

GENERAL FREQUENCY MANAGEMENT TOPICS

World Radiocommunication Conference 2007 (WRC-07) adopted favourable regulations for a number of frequency bands of interest and concern to the meteorological satellite operators which constitutes a major achievement in terms of long term protection of important passive sensing bands for Earth Exploration and in view of spectrum requirements for meteorological satellite systems.

WRC-07 adopted an extension of the existing MetSat service allocation in the band 18.1 – 18.3 GHz into the band 18.3 – 18.4 GHz in ITU Regions 1 and 3 (Europe, Africa incl. Arab countries and Asia) and in ITU Region 2 (Americas) into the band 18.0 – 18.1 GHz without any restrictions that could hamper the operation of a MetSat system over 300 MHz of contiguous spectrum.

Furthermore, WRC-07 adopted mandatory protection limits from unwanted emissions in five important passive sensing bands (24 GHz, 31 GHz, 36 GHz, 50 GHz and 52 GHz) and recommended levels for two further frequency bands (1.4 and 10.6 GHz).

This contribution also provides an outlook to WRC-11 agenda items of interest and concern, highlighting preparatory activities that need to be performed and coordinated among space agencies and MetSat operators.

In addition, the need for coordination of future DCS use in the band 401 – 403 MHz is highlighted, given the different overlapping requirements for DCS in planned non-geostationary and geostationary MetSat systems. This contribution provides an overview of the current and planned spectrum use for DCS in the range 401 – 403 MHz and makes an attempt to propose a possible arrangement to accommodate future requirements (presented to SFCG-28 - September 2008-).

GENERAL FREQUENCY MANAGEMENT TOPICS

1 INTRODUCTION

This contribution provides an overview on the outcome of the World Radiocommunication Conference 2007 (WRC-07) on issues of interest and concern to EUMETSAT related to the Meteorological Satellite Service (MetSat) and the Earth Exploration Satellite Service (EESS).

Also an outlook to agenda items of interest and possibly concern at the forthcoming WRC-11 is provided, raising awareness and highlighting preparatory activities that need to be performed and coordinated among space agencies and MetSat operators.

Furthermore, the need for coordination of future DCS use in the band 401 – 403 MHz is highlighted, given the different overlapping requirements for DCS in planned non-geostationary and geostationary MetSat systems.

2 OUTCOME OF WRC-07 AND OUTLOOK TO WRC-11 PREPARATION

From 22 October 2007 to 16 November 2007 the World Radiocommunication Conference 2007 (WRC-07) took place in Geneva.

Several agenda items of importance for EUMETSAT which related to the requirements of meteorological satellites and the Earth exploration satellite service in particular for passive sensing were discussed. This document provides a short summary of the decisions on those items and their consequences for the operation of meteorological satellites.

2.1 WRC-07 agenda items of relevance for EUMETSAT

WRC-07 agenda items of relevance for EUMETSAT were:

Agenda Item 1.2:

Extension of the 18 GHz Meteorological Satellite service (MetSat) frequency band 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 EESS (passive) band 1400 – 1427 MHz,

Agenda Item 1.20:

Protection of the EESS (passive) from unwanted emissions in the frequency bands 1400 – 1427 MHz, 23.6 – 24.0 GHz, 31.3 – 31.5 GHz, 50.2 – 50.4 GHz and 52.6 – 54.25 GHz,

Agenda Item 7.2: Agenda items for WRC-11.

2.2 Decisions of WRC-07 regarding the extension of the MetSat frequency band allocation at 18 GHz under Agenda Item 1.2

WRC-07 adopted an extension of the existing MetSat service allocation in the band 18.1 – 18.3 GHz into the band 18.3 – 18.4 GHz in ITU Regions 1 and 3 (Europe, Africa incl. Arab countries and Asia) and in ITU Region 2 (Americas) into the band 18.0 – 18.1 GHz without any restrictions that could hamper the operation of a MetSat system over 300 MHz of contiguous spectrum.

This extension of the primary MetSat frequency allocation to 300 MHz of contiguous spectrum in the band 18.1 – 18.4 GHz in ITU Regions 1 and 3 adopted at WRC-07 satisfies the spectrum requirement specified for the EUMETSAT next generation geostationary MetSat system MTG (Meteosat Third Generation) raw data downlink.

2.3 Decisions regarding the protection of the number of EESS (passive) bands under Agenda Item 1.2, 1.7 and 1.20

WRC-07 adopted a package solution for the bands under agenda items 1.2 and 1.20. The key issue for resolving agenda items 1.2 and 1.20 turned out to be the bands 1400 – 1427 MHz and 10.6 – 10.68 GHz. A compromise on those two bands to adopt only recommended protection levels allowed, in return, achieving mandatory protection limits from unwanted emissions from numerous active services in neighbouring frequency bands for all remaining 5 bands under discussion (24 GHz, 31 GHz, 36 GHz, 50 GHz and 52 GHz).

Four of those bands are currently used by AMSU-A and are expected to be used by any future microwave temperature sounder follow-on instruments. Long-term protection for passive sensing in those bands is therefore of most importance for many of the existing and future Earth Exploration satellite systems.

Even for the band 1400 – 1427 MHz, for which under agenda item 1.7 the protection status was improved by deleting a frequency allocation to feederlinks for mobile satellite systems in a neighbouring band, and for 10.6 – 10.68 GHz for which only recommended protection levels were adopted and included in the Radio Regulations it can be expected that most administrations in the long term will incorporate these levels into national regulations when the usage situation of existing services allows.

The regulations adopted by WRC-07 under agenda items 1.2, 1.7 and 1.20 constitute a major achievement in terms of long term protection of important passive sensing bands for Earth Exploration and Meteorology.

2.4 Agenda items adopted for WRC-11 under Agenda Item 7.2

The number of proposed agenda items for WRC-11 was far beyond the number of items a conference could handle, and therefore had to be significantly reduced. The mechanism to agree which items should be placed on the agenda for WRC-11 required that an issue had to be supported by at least 4 of 6 regional groups with only one opposition. Finally, the WRC-11 agenda contains 25 items plus a number of standing items.

WRC-11 Agenda Items of interest for a meteorological satellite operator such as EUMETSAT are:

Agenda Item 7.2: WRC-11 Agenda Item 1.6 regarding frequency allocations for EESS (passive) in bands above 275 GHz,

Agenda Item 7.2: WRC-11 Agenda Item 1.24 regarding the extension of the frequency band allocation for non-geostationary MetSat in the band 7750 - 7850 MHz by 50 MHz into the band 7850 7900 MHz.

WRC-11 did not only adopt issues that are to the benefit of the MetSat and EESS (passive) services. There are also issues which have the potential to impact negatively the future use of bands, particularly for passive sensing.

The issue currently with highest potential impact is WRC-11 Agenda Item 1.8, which calls for ITU-R studies concerning the technical and regulatory issues relative to the fixed service in the bands between 71 GHz and 238 GHz. Since this frequency range includes bands currently used by many passive sensors such as AMSU-A and MHS as well as future passive sensors on planned missions, it must be ensured that any consideration or studies resulting in proposals to WRC-11 do not negatively impact the long term usability and protection of these EESS (passive) bands.

2.5 Outlook to WRC-11

As experience in past WRCs has shown, a detailed and coordinated preparation of the agenda items of interest and concern will be mandatory in order to be able to achieve a satisfactory outcome of WRC-11.

2.5 WRC-11 Agenda Item 1.6 regarding frequency allocations for EESS (passive) in bands above 275 GHz

Regarding WRC-11 Agenda Item 1.6 the frequency bands listed in Radio Regulations Footnote 5.565 will have to be reviewed and compared with the planned use of frequency bands above 275 GHz by passive sensors on future missions.

The individual plans of space agencies and MetSat operators will have to be merged and transferred into a coordinated and consolidated list of frequency bands above 275 GHz, finding a reasonable compromise between requirements and plans for current and future use by passive sensors as opposed to potential other users of bands above 275 GHz.

2.6 WRC-11 Agenda Item 1.24 (Extension of the MetSat allocation at 7750–7850 MHz by 50 MHz into the band 7850 – 7900 MHz)

Regarding WRC-11 Agenda Item 1.24 the following issues/activities would need to be addressed and coordinated between the MetSat operators already using this band or planning to use it in future:

Regarding dump of stored instrument data to dedicated Earth stations, confirmation of the applicability of the results of the sharing studies for the band 7750 – 7850 MHz in preparation for WRC-97 also to the band 7850 – 7900 MHz and possible adaptation to the situation in the extension band;

For other applications such as the dissemination of data directly to the user, sharing with the fixed and mobile services would need to be studied and results would have to be fed into WP7B;

Considering the different concepts for using this band by current polar-orbiting MetSat systems, such as FY-3, NPOESS and Metop and the potential to interfere with each other, a coordinated approach for planning the long term use of the band 7750 – 7900 MHz would be necessary, taking into account SFCG RES 19-7R3.

Note: This issue is subject for discussion at the SFCG-28 meeting held on 16 – 25 September 2008.

2.7 WRC-11 Agenda Items with potential negative impact on MetSat and EESS (passive)

Since a number of WRC-11 Agenda Items are very wide in scope, searching for suitable frequencies for different applications in a large spectrum range without specifying which frequency band is targeted; all those will need to be monitored until the candidate bands are identified.

Currently, the issue with the highest potential impact on passive sensing bands is WRC-11 Agenda Item 1.8, which calls for ITU-R studies concerning the technical and regulatory issues relative to the fixed service in the bands between 71 GHz and 238 GHz.

It will have to be necessary to ensure that any considerations regarding this agenda item will take into account the protection requirements of the passive sensing use in bands allocated to the EESS (passive) in the range 71 GHz to 238 GHz.

3 COORDINATION OF FUTURE DCS USE IN THE BAND 401 – 403 MHZ

Plans for future use of the band 401 – 403 MHz for Data Collection Systems (DCS) by geostationary and non-geostationary meteorological satellite systems will make it necessary to consider a coordinated approach of using and possibly segmenting the band 401 – 403 MHz in order to ensure an interference-free utilisation of the band, as it was done in the past where different parts of the band were designated for different systems.

At SFCG-27, held in September 2007, CNES presented a frequency declaration for the ARGOS-4 system in which 5 so called “beams” were identified with frequency bands in the range 401 – 403 MHz (Beam-1: 401.275 – 401.580 MHz, Beam-2: 401.690 – 402.400 MHz, Beam-3: 402.521 – 402.650 MHz, Beam-4: 402.850 – 403 MHz and Beam-6: 401 – 401.225 MHz).

In bilateral discussions after SFCG-27 between CNES and EUMETSAT as well as between CNES and NOAA it was concluded that overlapping frequency use as it would be the case for Beam-2 (401.690 – 402.400 MHz) between ARGOS-4 on non-geostationary MetSat systems and DCPs use on current geostationary MetSat systems would result in mutual harmful interference.

Beside the issue of coexistence between next generation non-GSO and GSO Data Collection Systems in the frequency range 401 – 403 MHz, plans for expansion of the frequency spectrum requirements for next generation GSO MetSat systems requires to coordinate or segment the spectrum resource among the operators in order to allow an effective and interference-free use of the spectrum, as it successfully demonstrated today by segmenting the band among the geostationary MetSat operators.

Note: As an input to the SFCG-28 meeting (16 – 25 September 2008) an overview of the current and planned spectrum use for DCS in the range 401 – 403 MHz was provided and an attempt was made to propose a possible arrangement to accommodate future requirements (see section 3.1 and attached figure). Any consideration of this subject within CGMS would have to take into account the discussion and findings of SFCG-28 that are planned to be reported in EUM-WP-17 or in the report to CGMS from the liaison officer.

3.1 Detailed proposal to SFCG-28 for a coordinated future DCS use in the band 401 – 403 MHz

In view of the information on current and future planned use of the band 401– 403 MHz by non-geostationary and geostationary MetSat system for DCS, the following proposal was presented at SFCG-28 for discussion:

- 1) The band 401.701 – 402.001 MHz and 402.1 - 402.435 MHz should remain available only for DCS using geostationary MetSat systems in cross-support between the regions and to avoid interference into neighboring MetSat systems.
- 2) The band 402.435 – 402.850 MHz should be designated for DCS using geostationary MetSat systems and split-up in two sub-bands (402.435 – 402.635 MHz and 402.635 – 402.850 MHz) in similar fashion as the bands under 1) in order to avoid interference into neighboring MetSat systems. The concept of cross-support between the regions could also be applied.
- 3) Within the band 402.435 – 402.850 MHz, 100 kHz should be designated for an ARGOS-GEO component, ideally made available on a global basis by all geostationary MetSat operators. If the concept of cross-support would be applied, these 100 kHz could be positioned in the middle of both sub-bands (e.g. 402.585 – 402.685 MHz), or in one of the two sub-bands. CNES and EUMETSAT are currently arranging a test at which ARGOS platform messages are relayed via geostationary MetSat system.
- 4) The band 401.1 – 402.4 MHz which is currently used by FY-2 satellites would have to remain available for DCS using geostationary MetSat systems. The future planned use by next generation Chinese geostationary MetSat systems (FY-4) would need to be taken into account.

- 5) The remaining portions of the band 401 – 403 MHz, namely 401- 401.1 MHz, 401.4 – 401.7 MHz and 402.850 – 403 MHz, in total 550 kHz could be designated to the ARGOS LEO component.

