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WMO

Preliminary WMO position on WRC-12 agenda

Abstract

The present document provides the Preliminary WMO position on WRC-12 agenda as agreed in January 2011.



World Meteorological Organization
Organisation météorologique mondiale

Weather • Climate • Water
Temps • Climat • Eau

PRELIMINARY WMO POSITION ON
WORLD RADIOCOMMUNICATION CONFERENCE 2012 AGENDA
(January 2011)

1 Introduction

Timely warning of impending natural and environmental disasters, accurate climate prediction and detailed understanding of the status of global water resources: these are all critically important everyday issues for the global community. The National Meteorological and Hydrological Services around the world are responsible for providing this information, which is required for the protection of the environment, economic development (transport, energy, agriculture,..) and the safety of life and property.

Radio-frequencies represent scarce and key resources used by National Meteorological and Hydrological Services to measure and collect the observation data upon which analyses and predictions, including warnings, are based or processed, and to disseminate this information to governments, policy makers, disaster management organisations, commercial interests and the general public.

On a more general basis, the utmost importance of radio-frequencies for all Earth Observation activities is also to be stressed, in particular with regard to the global warming and climate change activities.

This document reflects the position of the World Meteorological Organisation (WMO) on the agenda of the World Radiocommunication Conference 2012 (*WRC-12*) as given in Resolution **805 (WRC-07)**.

2 General comments

The Global Observing System (GOS), coordinated by WMO, comprises components which make use of a number of different radio applications and services, some of which may be affected by WRC-12 decisions.

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

The impressive progress made in the recent years in weather and climate analysis and forecasts, including warnings for dangerous weather phenomena (heavy rain, storms, cyclones) that affect all populations and economies, is to a great extent attributable to spaceborne observations and their assimilation in numerical models.

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 radiations, usually of very low power levels, which contain essential information on the physical process under investigation.

The relevant frequency bands are determined by fixed physical properties (molecular resonance) that cannot hence be changed or ignored, nor are these physical properties able to be 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. In addition, in most cases these sensors are not able to discriminate between natural and man-made radiations.

For passive sensing bands shared with active services, the situation tends to be more and more critical with the increased density of terrestrial active devices and serious cases of interference are already reported.

In the more critical passive sensing frequency bands, RR N° **5.340** stating that “all emissions are prohibited” enables in principle passive services to deploy and operate their systems with the highest reliability. However this protection appears in practice insufficient with examples of unregulated and potentially mass-market short range devices allowed nationally to operate in these bands or unwanted emissions from not properly regulated adjacent bands.

It should be stressed that bands below 100 GHz are of particular importance, as they provide an “all-weather” capability since clouds are almost transparent at these frequencies.

Several geophysical parameters contribute, at varying levels, to natural emissions, which can be observed at a given frequency which presents unique properties. Therefore, measurements at several frequencies in the microwave spectrum must be made simultaneously in order to isolate and to retrieve each individual contribution, and to extract the parameters of interest from the given set of measurements.

As a consequence, interference that could impact a given “passive” frequency band could thus have an impact on the overall measurement of a given atmospheric component.

Each passive frequency band cannot hence be considered on its own but should be seen as a complementary component of a complete spaceborne passive sensing system. Current scientific and meteorological satellite payloads are not dedicated to one given band but include many different instruments performing measurements in the entire set of passive bands.

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 in particular by altimeters for ocean and ice studies, scatterometers or rain and cloud radars, provides meteorological and climatology activities with important information on the state of the ocean and land surfaces and atmospheric phenomena.

In addition, **meteorological radars** and **wind-profiler radars** are important surface-based instruments in the meteorological observation processes. Radar data are input to nowcasting, and to the Numerical Weather Prediction models for short-term and medium-term forecasting. There are currently about one hundred wind-profiler radars and several hundreds of meteorological radars worldwide that perform precipitation and wind measurements and 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 flood or severe storm events, such as in several recent dramatic cases.

Meteorological Aids, mainly radiosondes, are the main source of atmospheric *in situ* measurements with high vertical resolution (temperature, relative humidity and wind speed) 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.

Also of great importance is the availability of sufficient and well-protected **Earth exploration**

and **meteorological satellite** services frequency spectrum for **telemetry/telecommand** as well as for **satellite downlink** of the collected data.

Finally, it should be noted that the **fixed-satellite service** systems, through commercial payloads in the **C-band** ((3400-4200 MHz) and the **Ku Band** (10700-11700 MHz), are used globally to disseminate weather, water and climate related information, including disaster warnings to meteorological agencies and user communities. It has to be stressed that a large part of the population, in particular in developing countries, is heavily dependent on the use of **C-Band satellites** in areas where propagation conditions (e.g. heavy rain in tropical and equatorial zones) make the use of any other telecommunication support impractical.

The Fifteenth World Meteorological Organisation Congress (Geneva, May 2007), attended by 163 Member countries, confirmed serious concern at the continuous threat to radio frequency bands allocated for meteorological and related environmental systems and adopted the Resolution 4 (Cg-XV) – *Radio frequencies for meteorological and related environmental activities* – (**see annex**) 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.

3 WMO position on WRC-12 agenda

Among WRC-12 agenda items, 13 items concerned frequency bands or issues of prime interest/concern for Meteorology:

- **agenda item 1.2** : Enhancing the international regulatory framework (**see section 3.1**)
- **agenda item 1.5** : Electronic News Gathering (ENG) (**see section 3.2**)
- **agenda item 1.6 (Res. 950)** : Passive service between 275 and 3000 GHz (**see section 3.3**)
- **agenda item 1.8** : Fixed service between 71 and 238 GHz (**see section 3.4**)
- **agenda item 1.15** : Oceanographic radars in the frequency range 3-50 MHz (**see section 3.5**)
- **agenda item 1.16** : Lightning detection below 20 kHz (**see section 3.6**)
- **agenda item 1.19** : Software Defined Radio (SDR) and Cognitive Radio Systems (CRS) (**see section 3.7**)
- **agenda item 1.20** : High Altitude Platform Stations (HAPS) in the range 5 850-7 075 MHz (**see section 3.8**)
- **agenda item 1.22** : Effect of emissions from short-range devices (SRD) (**see section 3.9**)
- **agenda item 1.24** : Extension of the 7 750-7 850 MHz Metsat band to the band 7 850-7 900 MHz (**see section 3.10**)
- **agenda item 1.25** : Mobile Satellite Service (**see section 3.11**)
- **agenda item 8.1.1** : (issue C) Resolution 673 (WRC-07) on Radiocommunications use for Earth observation applications (**see section 3.12**)
- **agenda item 8.2** : WRC-2015 Agenda (**see section 3.13**)

3.1 Agenda item 1.2: Enhancing the international regulatory framework

Resolution **951 (Rev.WRC-07)** calls for the ITU-R to continue studies in order to develop concepts and procedures for enhancing the Radio Regulations to meet the demands of current, emerging and future radio applications, while taking into account existing services and usage. The Resolution also invites WRC-12 to take into consideration the results of these studies, including sharing and their impact on allocations in the concerned frequency bands, and take appropriate action in accordance with Annex 2 of the Resolution.

Under this Agenda item, the possible elimination of a clear distinction between FS and MS could be of potential risk since it could create incompatibility scenarios. For example the applicability of RR No. **5.391** (band 2 200-2 290 MHz for METSAT and EESS satellites) must be maintained. Also, the technical/operational and regulatory conditions in bands shared between terrestrial services and EESS (passive) should not be modified in a way that would increase the resulting global emission levels at high angles by the terrestrial services.

WMO Position:

WMO supports “No change” (i.e. Methods A1 and B1 of the current CPM Text) and urges that, in case of Modifications to the RR, all consequences related to specific frequency bands be assessed with a view to maintaining availability and relevant protection of Meteorological applications.

3.2 Agenda item 1.5: Electronic News Gathering (ENG)

This agenda item considers worldwide/regional harmonization of spectrum for electronic news gathering (ENG) that are mainly Mobile applications used on a case by case basis.

Irrespective of the regulatory means to pursue such harmonisation, the current ITU-R studies have not concluded yet on the list of corresponding frequency bands. Therefore, at this stage, some frequency bands under consideration for ENG are also allocated to meteorological services (e.g. 2 200-2 290 MHz for METSAT and EESS satellites, 2700 – 2900 MHz and 5470-5725 MHz for radars and 10.6 – 10.68 GHz for passive sensing) in which concentration of rather powerful ENG operations could adversely impact corresponding meteorological applications. No technical studies have currently been performed in those bands.

WMO Position:

Should identification or allocations for Electronic News Gathering (ENG) be considered in bands allocated to meteorological services, WMO urges that compatibility with related applications be assessed and adequate protection be ensured. More specifically, WMO strongly oppose to any ENG harmonisation in bands used by Meteorological radars (2700-2900 MHz and 5470-5725 MHz bands)

WMO favours Method B as currently described in the CPM Text

3.3 Agenda item 1.6 (Res. 950): Passive service between 275 and 3000 GHz

This agenda item considers a review of No. **5.565** of the Radio Regulations with a view to update the spectrum use by the passive services between 275 GHz and 3 000 GHz and in particular the Earth exploration-satellite service (EESS).

Bands within this frequency range are currently or planned to be used by a number of passive sensors flying on meteorological and environmental satellites such as STEAMR , MWI , MLS, GEM, GOMAS, CLOUDICE, ODIN/SMR, or SMILES. These bands correspond in particular to water vapour and oxygen spectral lines that are important for ice cloud and precipitation measurements, which are needed for storm monitoring and climate studies.

In preparation for this agenda item, ITU-R has recently adopted Report RS.2194 that provides the relevant frequency bands and corresponding technical background.

WMO Position:

Under Resolution 950 (WRC-07), WMO confirms the high interest and importance of bands above 275 GHz for meteorology, climatology and environmental activities and supports the review and update of spectrum use by EESS to allow early assessment of meteorological next generation equipments. To this respect, WMO supports the outcomes of ITU-R Report RS.2194 as a basis for RR N° 5.565 revision.

WMO support the current Method given in the draft CPM Text and has a preference for Option A.

3.4 Agenda item 1.8: Fixed service between 71 and 238 GHz

This agenda item mainly considers technical and regulatory issues related to the fixed service between 71 and 238 GHz, including sharing and adjacent compatibility with passive services under Resolution 731 (WRC-2000).

This frequency range covers a number of important EESS (passive) frequency bands, such as 86-92 GHz, 100-102 GHz, 114.25-122.25 GHz, 148.5-151.5 GHz, 174.8-191.8 GHz, 226-231.5 GHz and 235-238 GHz, covered or not by RR N°5.340 and already in use by a number of instruments.

At this stage, this agenda item is focusing on defining regulatory solutions (unwanted emissions power limits) to be applied to the Fixed Service in the 81-86 GHz and 92-94 GHz bands to ensure protection of the 86-92 GHz EESS (passive) band, covered by RR N°5.340.

WMO Position:

WMO supports the protection of passive frequency bands in the 71-238 GHz range and strongly urges that any technical and regulatory conditions set up for the Fixed Service (FS) should be associated with appropriate in-band or adjacent-band conditions to ensure protection of the EESS (passive). In particular, WMO urges the introduction of relevant mandatory limits for unwanted emissions of FS in the 81-86 GHz and 92-94 GHz bands, noting that these limits have been recognised as not unduly constraining Fixed Service.

WMO strongly supports Method B1 and stresses the fact that only this Method is able to provide a long-term coexistence between FS and EESS (passive), providing a clear regulatory situation to both FS and EESS proponents to secure their future developments.

3.5 Agenda item 1.15: Oceanographic radars in the frequency range 3-50 MHz

This agenda item considers possible allocations in the range 3-50 MHz to the radiolocation service for oceanographic radar applications.

The experience gained from operating experimental or pre-operational HF oceanographic radars in a number of countries around the world has provided an understanding of spectrum needs and spectrum sharing considerations, as well as an understanding and confirmation of the benefits provided by these systems through measurement of coastal sea surface conditions to support environmental, oceanographic, meteorological, climatological, maritime and disaster mitigation activities.

The ITU-R studies allowed to draw Report [RLS 3-50 MHz SHARING] that provides relevant sharing studies and corresponding technical parameters, minimum separation distances as well as mitigation techniques improving coexistence with other services. This Report is aimed at being adopted in 2011.

WMO Position:

WMO confirms the importance of oceanographic radars for meteorology, climatology and environmental activities and supports relevant radiolocation service allocations within the 3-50 MHz band to enable the implementation and operation of such radars.

WMO supports Method A of CPM Text that proposes to add new primary allocations to the Radiolocation Service in portions of the 3 to 50 MHz range, limited to Oceanographic Radars.

3.6 Agenda item 1.16: Lightning detection below 20 kHz

This agenda item considers recognition of systems in the meteorological aids service (passive) in the frequency range below 20 kHz for lightning detection applications and a corresponding service allocation.

One such system is currently deployed and operated by the UK Met Office to the benefit of meteorological organizations worldwide. This system contributes towards safety of life, both in terms of forecasting for public safety and safety of aviation operations, especially over the oceans and large areas of land where national lightning detection systems do not exist. As well as the dangers of the lightning strike itself, thunderstorms can result in intense precipitation with consequent flooding, severe icing, wind shear, turbulence and gusting winds. Recently, the potential has been shown for this system to monitor volcanic ash cloud activity.

This system which does not yet provide the required global coverage, is currently operated below 20 kHz without RR allocation. This system allows for long distance (several thousands kms) strike detection but is currently experiencing interference that is impacting its quality of service.

ITU-R studies have allowed showing that the use of systems under the Met aids (passive) service in the 8.3-11.3 kHz can be done while being protected from emissions of other services, under specific coordination conditions.

An allocation to the meteorological aids service (passive) in this 8.3-11.3 kHz frequency band would provide necessary recognition and long-term protection to this application.

WMO Position:

WMO supports an allocation to the meteorological aids service (passive) between 8.3 and 11.3 kHz that is the only solution to ensure long-term availability of long range and global lightning detection applications of importance for a number of meteorological services and the whole meteorological community.

WMO notes that the current Method given in the CPM Text only proposes an allocation to the Metajds Service in the 9-11.3 kHz band. Therefore, WMO supports an alternative Method B aiming at providing an allocation to the Metajds service in the 8.3-11.3 kHz band.

3.7 Agenda item 1.19: Software Defined Radio (SDR) and Cognitive Radio Systems (CRS)

This agenda item aims at considering regulatory measures and their relevance, in order to enable the introduction of software-defined radio (SDR) and cognitive radio systems (CRS).

The current ITU-R studies have shown that there is no need for any specific regulations for SDR.

CRS is more problematic since the aim of such technology is to improve and increase the use of certain frequency bands through the development of various techniques such as “geo-location” or “sensing”, aimed at detecting geographical areas or spectrum bands that are not being used by any radio equipments.

During the ITU-R technical studies, particular attention was paid to some specific Radiocommunication services that would require careful consideration with regards to CRS, namely space services (space-to-Earth), passive services (radio astronomy, EESS and SRS) and radiodetermination, i.e. for most meteorological applications (METSAT, passive sensors and radars).

The specific case of passive bands covered by RR No. **5.340** for which “all emissions are prohibited”, is to be stressed since these bands would appear to be unused due to the lack of intentional emitters.

Also, following the experience of RLAN 5 GHz and related interference events that recently occurred, it should be stressed that detection of Meteorological Radar signals is not trivial and, in addition, that specification of such cognitive feature could lead to totally freeze the future development of radars.

WMO Position:

WMO is of the view that CRS should only use the spectrum allocated to the service delivered by the particular CRS application and governed by RR applicable to that service.

WMO stresses that CRS applications are by nature incompatible with passive sensors. WMO is totally opposed to CRS applications in these bands.

WMO is also very concerned about CRS applications in bands used by meteorological radars, based on previous interference from RLAN in the 5470-5725 MHz band.

WMO does not support Method A in the draft CPM. WMO supports Methods B1 or B2.

3.8 Agenda item 1.20: High Altitude Platform Stations (HAPS) in the range 5 850-7 075 MHz

This agenda item considers possible spectrum identification for gateway links for high altitude platform stations (HAPS) in the range 5 850-7 075 MHz in order to support operations in the fixed and mobile services.

Within this frequency range, the 6425-7075 MHz band is used by EESS passive sensing and current ITU-R studies have shown that sharing with HAPS uplinks is unlikely being feasible whereas it is feasible with HAPS downlinks.

Due to the current regulatory situation in this band, the passive sensors using this band already receive a great deal of interference from ground-based transmitters. Addition of HAPS gateways in this band would only exacerbate the current situation.

WMO Position:

WMO does not favour any HAPS identification in the 6425-7075 MHz band and supports Method A (No change) as described in the current draft CPM text.

3.9 Agenda item 1.22: Effect of emissions from short-range devices (SRD)

This agenda item examines the effects of emissions from Short Range Devices (SRDs) in order to ensure that radiocommunication services are adequately protected.

Even though a particular focus is made on RFIDs, this agenda item could consider all types of SRDs, including Ultra Wide Bands (UWB) applications, and, to this respect, could hence lead to a global consideration of all frequency bands of interest for the meteorological community.

At this stage, it is rather difficult to assess the potential risk of the various Methods described in the CPM text, in particular due to the fact that they do not address any frequency bands.

However, confusion comes from the fact that, in parallel, under ITU-R Resolution 54, ITU-R is working on a Recommendation on “Frequency bands regionally or globally identified for short-range devices” that could probably become a reference for the final conclusions at WRC-12, should any frequency bands be considered.

This Recommendation is currently considering, among others, the 401-406 MHz band and the 5150-5350 and 5470-5725 MHz bands as potential “harmonised SRD bands” hence putting a highlight that would encourage manufacturers to develop SRD equipments in these frequency bands with a huge risk of proliferation and, for the 5 GHz range, a likely misapplication of radar protection mechanisms.

WMO Position:

Should any provision relating to SRDs be included in the Radio Regulations, WMO urges that compatibility with and protection of meteorological applications and services be ensured.

WMO has no preference among the current 4 Methods described in the CPM Text but stresses that the aggregate effect of emissions from SRDs deployed within one country could have negative impact on space-based radiocommunication systems and in particular Passive Remote sensors operated by other administrations and on the integrity of the passive data collected over that country.

WMO also opposes identification of the so-called “RLAN bands” (5150-5350 MHz and 5470-5725 MHz) and the 401-406 MHz band as harmonised SRD bands either at WRC-12 or in an ITU-R Recommendation.

3.10 Agenda item 1.24: Extension of the 7 750-7 850 MHz Meteorological-satellite service allocation to the band 7 850-7 900 MHz

This agenda item considers the extension of the existing primary allocation to the meteorological-satellite service in the band 7750-7850 MHz to the band 7850–7900 MHz, for non-geostationary meteorological satellites in the space-to-Earth direction.

The mission requirements for next generation non-GSO (Geostationary-Satellite Orbit) meteorological satellites in terms of observations, instruments and user-services clearly show a need to transmit higher data rates compared to current systems.

The required extension of the MetSat allocation into the band 7850–7900 MHz concerns the same radiocommunication services, namely the Fixed (FS) and Mobile (except aeronautical mobile) (MS) services as in the current band 7750–7850 MHz.

Existing use of Metsat systems in the band 7750-7850 MHz and technical studies (see ITU-R Report SA. 2164) demonstrating compatibility between MetSat and FS and MS, have confirmed that Metsat and FS can share the 7850-7900 GHz band under similar conditions.

WMO Position:

WMO stresses that the same services are allocated in the 7750-7850 MHz and 7850-7900 MHz bands hence justifying similar sharing conditions with the METSAT service. WMO supports the METSAT allocation extension in the 7850-7900 MHz under the same regulatory conditions as in the 7750-7850 MHz band.

WMO supports the content of the CPM-Text and the only one method that is proposed to satisfy this agenda item, namely the inclusion of the allocation to the METSAT service in the band 7850-7900 MHz under the same regulatory conditions as in the 7750-7850 MHz band.

3.11 Agenda item 1.25: Mobile Satellite Service

This agenda item considers studies of possible bands for new allocations to the mobile-satellite service in the Earth-to-space and space-to-Earth directions, with particular focus on the range 4 GHz to 16 GHz in which a number of bands are allocated and used by various meteorological applications (METSAT, radars, EESS).

The ITU-R has examined the bands between 4 and 16 GHz and identified some bands as having potential for new allocations, subject to completion of sharing studies with respect to other services. Those bands are:

Frequency band	MSS direction (DL = downlink, UL = uplink)	Meteorological applications concerned
5 150-5 250 MHz	DL	
7 055-7 250 MHz	DL	Passive sensing
8 400-8 500 MHz	UL	
10.5-10.6 GHz	DL	Passive sensing (adjacent band)
13.25-13.4 GHz	DL	Active sensing
15.43-15.63 GHz	UL	

WMO stresses the difficulty of coexistence with MSS, in particular on the uplink. Indeed, MSS Earth stations are mobile and unlicensed by nature and as such, make the necessary separation distances with fixed stations (e.g. METSAT receiving stations) difficult to control.

WMO Position:

Should identification or allocations for mobile satellite service be considered in bands allocated or adjacent to meteorological or EESS services, WMO urges that adequate protection be ensured with related applications.

WMO supports Method B1 of the current CPM Text (no allocation to the MSS in the entire band 7 055-7 250 MHz band) and recognizes that Method D2 (Introduction of MSS primary downlink allocation in the band 10.5-10.6 GHz) is compatible with passive sensors operated in the adjacent 10.6-10.7 GHz band. WMO also supports Method E1 (no allocation to the MSS in the entire band 13.25-13.4 GHz band) since there has been currently no technical studies between MSS and existing or planned EESS (active) sensors in this band.

3.12 Agenda item 8.1.1 (Issue C): Resolution 673 (WRC-07) on Radiocommunications use for Earth observation applications

Last WRC-07 adopted **Resolution 673** (WRC-07) on Radiocommunications use for Earth observation applications, highlighting and recognising the importance of the essential role and global importance of Earth observation radiocommunications applications and calling on studies on possible means of improving this recognition and of increasing the knowledge and understanding of administrations regarding the utilization and benefits of these applications.

This **Resolution 673** (WRC-07) instructs the Director of the Radiocommunication Bureau to report to WRC-12 on these studies and will, to this respect, be considered under WRC-12 agenda item 8.1.1 (Issue C).

WMO would like to emphasise the importance of **Resolution 673** (WRC-07) that has already been referred to and welcomed in the Earth Observation Summit Ministerial declaration (Cape Town, Nov 07).

To this respect, WMO welcomes the work undertaken in ITU-R in preparation for this agenda item and in particular the adoption of ITU-R Recommendation RS.1859 and Draft Recommendation RS.7BL8 as well as ITU-R Report RS.2178 and Handbook on "Earth Exploration satellite service", stressing the importance and essential role of Earth observations.

Report RS.2178 describes the considerable societal weight and economic benefits of spectrum use for Earth observation activities and, where possible, references previous studies and reports that have evaluated these impacts and benefits for the global community. It shows the economic benefits in relation to the investments for these observation systems and also notes that most of the societal benefits of Earth observation applications occur over many years and therefore these benefits are long term in nature.

This Report emphasises in particular the Role of the World Meteorological Organisation (WMO) in Climate and meteorological activities and the essential role of radio-applications for these activities. It also highlights the intergovernmental Group on Earth Observations (GEO) worldwide effort over the next 10 years to build a *Global Earth Observation System of Systems* (GEOSS) that will work with and build upon existing national, regional, and international systems to provide comprehensive, coordinated Earth observations from thousands of instruments worldwide, transforming the data they collect into vital information for society.

Also of note are the activities of the GCOS (Global Climate Observing System) that are essential to serve the needs expressed by the UNFCCC (United Nations Framework Convention on Climate Change).

WMO Position:

WMO stresses the importance of Resolution 673 (WRC-07) in relation to Earth Observations activities and the need to secure it as a long-term ITU-R Resolution. WMO supports and welcomes the new ITU-R Report on “*The essential role and global importance of radio spectrum use for Earth observations and for related applications*” that represents a new major step in the recognition of Earth Observations radio-spectrum applications. Also, WMO encourages the use of such study results to identify frequency bands for use in Earth observation activities, which could require consideration at future WRCs.

WMO supports current CPM Text and favours its findings mentioning as a relevant response a modification of Resolution 673 (WRC-07) at WRC-12 together with the inclusion of a new provision in the RR Article 4 urging Administrations to duly recognize the importance of Earth observation radio applications.

3.13 Agenda item 8.2: WRC-2015/16 agenda item

WMO consideration of agenda items for WRC-15/16 in the CPM Text should take into account implications on meteorological radio services.

WMO will provide possible agenda items, as appropriate, and its position on other proposals in time for WRC-12.

4 Conclusion

Radio-frequencies represent scarce and key resources used for measurement, collection and dissemination of information, for provision of meteorological services to the global community. All these frequency applications are inter-related and help to comprise a global meteorological system.

WMO hence stresses the fact that a lack of any radio component of this system, whether associated with measurement, collection or dissemination, is able to put at risk the whole meteorological process and, as expressed in the attached WMO Resolution 4 (Cg-XV), **appeals to the International Telecommunication Union and its Member Administrations:**

- (1) To ensure the availability and absolute protection of the radio-frequency bands which, due to their special physical characteristics, are a unique natural resource for spaceborne passive sensing of the atmosphere and the Earth surface; In this regard, the exclusive 23.6 - 24 GHz passive band that is associated with a water vapour absorption line is of crucial importance for weather, water and climate research and operations;
- (2) To give due consideration to the WMO requirements for radio frequency allocations and regulatory provisions for meteorological and related environmental operations and research;

It is emphasized that observing systems using these frequencies have a crucial role in detecting, warning and forecasting weather, water and climate related disasters. Since these disasters represent more than 90% of natural disasters, these systems are essential components of all-hazards emergency and disasters early-warning and mitigation systems promoted in particular by Resolution 136 (Antalya, 2006) of the Plenipotentiary Conference under its *resolves* 1 and 2.

WMO would also like to stress the importance of radio-frequencies for all Earth Observation activities, in particular with regard to global warming and climate change related activities, coordinated within the GEO group and, in this respect, highlight the declaration of the Cape Town Ministerial Summit on “Earth Observations for sustainable growth and development” (30 Nov 2007) that specifically addresses radio-frequency issues in stating:

“We welcome the resolution of the World Radio Conference-07 on radiocommunication use for Earth observation applications and the support it provides for the international protection and long-term availability of frequencies for terrestrial, oceanic, air-borne and space-based observations, including passive measurement”

ANNEX

WORLD METEOROLOGICAL ORGANISATION

RESOLUTION 4 (CG-XV)

RADIO FREQUENCIES FOR METEOROLOGICAL AND RELATED ENVIRONMENTAL ACTIVITIES

THE CONGRESS,

Noting:

- (1) The WMO Strategic Plan and the Millennium Development Goals,
- (2) Resolution 3 (Cg-XIV) – Radio-frequencies for meteorological and related environmental activities,
- (3) The current radio frequency allocations and regulatory provisions related to the meteorological aids, meteorological satellite, Earth exploration-satellite and radiolocation (weather and wind profiler radars) services in the Radio Regulations of ITU,
- (4) The outcome of the ITU World Radiocommunication Conferences (especially WRC-2000 and WRC-03),
- (5) The agenda of the forthcoming ITU World Radiocommunication Conference (WRC-07) and related WMO positions submitted during the ITU preparatory process,

Considering:

- (1) The prime importance of the specific radiocommunication services for meteorological and related environmental activities required for the prevention, detection, early warning and mitigation of natural and technological (man-made) disasters, the safety of life and property, the protection of the environment, climate change studies and scientific research,
- (2) The importance of information provided by the Earth-exploration systems including meteorological systems for a wide range of economic activities such as agriculture, transportation, construction, tourism, etc,
- (3) The crucial importance of the allocation of suitable radio-frequency bands for the operation of surface-based meteorological observing systems, including in particular radiosondes, weather radars, wind profiler radars,
- (4) The crucial importance of the allocation of suitable radio-frequency bands for the operation of Meteorological and R&D satellites, including remote sensing, data collection and data distribution links,

Stressing that some radio-frequency bands are a unique natural resource due to their special characteristics and natural radiation enabling spaceborne passive sensing of the atmosphere and the Earth surface, that deserve adequate allocation to the Earth exploration satellite service (passive) and absolute protection from interference,

Expresses its serious concern at the continuing threat to several 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;

Requests the Commission for Basic Systems to pursue the continuous review of regulatory and technical matters related to radio-frequencies for operational and research meteorological and related environmental activities, and preparation of guidance and information for NMHSs, in coordination with other technical commissions, especially CIMO, and in liaison with other relevant international bodies, in particular the Coordination Group for Meteorological Satellites;

Urges all Members to do their utmost to ensure the availability and protection of suitable radio frequency bands required for meteorological and related environmental operations and research, and in particular:

- (1) To ensure that their national radiocommunication administrations are fully aware of the importance of and requirements for radio frequencies for meteorological and related activities, and to seek their support in the ITU World Radiocommunication Conferences and Radiocommunication Sector activities;
- (2) To participate actively in the national, regional and international activities on relevant radiocommunication regulatory issues and, in particular, to involve experts from their Services in the work of relevant regional radiocommunication organizations and of ITU-R, especially ITU-R Study Group 7 on Science Services;
- (3) To register adequately with their national radiocommunication administrations all radiocommunication stations and radio frequencies used for meteorological and related environmental operations and research;

Appeals to ITU and its Member Administrations:

- (1) To ensure the availability and absolute protection of the radio-frequency bands which, due to their special physical characteristics, are a unique natural resource for spaceborne passive sensing of the atmosphere and the Earth surface; In this regard, the exclusive 23.6 - 24 GHz passive band that is associated with a water vapour absorption line is of crucial importance for weather, water and climate research and operations;
- (2) To give due consideration to the WMO requirements for radio frequency allocations and regulatory provisions for meteorological and related environmental operations and research;
- (3) To pay special attention to the WMO positions related to WRC-07 agenda, in the light of Appeals (1) and (2) above;

Requests the Secretary-General:

- (1) To bring this resolution to the attention of all concerned, including the International Telecommunication Union;
- (2) To pursue as a matter of high priority the coordination role of the Secretariat in radio frequency matters, especially with ITU-R, including participation of WMO in ITU-R Radiocommunication Study Groups, conference preparatory meetings and World Radiocommunication Conferences;

- (3) To facilitate the coordination between National Meteorological and Hydrological Services and their national radiocommunication administrations, particularly in preparing the ITU World Radiocommunication conferences, by providing appropriate information and documentation;
 - (4) To assist the Commission for Basic Systems in the implementation of this resolution.
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NOTE: This resolution replaces Resolution 3 (Cg-XIV), which is no longer in force

List of Acronyms

Acronym	Explanation
CLOUDICE	Cloud Ice Water-path Sub-millimetre Imaging Radiometer'
CPM	Conference Preparatory Meeting
CRS	Cognitive Radio Systems
DL	Downlink
EESS	Earth Exploration Satellite Service
ENG	Electronic News Gathering
FS	Fixed Service
GCOS	Global Climate Observing System
GEO	Group on Earth Observations
GEOSS	<i>Global Earth Observation System of Systems</i>
GEM	Geostationary Microwave Observatory
GOMAS	Geostationary Observatory for Microwave Atmospheric Sounding
GOS	Global Observing System
HAPS	High Altitude Platform Station
ITU-R	International Telecommunication Union – Radiocommunication sector
METAIDS	Meteorological Aids
METSAT	Meteorological satellite
MLS	Microwave Limb Sounder
MS	Mobile Service
MSS	Mobile Satellite Service
MWI	MicroWave Imager
RFID	Radio Frequency IDentification
RLAN	Radio Local Area Network
RR	Radio Regulations
RS	Remote Sensing
SDR	Software Defined Radio
SMILES	Superconducting Sub-Millimeter Wave Limb Emission Sounder
SMR	Sub-millimeter Microwave Radiometer
SRD	Short-Range Devices
STEAMR	Stratosphere Troposphere Exchange And Climate Monitor Radiometer
UL	Uplink
UNFCCC	United Nations Framework Convention on Climate Change
UWB	Ultra Wide Band
WMO	World Meteorological Organisation
WRC	World Radiocommunication Conference