WEATHER CLIMATE WATER
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WMO OMM
World Meteorological Organization
Organisation météorologique mondiale
Organización Meteorológica Mundial
Всемирная метеорологическая организация
المنظمة العالمية للأرصاد الجوية
世界气象组织

1950-2025
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Annex: 1

Subject: World Meteorological Organization (WMO) preparation and coordination of the World Radiocommunication Conference in 2027 (WRC-27)

Action required: To inform your national spectrum regulator about the Preliminary WMO Position on the WRC-27 agenda

Dear Sir/Madam,

I would like to bring to your attention that several agenda items of the upcoming International Telecommunication Union (ITU) World Radiocommunication Conference in 2027 (WRC-27) are of prime interest to the meteorological community. The World Radiocommunication Conferences (WRC) are held every four years to review and revise the Radio Regulations, the international treaty governing the use of the radio-frequency spectrum and the geostationary-satellite and non-geostationary-satellite orbits.

At its meeting held from 26 to 28 February 2025, the WMO Expert Team on Radio-Frequency Coordination (ET-RFC) further elaborated on the Preliminary WMO Position on the WRC-27 agenda (see annex).

As WMO only has an observer status at these conferences, it is essential that the importance of the issues relevant to National Meteorological and Hydrological Services is properly recognized and accounted for by your National Radiocommunication Authority acting at the conference.

To support your efforts in coordinating with your national spectrum regulator in preparation for WRC-27, WMO has developed its position on the WRC-27 agenda. You are therefore kindly encouraged to promote the WMO position on the relevant agenda items by engaging with your national spectrum regulator and seeking support from your National Radiocommunication Authority on these matters.

Should you have any additional input or questions related to radio-frequency matters, please do not hesitate to contact the WMO Secretariat (Ms Natalia Donoho, ndonoho@wmo.int).

I would like to express my appreciation for your continued support in promoting the activities of WMO.

Yours faithfully,

Ms Ko Barrett
for the Secretary-General

To: Permanent Representatives of Members with WMO

cc: National Focal Points on Radio Frequency matters
Mr Michel Jean, President of INFCOM
Ms Estelle Grueter, SC-ON Chair

Ref.: 03431/2025-L7 I/SSU

World Meteorological Organization **ET-RFC-6**

COMMISSION FOR OBSERVATION, INFRASTRUCTURE AND INFORMATION SYSTEMS

Expert Team Radio Frequency Coordination
26–28 February 2025, Face2Face Session 1.III.2025

PRELIMINARY WMO POSITION ON THE WORLD RADIOCOMMUNICATION CONFERENCE 2027 (WRC-27) AGENDA

1. Introduction

World Meteorological Organization (WMO) Members through their National Meteorological and Hydrological Services (NMHSs) and supporting agencies, including operators of space-based observing systems, make available a wide range of essential services to observe weather, water, climate and related environmental events.

The information gathered through these observations is vital for the global community and contributes to ensuring safety of life and property and in the longer term to implementing the global development agendas, such as the 2030 agenda for Sustainable Development[1], the Paris Climate Agreement, the Sendai Framework for Disaster Risk Reduction and the Early Warnings for All initiative[2].

The observing networks provided by WMO Members form the backbone of the WMO Integrated Global Observing System (WIGOS) and are critically dependent on the use of radiofrequencies for the sensing and dissemination of data and information.

In this context, Resolution **673** of the International Telecommunication Union (ITU) World Radiocommunication Conference (Geneva, 2012)[3] observes that:

- Earth observation data are essential for monitoring and predicting climate change, for disaster prediction, monitoring and mitigation, for increasing the understanding, modelling and verification of all aspects of climate change, and for related policymaking;
- Many observations are performed over the entire world which require spectrum-related issues to be considered on a worldwide basis;
- Earth observations are performed for the benefit of the whole international community and the data are generally made available at no cost;

and resolves:

[1] See: Sustainable Development Goals (wmo.int)

[2] See: Executive Action Plan 2023–2027 (The United Nations Global Early Warning Initiative for the Implementation of Climate Adaptation): EARLY WARNINGS FOR ALL: Executive Action Plan 2023 | E-Library (wmo.int)

[3] World Radiocommunication Conference Resolutions are contained in Volume 3 of the in-force version of the Radio Regulations. The Radio Regulations can be obtained at: https://www.itu.int/hub/publication/r-reg-rr-2024/

- To continue to recognize that the use of spectrum by Earth observation applications has a considerable societal and economic value;

- To urge administrations to take into account Earth observation radio-frequency requirements and in particular protection of the Earth observation systems in the related frequency bands;

- To encourage administrations to consider the importance of the use and availability of spectrum for Earth observation applications prior to taking decisions that would negatively impact the operation of these applications.

In addition to meteorological observations, the WMO mandate also covers related environmental observations, including observations of space weather. The collection and exchange of space weather data are important for detecting solar activity events, including solar flares and high energetic particles, and their relevant consequences for the Earth's geomagnetic and ionospheric conditions, and other space weather phenomena that impact services critical to the national economies and public safety.

Resolution **675** of the ITU World Radiocommunication Conference (Dubai, 2023) resolves:

- To recognize the importance of spectrum usage by space weather applications for monitoring space weather phenomena and events that impact services critical to the economy, safety and security of administrations and the populations of their countries;

- To urge administrations to take into account space weather radio-frequency requirements and in particular protection of the related frequency bands.

The development of new, mass-market and value-added radio applications is putting increasing pressure on the frequency bands used for meteorological purposes. This presents potential risks of limiting meteorological and other related environmental applications, but also opportunities for enhancing observations.

WMO remains committed to working with ITU towards optimizing the use of the radio-frequency spectrum for the benefit of the global community.

This document reflects the WMO position on the agenda of the World Radiocommunication Conference 2027 (WRC-27)[4].

2. General comments

WIGOS comprises components that make use of a wide number of different radio applications and services, some of which may be affected by WRC-27 decisions.

Space-borne sensing of the Earth's surface and atmosphere is of critical and growing importance in operational and research meteorology, in particular for mitigating the impact of weather, water and climate related disasters, and in the scientific understanding, monitoring and prediction of climate change and its impacts.

The impressive progress made in recent years in weather, water and climate analysis and forecasts, including warnings for dangerous weather phenomena (heavy rain, storms, cyclones, etc.) and solar activity that affect all populations and economies, is to a great extent attributable to space-borne observations and their assimilation in numerical weather and environmental prediction models.

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[4] ITU-R Resolution **813 (WRC-23)** "Agenda for the 2027 World Radiocommunication Conference"

2.1 Space-based observations

Space-borne passive sensing for meteorological applications is performed in bands allocated to the Earth exploration-satellite (passive) and meteorological-satellite services. Passive sensing requires the measurement of naturally occurring radiation, usually of very low-power levels, which contains essential information on the physical process under investigation.

The relevant frequency bands are determined by fixed physical properties (molecular resonance) that cannot be changed, ignored or duplicated in other bands. Therefore, these frequency bands are an important natural resource. Even low levels of interference received by a passive sensor may degrade its data, as the measurement sensitivity is designed for the observation of changes in natural background radiation. In addition, in most cases, these sensors are not able to discriminate between natural and man-made radiation.

For passive sensing bands shared with active services, the situation is becoming increasingly critical with an increased density of terrestrial active devices and serious cases of interference already being reported.

In the more critical passive sensing frequency bands, Radio Regulation (RR) No **5.340**[5] stating that "all emissions are prohibited" enables in principle passive services to deploy and operate their systems with the highest reliability. However, in some cases this protection appears to be insufficient due to unregulated and potentially mass-market short-range devices allowed nationally to operate in these bands or unwanted emissions from adjacent bands not adequately regulated to ensure the protection of Earth exploration-satellite service (passive) (EESS (passive)) systems from interference. Several geophysical parameters contribute, at varying levels, to natural emissions, which can be observed at a given frequency and present unique properties. Therefore, measurements at several frequencies in the microwave spectrum must be made simultaneously in order to isolate and retrieve each individual contribution and to extract the parameters of interest from the given set of measurements.

Consequently, interference affecting a given passive frequency band can cause disturbances in the overall measurement of a given environmental variable. Each passive frequency band cannot hence be considered on its own but should be seen as a component of a complete space-borne passive sensing system.

It should also be noted that full global data coverage is of particular importance for most weather, water and climate applications and services.

Space-borne active sensing, performed by altimeters, rain and cloud radars, scatterometers and synthetic aperture radars[6], provides meteorological and climatology activities with important information on the state of the ocean, ice and land surfaces and atmospheric phenomena.

Also, of great importance is the availability of sufficient and well-protected radio-frequency spectrum allocations to the Earth exploration-satellite and meteorological-satellite services for telemetry, telecommand and control (2200–2290 MHz and 2025–2110 MHz) as well as for satellite downlink of the collected data (1675–1710 MHz, 7450–7550 MHz, 7750–7900 MHz, 8025–8400 MHz and 25.5–27 GHz).

2.2 Surface-based and in-situ observations

In addition, meteorological radars and wind profiler radars are important surface-based instruments in the meteorological observation process. Radar data are input to nowcasting and to numerical weather and environmental prediction models for short-term and medium-term

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[5] Radio Regulations footnotes are found in Volume 1 of the Radio Regulations. The Radio Regulations can be obtained at: https://www.itu.int/hub/publication/r-reg-rr-2024/.

[6] Synthetic Aperture Radars (SAR) provide complementary information, which is useful for flood disaster management and many other applications.

forecasting. There are currently about one hundred wind profiler radars and several hundreds of meteorological radars worldwide that perform wind and precipitation measurements. These systems play a crucial role in the immediate meteorological and hydrological alert processes. Meteorological radar networks represent the last line of defence in a disaster warning strategy against loss of life and property in flash floods or severe storm events.

Meteorological aids systems, mainly radiosondes, are the main source of atmospheric in-situ measurements (temperature, relative humidity and wind speed) with the high resolution to provide real-time vertical atmospheric profiles that are and will remain essential for operational meteorology, including weather analysis prediction and warnings, as well as for climate monitoring. In addition, these in-situ measurements are essential for calibrating space-borne remote sensing, in particular passive sensors.

2.3 WMO actions

The nineteenth session of the World Meteorological Congress (Geneva, 2023), attended by 193 Member countries, adopted Resolution 31 (Cg-19)[7] in which all WMO Member countries are urged to make all efforts to do their utmost to ensure the availability and protection of suitable radio-frequency bands required for meteorological and related environmental operations and research.

Additionally, WMO Resolution 31 (Cg-19) "… stresses that some radio-frequency bands are a unique natural resource due to their special characteristics and natural radiation enabling space-borne passive sensing of the atmosphere and the Earth's surface, which deserve adequate allocation to the Earth exploration-satellite service (passive) and absolute protection from interference", and "… expresses its serious concern at the continuing threat to several radio-frequency bands allocated to the meteorological aids, meteorological-satellite, Earth exploration-satellite and radiolocation (weather and wind profiler radars) services posed by the development of other radiocommunication services".

The dependency of observing systems on radio-frequency management has long-term ramifications on the sustainability and usability of essential weather, water, climate and other related environmental observations that contribute to the Observations and Monitoring pillar of the Global Framework for Climate Services (GFCS).

3. Preliminary WMO position on WRC-27 agenda items

Among WRC-27 agenda items, 14 items or topics are related to frequency bands or issues of prime interest or concern for meteorology and related environmental fields:

Agenda item 1.1:	Fixed-satellite service (FSS) aeronautical and maritime Earth stations in motion (ESIMs) in the 47.2–50.2 GHz and 50.4–51.4 GHz bands
Agenda item 1.3:	FSS gateways in the 51.4–52.4 GHz band transmitting to non-geostationary-satellite orbit (NGSO) systems
Agenda item 1.4:	FSS and broadcasting-satellite service (BSS) downlinks in the 17.3 to 17.8 GHz range
Agenda item 1.7:	International Mobile Telecommunications (IMT) identifications in the 4.4–4.8 GHz, 7.125–8.4 GHz and 14.8–15.35 GHz bands
Agenda item 1.8:	Radiolocation service in the 231.5–275 GHz and 275–700 GHz ranges

[7] WMO Resolution 31 (Cg-19) - WMO Position of the World Radiocommunication Conference 2023: *Cg-19: World Meteorological Congress* (WMO-No. 1326)

Agenda item 1.11: Space-to-space links in bands allocated to the mobile-satellite service (MSS) in the 1518 to 1675 MHz range and the 2483.5–2 500 MHz band

Agenda item 1.12: MSS in the 1427–1432 MHz, 1645.5–1646.5 MHz, 1880–1920 MHz and 2010–2025 MHz bands for low data rate NGSO systems

Agenda item 1.13: MSS in the 694 to 2700 MHz range for direct connectivity to IMT user equipment

Agenda item 1.14: MSS in the bands 2 010–2 025 MHz, 2120–2160 MHz and 2 160–2 170 MHz

Agenda item 1.17: Regulatory provisions and protection of receive-only space weather sensors

Agenda item 1.18: Protection of EESS (passive) sensors from active services in adjacent bands above 76 GHz

Agenda item 1.19: New primary allocations to the EESS (passive) in the 4.2–4.4 GHz and 8.4–8.5 GHz bands for SST measurements

Agenda item 7: Satellite regulatory procedures

Agenda item 10: Preliminary agenda for WRC-31

3.1 Agenda item 1.1

"to consider the technical and operational conditions for the use of the frequency bands 47.2–50.2 GHz and 50.4–51.4 GHz (Earth-to-space), or parts thereof, by aeronautical and maritime Earth stations in motion communicating with space stations in the fixed-satellite service and develop regulatory measures, as appropriate, to facilitate the use of the frequency bands 47.2–50.2 GHz and 50.4–51.4 GHz (Earth-to-space), or parts thereof, by aeronautical and maritime Earth stations in motion communicating with geostationary space stations and non-geostationary space stations in the fixed-satellite service, in accordance with Resolution ***176 (Rev. WRC-23)****"*

This agenda item considers regulatory provisions to facilitate the deployment of Earth stations in motion (ESIMs) in the Earth-to-space direction by aeronautical and maritime ESIMs communicating with GSO and NGSO space stations operating in the fixed-satellite service (FSS). This agenda item introduces a potential for increased aggregate interference to the EESS (passive) in the frequency band 50.2–50.4 GHz by changing the way that FSS uses the frequency bands to which it is allocated by allowing operation of ESIMs.

WMO has concerns regarding the protection of EESS (passive) in the frequency band 50.2–50.4 GHz, which corresponds to a reference window for atmospheric temperature profiling (surface temperature) that is essential for weather prediction, the Early Warnings for All initiative, and climate monitoring.

It should be noted that in this frequency band, both footnote RR No. **5.340** and Resolution **750 (Rev. WRC-19)** apply. Resolution **750 (Rev. WRC-19)** emphasizes the critical importance of long-term protection of the EESS (passive) in various frequency bands including 50.2–50.4 GHz.

Resolution **750 (Rev. WRC-19)** already contains mandatory unwanted emission limits applicable to FSS (Earth-to-space) in the bands 49.7–50.2 GHz and 50.4–50.9 GHz for the protection of EESS (passive) in the band 50.2–50.4 GHz. These limits were determined for traditional FSS Earth stations, and these limits may not be appropriate for ESIMs.

In order to ensure that the EESS (passive) in the band 50.2–50.4 GHz is adequately protected, studies under WRC-27 Agenda item 1.1 should determine whether the current limits in Resolution **750 (Rev. WRC-19)** need to be modified, taking into account the combination of ESIM and traditional FSS operations.

Working Party 4 A is the responsible group for studies.

Preliminary WMO Position on WRC-27 Agenda item 1.1

WMO does not oppose the operation of ESIMs in the bands 47.2–50.2 GHz and 50.4–51.4 GHz (Earth-to-space) provided that the protection of the EESS (passive) in the adjacent frequency band 50.2–50.4 GHz continues to be ensured through revision, if necessary, of existing mandatory unwanted emission limits in Resolution **750 (Rev. WRC-19)**.

3.2 Agenda item 1.3

*"to consider studies relating to the use of the frequency band 51.4–52.4 GHz to enable use by gateway Earth stations transmitting to non-geostationary-satellite orbit systems in the fixed-satellite service (Earth-to-space), in accordance with Resolution **130 (WRC-23)**"*

This agenda item considers extending the use of the FSS by gateway Earth stations transmitting to non-geostationary-satellite orbit (NGSO) systems. This agenda item introduces a potential for increased interference to the EESS (passive) in the 52.6–54.25 GHz frequency band.

It should be noted that in the 52.6–54.25 GHz frequency band both footnote RR No. 5**.340** and Resolution **750 (Rev. WRC-19)** apply.

Resolution **750 (Rev. WRC-19)** already contains mandatory unwanted emission limits applicable to GSO FSS (Earth-to-space) networks in the band 51.4–52.4 GHz for the protection of EESS (passive) in the band 52.6–54.25 GHz. However, NGSO FSS unwanted emission limits are not specified.

The activities under WRC-27 Agenda item 1.3 should develop the relevant corresponding limits for NGSO FSS (Earth-to-space) networks in the band 51.4–52.4 GHz taking into account aggregation effects with the existing use of this band by gateway Earth stations transmitting to GSO FSS networks. Additionally, due to aggregation effects, there may be a need to adjust the existing GSO FSS limits in Resolution **750 (Rev. WRC-19)**, as stipulated in recognizing j) and resolves 2) of Resolution **130 (WRC-23)**.

Working Party 4 A is the responsible group for studies.

Preliminary WMO position on WRC-27 Agenda item 1.3

WMO is not opposed to the use of the frequency band 51.4–52.4 GHz for gateway Earth stations transmitting to NGSO systems in the FSS (Earth-to-space) provided that the protection of the EESS (passive) in the frequency band 52.6–54.25 GHz is still adequately ensured. This may require inclusion of relevant mandatory unwanted emission limits for NGSO FSS and necessary adjustments to the existing GSO FSS limits in Resolution **750 (Rev. WRC-19)** taking into account the aggregate interference from GSO and NGSO FSS systems into the EESS (passive).

3.3 Agenda item 1.4

*"to consider a possible new primary allocation to the fixed-satellite service (space-to-Earth) in the frequency band 17.3–17.7 GHz and a possible new primary allocation to the broadcasting-satellite service (space-to-Earth) in the frequency band 17.3–17.8 GHz in Region 3, while ensuring the protection of existing primary allocations in the same and adjacent frequency bands, and to consider equivalent power flux-density limits to be applied in Regions 1 and 3 to non-geostationary-satellite systems in the fixed-satellite service (space-to-Earth) in the frequency band 17.3–17.7 GHz, in accordance with Resolution **726 (WRC-23)**"*

WMO wants to ensure protection of EESS (active) systems operating in the adjacent frequency band 17.2–17.3 GHz. WP 7C is updating ITU-R documents to reflect a planned space-borne synthetic aperture radar system that will operate in 17.2–17.3 GHz.

Working Party 4 A is the responsible group for studies.

Preliminary WMO position on WRC-27 Agenda item 1.4

WMO is not opposed to new allocations to the FSS (space-to-Earth) and broadcasting-satellite service (BSS) (space-to-Earth) provided that the EESS (active) in the adjacent frequency band 17.2–17.3 GHz is protected.

3.4 Agenda item 1.7

*"to consider studies on sharing and compatibility and develop technical conditions for the use of International Mobile Telecommunications (IMT) in the frequency bands 4 400–4 800 MHz, 7 125–8 400 MHz (or parts thereof), and 14.8–15.35 GHz taking into account existing primary services operating in these, and adjacent, frequency bands, in accordance with Resolution **256 (WRC-23)**"*

WMO has major concerns regarding an International Mobile Telecommunications (IMT) identification in the 7 125–8 400 MHz frequency band (or parts thereof). Multiple frequency bands within this frequency range proposed for IMT operations are used extensively in support of EESS and meteorological-satellite service (MetSat) operations that are of critical interest to WMO.

Frequency Band	Operations	Notes
7 190–7 250 MHz	EESS (Earth-to-space)	Used for tracking, telemetry and control (TT&C) only
7 450–7 550 MHz	MetSat (space-to-Earth)	GSO MetSats only

Frequency Band	Operations	Notes
		Used to enable wide bandwidths to meet high data rates for the downlink of raw instrument data from geostationary (GSO) MetSat systems.
7 750–7 900 MHz	MetSat (space-to-Earth)	NGSO MetSats only For transmitting the raw meteorological data from non-geostationary (NGSO) meteorological satellites and the global dissemination of the meteorological data directly to the users of direct broadcast Earth stations to ensure compliance with low latency data access requirements for meteorological applications.
8 025–8 400 MHz	EESS (space-to-Earth)	Earth stations in this band constitute a critical part of the EESS communications infrastructure. Used to enable wide bandwidths to meet high data rates for the downlink of raw instrument data from EESS systems. Used for real-time data transmission directly from the satellite to direct broadcast Earth stations with a direct line-of-sight to the satellite. These stations provide immediate observations of the local environment and are used for tasks ranging from forecasting weather to monitoring plant health to directing fire fighters battling wildland fires.
8 175–8 215 MHz	MetSat (Earth-to-space)	Used for uplink of High Resolution Image Transmission (HRIT) to GSO meteorological satellites for dissemination of processed data to users.

WMO considers that studies assessing the potential interference from EESS and MetSat service transmitters operating in the 7 190–7 250 MHz and 8 175–8 215 MHz bands into IMT BS receivers potentially deployed in the same frequency bands (often referred to as "reverse studies") need to be conducted. This should allow determination of the separation distances needed to ensure the compatibility between EESS/MetSat Earth stations and IMT systems.

WMO holds the view that a potential IMT identification in the frequency band 7 190–7 250 MHz cannot be considered as a development of the existing mobile service, and therefore, footnote RR No. **5.460 A** does not apply. Sharing studies to ensure the continued reliable use of this band by EESS (Earth-to-space) are necessary.

There is currently a very high number of MetSat and EESS Earth stations deployed worldwide in urban, sub-urban and rural environments including a large number of receive-only stations that do not need to be licenced, meaning that their locations may not be known. These stations can be at fixed locations, installed nearby the premises of end users, or transportable, placed in the vicinity of the area to image. The antenna sizes can vary, depending on the specific scenario and user needs.

It has to be noted that the number of filed systems and their associated Earth stations have been increasing over the last years. The number of Earth stations is expected to increase even further due to current and future needs for EESS missions. This is driven by a growing user base for current/planned EESS missions, and entrance of commercial operators providing service in these frequency bands.

This agenda item also calls for consideration of an IMT identification in the 14.8–15.35 GHz frequency band. A primary allocation to the EESS (passive) exists in the adjacent band 15.35–15.4 GHz, where No **5.340** applies. However, no use of the frequency band for EESS (passive) operations has been confirmed by WP7C.

It should also be noted that footnote RR No **5.458** indicates that administrations should bear in mind the needs of the Earth exploration-satellite (passive) and space research (passive) services in their future planning of the bands 6 425–7 075 MHz and 7 075–7 250 MHz as passive microwave sensor measurements are carried out in these frequency bands to measure sea-surface temperature (SST). Preliminary results of studies ongoing in ITU-R WP 7C show that interference will occur on current and planned SST measurements especially in coastal areas if IMT is deployed in any portion of the 6 425–7 125 MHz band. A similar conclusion can be drawn for the 7 125–7 250 MHz band if an IMT identification is made in that frequency band.

It has to be noted that due to the IMT identification in the frequency band 6 425–7 125 MHz during WRC-23 and the possible IMT identification in the band 7 125–7 250 MHz under Agenda item 1.7 of WRC-27, the new EESS (passive) allocations considered under Agenda item 1.19 are absolutely necessary to ensure the future SST measurement capability.

In addition, there would be a need to study the impact from possible new IMT identifications in 4 400–4 800 MHz and 7 125–8 400 MHz on the potential new EESS (passive) allocations for SST measurements in the bands 4 200–4 400 MHz and 8 400–8 500 MHz being considered under WRC-27 Agenda item 1.19. In the event that IMT identifications are made under WRC-27 Agenda item 1.7 in the frequency bands above 4.4 GHz and below 8.4 GHz, it will be necessary to establish appropriate out of band emission limits for the mobile service to ensure the protection of EESS (passive) operations in the 4 200–4 400 MHz and 8 400–8 500 MHz bands.

Working Party 5 D is the responsible group for studies.

Preliminary WMO position on WRC-27 Agenda item 1.7

WMO opposes any IMT identification:

- in the 7 450–7 550 MHz frequency band to ensure the protection of MetSat (space-to-Earth) allocations used for the transmission of collected data from GSO MetSat systems.
- in the 7 750–7 900 MHz frequency band to ensure the protection of MetSat (space-to-Earth) allocations used for the transmission of collected data from NGSO MetSat systems for direct broadcasting to end-user Earth stations to ensure compliance with low latency data access requirements for meteorological applications.
- in the 8 025–8 400 MHz frequency band to ensure the protection of EESS (space-to-Earth) allocations used for the transmission of data collected from Earth exploration satellites.

Introduction of widely deployed IMT networks would limit future deployment of MetSat and EESS Earth stations that are essential for the distribution of meteorological, related environmental (including space weather) and Earth observation data to the WMO user community.

WMO also opposes any IMT identification:

- in the 8 175–8 215 MHz frequency band to ensure the protection of MetSat (Earth-to-space) allocations used for uplink of HRIT to GSO meteorological satellites for dissemination of processed data to users.

- in the 7 125–7 250 MHz frequency band since SST measurements, performed in the overlapping 7 075–7 250 MHz frequency range, are of prime importance for weather forecasting, climate monitoring, and the Early Warnings for All initiative. The 7 075–7 250 MHz frequency range used for SST measurements will always be needed to ensure continuity with past and current SST measurements. Combining this frequency range with nearby channels considered under Agenda item 1.19 is required to improve science retrievals and to mitigate RFI.

WMO considers that, due to the specific characteristics and deployment of IMT, a potential IMT identification in the 7 190–7 250 MHz frequency band cannot be regarded as an extension of the existing mobile service. As a result, the constraint preventing EESS space stations from claiming protection from mobile stations, as specified in footnote RR No. 5**.460 A**, does not apply.

WMO supports the development of ITU-R studies to determine the potential for interference from EESS and MetSat Earth stations in the Earth-to-space direction into IMT systems.

WMO requests that the impact of IMT operations in the frequency ranges 4 400–4 800 MHz and 8 215–8 400 MHz on the potential new EESS (passive) allocations under Agenda item 1.19 be taken into consideration. In particular it is essential to define appropriate out of band emission limits for IMT to ensure the protection of EESS (passive) operations in the 4 200–4 400 MHz and 8 400–8 500 MHz bands.

3.5 Agenda item 1.8

"to consider possible additional spectrum allocations to the radiolocation service on a primary basis in the frequency range 231.5–275 GHz and possible new identifications for radiolocation service applications in the frequency bands within the frequency range 275–700 GHz for millimetric and sub-millimetric wave imaging systems, in accordance with ***Resolution 663 (Rev. WRC-23)****"*

Agenda item 1.8 considers regulatory changes to support the operation of radiolocation systems within the 231.5–700 GHz frequency range. The specific frequency bands to be studied for radiolocation operations have not yet been specified.

WMO is concerned that there is potential that frequency bands to be studied will overlap or be adjacent to frequency bands used for current or future EESS (passive) operations. The relevant allocated EESS (passive) bands in this range are: 226–231.5 GHz, 250–252 GHz (both of which are exclusively passive bands, as per RR No. 5**.340**), and 235–238 GHz, 239.2–242.2 GHz and 244.2–247.2 GHz (which are shared with active services).

Above 275 GHz there are currently no allocations in the RR, but RR No. 5**.565** identifies a number of bands that are relevant and already used for EESS (passive) measurements. RR No. 5**.564 A** contains a list of bands which previous studies have shown cannot be shared with FS and MS applications unless suitable conditions are determined.

The current documentation for Agenda item 1.8 indicates that it will include the use of hand-held/mobile devices. If such low-power devices (short-range and ultra-wideband) are intended to be covered under this Agenda item, WMO has concerns regarding the study of such kind of applications, as they are not considered to operate under a radiocommunication service and, therefore, are not entitled to obtain rights under the Radio Regulation. Furthermore, it is important to consider the cumulative impact of a large number of low-power devices, given their widespread use. Appropriate provisions will be required to ensure the protection of EESS (passive) allocations and identifications.

In addition, the band 237.9–238 GHz is also allocated to EESS (active) (see RR No. 5**.563B**).

Working Party 5B is the responsible group for studies.

Preliminary WMO position on WRC-27 Agenda item 1.8

WMO opposes any new allocations to the radiolocation service in the frequency band 250–252 GHz where footnote RR No **5.340** applies.

WMO is not opposed to new allocations to the radiolocation service on a primary basis in the frequency range 231.5–275 GHz, except for 250–252 GHz as noted above, or to new identifications in the frequency range 275–700 GHz provided that the protection of the existing allocations/identifications to the EESS (passive) and the EESS (active) is ensured, from both in-band and/or out of band emissions.

WMO is of the view that short-range device and ultra-wideband applications are not considered to operate under a radiocommunication service and therefore are not within the scope of this agenda item.

WMO is also of the view that consideration should be given to the protection of ground-based passive atmospheric sensing in the bands 235–238 GHz, 250–252 GHz and 265–275 GHz.

3.6 Agenda item 1.11

*"to consider the technical and operational issues, and regulatory provisions, for space-to-space links among non-geostationary and geostationary satellites in the frequency bands 1 518–1 544 MHz, 1 545–1 559 MHz, 1 610–1 645.5 MHz, 1 646.5–1 660 MHz, 1 670–1 675 MHz and 2 483.5–2 500 MHz allocated to the mobile-satellite service, in accordance with Resolution **249 (Rev. WRC-23)**"*

This agenda item calls for studies on provisions to allow space-to-space links to be operated in several frequency bands allocated to the mobile-satellite service (MSS).

WMO concerns are specifically related to the consideration of the frequency band 1 670–1 675 MHz and its potential impact on:

- the MetSat service operating in the adjacent band of 1 675–1 710 MHz
- the meteorological aids (MetAids) service operating in the frequency band 1 668.4–1 700 MHz

With respect to adjacent band MetSat usage, the 1 675–1 710 MHz frequency band is globally used by GSO and NGSO MetSat systems for the downlink of the measured data as well as the global dissemination of the data directly to users. For a number of different applications, the use of the MetSat 1 675–1 710 MHz is an indispensable component in existing and currently developed GSO and NGSO MetSat satellite systems/networks as well as in future constellations of small MetSat satellites. Therefore, it is important to preserve the long-term availability and protection of the band 1 675–1 710 MHz for MetSat use.

With regards to the MetAids usage, the frequency band 1 668.4–1 700 MHz is used for radiosonde operations to reduce the cost of expendable devices and offer the possibility to operate MetAids systems independently of international radionavigation systems.

Working Party 4C is the responsible group for studies.

Preliminary WMO position on WRC-27 Agenda item 1.11

WMO is not opposed to studying regulatory provisions for space-to-space links among GSO and NGSO satellites in bands allocated to the MSS provided that there is no negative impact on MetSat systems in the 1675–1710 MHz frequency band or MetAids systems in the 1 668.4–1 700 MHz frequency band.

3.7 Agenda item 1.12

*"to consider, based on the results of studies, possible allocations to the mobile-satellite service and possible regulatory actions in the frequency bands 1 427–1 432 MHz (space-to-Earth), 1 645.5–1 646.5 MHz (space-to-Earth) (Earth-to-space), 1 880–1 920 MHz (space-to-Earth) (Earth-to-space) and 2 010–2 025 MHz (space-to-Earth) (Earth-to-space) required for the future development of low data rate non-geostationary mobile-satellite systems, in accordance with Resolution **252 (WRC-23)**"*

WMO has concerns regarding the protection of the EESS (passive) allocation in the frequency band 1 400–1 427 MHz and the EESS (Earth-to-space and space-to-space) and space operation service (SOS) in the frequency band 2 025–2 110 MHz.

The EESS (passive) allocation in the frequency band 1 400–1 427 MHz, where No. 5**.340** applies, is used for measurements of soil moisture, sea-surface salinity and vegetation. WMO recognizes that the proposed MSS operations in 1 427–1 432 MHz are in the space-to Earth direction, however recent studies have shown that, depending on interference path geometry, space-to-Earth transmissions can result in interference to EESS (passive) operations. If confirmed by the studies, appropriate modifications of relevant mandatory unwanted emission limits in Resolution **750 (Rev. WRC-19)** will be required.

EESS/MetSat satellite systems are using the frequency band 2 025–2 110 MHz for TT&C. Since this band is very commonly used, radio-frequency interference from unwanted emissions in this band would affect a large number of MetSat and EESS satellites.

Working Party 4C is the responsible group for studies.

Preliminary WMO position on WRC-27 Agenda item 1.12

WMO does not oppose consideration of MSS allocations for low data rate applications provided that:

- Studies are conducted which consider the need for MSS unwanted emission limits for the protection of the EESS (passive) in the frequency band 1 400–1 427 MHz, where No. 5.340 applies, and those studies form the basis for mandatory unwanted emission limits, if required, in Resolution **750 (Rev. WRC-19)**.
- There is no negative impact on EESS/SOS operations in the 2 025–2 110 MHz frequency band.

3.8 Agenda item 1.13

*"to consider studies on possible new allocations to the mobile-satellite service for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipment to complement terrestrial IMT network coverage, in accordance with Resolution **253 (WRC-23)**"*

This agenda item considers new frequency allocations to the MSS to supplement terrestrial IMT network coverage where IMT user equipment would obtain service via MSS space stations. The agenda item does not indicate specific frequency bands to be considered within the broad frequency range of 694–2 700 MHz.

Based on discussions and documentation of WP 4C, this agenda item appears to only deal with possible new allocations to the MSS for direct connectivity in frequency bands already allocated to the mobile service and identified for IMT (694–960 MHz, 1 427–1 518 MHz, 1710–2 200 MHz, and 2 300–2690 MHz).

WMO concerns are focused on the protection of systems in bands adjacent to those bands identified for use by IMT as follows:

- Meteorological radars operating in the 2 700–2 900 MHz band, for which MSS providing service to IMT user equipment in the frequency band 2 500–2 690 MHz could result in similar compatibility issues that were studied between high altitude IMT base stations (HIBS) operating below 2 690 MHz and meteorological radars operating above 2700 MHz under WRC-23 Agenda item 1.4.

- EESS (passive) systems operating in the frequency band 1 400–1 427 MHz which are used for measurements of soil moisture, sea-surface salinity and vegetation. No. 5**.340** applies.

- MetSat in the 1 675–1 710 MHz band, which is used globally by GSO and NGSO MetSat systems/networks for the downlink of measured data as well as the global dissemination of data directly to users.

- EESS and SOS in the 2 025–2 110 MHz frequency band, which are used for TT&C of EESS/MetSat satellite systems.

Working Party 4C is the responsible group for studies.

Preliminary WMO position on WRC-27 Agenda item 1.13

Under the understanding that activities under Agenda item 1.13 are limited to frequency bands with mobile allocations already identified for IMT in the frequency range between 694 MHz and 2.7 GHz, WMO is not opposed to possible new allocations to the MSS for direct connectivity between space stations and IMT user equipment provided that there is no adjacent band negative impact on the following:

- EESS (passive) in the 1 400–1 427 MHz band where No. 5**.340** applies
- MetSat systems in the 1 675–1 710 MHz band
- EESS and SOS systems in the 2 025–2 110 MHz band
- Meteorological radar systems in the 2 700–2 900 MHz band

3.9 Agenda item 1.14

*"to consider possible additional allocations to the mobile-satellite service, in accordance with Resolution **254 (WRC-23)**"*

This agenda item calls for studies on possible new frequency allocations to the MSS in the frequency bands 2 010–2 025 MHz (Earth-to-space) and 2 160–2 170 MHz (space-to-Earth) in Regions 1 and 3 and 2 120–2 160 MHz (space-to-Earth) in all Regions.

WMO has concerns regarding the frequency band 2 010–2 025 MHz (Earth-to-space) to ensure that the adjacent frequency band (2 025–2 110 MHz), used for TT&C of EESS/MetSat systems (Earth-to-space), is not impacted.

Working Party 4C is the responsible group for studies.

Preliminary WMO position on WRC-27 Agenda item 1.14

WMO does not oppose possible additional allocations to the MSS in the 2 010–2 025 MHz (Earth-to-space) band, provided that there is no impact on the operation of EESS/MetSat systems in the adjacent 2 025–2 110 MHz frequency band.

3.10 Agenda item 1.17

*"to consider regulatory provisions for receive-only space weather sensors and their protection in the Radio Regulations, taking into account the results of ITU Radiocommunication Sector studies, in accordance with Resolution **682 (WRC-23)**"*

This agenda item is the follow-up to WRC-23 Agenda item 9.1 topic A. WRC-23 approved Resolution **675 (WRC-23)** and added Article 2**9B**, which defines space weather and designates space weather sensors to the MetAids service as the subset MetAids (*space weather*). The elaboration of these regulatory provisions in the Radio Regulations allowed WRC-23 to approve Resolution **682 (WRC-23)**, which resolves to conduct:

(1) Studies on spectrum needs, appropriate protection criteria for receive-only space weather sensors, and system characteristics;

(2) Sharing and compatibility studies pertaining to potential new primary allocations to MetAids (*space weather*) for receive-only sensors in the following frequency bands:

- 27.5–28.0 MHz,
- 29.7–30.2 MHz,
- 32.2–32.6 MHz,
- 37.5–38.325 MHz,
- 73.0–74.6 MHz,
- 608–614 MHz;

(3) studies on possible regulatory provisions of the Radio Regulations to accommodate the possibility for an administration that wishes to notify a receive-only space weather sensor station for inclusion in the Master International Frequency Register.

Agenda item 1.17 is of primary interest to WMO since the focus is to establish regulatory provisions for the protection of receive-only space weather sensors within select frequency bands to ensure their long-term protection. In accordance with Resolution **682 (WRC-23)**, this must be accomplished without claiming protection from, or constraining the future development of, incumbent services in these frequency bands or in adjacent bands by taking into account the existing services in accordance with RR Edition 2024. This will establish regulatory status for space weather sensors in the event that a future WRC considers new allocations in or adjacent to one of the subject frequency bands.

Working Party 7C is the responsible group for conducting studies.

Preliminary WMO position on WRC-27 Agenda item 1.17

WMO supports new primary allocations to MetAids (*space weather*) for receive-only sensors in all the frequency bands listed in, and in accordance with Resolution **682 (WRC-23)**.

WMO also supports the principle that these new allocations should be made without claiming protection from, or imposing constraints on existing services allocated in accordance with RR Edition 2024, or the future development of those services.

Furthermore, WMO also supports regulatory provisions of the Radio Regulations to notify a receive-only space weather sensor station for recording in the Master International Frequency Register.

3.11 Agenda item 1.18

*"to consider, based on the results of ITU Radiocommunication Sector studies, possible regulatory measures regarding the protection of the Earth exploration-satellite service (passive) and the radio astronomy service in certain frequency bands above 76 GHz from unwanted emissions of active services, in accordance with Resolution **712 (WRC-23)**".*

Frequency bands allocated to the EESS (passive) and the protection of corresponding EESS (passive) sensors are of prime interest to WMO.

The work on this agenda item is split into two topics in Resolution **712 (WRC-23)**. The interest of WMO falls under *resolves* 1, where regulatory measures are to be considered for protection of the EESS (passive) from unwanted emissions of active services operating in frequency bands adjacent to certain EESS (passive) allocations where No. 5**.340** applies. Resolution **750 (Rev. WRC-19)** is to be updated should any regulatory measures be required to ensure the protections of the EESS (passive). The following EESS (passive) bands and adjacent active services are to be studied:

EESS (passive) frequency band	Active service frequency band	Active service
86–92 GHz	81–86 GHz	Fixed-satellite service (FSS) (Earth-to-space), mobile service (MS)
	92–94 GHz	MS, radiolocation service (RLS)
114.25–116 GHz	111.8–114.25 GHz	Fixed service (FS), MS
164–167 GHz	158.5–164 GHz	FS, FSS (space-to-Earth), MS, mobile-satellite service (MSS) (space-to-Earth)
	167–174.5 GHz	FS, FSS (space-to-Earth), inter-satellite service (ISS), MS
200–209 GHz	191.8–200 GHz	FS, ISS, MS, MSS, radionavigation service (RNS), radionavigation-satellite service (RNSS)
	209–217 GHz	FS, FSS (Earth-to-space), MS

WMO also highlights that Resolution **731 (Rev. WRC-23)** calls for compatibility studies between the EESS (passive) in the bands 100–102 GHz, 148.5–151.5 GHz, 182–185 GHz,

190–191.8 GHz and 226–231.5 GHz and active services in adjacent bands, that are not within the scope of this agenda item.

Working Party 7C is the responsible group for studies requested in *resolves 1* of Resolution **712 (WRC-23)**.

Preliminary WMO position on WRC-27 Agenda item 1.18

WMO supports mandatory unwanted emission limits in Resolution **750 (Rev. WRC-19)** applicable to active services in order to ensure the protection and long-term usability of EESS (passive) in the frequency bands 86–92 GHz, 114.25–116 GHz, 164–167 GHz and 200–209 GHz.

WMO stresses the need to address this issue by WRC-27 before there is widespread deployment of active services in the bands to be studied.

3.12 Agenda item 1.19

*"to consider possible primary allocations in all Regions to the Earth exploration-satellite service (passive) in the frequency bands 4 200–4 400 MHz and 8 400–8 500 MHz, in accordance with Resolution **674 (WRC-23)**"*

The objective of this agenda item is to consider possible primary allocations in all Regions to the EESS (passive) in the frequency bands 4 200–4 400 MHz and 8 400–8 500 MHz in order to allow for the continuity of SST measurements that are of prime importance for weather forecasting and climate monitoring.

The frequency range 6 425–7 250 MHz is currently used for conducting SST measurements from satellites on an unprotected basis in accordance with Footnote No. 5**.458**. Preliminary studies performed in the ITU-R show that SST measurements would be severely constrained by high density deployment of communication systems (e.g. RLAN or IMT) in this frequency range.

Based on these studies, radio-frequency interference (RFI) to SST measurements in the 6/7 GHz frequency range is expected to increase significantly in the near future due to the WRC-23 decision to identify the 6 425–7 125 MHz frequency band for use by IMT. Therefore, WRC-27 Agenda item 1.19 was established to create a long-term solution for EESS (passive) sensors for conducting SST measurements.

Preliminary studies performed in ITU-R WP 7C during the previous study cycle showed some opportunities for SST measurements in the frequency bands 4 200–4 400 MHz and 8 400–8 500 MHz.

The aim of the studies under WRC-27 Agenda item 1.19 is to determine the conditions of usage of the frequency bands 4 200–4 400 MHz and 8 400–8 500 MHz by the EESS (passive). These potential new allocations to the EESS (passive) would be used in conjunction with the 6/7 GHz frequency range. Combining multiple nearby channels in this way is required to improve science retrievals and to mitigate RFI.

WMO notes that Agenda item 1.7 is evaluating possible new IMT identifications in the adjacent frequency bands of 4 400–4 800 MHz and 8 215–8 400 MHz. In case IMT identifications are created under WRC-27 Agenda item 1.7 in these frequency bands, it is necessary to define appropriate out of band emission limits for IMT to ensure the protection of EESS (passive) operations in the bands 4 200–4 400 MHz and 8 400–8 500 MHz.

Working Party 7C is the responsible group for studies.

Preliminary WMO position on WRC-27 Agenda item 1.19

WMO supports new primary EESS (passive) allocations in the frequency bands 4 200–4 400 MHz and 8 400–8 500 MHz in order to ensure the long-term continuity of SST measurements in conjunction with the existing 6/7 GHz frequency range.

Protection of these new primary EESS (passive) allocations in the frequency bands 4 200–4 400 MHz and 8 400–8 500 MHz from the potential new IMT identifications in adjacent bands (as considered by Agenda item 1.7) should be ensured by appropriate mandatory regulatory provisions.

3.13 Agenda item 7

*"to consider possible changes, in response to Resolution **86** (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, on advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution **86 (Rev. WRC-07)**, in order to facilitate the rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit"*

This standing agenda item deals with any possible changes to the Radio Regulations affecting the advance publication, coordination, notification and recording of satellite networks and requires WMO consideration.

Preliminary WMO position on WRC-27 Agenda item 7

WMO will monitor the development of Agenda item 7 issues to ensure that no unnecessary constraints are imposed on MetSat and EESS systems, and that the regulatory procedures for the corresponding ITU filings in the frequency bands used by these systems are not overly complicated.

3.14 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-23)**"*

WRC-23 established the Preliminary Agenda for WRC-31. The preliminary agenda will be reconsidered at WRC-27 where each preliminary agenda item will be evaluated for inclusion in the final WRC-31 Agenda.

The current WRC-31 preliminary agenda has a number of items of interest and/or concern to WMO:

> ***Agenda item 2.1** – to consider potential new allocations to the fixed, mobile, radiolocation, amateur, amateur-satellite, radio astronomy, Earth exploration-satellite (passive and active) and space research (passive) services in the frequency range 275–325 GHz in the Table of Frequency Allocations of the Radio Regulations, with the consequential update of Nos. **5.149**, **5.340**, **5.564 A** and **5.565**, in accordance with Resolution **721** (WRC-23);*
>
> **WMO position:** WMO is not opposed to assessing the possibility of new allocations in the frequency range 275–325 GHz provided that the existing EESS (passive) identifications (No. 5**.565**) are upgraded to primary allocations and their protection is ensured.

Agenda item 2.2 *– to consider the possible [frequency bands] for [non-beam and beam] wireless power transmission to avoid harmful interference to the radiocommunication services caused by wireless power transmission, in accordance with Resolution 910 (WRC-23);*

WMO position: WMO will monitor the development of this preliminary agenda item to assess potential impacts on WMO interests.

Agenda item 2.3 – *to consider the use of aeronautical and maritime Earth stations in motion communicating with non-geostationary space stations in the fixed-satellite service (Earth-to-space) in the frequency band 12.75–13.25 GHz, in accordance with Resolution 133 (WRC-23);*

WMO position: WMO is not opposed to this preliminary agenda item provided that the following is taken into account:

- protection of the EESS (active) in the adjacent frequency band 13.25–13.75 GHz

- protection of the EESS (passive) in the adjacent frequency band 10.6–10.7 GHz from unwanted emissions produced by non-GSO FSS systems communicating with aeronautical and maritime stations in motion operating in the paired downlink frequency band 10.7–10.95 GHz (space-to-Earth).

Agenda item 2.6 *– to consider the identification of the frequency bands [102–109.5 GHz, 151.5–164 GHz, 167–174.8 GHz, 209–226 GHz and 252–275 GHz] for International Mobile Telecommunications, in accordance with Resolution* ***255 (WRC-23)****;*

WMO position: WMO is concerned with the protection of the EESS (passive) from IMT unwanted emissions, noting that each of the proposed frequency bands is adjacent to an EESS (passive) allocation that is subject to RR No. 5**.340**.

Agenda item 2.10 *– to consider a possible new primary allocation to the Earth exploration-satellite service (Earth-to-space) in the frequency band 22.55–23.15 GHz, in accordance with Resolution* ***664 (Rev.WRC-23)****;*

WMO position: WMO supports the preliminary agenda item for a new primary allocation to the EESS (Earth-to-space) in the frequency band 22.55–23.15 GHz. A new primary EESS (Earth-to-space) allocation in the band 22.55–23.15 GHz will pair with the existing EESS (space-to-Earth) allocation in 25.5–27 GHz, allowing uplinks and downlinks on the same transponder. It will also provide future capacity for telemetry and telecommand as demand increases.

Agenda item 2.13 *– to consider studies on coexistence between space-borne synthetic aperture radars operating in the Earth exploration-satellite service (active) and the radiodetermination service in the frequency band 9 200–10 400 MHz, with possible actions as appropriate, in accordance with Resolution* ***722 (WRC-23)****.*

WMO position: WMO will monitor progress on this preliminary agenda item due to potential impact on meteorological radars and the EESS (active).

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