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| **WORLD WEATHER WATCH****COMMISSION FOR BASIC SYSTEMS** |  |
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| **Steering Group on Radio Frequency Coordination (SG-RFC)****Payerne, Switzerland. 22-25 September 2015.** | **Document SG-RFC/2015-Doc13** |
|  | **15 September 2015** |
|  | **English only** |
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|  | **Restricted access required? (Y/N)[[1]](#footnote-1)\*** | **N** |  |
| STEERING GROUP ON RADIO FREQUENCY COORDINATION (SG-RFC) |
| David FRanc (USA) |
| **Information Document for CIMO- Summary of Wind Profiler Radar Spectrum** |

**Introduction**

During the November 2014 meeting of the SG-RFC Steering Group members as well as WMO staff involved with CIMO expressed a concern that some potential proposal for WRC-15 could impact the ability of WMO members to use radio spectrum identified for wind profiler radar operations. Some participants indicated that they believe some action may be required to ensure continued protection of wind profiler radar operations.

Side discussions resulted in an agreement that a document outlining the current state of spectrum usable by wind profiler radars was needed and should be provided to CIMO. In return CIMO should provide the SG-RFC a document outlining the WMO strategy for future wind profiler radars operations and indicate where deficiencies exist in the spectrum already available. Based on that strategy the SG-RFC could better determine if any actions are required relating to protection of radio spectrum used by wind profiler radars.

 **X. Action (by SG-RFC) Proposed** *(for example, note the information, study the matter, etc.)*

WMO SG-RFC members are requested to review and comment on the attached document and assist finalizing a version that the CIMO Theme Leaders on Radio Frequency Protection can provide to the relevant CIMO Expert Teams.

**Y. Draft Text for Inclusion in the SG-RFC Meeting Reports or Other Documents**

Dependent on discussion during the September 2015 SG-RFC meeting.

**Information Document for CIMO-Summary of Wind Profiler Radar Spectrum**

(Prepared by CIMO Theme Leader-

Radio Frequency Protection, TL-RFP)

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**Background**

At the November 2014 meeting of the WMO Steering Group on Radio Frequency Coordination concern was raised over the possibility that frequency bands available for operation of wind profiler radars could be allocated to the mobile service and/or identified for mobile broadband (IMT) under WRC-15 Agenda Item 1.1. Discussions about this issue were also held with WMO staff involved with CIMO.

This document is for use by the appropriate CIMO Expert Teams to gain a better understanding of the spectrum that is available for wind profiler operation, and any restrictions that may be associated with use of the spectrum. If any action is required by the WMO SG-RFC or WMO Members, CIMO should provide a long-term strategy for deployment of wind profiler radars so that spectrum spectrum-related regulatory actions can be justified.

**Resolution 217 (WRC-97)**

The majority of the work in the International Telecommunications Union Radiocommunication Sector (ITU-R) to identify spectrum for wind profiler radars was in the ITU-R study period leading up to the 1997 World Radiocommunication Conference (WRC-97) and during WRC-97. WRC-97 captured the summary of the ITU-R study work and its decision on wind profiler radar spectrum in **Resolution 217 (WRC-97)**. **Resolution 217** identified 6 frequency bands as the first choices for operation of wind profiler radars, and two additional frequency bands as alternative choices. Not all of the frequency bands are available for wind profiler radar use on a global basis.

**Frequency Bands**

**Resolution 217** lists 6 frequency bands that may be used for wind profiler radar operations, with due regard to the potential for incompatibility with other radio services and assignments. Two other frequency bands are also mentioned as alternatives. It should be noted that wind profiler radars are considered a radio system in the radiolocation service.

46-68 MHz:

This frequency band must be used in accordance with No. **5.162A** of the International Radio Regulations. No. **5.162A** states that:

 “*in Germany, Austria, Belgium, Bosnia and Herzegovina, China, Vatican, Denmark, Spain, Estonia, the Russian Federation, Finland, France, Ireland, Iceland, Italy, Latvia, The Former Yugoslav Republic of Macedonia, Liechtenstein, Lithuania, Luxembourg, Monaco, Montenegro, Norway, the Netherlands, Poland, Portugal, the Czech Rep., the United Kingdom, Serbia, Slovenia, Sweden and Switzerland the band 46-68 MHz is also allocated to the radiolocation service on a secondary basis. This use is limited to the operation of wind profiler radars in accordance with Resolution 217 (WRC-97).*”

In the countries listed in No. **5.162A** wind profiler radars may operate as part of the radiolocation service with secondary allocation status. Outside of the countries listed in No. **5.162A**, no spectrum is available for wind profiler radar operation around 50 MHz. In the listed countries, wind profiler radars may not claim protection or cause harmful interference to radio services allocated on a primary basis.

440-450 MHz:

The frequency band 440-450 MHz is allocated to the radiolocation service on a secondary basis in the International Radio Regulations. In Australia, United States, India, Japan and the United Kingdom the allocation to the radiolocation service is on a primary basis under No. **5.269**. Wind profiler radars may operate under the secondary and primary allocations to the radiolocation service, as applicable for the country of operation. In the case where secondary allocations apply, the fixed and mobile services have priority over the radiolocation service, meaning radiolocation may not claim protection from nor cause interference to the fixed and mobile services.

470-494 MHz:

This frequency band must be used in accordance with No. **5.291A** of the International Radio Regulations. No. **5.291A** states that:

“*in Germany, Austria, Denmark, Estonia, Finland, Liechtenstein, Norway, Netherlands, the Czech Rep. and Switzerland, the band 470-494 MHz is also allocated to the radiolocation service on a secondary basis. This use is limited to the operation of wind profiler radars in accordance with Resolution 217 (WRC-97).*”

In the countries listed in No. **5.291A** wind profiler radars may operate as part of the radiolocation service with secondary allocation status. Outside of the countries listed in No. **5.291A**, the frequency band 470-494 MHz is not available for use.

902-928 MHz:

The frequency band 902-928 is available for wind profiler radar operation in ITU Region 2 (Americas) only. The allocation to the radiolocation service in ITU Region 2 is on a secondary basis. The fixed service has a primary allocation in this frequency band and therefore has priority over wind profiler operations. Wind profiler operations may not claim protection from or cause harmful interference to the fixed service.

1270-1295 MHz:

The frequency band 1240 -1300 MHz is allocated to the radiolocation service on a primary basis, and **Resolution 217** encourages operation of wind profiler radars in the sub-band 1270- 1295 MHz under the allocation to the radiolocation service. The radiolocation service allocation is co-primary with the Earth exploration satellite service (active), radionavigation satellite service (space-to-Earth) and (space-to-space) and the space research service (active). Co-primary status means that wind profiler radars may operate on an equal status with the other co-primary radio services.

1300-1375 MHz:

The frequency bands 1300 – 1350 MHz and 1350 -1400 MHz are allocated on a primary basis to the radiolocation service worldwide. **Resolution 217** encourages operation of wind profiler radars in the sub-band 1300-1375 MHz. In the frequency range 1300-1350 MHz the radiolocation service allocation is co-primary with the aeronautical radionavigation service and the radionavigation satellite service (Earth-to-space). In the frequency range 1350-1375 MHz the radiolocation service allocation is co-primary with the fixed and mobile services in ITU Region 1 (Europe and Africa). Co-primary status means that wind profiler radars may operate on an equal status with the other co-primary radio services.

Other Frequency Bands:

420-435 MHz:

This frequency range is indicated in **Resolution 217** as an alternative band to be considered for wind profiler radar operation in the event that compatibility issues with other radio applications exist in the frequency bands 440-450 MHz and 470-494 MHz. The frequency range 420-430 MHz is allocated to the radiolocation service on a secondary basis, with the fixed and mobile services holding priority over the radiolocation service. The frequency range 430- 435 MHz is allocated to the radiolocation service on a primary basis, with the amateur service holding a co-primary allocation in ITU Region 1 (Europe and Africa) only.

It should be noted that No. **5.276** provides additions primary allocations to the fixed and mobile services in some countries:

“*in Afghanistan, Algeria, Saudi Arabia, Bahrain, Bangladesh, Brunei Darussalam,*

*Burkina Faso, Djibouti, Egypt, the United Arab Emirates, Ecuador, Eritrea, Ethiopia, Greece, Guinea, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Italy, Jordan, Kenya, Kuwait, Libya, Malaysia, Niger, Nigeria, Oman, Pakistan, the Philippines, Qatar, the Syrian Arab Republic, the Dem. People’s Rep. of Korea, Singapore, Somalia, Sudan, Switzerland, Tanzania, Thailand, Togo, Turkey and Yemen, the band 430-440 MHz is also allocated to the fixed service on a primary basis and the bands 430-435 MHz and 438-440 MHz are also allocated to the mobile, except aeronautical mobile, service on a primary basis*.”

These additional allocations by footnote to the fixed and mobile services could limit use of the frequency bands for wind profiler radars in some countries.

438-440 MHz:

This frequency range is indicated in **Resolution 217** as an alternative band to be considered for wind profiler radar operation in the event that compatibility issues with other radio applications exist in the frequency bands 440-450 MHz and 470-494 MHz. The frequency range 438-440 MHz is allocated to the radiolocation service on a primary basis, with the amateur service holding a co-primary allocation in ITU Region 1 (Europe and Africa) only.

It should be noted that No. **5.276** provides additions primary allocations to the mobile service in some countries:

“*in Afghanistan, Algeria, Saudi Arabia, Bahrain, Bangladesh, Brunei Darussalam,*

*Burkina Faso, Djibouti, Egypt, the United Arab Emirates, Ecuador, Eritrea, Ethiopia, Greece, Guinea, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Italy, Jordan, Kenya, Kuwait, Libya, Malaysia, Niger, Nigeria, Oman, Pakistan, the Philippines, Qatar, the Syrian Arab Republic, the Dem. People’s Rep. of Korea, Singapore, Somalia, Sudan, Switzerland, Tanzania, Thailand, Togo, Turkey and Yemen, the band 430-440 MHz is also allocated to the fixed service on a primary basis and the bands 430-435 MHz and 438-440 MHz are also allocated to the mobile, except aeronautical mobile, service on a primary basis*.”

These additional allocations by footnote to the mobile service could limit use of the frequency bands for wind profiler radars in some countries.

**Summary**

Review of the spectrum available for wind profiler radar operations shows that a variety of frequency bands are available around the world, some on a primary basis and some on a secondary basis. In addition, globally available bands are not common. The review of frequency bands does not take into account national allocations and regulations that could vary from country to country.

Frequency allocation decisions made at a WRC are typically based on technical studies that analyze the impact that the proposed new radio service may have on operation of incumbent radio services holding primary allocations in the frequency band. It is the results of the studies conducted prior to WRC-97 that lead to a variety of frequency bands, some of which are allocated to the radiolocation service on a secondary basis. Some of the radiolocation service allocations already existed, and WRC-97 simply concluded that the spectrum in those allocated bands was suitable for wind profiler radar operation. For new allocations, it is uncommon to find spectrum where restrictions are not placed on the new radio service, requiring the new radio service to take measures to coexist with incumbent radio services. For this reason, some frequency bands available for wind profiler radar operation are limited to specified geographic areas, and some frequency bands are available for use under a secondary allocation status.

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| **Table Summarizing Spectrum Available for Wind Profiler Radar Operations** |
| **Frequency Range** | **Allocation** | **Applicability** | **Comment** |
| 46-68 MHz | Secondary | 32 countries in ITU Region 1 listed in No. **5.162A** | N/A |
| None | Elsewhere |
| 440-450 MHz | Primary | 5 countries listed in No. **5.269** | N/A |
| Secondary | Elsewhere |
| 470-494 MHz | Secondary | 10 countries in Europe listed in No. **5.291A** | N/A |
| None | Elsewhere |
| 902-928 MHz | Secondary | ITU Region 2 (Americas) | N/A |
| None | Elsewhere |
| 1270-1295 MHz | Primary | Global | Co-primary with Earth exploration satellite service, space research service (active), and radionavigation satellite service |
| 1300-1375 MHz | Primary | Global | Co-primary with fixed service and mobile service in ITU Region 1, above 1350 MHz |
| 420-435 MHz | 420-430 MHz- Secondary430-435 MHz-Primary | Global | Alternative band to 440-450 MHz and 470-494 MHzCo-primary with fixed service and mobile service above 430 MHz in 43 countries listed in No. **5.276** |
| 438-440 MHz | Primary | Global | Alternative band to 440-450 MHz and 470-490 MHzCo-primary with amateur service in ITU-Region 1 and with fixed service and mobile service in 43 countries listed in No. **5.276** |

Frequency bands where wind profiler radars operate with secondary allocation status do not appear to currently be problematic relative to radio services that have primary allocations in the frequency band. However, as noted during the November 2014 SG-RFC meeting, proposals to add new primary allocations in some of the frequency bands may pose problems for wind profiler radars operating using a secondary allocation status. The potential for allocations created for the mobile service for mobile broadband under WRC-15 Agenda Item 1.1 is one example.

During the November SG-RFC meeting it was noted that some believe action is needed to address potential allocation changes in the frequency bands used by wind profiler radars. The SG-RFC seeks input from CIMO on the long-term plan for wind profiler radars using the currently identified frequency bands.

1. \* If restricted access is selected the WMO Document will only be accessible to the WMO WIKI registered users. [↑](#footnote-ref-1)