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GENERAL FREQUENCY MANAGEMENT TOPICS

At the forthcoming World Radio Conference 2007 (WRC-07) which will take place in Geneva from 22 October to 16 November 2007 a number of issues of interest and concern to EUMETSAT in relation to the Meteorological Satellite Service (MetSat) and Earth Exploration-Satellite Service (EESS) as defined in the RR of the ITU will be discussed.

This document highlights the topics of most relevance for EUMETSAT and provides an outlook on the desired outcome at WRC-07.

General Frequency Management Topics

1 INTRODUCTION

At the forthcoming World Radio Conference 2007 (WRC-07) which will take place in Geneva from 22 October to 16 November 2007 a number of issues of interest and concern to EUMETSAT in relation to the Meteorological Satellite Service (MetSat) and Earth Exploration-Satellite Service (EESS) as defined in the RR of the ITU will be discussed.

This document highlights the topics of most relevance for EUMETSAT and provides an outlook on the desired outcome at WRC-07.

Those WRC-07 agenda items of relevance for EUMETSAT are:

- Agenda Item 1.2 - Extension of the 18 GHz Meteorological Satellite (MetSat) Service allocation and protection of the 10.6 – 10.68 GHz and 36 – 37 GHz Earth Exploration-Satellite Service (EESS) (passive) bands,
- Agenda Item 1.17 - Protection of the 1400 – 1427 MHz EESS (passive) band,
- Agenda Item 1.20 - Protection of the EESS (passive) bands at 1400 – 1427 MHz, 23.6 – 24.0 GHz, 31.3 – 31.5 GHz, 50.2 – 50.4 GHz and 52.6 – 54.25 GHz from unwanted emissions,
- Agenda Item 7.2 – Potential agenda items for WRC-11.

2 WRC-07 AGENDA ITEMS OF CONCERN TO EUMETSAT

In the following sections the issues of concern to EUMETSAT are described and the European positions and proposals, represented by the CEPT (European Conference of Postal and Telecommunications Administrations) at WRC-07, are provided which are fully in line with EUMETSAT interests.

2.1 WRC-07 Agenda Item 1.2 - Extension of the 18 GHz Meteorological Satellite (MetSat) Service allocation and protection of the 10.6 – 10.68 GHz and 36 – 37 GHz Earth Exploration-Satellite Service (passive) bands

2.1.1 Extension of the 18 GHz MetSat Service allocation by 100 MHz

On the initiative of EUMETSAT this issue of extension of the MetSat service allocation in the band 18.1 – 18.3 GHz by 100 MHz to 300 MHz of contiguous spectrum was pushed by CEPT at WRC-03 to be placed on the agenda for WRC-07 in order to cater for the increased spectrum requirements for raw instrument data downlink of the next generation geostationary MetSat satellites, such as for MTG.

The existing MetSat allocation at 18.1 – 18.3 GHz was considered not sufficient to satisfy the higher bandwidth requirements that are mainly determined by the use of IR sounding units as well as higher-resolution imagers with higher repetition rates, increased number of spectral channels and higher geographic resolution as compared to the current generation of geostationary meteorological satellites.

All compatibility studies with the other allocated radiocommunication services in the possible extension bands 18.0 – 18.1 GHz and 18.3 – 18.4 GHz performed within the ITU-R in preparation for WRC-07 indicate that sharing with all other allocated services is possible, thus there is no technical reason that would hinder such an extension of the MetSat allocation in either of the directions.

All methods to satisfy the agenda item in the Conference Preparatory Meeting (CPM) Report consequently foresee such an extension to 300 MHz of contiguous spectrum, therefore a successful conclusion of the issue at WRC-07 is probable, although the various regional groups favour different directions (partly with particular conditions) in which the extension of the MetSat allocation should be realised.

CEPT supports the extension of the MetSat allocation and proposes to WRC-07 an extension of the MetSat allocation into the band 18.3 – 18.4 GHz.

2.1.2 Regulatory provisions to protect the Earth Exploration-Satellite Service (passive) in the bands 10.6 - 10.68 GHz and 36 - 37 GHz

The band 10.6 – 10.68 GHz together with the band 10.68 – 10.7 GHz (covered by RR Footnote 5.340 – “all emissions are prohibited”) is of primary interest to measure rain, snow, sea state and ocean wind for ocean and land surfaces. The band 36 – 37 GHz is vital for the study of global water circulation since in this band it is possible to monitor rain, snow, ocean ice and water vapour for ocean and land surfaces.

Both bands are identified as candidate channels for the observation missions in the framework of Post-EPS. The band 10.6 – 10.68 GHz is a candidate channel for the Microwave Sounder (MWS) as well as for the Microwave Imager (MWI). The band 36 – 37 GHz is a candidate channel to be observed in the MWI.

For Post-EPS the MWS is intended to observe all channels required for covering all weather temperature and humidity observations while the selection of channels for the MWI is optimised for precipitation, clouds and land/ocean imaging.

The compatibility studies in the framework of the ITU-R concluded that in order to ensure adequate protection for the EESS (passive) from the fixed and mobile services, particularly in the case of the band 10.6 - 10.68 GHz, severe limitations would have to be included in the RR.

The views expressed at CPM from around the world on how to resolve this issue at WRC-07 vary from full protection for EESS passive in those bands through mandatory limits in the RR on the basis of the results of the studies within ITU-R to only an encouragement of administrations to apply the relevant ITU-R Recommendations.

CEPT supports the adoption of adequate limitations and therefore proposes to WRC-07 to include mandatory emission limits in the RR to provide full protection to the EESS (passive) in the bands 10.6 – 10.68 GHz and 36 – 37 GHz.

2.2 WRC-07 Agenda Item 1.17 - Protection of the 1.4 GHz Earth Exploration-Satellite Service (passive) band

WRC-03 concluded a secondary allocation to the fixed-satellite service (FSS) for feeder links for non-geostationary satellite networks in the mobile-satellite service with service links below 1 GHz through RR footnote 5.339A in the bands 1390-1392 MHz (Earth-to-space) and 1430-1432 MHz (space-to-Earth). However, due to the fact that there was a lack of studies and test measurements with regard to the protection of other services in the bands or in the passive band 1400-1427 MHz it was decided that these additional allocations shall not be used until the completion of all studies and the results of these studies reported to WRC-07.

The band 1400 – 1427 MHz is a vital resource for measuring soil moisture (over land), ocean salinity, and other aspects of the Earth and its atmosphere. This band is one of the few bands for which RR footnote 5.340 prohibits all emissions, emphasising its particular importance for the science community. The band 1400 – 1427 MHz is a candidate channel for the Microwave Imager (MWI) in the framework of Post-EPS for the measurement of ocean salinity and soil moisture.

ITU-R studies have concluded that considerable limitations would have to be imposed on this service in order to ensure the protection of the EESS (passive) in the band 1400 – 1427 MHz.

Due to significant opposition and the lack of support for confirming this provisional allocation to the FSS for feeder links for non-geostationary satellite networks in the mobile-satellite service already CPM identified only one method to satisfy the agenda item which is to suppress this allocation.

CEPT proposes the suppression of this allocation for FSS feeder links.

2.3 WRC-07 Agenda Item 1.20 - Protection of several Earth Exploration-Satellite Service (passive) bands from unwanted emissions

This agenda item deals with the issue of inclusion of regulatory provisions in the RR to protect the EESS (passive) in a total of five bands from unwanted emissions from numerous active services in neighbouring frequency bands. All the bands as listed below to be considered under this agenda item are covered by RR footnote 5.340 - "all emissions are prohibited":

- 1400 – 1427 MHz
- 23.6 – 24.0 GHz
- 31.3 – 31.5 GHz
- 50.2 – 50.4 GHz
- 52.6 – 54.25 GHz

As already indicated under WRC-07 Agenda Item 17 above, the band 1400 – 1427 MHz is a candidate channel for the Microwave Imager (MWI) in the framework of Post-EPS for the measurement of ocean salinity and soil moisture.

All other bands (23.6 – 24 GHz, 31.3 – 31.5 GHz, 50.2 – 50.4 GHz and 52.6 – 54.25 GHz) are already observed by AMSU-A on MetOp and will continue to be observed by the MWS in the framework of Post-EPS. Those bands are of vital importance for water-vapour measurements and temperature profiling.

In the framework of the ITU-R studies a total of 12 constellations had to be studied between unwanted emissions produced by the numerous neighbouring active services into the five bands listed above. The results of the studies for each of the bands under consideration were summarised in an ITU-R Report SM.2092 as well as in the CPM-Report.

According to those study results unwanted emission limits would have to be imposed on the active services in order to ensure the adequate protection of the EESS (passive) in the five bands covered by RR footnote 5.340.

Similar to the situation in the band 10.6 – 10.68 GHz under WRC-07 Agenda Item 1.2 the views expressed at CPM from around the world on how to resolve this issue at WRC-07 vary from full protection for EESS (passive) in those bands through mandatory limits in the RR on the basis of the results of the studies within ITU-R to “no change” to the current regulatory situation. In addition, some administrations have a principle problem with the inclusion of unwanted emission limits in the RR. It seems that it will be particularly difficult to reach a satisfactory solution at WRC-07 for the band 1400 – 1427 MHz.

CEPT supports the adoption of adequate limitations and therefore proposes to include mandatory unwanted emission limits in the RR to provide full protection to the EESS (passive) in the five bands listed above.

2.4 WRC-07 Agenda Item 7.2 – Potential Agenda Items for WRC-11

2.4.1 Consideration of frequency allocations between 275 and 3 000 GHz

On the tentative agenda for WRC-11 that was agreed already at WRC-03 an item 2.2 was included to consider frequency allocations between 275 GHz and 3 000 GHz taking into account the result of ITU-R studies in accordance with Resolution 950 (WRC-03).

The list of candidate channels for the MWI for Post-EPS includes a number of channels above 275 GHz that are currently not covered by the RR therefore the retention of this issue on the agenda for WRC-11 would be required. However, due to a lack of use by the various active services a general consideration of frequency allocations between 275 GHz and 3 000 GHz might be premature.

Therefore, CEPT proposes to modify the Agenda Item 2.2 for WRC-11 limiting the consideration on the revision of the adequacy of the protection provided to passive services by RR 5.565 in the light of planned applications for passive services between 275 GHz and 3 000 GHz.

2.4.2 Extension of the MetSat service allocation at 7750 – 7850 MHz by up to 100 MHz

The spectrum available and nominally foreseen for the downlink of raw instrument data of polar-orbiting MetSat systems, namely 7750 – 7850 MHz, already today is very limited and forced most operators of the soon to be launched systems to use other frequency bands that like the band 8025 – 8400 MHz are already facing congestion. Increasing spectrum requirements of next generation polar-orbiting systems like the EUMETSAT Polar System (EPS) follow-on system (Post-EPS) will worsen this situation.

In order to be able to provide continuation of the current EPS services in an enhanced manner and to fulfil the additional missions requested in the framework of Post-EPS, the amount of raw instrument data will increase significantly, exceeding the bandwidth that is currently available in the band 7750 – 7850 MHz.

Due to this further increasing spectrum requirement of future polar-orbiting MetSat systems like Post-EPS an extension of the frequency allocation to the MetSat service in the frequency band 7750 – 7850 MHz is considered necessary in order to keep the band usable for the MetSat service in a longer term perspective.

Therefore, CEPT proposes an agenda item for WRC-11 considering the existing allocation to the meteorological satellite service in the band 7750 – 7850 MHz with a view to extending this allocation by up to 100 MHz limited to non-geostationary meteorological satellites in the space-to-Earth direction to provide up to a maximum of 200 MHz of contiguous spectrum

2.4.3 Adequacy and possible improvement of the regulatory status and recognition of the scientific services in the Radio Regulations

Reliable access to Earth Observation global data obtained using the radio spectrum is not only essential to maintaining and improving the accuracy of weather forecasts that contribute to the safety of life and preservation of property throughout the world, but also the monitoring and prediction of climate change, support in sustainable development as well as in disaster prediction, monitoring and mitigation, recognising that more than 90% of natural disasters are climate or weather related.

In order to cater for this CEPT proposes an agenda item for WRC-11 to consider ways of improving in the Radio Regulations the regulatory recognition and status of Earth Observation carried out in the Earth Exploration Satellite Service (active and passive), the Meteorological Satellite Service, the Meteorological Aids Service and Radiolocation Service and in particular the increasingly essential role of corresponding applications, in

climate change, sustainable development and disaster prediction, monitoring and mitigation related activities.

3 OUTLOOK TO WRC-07

3.1 Outlook to MetSat issues at WRC-07

With regard to the extension of the MetSat allocation at 18 GHz from 200 MHz to 300 MHz of contiguous spectrum there is generally wide support from the regional groups from around the world, however there still remains the task at the WRC-07 itself to find an agreement on the direction (upwards or downwards) in which the MetSat allocation should be extended.

Although there is no compatibility problem in either direction, in particular the Arab countries are against an extension downwards to protect their interests in feeder links for broadcasting satellites. Contrary to the position of the Arab countries, especially the US and Canada favour an extension downwards and are against an extension upwards as proposed by CEPT in order to protect their interests with regard to the fixed-satellite service use.

3.2 Outlook to EESS (passive) issues at WRC-07

Regarding the protection of the EESS (passive) in the various frequency bands under agenda items 1.2 and 1.20 the proposals to the WRC-07 will be covering a wide range of options from providing full protection through the inclusion of adequate limits in the RR to “no change” to the current regulatory status. It will be subject to heavy discussions at WRC-07 itself to find a mutually acceptable solution for each individual band in particular for the bands 1400 – 1427 MHz and 10.6 – 10.68 GHz.

3.3 Outlook to possible Agenda Items for WRC-11

A WRC agenda comprises about 20 – 25 items. CEPT already proposes 20 new agenda items. Other regional organisation will also propose a number of new agenda items for WRC-11 in the same order of magnitude. Together with the issues (unfinished business or consequential follow-on issues) resulting from the discussions on the WRC-07 items, the chance of getting a new item on the agenda for WRC-11 is unpredictable and largely depends on the support an issue receives from the regional organisations.