-satellite service (FSS) (space-to-Earth) and the mobile-satellite service (MSS) (space-to-Earth) and the frequency band 74-76 GHz is allocated to the broadcasting-satellite service;

*d)* that the frequency band 81-86 GHz is also allocated to the FSS and MSS (Earth-to-space);

*e)* that sharing conditions between the fixed service and satellite services in the frequency bands 71-76 GHz and 81-86 GHz could not be fully developed at WRC‑2000 due to lack of available information on these services at the time;

*f)* that now, more than 20 years on, there have been a number of significant technology advances and changes in network requirements in the fixed service, and the frequency bands 71-76 GHz and 81-86 GHz have become strategically important frequency bands for high-capacity fixed-service links, including backhaul for future mobile networks;

*g)* that WRC‑12 already addressed sharing and compatibility issues between the fixed service and passive services in the frequency bands 71-76 GHz and 81-86 GHz and relevant adjacent frequency bands,

recognizing

*a)* that there is now much more information available in the ITU Radiocommunication Sector (ITU‑R) on the characteristics and deployment of fixed-service systems;

*b)* that there are an increasing number of satellite filings in the frequency bands 71-76 GHz and 81-86 GHz;

*c)* that Article **21** and other provisions of the Radio Regulations currently do not contain the necessary technical and regulatory provisions to protect the fixed-service in the frequency bands 71-76 GHz and 81-86 GHz;

*d)* that Resolution **750 (Rev.WRC‑19)** already contains necessary provisions to protect passive services in the frequency bands and adjacent frequency bands from emissions of the fixed service in the frequency bands 71-76 GHz and 81-86 GHz, and there is no intention to change these provisions;

*e)* that there is no intention to change the existing allocations or status of those allocations in Article **5** of the Radio Regulations for the frequency bands 71-76 GHz and 81-86 GHz,

resolves to invite the ITU-R to conduct and complete in time for WRC-27

the appropriate studies to determine power flux-density (pfd) and equivalent isotropically radiated power (e.i.r.p) limits to be included in Article **21** of the Radio Regulations for satellite services (FSS, MSS, and BSS) to protect the fixed service in the frequency bands 71-76 GHz and 81-86 GHz,

resolves to invite the WRC-27

to consider the results of ITU-R studies as described in resolves to invite the ITU-R to conduct and complete in time for WRC-27, and include, as appropriate, pfd and e.i.r.p limits in Article **21** of the Radio Regulations for satellite services (FSS, MSS, and BSS) to protect the fixed service in the frequency bands 71-76 GHz and 81-86 GHz,

invites administrations

to participate actively in the studies as described in the *invites ITU-R to complete in time for WRC-27* and provide the information required for the studies by submitting contributions to ITU‑R.

1. **Modification to preliminary agenda 2.10**

*[Editor’s note: this section was developed in APG23-5 without detailed discussion. It will be reviewed in APG23-6.]*

**Background**

WRC-19 developed a preliminary agenda item for WRC-27 "to consider improving the utilization of the VHF maritime frequencies in Appendix 18, in accordance with Resolution 363 (WRC-19)" (item 2.10 of Resolution **812 (WRC-19)**). ITU-R is currently conducting studies to improve the automatic connection system (ACS) in the MF and HF maritime mobile frequency bands. The implementation of ACS will ensure that mariners have easy and reliable access to the radio links they need. Therefore, consider modifying Resolution **363 (WRC-19)** to include the MF and HF bands in the consideration of improving the use of maritime VHF frequencies in Appendix 18.

|  |  |  |
| --- | --- | --- |
| **Subject: Proposal for a WRC-27 agenda item** | | |
| **Origin: APT** | | |
| ***Proposal*:**  to consider improving utilization of the maritime frequencies in Appendix **18**, and improving channelling arrangements in the MF maritime mobile band and Appendix **17**, in accordance with Resolution **363 (Rev.WRC-23)** | | |
| ***Background/reason*:**  At WRC-19, preliminary Agenda Item for WRC-27 “to consider improving the utilization of the VHF maritime frequencies in Appendix **18**, in accordance with Resolution **363 (WRC-19)**” was developed (item 2.10 of Resolution **812 (WRC-19)**).  ITU-R is currently conducting studies on the improvement of the automatic connection system (ACS) in MF and HF maritime mobile frequency bands. The implementation of ACS will ensure simple and reliable access to the required radio links for the mariners.  Voice communication in the VHF maritime mobile band is one of the key elements of the safety of navigation. VHF voice communication should be clear and unambiguous in order to prevent maritime accidents such as collision and grounding. Recently, communications using digital technology such as digital selective calling (DSC), automatic identification system (AIS) and VHF data exchange (VDE) have been introduced to the VHF maritime frequency band, and consequently the number of analogue voice communication channels in this frequency band has been reduced. Since the demand for voice communication does not decline, the analogue voice communication channels start to congest. Digitalization is a solution to improve channel efficiency of the VHF maritime mobile band. The channel efficiency can be improved up to four times by converting each 25 kHz analogue voice channel in Appendix **18** into four 6.25 kHz digital voice channels.  Ranging mode (R-Mode) is a concept of new terrestrial radio navigation system using timing information on existing maritime radio systems to provide Global Navigation Satellite Systems (GNSS) independent shipborne position, navigation and timing (PNT). It is therefore considered a possible candidate as a regional backup of GNSS. There are currently two carriers considered for providing timing information, MF using existing Differential GNSS (DGNSS) radio beacon frequencies and VHF using existing VHF data exchange system (VDES) frequencies. In order to introduce R-Mode in the marine VHF band, it is necessary to add allocation for radionavigation service to the frequency band currently allocated to maritime mobile service.  The implementation of ACS will ensure simple and reliable access to the required radio links for the mariners. The International Maritime Organization (IMO) decided to introduce ACS in IMO performance standards for shipborne MF and MF/HF radio installations for the global maritime distress and safety system (GMDSS). Recommendations ITU-R M.493 and ITU-R M.541 are under revision in order to allow the introduction of an automatic connection system (ACS) based on DSC for communication in the MF and HF bands. ACS will require channelling arrangements for more working channels on an international basis, however that there is no global channel in the MF band, and some HF bands lack channels for intership operation in Appendix **17**. | | |
| ***Radiocommunication services concerned*:**  Maritime mobile service and radionavigation service | | |
| ***Indication of possible difficulties*:**  MF maritime mobile band and Appendixes **17** and **18** identify frequencies to be used for distress and safety communications and other maritime communications on an international basis. | | |
| ***Previous/ongoing studies on the issue*:**  Resolution **363 (WRC‑19)**  Recommendations ITU-R M.493, ITU-R M.541 and ITU-R M.1084-5  Report ITU-R M.2010-1,  Reports ITU-R M.[DIGITAL-VOICE] and M.[ACS] | | |
| ***Studies to be carried out by*:**  ITU-R Working Party 5B | ***with the participation of*:**  Other Working Parties as required, Member States, Sector Members, and International Organizations such as IMO, IALA etc. | |
| ***ITU‑R study groups concerned*:**  ITU-R Study Group 5 | | |
| ***ITU resource implications, including financial implications (refer to CV126)*:**  ITU-R Working Party 5B usually has meetings twice a year each requiring ten working days | | |
| ***Common regional proposal*:** Yes/No | | ***Multicountry proposal*:** Yes/No  ***Number of countries*:** |
| ***Remarks*** | | |

Draft Revision of RESOLUTION 363 (WRC‑23)

Improving the utilization of the VHF maritime  
 frequencies in Appendix 18, and improving the channelling arrangements in the MF maritime mobile band and Appendix 17

*[Editor's Note: another proposed modification to the title:* *Improving the resiliency, utilization and channelization of maritime radiocommunication in the MF/HF and VHF bands]*

The World Radiocommunication Conference (Dubai, 2023),

considering

*a)* that Appendix **18** identifies frequencies to be used for distress and safety communications and other maritime communications on an international basis;

*b)* that congestion on Appendix **18** frequencies requires consideration of efficient new technologies;

*c)* that the ITU Radiocommunication Sector (ITU‑R) is conducting ongoing studies on improving efficiency in the use of Appendix **18**;

*d)* that the use of digital technologies will make it possible to respond to the emerging demand for new uses and ease congestion;

*e)* that use of existing maritime mobile service (MMS) allocations, where practicable, for ship and port security and enhanced maritime safety would be preferable, particularly where international interoperability is required;

*f)* that changes made in Appendix **18** should not prejudice the future use of these frequencies or the capabilities of systems or new applications required for use by the MMS;

*g)* that the International Maritime Organization (IMO) has initiated a regulatory scoping exercise for the use of maritime autonomous surface ships (MASS);

h) that the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) is developing ranging mode (R‑Mode), which is a radionavigation system that is intended to provide a contingency system in case of temporary global navigation satellite system (GNSS) disruption, to support e‑navigation;

i) that ITU-R is currently conducting studies on the improvement of the automatic connection system (ACS) in MF and HF maritime mobile frequency bands;

j) that IMO decided to remove narrow-band direct-printing (NBDP) for distress and safety communications from the global maritime distress and safety system (GMDSS) in MF and HF bands,

recognizing

*a)* that it is desirable to enhance maritime safety and ship and port security via spectrum-dependent systems;

*b)* that ITU and relevant international organizations have initiated related studies on the use of digital technologies for maritime safety and ship and port security;

*c)* that studies will be required to provide a basis for considering possible regulatory provisions to improve maritime safety and ship and port security, which may need access to spectrum for experimental use;

*d)* that, in order to provide worldwide interoperability of equipment on ships, there should be harmonized technologies, or interoperable technologies, implemented under Appendix **18**;

e) that administrations’ and some relevant international organizations’ efforts to continue the development of R‑Mode to support the implementation of e-navigation may require a review of the Radio Regulations;

*f)* that the implementation of ACS will ensure simple and reliable access to the required radio links for the mariners;

*g)* that ACS will require channelling arrangements for working channels on an international basis;

*h)* that there is no global channel in the MF band, and some HF bands lack channels for intership operation in Appendix **17**;

*i)* that there are millions of vessels worldwide using analog voice VHF radios, and it may take a long term to change to a digital voice system,

noting

*a)* that WRC‑12, WRC‑15 and WRC-19 have reviewed Appendix **18** to improve use and efficiency for data communication using digital systems;

*b)* that maritime on-board communication systems have implemented digital technologies for voice communication as described in Recommendation ITU‑R M.1174 to improve efficient use of the frequency band 450-470 MHz;

*c)* that digital systems have been implemented in the land mobile service;

*d)* that this conference has reviewed MF and HF bands in RR Article **5** and Appendix **17** to introduce of ACS,

*Editor's Note:*

*- provide information on relevant ITU-R deliverables (Recommendations, Reports, Questions…);*

*- provide information on any relevant studies so far carried out in previous cycles, to avoid repeating studies previously performed,*

noting further

that WRC‑12, WRC‑15 and WRC-19 have reviewed Appendix **18** to improve efficiency and introduce frequency bands for new digital technology for data communication, e.g. for the introduction of the VHF data exchange system (VDES),

resolves to invite the ITU-R to conduct and complete in time for WRC-27

the appropriate studies on:

1 spectrum needs and possible changes to Appendix **18** in order to enable use of VHF maritime frequencies in the MMS for future implementation of new technologies, for improving efficient use of the maritime frequency bands;

2 spectrum needs and possible changes to the Radio Regulations for implementation of R‑Mode as a new maritime radionavigation service;

3 possible changes to the Radio Regulations for effective use of ACS,

*Editor's Note: changes to which part of RR is required?*

resolves to invite the WRC-27

to consider the results of ITU-R studies as described in *resolves to invite the ITU-R to conduct and complete in time for WRC-27*, and

1 to consider possible changes to Appendix **18** in order to enable use of VHF maritime frequencies in the MMS for future implementation of new technologies;

2 to consider possible changes to the Radio Regulations for implementation of R‑Mode;

3 to consider possible regulatory actions in the MF maritime mobile band and Appendix **17** for implementation of channelling arrangements,

invites administrations

to participate actively in the studies as described in the *invites ITU-R to complete in time for WRC-27* and provide the information required for the studies by submitting contributions to ITU‑R.

invites relevant international organizations

to participate actively in the studies by providing requirements and information that should be taken into account in ITU‑R studies,

instructs the Secretary-General

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

# Attachment 2

# Proposals on the preliminary agenda item Review the usage and sharing conditions of 13.75-14 GHz to enable efficient use of the band by uplink geostationary and non-geostationary FSS earth stations

*[Editor’s note: this Attachment was developed in APG23-4 and modified in APG23-5. It will be reviewed in APG23-6.]*

**Background**

A proposal was received in which major considerations are as follows:

1. Nos. **5.502** and **5.503** were made 30-20 years ago. Now, the services, system characteristics and their associated usage and application requirements in this 13.75-14 GHz might have changed over the last decades.
2. The use of smaller FSS earth stations at the band around 10-15 GHz has been witnessed an ascending trend. However, difficulties are witnessed in other parts of the band except 13.75-14 GHz in the uplink based on preliminary studies. For No.**5.502**, relieving the FSS earth station limitations on antenna sizes will improve the mismatch difficulty of the uplink and downlink Ku band, and alleviate the pressing and growing need for smaller FSS earth station’s use in the Ku band. Based on preliminary studies, relieving the FSS earth station antenna size can keep the interference potential into radiolocation and radionavigation services.
3. For No.**5.503**, FSS earth stations need to protect 5 specific SRS receiving earth stations within 8 SRS networks on a global scale. Preliminary studies show that among these 5 GSO to non-GSO space-to-space TDRS links, only the ISS one link is valid and need to be protected during its operational period until year 2030.

Having these observations, this proposal suggested to review the usage and [sharing conditions/constraints] of the band 13.75-14 GHz to enable efficient use of the band by uplink GSO and non-GSO FSS earth stations, including those of smaller antenna sizes.

**Proposals on the preliminary agenda item –   
GSO and non-GSO FSS in 13.75-14GHz**

|  |  |
| --- | --- |
| **Subject:**Review the usage and possible revision of [sharing conditions/constraints] of the frequency band 13.75-14 GHz to enable efficient use of the band by uplink FSS earth stations, including FSS earth stations using smaller antenna sizes | |
| **Origin:** China, India, Papua New Guinea, Singapore, Thailand | |
| **Proposal:**  Possible revisions to RR Nos. **5.502** and **5.503**, to enable efficient use of the frequency band 13.75-14 GHz by GSO and non-GSO uplink FSS earth stations, including FSS earth stations using smaller antenna sizes, in accordance with Draft New Resolution [GSO and non-GSO FSS in 13.75-14 GHz] (WRC-23) | |
| **Background/reason:**  The fixed-satellite service (FSS) has seen a big increase in the number of geostationary (GSO) satellite networks and non-geostationary (non-GSO) satellite systems in recent decades. The uses of smaller FSS earth stations at frequencies around 10-15 GHz have also been increasing 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 10-15 GHz range, not subject to RR Appendices **30**, **30A** or **30B**, that can efficiently be used to provide services by smaller GSO and non-GSO FSS earth station antennas, e.g. HTS or broadband user terminals and news gathering etc. The 13.75-14 GHz band was allocated globally by WARC-92 for FSS, but limitations were introduced through 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 use of smaller GSO and non-GSO FSS uplink earth station antennas in this frequency band are not allowed. The system characteristics and their associated usage and application requirements in this frequency band might have changed over the last decades. Therefore, based on the evolving needs for the efficient use of 13.75-14 GHz band for smaller uplink GSO and non-GSO FSS earth station antennas, identification of possible alternative [sharing conditions/constraints] for this band is required to meet the emerging demands for satellite applications in the FSS. | |
| **Radiocommunication services concerned:**  The concerned radiocommunication services in the 13.75-14 GHz band. | |
| **Indication of possible difficulties:**  TBD. | |
| **Previous/ongoing studies on the issue:**  Studies during WRC-03 study period. | |
| **Studies to be carried out by:**  ITU-R WP 4A as responsible group | **with the participation of:**  Other relevant WPs, Administrations, Sector Members |
| **ITU‑R study groups concerned:**  SG 4, SG 5, SG 7 | |
| **ITU resource implications, including financial implications (refer to CV126):**  No direct financial implications have been identified to date. | |
| **Common regional proposal:** TBD | **Multicountry proposal:** TBD  **Number of countries:** TBD |
| **Remarks** | |

Draft New Resolution [GSO and non-GSO FSS in 13.75-14 GHz] (WRC-23)

**Review the usage and possible revision of [sharing conditions/constraints] of the frequency band 13.75-14 GHz to enable efficient use of the band by uplink GSO  
and non-GSO FSS earth stations, including FSS   
earth stations using smaller antenna sizes**

The World Radiocommunication Conference (Dubai, 2023),

*considering*

1. that WARC-92 added an allocation to the fixed-satellite service (FSS) (Earth-to-space) in the band 13.75-14 GHz;
2. 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) fixed-satellite service (FSS) networks and 4.5m for non-geostationary (non-GSO) FSS systems under power flux-density and e.i.r.p. density limits;
3. that there is a great congestion in the geostationary 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;
4. that there is a lack of uplink bandwidth in the 13-15 GHz range that can be used efficiently, including by smaller earth station antennas, globally to feed the downlink capacity in the 10-13 GHz range;
5. that this band is shared with the radiolocation service under the conditions set out in No. **5.502**;
6. that the space research service has a secondary allocation in this band and the relevant [sharing conditions/constraints] are provided in No. **5.503**;
7. that for geostationary 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 fixed-satellite service; after that date, new geostationary space stations in the space research service will operate on a secondary basis;
8. that until those geostationary 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**;
9. that the use of the services sharing this band with the fixed-satellite service and the associated required co-existence conditions may have changed;
10. 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**);
11. 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 Earth-to-space and the space-to-Earth frequency bands in the 13-15 and 10-13 GHz ranges,

*recognizing*

1. that studies are required to develop regulatory changes to meet the growing requirements for spectrum that can be used efficiently by GSO and non-GSO FSS uplink earth stations, including by smaller earth station antennas in the 13-15 GHz range;
2. that in consideration of the 13.75-14 GHz band, there is a need to determine the co-existence conditions between the services sharing this band and the appropriate balance between them;

*resolves to invite ITU-R*

1. to conduct studies, in time for consideration by WRC-27, on the usage of the band 13.75-14 GHz and possible revisions to the [sharing conditions/constraints] in Nos. **5.502** and **5.503** to facilitate efficient use of the Earth-to-space and space-to-Earth FSS orbit and spectrum resources in the 13-15 and 10-13 GHz ranges and meet the evolving needs of FSS:
   1. to enable efficient use of the band by uplink GSO FSS earth stations, including FSS earth stations using smaller antenna sizes;
   2. to enable efficient use of the band by uplink non-GSO FSS earth stations, including FSS earth stations using smaller antenna sizes.

# Attachment 3

# Proposals on the preliminary agenda item Spectrum allocation and associated regulatory provisions to support use of the 51.4-52.4 GHz FSS (Earth-to-space) frequency band for gateway earth stations operating with non-GSO FSS systems on a primary basis

*[Editor’s note: this Attachment was developed in APG23-5 without detailed discussion. It will be reviewed in APG23-6.]*

**Background**

Proposals were received to study the use of 51.4-52.4 GHz band to enable use by gateway earth stations transmitting to non-geostationary FSS satellite orbit systems (Earth-to-space). Report ITU-R S.2461 demonstrated the need for additional FSS spectrum in the Earth-to-space direction for both geostationary-satellite orbit (GSO) FSS networks and non-GSO FSS systems. WRC-19, pursuant to Resolution **162 (WRC-15),** allocated the 51.4-52.4 GHz band to the FSS (Earth-to-space) on a primary basis, and adopted No. **5.555C** which limited the use of the FSS allocation to geostationary satellite networks and associated gateway earth stations with a minimum antenna diameter of 2.4 meters. The need for additional uplink spectrum in the 50 GHz range for NGSO FSS gateway earth station use continues.

RR No. 5.340 indicates that all emissions are prohibited to protect EESS (passive) and SRS (passive) services in the frequency band 52.6-54.25 GHz. While the frequency band is not allocated to radio astronomy service, RR No. 5.556 indicates that radio astronomy observations are carried out in the frequency band 51.4-54.25 GHz and that appropriate measures may have to be defined to protect radio astronomy service.

Submission of proposals for agenda items

|  |  |
| --- | --- |
| **Subject:**  Use of the 51.4 - 52.4 GHz band by gateway earth stations transmitting to non-geostationary satellite orbit systems operating in the FSS (Earth-to-space) | |
| **Origin:** Singapore, India | |
| ***Proposal*:**  to determine the suitability of revising conditions associated to the primary allocation to the FSS in the frequency band 51.4-52.4 GHz (Earth-to-space) to enable use by gateway earth stations of NGSO FSS networks (Earth-to-space), and the possible regulatory actions | |
| ***Background/reason*:**  *The need for additional FSS spectrum in the 50 GHz range 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. Under Agenda item 9.1 issue 9.1.9, WRC-19 added FSS (Earth-to-space) as primary allocation to 51.4-52.4 GHz limited to feeder links of GSO network with a minimum antenna size for earth station at 2.4m as per No. 5.555C.*  *Now, it is time for the ITU-R to consider expanding the use of the FSS (Earth-to-space) 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. Review of No. 5.555C would be required to consider associated regulatory provisions in accommodating NGSO use of FSS (Earth-to-space) in the band 51.4-52.4 GHz for gateway earth stations. 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. Possible inclusion of 51.4-52.4 GHz to the scope of Resolutions 769 & 770 (WRC-19) to ensure protection of geostationary satellite networks could also be considered.* | |
| ***Radiocommunication services concerned*:**  *The concerned radiocommunication services in the 51.4-52.4 GHz band.* | |
| ***Indication of possible difficulties*:**  *TBD* | |
| ***Previous/ongoing studies on the issue*:**  *WRC-19 agenda item 9.1 issue 9.1.9* | |
| ***Studies to be carried out by*:**  *ITU-R WP 4A as responsible group* | ***with the participation of*:**  *Other relevant WPs, Administrations, Sector Members* |
| ***ITU‑R study groups concerned*:**  *SG 4, SG 5, SG 7* | |
| ***ITU resource implications, including financial implications (refer to CV126)*:**  *No direct financial implications have been identified to date.* | |
| ***Common regional proposal*:** TBD | ***Multicountry proposal*:** TBD  ***Number of countries*:** TBD |
| ***Remarks*** | |

DRAFT RESOLUTION [AI10\_51.4-52.4 NGSO FSS] (WRC-23)

**Studies relating to the use of 51.4-52.4 GHz band 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, while the frequency band is not allocated to radio astronomy service, No. 5.556 indicates that radio astronomy observations are carried out in the frequency band 51.4-54.25 GHz and that appropriate measures may have to be defined to protect radio astronomy service;

*d)* that Report ITU-R S.2461 demonstrated the need for additional FSS spectrum in the Earth-to-space direction for both geostationary-satellite orbit (GSO) FSS networks and non-GSO FSS networks in the frequency band 51.4-52.4 GHz;

*e*) that Report ITU-R S.2462 presents sharing and compatibility studies between geostationary-satellite orbit (GSO) FSS networks and non-GSO FSS systems in 50/40 GHz;

*f)* 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 limit the use of the FSS allocation to GSO networks and associated gateway earth stations with a minimum antenna diameter of 2.4 meters;

*g)* that the need for additional uplink spectrum in the 50 GHz range for NGSO FSS gateway earth station 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 conditions associated to the primary allocation to the FSS in the frequency band 51.4-52.4 GHz (Earth-to-space) to enable use by gateway earth stations of NGSO FSS networks (Earth-to-space), and the possible regulatory actions;

 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 NGSO FSS systems and associated gateways, including possible associated regulatory actions and possible inclusion of 51.4-52.4 GHz to the scope of Resolutions 769 and 770 (Rev. WRC-19),

*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.

# Attachment 4

# Proposals on the preliminary agenda item Consider a new primary allocation to the fixed-satellite service in the space-to-Earth direction in 17.3-17.7 GHz in Region 3

*[Editor’s note: this Attachment was developed in APG23-5 without detailed discussion. It will be reviewed in APG23-6.]*

**Background**

There has been an increasing need for broadband satellite communications in recent years to provide high speed and high capacity broadband services to homes, vehicles, airplanes and ships and the fixed-satellite service (FSS) allocations in Ka-band are widely used by both GSO and NGSO satellites to cater to customer requirements. As there is mismatch between frequencies allocated to the FSS in the Earth-to-space and space-to-Earth directions in Region 3, it is critical to identify more downlink capacity in the Ka-band. This will enable efficient use of orbit and spectrum resources to meet demands for current and emerging satellite applications.

This frequency band 17.3-17.7 GHz is used in Region 3 by geostationary-satellite systems in the fixed-satellite service (Earth-to-space), limited to feeder links for the broadcasting-satellite service, subject to the application of No. **5.516**. Further, extending the FSS (space-to-Earth) allocation in 17.3-17.7 GHz to Region 3, which has been allocated to Region 1 and being studied under WRC-23 agenda item 1.19 for Region 2, will contribute to global harmonization.

**ANNEX 2 TO RESOLUTION 804 (WRC-19)**

Submission of proposals for agenda items

|  |  |
| --- | --- |
| **Subject:**  Consideration of a new primary allocation to the fixed-satellite service in the space-to-Earth direction in the frequency band 17.3-17.7 GHz in Region 3 | |
| **Origin: Australia/Singapore** | |
| ***Proposal*:**  *To consider a new primary allocation to the fixed-satellite service in the space-to-Earth direction in the frequency band 17.3-17.7 GHz in Region 3, while ensuring the protection of existing primary allocations in the same and adjacent frequency bands.* | |
| ***Background/reason*:**  *There has been an increasing need for broadband satellite communications in recent years to provide high speed and high capacity broadband services to homes, vehicles, airplanes and ships and the fixed-satellite service (FSS) allocations in Ka-band are widely used by both GSO and NGSO satellites to cater to customer requirements. As there is mismatch between frequencies allocated to the FSS in the Earth-to-space and space-to-Earth directions in Region 3, it is critical to identify more downlink capacity in the Ka-band. This will enable efficient use of orbit and spectrum resources to meet demands for current and emerging satellite applications. Further, extending the FSS (space-to-Earth) allocation in 17.3-17.7 GHz to Region 3, which has been allocated to Region 1 and being studied under WRC-23 agenda item 1.19 for Region 2, will contribute to global harmonization.* | |
| ***Radiocommunication services concerned*:**  *The concerned radiocommunication services in the 17.3-17.7 GHz band.* | |
| ***Indication of possible difficulties*:**  *TBD* | |
| ***Previous/ongoing studies on the issue*:**  *WRC-23 agenda item 1.19* | |
| ***Studies to be carried out by*:**  *ITU-R WP 4A as responsible group* | ***with the participation of*:**  *Other relevant WPs, Administrations, Sector Members* |
| ***ITU‑R study groups concerned*:**  *SG 4, SG 5, SG 7* | |
| ***ITU resource implications, including financial implications (refer to CV126)*:**  *No direct financial implications have been identified to date.* | |
| ***Common regional proposal*:** TBD | ***Multicountry proposal*:** TBD  ***Number of countries*:** TBD |
| ***Remarks*** | |

**Draft New Resolution**

**Primary allocation to the fixed-satellite service in the space-to-Earth direction in the frequency band 17.3-17.7 GHz in Region 3**

The World Radiocommunication Conference (Dubai, 2023),

*considering*

a) the need to encourage the development and implementation of new technologies in the fixed-satellite service (FSS) for broadband applications;

*b)* that FSS systems based on the use of new technologies associated with geostationary and non-geostationary satellite systems are capable of providing high-capacity and low-cost means of broadband communication even to the most isolated regions of the world;

*c)* that due to the orbital characteristics of non-geostationary satellite systems the constellations are capable of providing services globally;

*e)* that the Radio Regulations should enable the introduction of new applications of radiocommunication technology to ensure the operation of as many systems as possible in order to ensure efficient use of the spectrum;

*f)*  that there is a mismatch of usable downlink bandwidth in Region 3 in the 17-20 GHz range associated to the uplink range of 27-30 GHz;

*g)* that the frequency band 17.3-17.7 GHz is allocated in Region 3 on a primary basis to the FSS (Earth-to-space), subject to the application of No. **5.516**,

*noting*

1. that technology has been developed to provide more efficient use of the spectrum and to enable bi-directional sharing;
2. that bi-directional sharing between FSS (Earth-to-space) and FSS (space-to-Earth) is already considered in Regions 1 [and 2] for the frequency band 17.3-17.7 GHz;
3. that extending the FSS (space-to-Earth) allocation in 17.3-17.7 GHz to Region 3 will contribute to global harmonization;
4. that there is no other primary service in the frequency band 17.3-17.7 GHz apart from the FSS in Region 3.

*resolves*

that the studies referred in *invites the ITU Radiocommunication Sector* below shall protect radiocommunication services to which the frequency band is allocated on primary basis, in particular assignments to feeder links for the broadcasting-satellite service (BSS) contained in Appendix **30A**,

*invites the ITU Radiocommunication Sector*

to conduct, and complete in time for WRC-27, sharing and compatibility studies between the FSS (space-to-Earth) and the FSS (Earth-to-space), in order to consider a possible new primary allocation to the FSS (space-to-Earth) in the frequency band 17.3-17.7 GHz for Region 3, while ensuring the protection of existing primary allocations in the same and adjacent frequency bands, as appropriate, and without imposing any additional constraints on existing allocations to the FSS (Earth-to-space), including assignments to feeder links for the BSS contained in **Appendix 30A**.

*invites the 2027 World Radiocommunication Conference*

to consider the results of the above studies and take necessary actions, as appropriate,

*invites administrations*

to participate actively in the studies and provide the technical and operational characteristics of the systems involved by submitting contributions to the ITU Radiocommunication Sector.

# Attachment 5

# Proposals on the preliminary agenda item Studies towards potential new allocations to the MSS for satellite component of IMT in the frequency bands identified for IMT and/or allocated to MS below 7 GHz

*[Editor’s note: this Attachment was developed in APG23-5 without detailed discussion. It will be reviewed in APG23-6.]*

**Background**

A proposal was received which noted that with the extensive network deployment of IMT systems broadband and high-speed communication services for end users have been provided in densely populated areas. However, the deployment of IMT network is restricted by many factors such as geographical environment, operation and maintenance costs, and it is therefore uneconomical or even infeasible to deploy IMT base stations in the remote area. The mobile-satellite service (MSS) of non-geostationary-satellite (non-GSO) system is one of the effective means to make up for the insufficient coverage of the above ground mobile communication system. However, at present there is limited frequency bands allocated to mobile-satellite service below 7 GHz within which it is considered suitable to apply direct-to-phone service. Therefore, it is proposed to conduct studies for potential new allocations to the mobile satellite service (MSS) for satellite component of IMT in the frequency bands identified for IMT and/or allocated to MS below 7 GHz.

Template for the submission of proposals for agenda items

|  |  |
| --- | --- |
| Subject: Studies towards potential new allocations to the non-GSO mobile satellite service (MSS) for satellite component of IMT below 7 GHz | |
| **Origin:** China | |
| ***Proposal*:**  to study the feasibility of additional allocations of non-GSO MSS for satellite component of IMT below 7 GHz. | |
| ***Background/reason:***  In recent years, with the extensive network deployment of IMT 5G system in the world, broadband and high-speed communication services for mobile phone users have been provided in densely populated scenes such as cities and hot spots. However, in the remote areas such as air, sea, desert, grassland and forest, the ground mobile communication network is limited by many factors such as geographical environment and operation and maintenance cost, so it is impossible or inconvenient to deploy 5G base stations in these areas. Therefore, the broadband mobile communication application experience of individual users has declined or is limited. Mobile satellite service is one of the effective means to make up for the insufficient coverage of the above ground mobile communication system. At present, the application requirements and vision of the 6G is understudied, and the integration of space and ground is one of its important features. According to the schedule, the commercial operation of 6G system will be realized around 2030. Already, many satellite operators are actively cooperating with ground operators to carry out the construction of the integrated direct-to-phone satellite system. The frequency bands below 7GHz is a relatively mature band supported by the mobile phone terminal industry in the 5G and 6G.  With the progress of technology, by means of beam control, power control, electronic fence, out of band suppression, LEO constellation satellite mobile service system can effectively avoid harmful interference to existing services through cooperative operation with ground services.  At present, there is limited frequency allocations of mobile-satellite service below 7 GHz frequency band. It is suggested that in order to realize the construction of 6G space and ground integrated system as soon as possible, there is a need to allocate additional non-GSO mobile-satellite service within this frequency range.  The candidate frequency bands are considered to be the frequency bands as having been identified to IMT application and/or having been allocated primarily to MS service. | |
| ***Radiocommunication services concerned*:**  The concerned radiocommunication services below 7GHz band. | |
| ***Indication of possible difficulties*:**  *TBD*. | |
| ***Previous/ongoing studies on the issue*:**  Studies during WRC-12 study period, WRC-12 AI 1.25. | |
| ***Studies to be carried out by*:**  ITU-R WP 4C as responsible group | ***with the participation of*:**  Administrations, Sector Members, Interested Operators |
| ***ITU‑R study groups concerned*:**  SG 4, SG 5, SG 7 | |
| ***ITU resource implications, including financial implications (refer to CV126)*:**  No direct financial implications have been identified to date. | |
| ***Common regional proposal*:** TBD | ***Multicountry proposal*:** TBD  ***Number of countries*:** TBD |
| ***Remarks*** | |

RESOLUTION [below 7 GHz] (WRC-23)

Studies towards potential new allocations to the mobile satellite service (MSS) for satellite component of IMT in the frequency bands below 7 GHz

The World Radiocommunication Conference (Dubai, 2023),

considering

1. that there is a need to allow additional frequency bands allocated to mobile satellite service below 7 GHz to facilitate the complementation of the ground IMT for mobile users globally;
2. that IMT systems have evolved significantly in terms of spectrum identification, network deployment and radio access technology, with the standardization of IMT‑Advanced and IMT‑2020;
3. that studies of new IMT network topologies may provide increased spectrum efficiency for the frequency bands already identified for IMT;
4. that non-GSO MSS may be used as a part of IMT networks to provide mobile connectivity to underserved communities and in rural and remote areas;
5. that the bands 1980-2010 MHz, 2170-2200 MHz have been allocated to MSS together with FS and MS allocation;
6. that ITU‑R has performed studies on integrated MSS and ground component systems, and that some administrations have performed such usage;
7. With the development of technology, non-GSO MSS can be compatible and shared with existing services under specific technical method and conditions below 7GHz;
8. that in consideration of the frequency band below 7GHz for new allocation of MSS, there is a need to determine the co-existence conditions and regulatory provisions between the services sharing this band and the appropriate balance between them.

Noting

1. ITU-R Recommendation M.2083-0 addressed the IMT Vision - Framework and overall objectives of the future development of IMT for 2020 and beyond;
2. ITU-R Report M.2370, addressed the IMT Traffic estimates for the years 2020 to 2030;
3. The non-GSO mobile-satellite system can provide services to the target area, regardless of its geographical environment, such as air, sea, desert, high mountains, etc.;
4. that previous studies addressed spectrum requirements for the satellite component of International Mobile Telecommunications (IMT) - IMT‑2000 and systems beyond IMT-2000 (Report ITU‑R M.2077), and spectrum requirements for new broadband MSS applications in the 4‑16 GHz frequency range (Reports ITU‑R M.2218 and ITU‑R M.2221);
5. ITU-R Report M.2516-0 addressed future technology trends of terrestrial International Mobile Telecommunications systems towards 2030 and beyond;

recognizing

1. that the frequency bands 450-470 MHz, 470-698 MHz, 698-960 MHz have been identified for IMT according to Nos.5.286AA, 5.295,5.269A, 5.308A, 5.313A, 5.317A;
2. that the frequency bands 1427-1452 MHz, 1452-1492 MHz,1492-1518 MHz have been identified for IMT according to Nos. 5.341A, 5.341B, 5.341C, 5.346,5.346A;
3. that the frequency bands 1710-1885 MHz, 1885-2025 MHz, 2110-2200 MHz,2300-2400 MHz,2500-2690 MHz have been identified for IMT according to Nos. 5.384A, 5.388;
4. that the bands 3300-3400 MHz, 3400-3600 MHz, 3600-3700 MHz have been identified for IMT according to Nos.5.429B, 5.429D, 5.429F, 5.430A, 5.431B, 5.432A, 5.432B, 5.433A, 5.434;
5. that the bands 4800-4900 MHz has been identified for IMT application according to Nos.5.441A, 5.441B;

resolves to invite ITU Radiocommunication Sector

to conduct sharing and compatibilities studies, in time for consideration by WRC-27, between non-GSO mobile satellite service for satellite components of IMT and other services allocated on a primary basis in the frequency bands identified to IMT and/or allocated to MS below 7 GHz;

invites the 2027 World Radiocommunication Conference

based on the results of the above studies, to consider new allocation to the non-GSO mobile satellite service for the satellite component of IMT in frequency bands identified to IMT and/or allocated to MS below 7GHz.

# Attachment 6

# Proposals on the preliminary agenda item Consider technical and regulatory measures to ensure coexistence between SAR in the EESS (active) and radiodetermination service in 9 200-10 400 MHz

*[Editor’s note: this Attachment was developed in APG23-5 without detailed discussion. It will be reviewed in APG23-6.]*

**Background**

Proposals were received to study technical and regulatory measures to ensure coexistence between spaceborne synthetic aperture radars (SAR) in the Earth exploration-satellite service (active) and radiodetermination service in 9 200-10 400 MHz frequency bands. WRC-07 and WRC-15 extended the allocations to Earth exploration-satellite service (active) from 9 500-9 800 MHz to 9 200-10 400 MHz, which is shared with the radiodetermination service, including radiolocation and radionavigation services. The sharing and compatibilities studies conducted in ITU-R showed that the radars would be affected by spaceborne SAR with interference levels significantly exceed the specified I/N threshold value of I/N = -6 dB, and the time percentage of the occurrence of the interference would be low if the number of spaceborne SAR stations is limited.

During recent years, with the advancement of technology and the reduction of manufacturing cost, more and more SAR satellites were launched and operated, which is far beyond the expectations in WRC-07 and WRC-15 study cycles. In addition, the system parameters of SAR satellites also changed from the past study cycles. These changing situations would lead the coexistence between SAR satellites and radiodetermination service becomes more difficult than before. And it will probably result in harmful interference to radiodetermination radars happen more and more frequently and become a significant problem among administrations in the future.

Submission of proposals for agenda items

|  |  |
| --- | --- |
| **Subject:**  Measures to ensure coexistence between spaceborne synthetic aperture radars (SAR) in the Earth exploration-satellite service (active) and radiodetermination service in 9 200-10 400 MHz frequency bands | |
| **Origin:** [China, …] | |
| ***Proposal*:**  *To study and develop technical and regulatory measures to ensure coexistence between spaceborne synthetic aperture radars (SAR) in the Earth exploration-satellite service (active) and radiodetermination service in 9 200-10 400 MHz frequency bands.* | |
| **Background/reason:**  The Earth exploration-satellite service (active) is mainly used for active spaceborne sensors, including synthetic aperture radar (SAR), Altimeter, Scatterometer, Precipitation radar and Cloud profile radar. Amongst these applications, SAR is the most widely used spaceborne sensors. WRC-07 and WRC-15 successively extended the allocations to Earth exploration-satellite service (active) from 9 500-9 800 MHz to 9 200-10 400 MHz, which is shared with the radiodetermination service, including radiolocation and radionavigation services. During past years in ITU-R, especially in the WRC-07 and WRC-15 study cycles, numerous studies have been performed regarding the sharing between Earth exploration-satellite service (active) and radiodetermination service. Under the assumptions and system parameters at that time, the ITU-R studies concluded that, although the radars would be affected by spaceborne SAR with interference levels significantly exceed the specified I/N threshold value of I/N = -6 dB, the time percentage of the occurrence of the interference would be low. However, there are some deficiencies in the studies. One is not mentioning what the time percentage should be to ensure the radiodetermination service will not be adversely impacted by the pulsed type interference like spaceborne SAR emissions. The second is the conclusion was based on the assumptions that the expected number of the actually operated SAR satellites would be very limited, but which is not the case at nowadays.  During recent years, with the advancement of technology and the reduction of manufacturing cost, more and more SAR satellites were launched and operated by many countries. According to publicly available information, current and future SAR Satellites operated in X band has already exceeded 300, which is far beyond the expectations in WRC-07 and WRC-15 study cycles. In addition, the system parameters of SAR satellites also changed from the past study cycles during recent years. These changing situations would lead the coexistence between SAR satellites and radiodetermination service becomes more difficult than before. And it will probably result in harmful interference to radiodetermination radars happen more and more frequently and become a significant problem among administrations in the future  Therefore, it is necessary to conduct studies on the technical and regulatory measures to ensure coexistence between spaceborne synthetic aperture radars (SAR) in the Earth exploration-satellite service (active) and radiodetermination service in 9 200-10 400 MHz frequency bands with the aim to facilitate the operation of both side systems. | |
| ***Radiocommunication services concerned*:**  Earth exploration-satellite service (active), radiolocation service and radionavigation service | |
| ***Indication of possible difficulties*:**  *TBD*. | |
| ***Previous/ongoing studies on the issue*:**  *Studies during WRC-07, WRC-15 study periods.* | |
| ***Studies to be carried out by*:**  ITU-R WP [5B/7C] as responsible group | ***with the participation of*:**  Other relevant WPs, Administrations, Sector Members |
| ***ITU‑R study groups concerned*:**  SG 5, SG 7 | |
| ***ITU resource implications, including financial implications (refer to CV126)*:**  No direct financial implications have been identified to date. | |
| ***Common regional proposal*:** TBD | ***Multicountry proposal*:** TBD  ***Number of countries*:** TBD |
| ***Remarks*** | |

RESOLUTION [Coexistence between Spaceborne SAR and RDS] (WRC-23)

**Studies of technical and regulatory measures to ensure coexistence between spaceborne synthetic aperture radars in the Earth exploration-satellite service (active) and radiodetermination service in the 9 200-10 400 MHz frequency band**

The World Radiocommunication Conference (Dubai, 2023),

*considering*

1. that the Earth exploration-satellite service (active) is used for various active spaceborne sensor applications, among which synthetic aperture radar (SAR) is the most widely used application;
2. that following the decisions of WRC-07 and WRC-15, the allocation of the Earth exploration-satellite service (active) in X band was extended from 9 500-9 800 MHz to 9 200-10 400 MHz, which is shared with the radiodetermination service, including radiolocation and radionavigation services;
3. that under the assumptions and system parameters before WRC-15, the ITU-R studies concluded that the time percentage of the occurrence of the interference to the radiodetermination service would be low, and based on these conclusions the two WRCs made the extended allocations to Earth exploration-satellite service (active) successively;
4. that in recent years, with the advancement of technology and the reduction of cost, the number of SAR satellites in the 9 200-10 400 MHz band increased significantly through the world, which is far beyond the assumptions made in the past ITU-R studies;
5. that the system parameters of SAR satellites also changed from the past ITU-R studies during recent years;
6. that the emerging situations in *considering d)* and *e)* would lead the coexistence between SAR satellites and radiodetermination service becomes more difficult than before;
7. that there are already indications that some radiodetermination radars have suffered harmful interference from SAR satellites in the 9 200-10 400 MHz band;
8. that it will be very likely that harmful interference to radiodetermination radars happen more and more frequently and become a significant problem among administrations in the future;

*recognizing*

1. that the importance of the continuing need for protection for the radiodetermination systems operating in the frequency band 9 200-10 400 MHz;
2. that No. **5.476A** states that “In the band 9 300-9 800 MHz, stations in the Earth exploration-satellite service (active) and space research service (active) shall not cause harmful interference to, nor claim protection from, stations of the radionavigation and radiolocation services. (WRC‑07)”;
3. that No. **5.474D** states that “stations in the Earth exploration-satellite service (active) shall not cause harmful interference to, or claim protection from, stations of the maritime radionavigation and radiolocation services in the frequency band 9 200-9 300 MHz, the radionavigation and radiolocation services in the frequency band 9 900-10 000 MHz and the radiolocation service in the frequency band 10.0-10.4 GHz.  (WRC‑15)” ;
4. that the aeronautical radionavigation service operating in the frequency band 9 000-9 200 MHz and the maritime radionavigation service operating in the frequency band 9 200-9 500 MHz are used by safety service systems, in accordance with Nos. **1.59** and **4.10**;
5. that Recommendation ITU-R M.1796 contains the technical characteristics and protection criteria for radars operating in the radiodetermination service in the frequency range 8 500-10 680 MHz;

*noting*

1. that No. **5.474A** stipulates that the use of the frequency bands 9 200-9 300 MHz and 9 900-10 400 MHz by the Earth exploration-satellite service (active) is subject to agreement to be obtained under No. **9.21** from a number of administrations;
2. that No. **21.16** provides power flux-density limit at the Earth’s surface produced by emissions from Earth exploration-satellite service (active) in the 9 900-10 400 MHz frequency band with respect to the protection of fixed service;

*resolves to invite ITU- Radiocommunication Sector*

1 to identify the representative technical characteristics of the spaceborne synthetic aperture radars (SAR) in the Earth exploration-satellite service (active) in 9 200-10 400 MHz frequency bands which could reflect the latest technology and design applied by recent operated SAR satellites;

2 to study the appropriate protection criteria for radiodetermination service in 9 200-10 400 MHz frequency bands from pulsed type interference, in particular the time percentage or probability of interference which could be tolerated by radiodetermination service;

3 to conduct studies, in time for consideration by WRC-27, on the technical and regulatory measures to ensure coexistence between spaceborne synthetic aperture radars (SAR) in the Earth exploration-satellite service (active) and radiodetermination service in 9 200-10 400 MHz frequency bands;

4 to identify, in time for consideration by WRC-27, possible changes to No.**21.16** and/or other relevant regulatory changes to the Radio Regulations.

*invites the 2027 World Radiocommunication Conference*

to consider the results of the above studies and take appropriate action,

*invites administrations*

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

# Attachment 7 Proposals on the preliminary agenda item To consider the development of a regulatory framework for non-GSO FSS satellite systems, to ensure the protection of GSO FSS and BSS networks as well as the long-term sustainability, the equitable access, and rational and compatible use of the non-GSO orbital and spectrum resources

*[Editor’s note: this Attachment was developed in APG23-5 without detailed discussion. It will be reviewed in APG23-6.]*

**Background**

In recent years, the number of non-GSO satellites launched and operated has grown explosively, which has triggered a preemption of radio-frequency spectrum and associated orbit resources in outer space. On the one hand, it would cause potential interference to the GSO systems. And on the other hand, considering the limited available radio-frequency spectrum and associated orbit resources, the subsequent development of space services in developing countries is seriously affected. This situation has been recognized by ITU, and the Plenipotentiary Conference (Bucharest, 2022) have approved a new resolution to establish the principle of equitable utilization and promote the sustainability of the radio-frequency spectrum and associated orbit resources used by space services.

In the WRC-23 study period, agenda item 7 topic J is discussing parts of the issues mentioned-above. Some methods of topic J propose to introduce the concept of consultation meeting. However, even though a method is adopted by the WRC-23 for topic J, the method will not address how to guarantee equitable and rational access to the radio-frequency spectrum and associated orbit resources for today and in the future.

The developing countries have the right to access the relevant resources and deploy their own non-GSO systems. Due to the cost and complexity of non-GSO systems, small-scale non-GSO constellation may be a realistic option for developing country. The giant constellations usually can have greater flexibility and capability to avoid harmful interference with small-scale constellations. Therefore, it is fairer and more feasible for the giant-constellation to take more measures to achieve compatibility with small-scale non-GSO systems to reserve development opportunities for developing countries who is willing to deploy a non-GSO system and has less capability to deploy a giant-constellation.

Therefore it is necessary to conduct studies on the technical measures and regulatory frameworks to ensure that the protection of GSO systems and the limited non-GSO spectrum and associated orbit resources can be equally accessed and rationally and compatibly used among all countries.

**Annex 2 to Resolution 804**

**Template for the submission of proposals for agenda items**

|  |  |
| --- | --- |
| **Subject:** Measures to ensure the protection of GSO systems and the long-term sustainability as well as the equitable access to, and rational and compatible use of the non-GSO orbital and spectrum resources. | |
| **Origin:** China | |
| ***Proposal*:**  *To consider the development of a regulatory framework for non-geostationary-satellite (non-GSO) FSS satellite systems, to ensure the protection of GSO FSS and BSS networks operating* *co-frequency in the frequency bands above as well as the long-term sustainability, the equitable access, and rational and compatible use of the non-GSO orbital and spectrum resources.* | |
| **Background/reason:**  In recent years, the number of non-GSO satellites launched and operational has grown explosively, which has triggered a pre-emption of radio-frequency spectrum and associated orbit resources in outer space. On the one hand, it would cause potential interference to the GSO systems. And on the other hand, considering the limited available radio-frequency spectrum and associated orbit resources, the subsequent development of space services in developing countries is seriously affected. This situation has been recognized by ITU, and the Plenipotentiary Conference (Bucharest, 2022) have approved a new resolution to establish the principle of equitable utilization and promote the sustainability of the radio-frequency spectrum and associated orbit resources used by space services.  Therefore, it is necessary to conduct studies on the technical measures and regulatory frameworks for non-GSO systems operating co-frequency to ensure that the protection of GSO systems and the limited non-GSO spectrum and associated orbit resources can be equally accessed and rationally and compatibly used among all countries. | |
| ***Radiocommunication services concerned*:**  Fixed-satellite service | |
| ***Indication of possible difficulties*:**  *TBD*. | |
| ***Previous/ongoing studies on the issue*:**  *Studies during WRC-19 study periods, WRC-19 AI 7 Topic J* | |
| ***Studies to be carried out by*:**  ITU-R WP 4A as responsible group | ***with the participation of*:**  Administrations, Sector Members, Interested Operators |
| ***ITU‑R study groups concerned*:**  SG 4 | |
| ***ITU resource implications, including financial implications (refer to CV126)*:**  No direct financial implications have been identified to date. | |
| ***Common regional proposal*:** TBD | ***Multicountry proposal*:** TBD  ***Number of countries*:** TBD |
| ***Remarks*** | |

**Draft New Resolution   
[Development a regulation framework for non-GSO satellite systems] (WRC-23)**

**Studies towards the development of a regulatory framework for non-geostationary (non-GSO) FSS satellite systems to ensure the long-term sustainability and equitable access, and rational and compatible use of the non-GSO orbital and spectrum resources**

The World Radiocommunication Conference (Dubai, 2023),

*considering*

1. that radio frequencies and any associated orbits are limited natural resources and that they must be used rationally, efficiently and economically;
2. the multiple non-GSO FSS systems is operating or planning to operate in the same frequency bands;
3. that some non-GSO FSS systems contain tens to hundreds of thousands of satellites and are considered large constellations;
4. that these large constellations in *considering c)* may have already pre-empt entire frequency bands subject coordination procedure under Section II of Article **9**, with almost no practical possibility for administrations to comment under Nos. **9.12** and **9.12A** to resolve sharing difficulties;
5. that, in accordance with No.**22.2**, non-GSO systems shall not cause unacceptable interference to GSO FSS and GSO BSS networks and, unless otherwise specified in the Radio Regulations, shall not claim protection from GSO FSS networks;
6. that Resolution **76 (Rev. WRC-15)** requests administrations operating or planning to operate non-GSO systems to take all necessary measures expeditiously to reduce the aggregate epfd levels to those given in Article **22** to protect GSO FSS networks;
7. that, in accordance with No. **22.5I**, a non-GSO FSS system operating in relevant frequency bands which is in compliance with the equivalent power flux-density (epfd) limits specified in Article **22** shall be considered as having fulfilled its obligations under No. **22.2** with respect to any GSO network, irrespective of the dates of receipt by the Bureau of the complete coordination or notification information;
8. that the aggregate interference from multiple non-GSO FSS systems will be related to the actual number of systems sharing a frequency band based on the single-entry operational use of each system;
9. that regulatory challenges emerge when for a large constellation is divided into use multiple filings each of which is complying with the epfd limits stated in Article **22**;
10. that more precise sharing strategies, including quantitative technical and regulatory framework, are required in order to ascertain the compatibility between non-GSO FSS satellite systems when large constellations are involved;
11. that equitable access to, rational and compatible use of limited radio-frequency spectrum and associated orbit resources by developing countries who are not capable of deploying a large-scale non-GSO system should be ensured,

*Noting*

1. that Recommendation ITU-R S.1503 provides guidance on how to compute the equivalent power flux-density (epfd) levels from a non-GSO system into GSO earth stations and satellites;
2. that Recommendation ITU‑R S.1588 “Methodologies for calculating aggregate downlink equivalent power flux-density produced by multiple non-geostationary fixed-satellite service systems into a geostationary fixed-satellite service network”;
3. that ITU Resolution **219 (Bucharest, 2022)** 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,

*recognizing*

1. that non-GSO FSS systems may need to implement interference mitigation techniques such as avoidance angles, Earth station site diversity and GSO arc avoidance, to facilitate sharing frequencies among non-GSO FSS systems and to protect GSO FSS and GSO BSS networks;
2. that administrations operating or planning to operate non-GSO FSS systems will need to agree cooperatively through consultation meetings to share the aggregate interference allowance (aggregate epfd level) for all non-GSO FSS systems sharing the frequency bands listed in *considering a)* in order to achieve the desired level of protection for GSO FSS and GSO BSS networks that is stated in Article **22**;
3. that large constellations have more flexibility, and can take a variety of mitigation measures to achieve the compatibility with small-scale non-GSO systems;
4. that it is necessary to guarantee in practice, to equitable and rational access to the non-GSO radio-frequency and associated orbit resources for the developing countries;
5. that current Radio Regulations lack an appropriate regulatory framework to address the challenges of large constellation management mentioned in *considering h), i) and j)*,

*resolves to invite ITU Radiocommunication Sector*

1 to continue its studies and to develop, as appropriate and as a matter of urgency, a suitable methodology for calculating the aggregate epfd produced by all non-GSO systems operating or planning to operate co-frequency in the frequency bands referred to in *considering a)* above into GSO FSS and GSO BSS networks, which may be used to determine whether the systems are in compliance with the aggregate power levels specified in Article **22**, taking into account relevant elements of Recommendation ITU-R S.1588, Recommendation ITU-R S.1503, and other relevant Recommendations, as appropriate;

2 to develop, as a matter of urgency, a suitable regulatory framework for the operation of all non-GSO systems operating co-frequency to ensure that the aggregate power levels given in Article **22** are met, as well as the equitable access to, rational and compatible use of the radio-frequency spectrum and associated orbit resources for administrations operating or planning to operate non-GSO systems;

3 to complete the studies in time for WRC-27,

*invites the 2027 World Radiocommunication Conference*

to review the results of these studies and take appropriate action.

**Attachment 8  
Proposals on the preliminary agenda item  
Review and update regulatory provisions for sharing between non-GSO systems and GSO networks in the portions of 14/11 GHz and 30/20 GHz frequency bands in which Article 22 epfd limits apply**

A proposal was received for a new agenda item for WRC-27 to review and update the regulatory provisions for spectrum sharing between non-GSO systems and GSO networks in the portions of the 14/11 GHz and 30/20 GHz frequency bands in which No. **22** epfd limits apply.

*[Editor’s note: the below paragraph was not agreed at APG23-5.]*

[Non-geostationary-satellite (“non-GSO”) systems in the Ka- and Ku-bands have recently become an important reality. No. **22** of the Radio Regulations (RR) contains provisions for uplink and downlink equivalent power flux-density (epfd↑ and epfd↓) limits. However, non-GSO systems and GSO networks are vastly different today than the systems that were considered in developing the No. **22** epfd limits in 1997 and 2000. Our knowledge about how NGSO systems and GSO networks operate in practice has advanced significantly. More importantly, ITU-R doc [S.2462-0 (07/2019)](https://www.itu.int/pub/publications.aspx?lang=en&parent=R-REP-S.2462-2019),which led to the development of the non-GSO-GSO sharing framework in the Q/V bands, demonstrated that No. **22** epfd limits are spectrally inefficient, having been derived in a manner that is known to lead to spectrum inefficiencies. Equally important, the long‑term epfd limits of No. **22** unduly and unnecessarily constrain non-GSO systems, as it easily demonstrated that all limits, when translated into I/N, exceed by far -12.2, which corresponds to 6% increase in ΔT/T.]

\_\_\_\_\_\_\_\_\_\_\_\_

1. The appearance of square brackets around the applicability date of Resolution 176 is understood to mean that WRC-23 will consider and revise as appropriate if Resolution 176 will include communication of A-ESIM and M\_ESIM with non-GSO systems. [↑](#footnote-ref-1)
2. \* 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. [↑](#footnote-ref-2)