Cover sheet for response to an Ofcom consultation

BASIC DETAILS

Consultation title: **Low power licence-exemption limits above 10GHz**

To (Ofcom contact): **William Webb**

Name of respondent: **Philippe Tristant**

Representing (self or organisation/s): - **World Meteorological Organisation (WMO)**

- **Group on Earth Observation (GEO)**

- **European Meteorological Network (EUMETNET)**

Address (if not received by email): **philippe.tristant@meteo.fr**

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Name : **TRISTANT Philippe** Signed (if hard copy)

1 Introduction

The World Meteorological Organisation (WMO – www.wmo.int), the intergovernmental organisation "Group on Earth Observation" (GEO – www.earthobservations.org) and the European Meteorological Network (EUMETNET – www.eumetnet.eu) would like to thank the UK OFCOM for the opportunity to comment on the Public Consultation related to "Low-Power licence exemption limits above 10 GHz".

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

Radio-frequencies represent scarce and key resources that are used by National Meteorological 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 regards to the global warming and climate change activities, as recently recognised at the Earth Observation Ministerial Summit (Cape Town, November 07).

Among these radio-frequency applications, satellite passive sensing represents a very specific application that is increasingly under threat from active radiocommunication applications. This is on both a technical basis (due to the interference susceptibility of the highly sensitive passive sensors) and on a regulatory basis (through proposed exceptions to the provisions of RR N° **5.340**).

This document provides background information and, through the response to the UK OFCOM questionnaire, expresses WMO, GEO and EUMETNET concerns about the possible use of the essential EESS passive bands for low power licence-exempt devices above 10 GHz.

2 General comments

2.1 Passive remote sensing

Space-borne passive sensing for meteorological and Earth Observation 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 processes under investigation.

The relevant frequency bands are determined by fixed physical properties (molecular resonance). They cannot for these reasons be changed or the physical constraints ignored, nor can these physical properties 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 emissions.

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. Serious cases of

interference are already being reported (e.g AMSR-E interference in the 10.6-10.7 GHz band, in particular over the UK territory).

In the other frequency bands, RR N° **5.340** enables the passive services to deploy and operate their systems in these critical frequency bands. However this protection can be insufficient when large numbers of unregulated short range devices are allowed to operate in these bands or unwanted emissions from adjacent bands are not properly regulated.

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.

Passive frequency bands cannot therefore be considered on their own but should be seen as a complete 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.

The requirements in each passive band vary and therefore a simple extrapolation is not valid. Every passive band has to be considered in the context of its use and application, and the size of the passive signal. For example, the impact of even very low levels of interference in the 50-57 GHz band would put back weather forecasting accuracy many years, with subsequent impact on socioeconomic factors and loss of life, as well as hampering the monitoring of climate change.

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

2.2 RR N° 5.340 and RSPG Opinion on scientific services

As far as passive bands are concerned it is worth quoting the Radio Regulations provision **5.340** that states that "All emissions are prohibited in the following bands", and which then lists the corresponding frequency bands, a number of which lie within the 10-100 GHz range.

To this respect, it is also worth highlighting the EU Radio Spectrum Policy Group Opinion (October 2006) and in particular its Recommend 9.5:

> *9.5. Exclusive allocations to scientific services are needed only to a limited portion of the spectrum, corresponding to unique frequencies.* ***The RSPG considers that these represent essential natural resources and urges Member States to respect their obligations under No. 5.340 of the Radio Regulations, which prohibits all emissions in the corresponding frequency bands.*** *The RSPG recommends the EC, when preparing appropriate measures on spectrum, to support the needs of the scientific services in these particular bands.*

2.3 Specificities of frequency management related to the compatibility between unlicenced radio devices and Passive sensors

Passive sensors are, by nature, sensitive to the highest degree to the aggregate effect from radio stations emissions, in particular Short-Range Devices (SRD)(or unlicensed equipments).

As recently stressed by the Space Frequency Coordination Group (SFCG) and the ITU-R Working party 7C under Agenda Item 1.22 (WRC-11), such aggregate effect of emissions from SRDs deployed within one country could have negative impact on EESS sensors operated by other administrations, meaning that SRDs (or unlicensed equipments) regulations should not be considered on a national basis but need to be carefully studied taking into account the international environment.

To this respect, the WMO, GEO and EUMETNET are concerned by the current situation within the UK National Table for the 10.6-10.7 GHz range in which both radars and SRDs are authorised in the **10.68-10.7 GHz band**, even though this band is included under RR N° **5.340.**

The UK is the only administration that has authorised unlicensed SRDs in this frequency range and EUMETNET has already shown that the current interference of the AMSR-E sensor over the UK was more than likely due to these SRDs (see document PT2(07)52_EUMETNET_AMSR-E as presented at the June 07 PT2 meeting during the WRC-07 preparation), compatibility issue yet unresolved.

This example highlights another issue concerning the deployment of unlicensed, usually mass-market, equipment. Should any interference occur it will be almost impossible to eliminate the interference, since it will be difficult to locate the sources and, more importantly, to ensure a total withdrawal of the devices from operation. There are already indications that this situation is occurring with the deployment of licence-exempt RLANs in the 5600 – 5650 MHz band used by meteorological radars. One can stress here that this situation is even more serious for passive sensors that are far more sensitive to interference. In such cases this could lead to a total loss of unique frequency bands essential for meteorological and Earth Observation activities.

3 OFCOM consultation

3.1 Comments to specific items in the consultation

Item 1.1 : This item states that the consultation aims at **increasing** the power levels below which devices will be exempted from licensing in bands above 10 GHz. This item seems to imply that current regulations already exist. What are these?

Item 1.6 : The statement in this item as “a high-frequency high power transmitter will generate the same amount of co-channel interference as low-frequency low-power transmitters” is definitively not valid for passive sensing. Indeed, the sensitivity of passive sensors is, irrespective of the frequency band, only related to the characteristics of the molecules under consideration and not the free-space attenuation. This comment is also valid for **Item 3.3**.

Item 1.8 : Although recognising the benefits of increased competition in radiocommunications, it should be stressed that the benefits of meteorology and Earth Observation activities also relates to both economical and societal impacts. It is here worth quoting the RSPG Opinion on “scientific services”: ***“scientific use of spectrum has a considerable societal value”*** and ***“Most of this societal value is incommensurable in financial terms, as they relate to***

preventing large losses of lives or threats to socio-political stability and security".

Item 3.7 : The statement that the OFCOM proposal is 30 dB below the levels for UWB between 3 and 5 GHz is here also not valid for passive sensors. Indeed, the only passive band considered in the generic UWB issue is the 10.6-10.7 GHz band and we can note that the OFCOM proposal does not take any margin compared to the corresponding level. Also, much more sensitive sensors are used at the higher passive frequency bands compared to those at 10.6-10.7 GHz.

Item 4.8 : In the light of the comment above, the statement "However, there is a risk that passive Earth observation may be slightly affected" is of the highest concern for WMO, GEO and EUMETNET. Indeed, a relevant regulation shall ensure interference-free operation of passive sensors, in particular in bands covered by RR N° **5.340**. Also, the assumptions under which such conclusion is drawn are unknown.

Items 8.4 and 8.5 : Can one assume that the Tables referred to in these items are 8-1 to 8-3 and not 9-1 to 9-3?

3.2 Response to the consultation questions

Q1: Do you agree with this assessment of the services that do not need further analysis?

The WMO, GEO and EUMETNET **totally disagree** with the fact that, should any regulation be considered, the Earth Exploration Satellite Service would not require further analysis.

Indeed, it is unacceptable that a regulation, in particular one related to unlicensed devices, could be built upon a conclusion that "However, there is a risk that passive Earth observation may be slightly affected" as in Table in section 4.8.

In addition, The WMO, GEO and EUMETNET have serious concerns about the relevance of these OFCOM conclusions. Indeed, this Table in section 4.8 states that these conclusions were reached with power levels 30 dB greater than those proposed in the consultation. As far as the 10.6 GHz band is concerned for UWB, there was no such margin compared to the protection of passive sensors. There are two possibilities :

1) if power levels 30 dB above really were used, then it should have led to a conclusion that Earth Observation would be totally corrupted;

2) if power levels as agreed for UWB have been used, then the OFCOM conclusion that Earth observation may be "slightly affected" shows that the OFCOM proposal would not ensure the protection of passive sensors in the 10.6 GHz (and hence even less so at higher frequency bands).

Also, as mentioned above, the sensitivity of passive sensors cannot be based on free-space attenuation considerations but only on passive sensing protection requirements that differ on a band-by-band basis and which do not follow any frequency proportional rule. In particular, it cannot be accepted that the protection of passive sensors in all bands above 10 GHz can be based upon the case of the 10.6-10.7 GHz band.

Finally, the power levels agreed in ECC for generic UWB were based on a number of realistic assumptions (indoor-outdoor ratio, activity factors, operation characteristics, etc.) related to telecommunications devices. Extrapolating these results to all kind of unlicensed

device (in particular other than telecommunications) is a dangerous short-coming since it would not be possible to ensure that all of the UWB assumptions would continue to be met.

Q2: Is this analysis of the risk of interference to broadcasting satellite correct?

N/A

Q3: Is this analysis of the risk of interference to radionavigation and location correct?

N/A

Q4: Is this approach to meteorological aids appropriate?

WMO, GEO and EUMETNET do confirm that the METAIDS bands above 10 GHz are not currently used. It is indeed difficult to provide any characteristics of possible future use of these bands but one can at least state that it will refer to "active" services. To this respect, it is expected that the protection requirements for these applications would more or less be comparable to other active services at similar frequencies.

It is therefore proposed that when drawing relevant conclusions, OFCOM should consider comments from other active services representatives and elaborate similar regulations for METAIDS as for these other active services.

Q5: Do you agree with the proposed licence-exemption limits set out above?

The WMO, GEO and EUMETNET **totally disagree** with the proposed licence-exemption limits set out for the bands between 10 and 100 GHz and are very concerned about the protection of passive sensing bands which are essential and vital for all meteorological and Earth Observation activities.

Although recognising that UK OFCOM is proposing a different power limit set in bands used by Earth Exploration and Radioastronomy service, WMO, GEO and EUMETNET are surprised and concerned that the UK is proposing to set power limits in frequency bands in which ALL EMISSIONS ARE PROHIBITED under RR N° **5.340**. We would respectfully urge UK OFCOM, "***to respect their obligations under No. 5.340 of the Radio Regulations, which prohibits all emissions in the corresponding frequency bands",*** which would be consistent with the EU RSPG Opinion on scientific services.

Finally, WMO, GEO and EUMETNET would like to highlight the fact that currently in Europe few regulations are made on a national basis, and would encourage UK OFCOM to work through European frequency management bodies (ECC and EC RSCOM) to address such issues. Indeed, as mentioned above, interference to passive sensing is not a national issue, first on a radiocommunications prospective since such unlicensed devices deployed on the UK territory could interfere with sensors operated by other Administrations and secondly, on an Earth Observation prospective since measurements carried over the UK territory do not only serve UK interests but are used, in particular, in global meteorological models or other Earth Observation tools.

4 Conclusion

The WMO, GEO and EUMETNET are concerned to the highest extent about the OFCOM proposal to set power limits with a view of providing a low-power licence exemption framework in bands above 10 GHz.

The WMO, GEO and EUMETNET hence strongly urge OFCOM and the UK administration not to pursue this path and to exclude all Earth Observation frequency bands from this proposal, and therefore comply with their obligations under the Radio Regulation.
