CGMS

CGMS-39 WMO-WP-19
v1, 09 Sep 2011
Prepared by WMO
Agenda Item: I.2
Discussed in WG I

RADIO-FREQUENCY COORDINATION

The document is an update on the WMO position provided by the WMO Steering Group on Radio Frequency Coordination (SG-RFC) in preparation for the World Radiocommunication Conference to be held in January-February 2012 (WRC-12). Thirteen key agenda items from WRC-12 are identified, along with their current status.

Agenda Items 1.2, 1.6, 1.8, 1.19, 1.24, 1.25 and 8.2 are most likely to be of interest to CGMS. A key should be WRC-12 Agenda item 1.8, where SG-RFC members feel that there is an increasing swell of support for removing Resolutions 731(WRC-2000), and 732(WRC-2000) that have to some extent protected satellite based passive sensing. CGMS Members are encouraged to alert their national frequency representatives to the potential impact of WRC-12 Agenda item 1.8.

Action/Recommendation proposed:

1. CGMS-39 is requested to review this WMO paper and provide feedback through the WMO secretariat to the meeting of the WMO Steering Group on Space Frequency Coordination being held 3-5 October 2011 in Geneva.

2. Space agencies are encouraged to participate in the SG-RFC preparation process for WRC-12

RADIO-FREQUENCY COORDINATION

1 INTRODUCTION

The development of new, mass-market and added-value radio applications is putting increasing pressure on the frequency bands used for meteorological purposes. This presents the potential risk of limiting meteorological applications in future. Meteorological users of the spectrum must remain vigilant and increasingly address issues concerning sharing of the spectrum with other radiocommunications services. The WMO Commission for Basic Systems (CBS) has maintained a special group of experts, the Steering Group on Radio Frequency Coordination (SG-RFC), to monitor spectrum resources related activities in the radiocommunication community.

The International Telecommunication Union (ITU) effects allocation of bands of the radio-frequency spectrum, the allotment of radio frequencies and the registration of radio-frequency assignments for terrestrial and space services. The ITU trough the World Radiocommunication Conferences (WRCs) develops and maintains international treaty level Radio Regulations (RR) containing the rules and regulations governing the use of radio-frequency spectrum by different systems and applications including meteorological systems. A WRC where radiocommunications regulations and guidelines are updated is normally convened every three to four years. The next one is in January to February 2012 (WRC-12).

The SG-RFC has monitored national and WRC Regional preparation, identifying key agenda items that could facilitate further development or affect meteorological applications and published a WMO position as guidance for all WMO Members in preparation for WRC-12. There are thirteen WRC-12 Agenda items that WMO has identified. Their position and status are described in more detail below.

The main WMO objectives at WRC-12 are:

- maintain the relevant protection of the existing meteorological systems and applications;
- support allocation of additional radio-frequency spectrum for new meteorological and Earth observation systems and applications.

WMO invites the CGMS to review these positions and provide comments as soon as possible to the SG-RFC (which is convened in Geneva during the CGMS-39 time frame) via the WMO representative at CGMS-39. Also of interest to the SG-RFC will be the identification of any other agenda items or issues CGMS would like WMO to consider in preparation for WRC-12

2 WMO Position statements

In order to prepare the relevant input to the WRC-12 the ITU Radiocommunication Sector (ITU-R) carried out the studies on the technical, operational, regulatory and procedural matters to be considered by WRC-12 and the Conference Preparatory Meeting (CPM) held in February 2011 (CPM-11) prepared the consolidated report (CPM Report to WRC-12, see at: http://www.itu.int/md/R07-CPM11.02-R-0001/en) that is used as the reference document.

AI 1.2: take appropriate action with a view to enhancing the international regulatory framework (Chapter 6 of CPM Report)
CPM Report contains 5 Methods (A1-A5) related to conversion between terrestrial services and 2 Methods (B1-B2) related to general allocation issues. It is very difficult to evaluate implications of Methods except A1 and B1 (no change to Radio Regulations (RR) under WRC-12 AI 1.2). For example: elimination of clear distinction between fixed service and mobile service could create incompatibility in frequency bands used by meteorological applications.

WMO position: WMO supports no change to RR Methods (A1 and B1 as described in the CPM Report).

AI 1.5: consider worldwide/regional harmonization of spectrum for electronic news gathering (ENG) (Chapter 3 of CPM Report)
WMO objective: avoid increasing interference level to meteorological applications due to introduction of ENG tuning ranges.
Current situation: CPM Report contains 4 Methods (A, B, C, D). All propose "no change" to RR. Only Methods B and D require to develop a WRC Recommendation (B, D)/Resolution (D) on tuning ranges. The list of tuning ranges in a Working Documents towards a "Preliminary Draft New Report ITU-R F.[ENGTUNING RANGES] in accordance with Method C contains bands critical for meteorological applications (2 200-2 290, 2 700-2 900 MHz, 10.6-10.68 GHz, etc.).

WMO position: WMO supports Method B in CPM Report ("no change" to RR + WRC Resolution/Recommendation on ENG tuning ranges) and opposes to inclusion in the tuning ranges bands 2 700-2 900, 5 470-5 725 MHz.

AI 1.6: update spectrum use by passive services in 275-3000 GHz, and possible procedures for free-space optical-links (Chapter 6 of CPM Report)
Current situation: CPM Report contains only 1 Method: include into RR No. **5.565**, bands of interest to Earth-exploration-satellite and space research passive services in the range 275-1 000 GHz and stress the interest of the passive services in the range 1 000-3 000 GHz. ITU-R recently approved Report ITU-R RS.2194 "Passive bands of scientific interest to EESS/SRS from 275 to 3 000 GHz" that provides the relevant frequency bands and technical background.

WMO position: WMO supports the only Method in the CPM Report.

AI 1.8: consider progress studies of technical and regulatory issues relative to the FS in the bands between 71 GHz and 238 GHz (Chapter 3 of CPM Report)
Current situation – Resolution **731 (WRC-2000)** part:
CPM Report contains 2 Methods (A1, A2) related to studies of sharing and adjacent band compatibility issues between passive and active services:

Method A1 proposes to keep Resolution **731(WRC-2000)**, **732(WRC-2000)**;
Method A2 suppresses these Resolutions.

There seems to be strong support for method A2 which could lead to increased vulnerability of passive sensor-based systems, which will no longer be protected by the resolution.

WMO position: taking into account that Resolution **731 (WRC-2000)** covers sharing and adjacent band compatibility issues between passive and active services in general not only with the fixed service WMO should support the Method A1 in the CPM Report

Current situation – Resolution **732 (WRC-2000)** part:
CPM Report contains 2 Methods (B1, B2) related to modification of RR to protect systems of the Earth exploration-satellite service in the 86-92 GHz band by introducing limitations on unwanted emissions from systems in the fixed service through footnotes in the adjacent bands (81-86 and 92-95 GHz):

Method B1 proposes to add a footnote to RR Article 5 containing unwanted emission power limits;

Method B2 contains a sample of the footnote that "encourages administrations" to comply with the limits specified by the mask.

WMO position: in order to provide an adequate protection to EESS WMO supports the Method B1 in the CPM Report.

AI 1.15: consider possible allocations in range 3-50 MHz to the RLS for oceanographic radar applications (Chapter 2 of CPM Report)
Current situation: CPM Report contains 3 Methods (A, B, C) proposing the same set primary/secondary allocations (some, or portions of the frequency bands 3 155-3 200 kHz, 4 438-4 650 kHz, 5 060-5 450 kHz, 7 450-8 100 kHz, 9 040-9 400 kHz, 9 900-9 995 kHz, 12 100-12 230 kHz, 13 410-13 570 kHz, 13 870-14 000 kHz, 14 350-14 990 kHz, 15 800-16 350 kHz, 22 855-23 200 kHz, 24 000-24 890 kHz, 25 010-25 070 kHz, 25 210-25 550 kHz, 26 175-27 500 kHz, 39-39.986 MHz, 40.02-40.98 MHz and 41.015-47 MHz) to oceanographic radars:

Method A – primary allocations subject to Resolution **612 (Rev.WRC-12)**, referred in a new footnote in RR Article **5**;

Method B – secondary allocations, suppress Resolution **612 (WRC-07)**;

Method C – primary and/or secondary allocations subject to Resolution **612 (Rev.WRC-12)**, referred in a new footnote in RR Article **5**.

ITU-R approved new Recommendation ITU-R M.1874 "Technical and operational characteristics of oceanographic radars operating in sub-bands within the frequency range 3-50 MHz".

WMO position: from WMO prospective Method A provides the best opportunities for oceanographic radar applications.

AI 1.16: needs of passive systems for lightning detection in MetAids, including possibility of allocation in range below 20 kHz (Chapter 4 of CPM Report)
Current situation: CPM Report contains only one Method proposing new allocation 8.3-11.3 kHz, modification of RR No. **5.53** and **5.54**, addition of 2 new footnotes (one of them is an additional allocation for one administration) to RR Article **5**.
ITU-R approved new Recommendation ITU-R RS.1881 "Protection criteria for arrival time difference receivers operating in the meteorological aids service in the frequency band 9-11.3 kHz" and several ITU-R Reports (RS.2184, RS.2185, RS.2186).

WMO position: WMO supports the proposed method that is ensuring long-term availability of lightning detection applications.

AI 1.19: consider regulatory measures in order to enable the introduction of software-defined radio and cognitive radio systems (Chapter 6)

Current situation: the CPM Report considers 2 issues: Issue A related to software-defined radio (SDR); Issue B related to cognitive radio systems (CRS).

Issue A – one Method (A) in the CPM Report – no change to RR and suppress Resolution **956 (WRC-07)**;

Issue B – two methods in the Report: B1 with options A, B and B2:

- Method B1 option A – no change to RR, suppress Resolution **956 (WRC-07)**;
- Method B1 option B – no change to RR, suppress Resolution **956 (WRC-07)** + new WRC-12 Resolution on technical/operational studies for implementation of CRS;
- Method B2 – no change to RR, suppress Resolution **956 (WRC-07)** + new WRC-12 Resolution on studies on deployment and use of CRS.

WMO position: CRS are incompatible with passive sensors. CRS shall not be used in "passive bands". WMO is concerned about the CRS use in the bands used by meteorological radars. WMO supports Methods A, B1 or B2. However the above-mentioned conditions should be observed.

AI 1.20: studies on spectrum identification for gateway links for HAPS in the range 5 850- 7 075 MHz to support operations in the FS and MS (Chapter 3 of CPM Report)

Current situation: the CPM Report describes 2 Methods (A and B):

Method A proposes NOC to RR, SUP Resolution **734 (Rev.WRC-07)** and application of Resolution **122 (Rev.WRC-07)**. No additional spectrum identification for HAPS in the range 5 850-7 075 MHz;

Method B: add a new Article **5** footnote identifying bands 6 440-6 520 (HAPS-to-ground), 6 560-6 6400 (ground-to-HAPS) MHz+ a new WRC-12 Resolution on the use of these bands by HAPS; suppress Resolution **734 (Rev.WRC-07)**, modify RR Article **11** and Appendix **4**.

WMO position: the 6 425-7 075 MHz band is used by EESS (passive). ITU-R sharing studies show that HAPS will cause interference to EESS (passive) systems. Therefore WMO supports Method A (NOC to RR).

AI 1.22: examine effect of emissions from short-range radio devices (SRD) on radiocommunications services (Chapter 3 of CPM Report)

Current situation: CPM Report contains 4 Methods (A, B, C, D):

Method A – NOC to RR, national/regional regulations + ITU-R Recommendations/Reports;

Method B – NOC to RR, a new WRC-12 Resolution inviting to study regional/global harmonization, technical requirements for SRD and develop ITU-R Recommendations/Reports;

Method C – recognize a limited number of harmonized frequency bands and technical characteristics of SRD in WRC-12 Resolution or RR Article **5** (including limits on the aggregated use of SRD applications);

Method D – include SRD definition and provisions for SRD operation in RR.

ITU-R is currently approving Recommendation ITU-R SM.[SRD] "Frequency ranges for global or regional harmonisation of short-range devices (SRDs)". Accepting WMO position WP 1B removed frequency ranges 401-406, 5 150-5 350, 5 470-5 725 MHz from the list of harmonized SRD bands.

WMO position: any method under condition that ranges 401-406, 5 150-5 350, 5 470-5 725 MHz not identified for SRD applications.

AI 1.24: consider extension to band 7850-7900MHz of existing MetSat allocation at 7750- 7850 MHz, for NGSO sat. (space-to-Earth) (Chapter 4 of CPM Report)
Current situation: CPM Report contains one Method only. The method proposes to modify RR:

add a global primary MetSat allocation (space-to-Earth) in the band 7 850-7 900 MHz limited to non-geostationary meteorological satellites;
apply power-flux density limits contained in RR Article **21** - same as applied for meteorological satellites in the band 7 250-7 850 MHz, use the same coordination distances as for the band 7 250-7 850 MHz (RR Appendix **7**);
suppress Resolution **672 (WRC-07)**.

WMO position: WMO is completely in line with the Method in the CPM Report.

AI 1.25: consider possible additional allocations to the mobile-satellite service (MSS), particular focus on the bands between 4 GHz and 16 GHz (Chapter 5 of CPM Report)
Current situation: 6 frequency bands that considered as potential new MSS allocations and related Methods in CPM Report are shown on right.
According to RR No. **5.458** in the band 7 055-7 250 MHz, passive measurements are carried out over ocean. The band 13.25-13.4 GHz is allocated to EESS (active) MSS-EESS sharing studies have been just recently completed and it was shown that it was possible to share this band with MSS under the conditions currently (15 September 2011) specified in the preliminary Draft Report ITU M.[MSS-SHARING]. The band 10.6-10.68 is allocated to EESS (passive) and MSS in the adjacent 10.5-10.6 GHz band may create unacceptable out of band emissions. MSS allocations in the above-mentioned bands may create significant problems for meteorological applications.

WMO position: WMO supports:

no allocation to MSS in the frequency band 7 055-7 250 MHz (Method B1);
WMO may agree to allocations in the 10.5-10.6 GHz (Method D2) and 13.25-13.4 GHz bands (Method E2) if protection of the adjacent frequency range 10.6-10.7 GHz is ensured and if protection as currently (15 September 2011) specified in the preliminary Draft Report ITU M.[MSS-SHARING] is also ensured

AI 8.1: Consider and approve the Report of the Director Radiocommunications Bureau on 8.1.1: Activities of the ITU-R Sector since WRC-07
Current situation: In response to Resolution **673 (WRC-07)** ITU-R with active participation of WMO developed several deliverables such as Recommendation ITU-R RS.1883 "Use of remote sensing systems in the study of climate change and the effects thereof", Report ITU-R RS.2178 "The essential role and global importance of radio spectrum use for Earth observations and for related applications", ITU/WMO Handbook

"Use of Radio Spectrum for Meteorology: Weather, Water and Climate Monitoring and Prediction".

CPM Report proposes:

add to a new provision to RR Article

- **4:4.YZ** Member States recognize the importance of the Earth observation related radio services; in this respect it is necessary to take into account Resolution **673 (Rev.WRC-12)**.

revise Resolution **673 (WRC-07)** taking into account the current development.

WMO position: WMO supports all actions aimed at further recognition of the essential role and global importance of meteorological applications and related radio systems/networks. WMO considering that the results of ITU/WMO common studies (to be included in the BR Director's Report to WRC-12) are adequate response to Resolution **673 (WRC-07)**.

AI 8.2: "to recommend to the Council items for inclusion in the agenda for the next WRC, and give its views on the preliminary agenda for the subsequent conferences, taking into account Resolution 806 (WRC-07)

Two items already identified by WRC-07:

Spectrum requirements and possible new allocations in the RDS to support operation of unmanned aerial systems (UAS)

Review use of band 5091-5150 MHz for feeder links of NGSO MSS in accordance with Resolution **114 (Rev.WRC-03)**.

There is no official information on proposed WRC-15 Agenda Items.

3 OTHER WRC-12 AGENDA ITEMS

3.1 When considering the planning for WRC-12, CGMS might be also concerned with WRC-12 Agenda items 1.11 and 1.12 (see below) due to the WMO involvement in the Space Weather programme.

AI 1.11 to consider a primary allocation to the space research service (Earth-to-space) within the band 22.55-23.15 GHz, taking into account the results of ITU-R studies, in accordance with Resolution 753 (WRC-07);

AI 1.12 to protect the primary services in the band 37-38 GHz from interference resulting from aeronautical mobile service operations, taking into account the results of ITU-R studies, in accordance with Resolution 754 (WRC-07);

These agenda items have not been included in the WMO position paper, but may be reviewed by the October 2011 meeting of the SG-RFC.

4 CONCLUSIONS

The WMO is concerned with the effective use and management of those radio-frequency bands that are allocated to meteorological, Earth exploration-satellite and other radiocommunication services used for obtaining, measurement, collection and dissemination of meteorological and environmental information. WMO also recognizes the limited nature of radio spectrum, promotes spectrum efficiency and support sharing frequency bands by several services where the relevant sharing and protection criteria

have been established by the ITU-R. At the same time the WMO holds the view that such sharing should not be included in the Radio Regulations without mutually agreed criteria.

The above-mentioned WRC-12 Agenda items may have either positive (e.g. AI 1.24 which provides addition allocation to MetSat) or negative effect (e.g. AI 1.25) on operation and/or development of meteorological applications and the WMO should invite WMO Members to undertake all possible actions for protecting WMO interests at WRC-12. WMO should also communicate its view to WRC-12.

Of the thirteen agenda items listed in the WMO position paper, agenda Items 1.2, 1.6, 1.8, 1.19, 1.24, 1.25 and 8.2 are most likely to be of interest to CGMS. A key should be WRC-12 Agenda item 1.8, where SG-RFC members feel that there is an increasing swell of support for removing Resolutions **731(WRC-2000)**, and **732(WRC-2000)** that have to some extent protected satellite based passive sensing from interference from out of bands emissions from adjacent active services. CGMS Satellite Operators are encouraged to alert their national frequency representatives to the potential impact of WRC-12 Agenda item 1.8.

The SG-RFC will be meeting at the same time as the CGMS-39, so it will be important for the CGMS to provide any information on the above or any additional agenda items that will be relevant to their final preparations for WRC-12.

WRC-12 determines the focus for the next World Radiocommunication Conference (WRC-15). Thus, WRC-12 Agenda item 8.2 will be an important area where satellite operators through CGMS would be encouraged to inform the SG-RFC members on the potential impact and priority for EESS of any proposed WRC-15 Agenda items that arise during WRC-12. The WMO secretariat will be happy to act as a go-between for CGMS and SG-RFC members during WRC-12.

ACRONYMS

AI	WRC-12 Agenda Item
BR	ITU Radiocommunications Bureau
CRS	Cognitive Radio Systems
CPM	WRC Conference Preparatory Meeting
ENG	Electronic News Gathering
EESS	Earth exploration-satellite service
FS	Fixed Services
HAPS	High Altitude Platform Station
ITU	International Telecommunications Union
ITU-R	ITU Radiocommunications sector
MSS	Mobile-Satellite Service
NGSO	NON Geostationary Orbit
NOC	No Change
RR	Radio Regulations
SDR	Software Defined Radio
SG-RFC	Steering Group on Radio Frequency Coordination
SRD	Short-Range Devices
SRS	Space Research Service
SUP	Suppress
UAS	Unmanned Aerial Systems
WRC	ITU World Radiocommunication Conference
WRC-12	WRC January-February 2012