



CGMS-34, NOAA-WP-08
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Technical Input to the Space Frequency Coordination Group and ITU-R

NOAA-WP-08 presents a summary of technical inputs provided by NOAA to the Space Frequency Coordination Group and various ITU-Radiocommunication groups during 2005-2006 as well a summary of the frequency issues concerning metsats. Also included is a brief summary of the WMO Steering Group on Radio Frequency Coordination.

This document is to provide information to CGMS Members regarding radio frequency management activities that could possibly affect frequencies used by metsats.

Technical Input to the Space Frequency Coordination Group and ITU-R

1. Introduction

There are various international groups, some ad hoc in nature, that meet on a regular basis to discuss management of radio frequencies. Decisions reached by these groups can often affect the future access to the spectrum by metsats. NOAA is actively engaged in defending as well as promoting the use of the radio frequencies for metsats in order to meet the needs of our satellite missions. Such spectrum use includes not only communication links, both space-to-Earth and Earth-to-space, but also use for passive sensing needs.

2. Space Frequency Coordination Group (SFCG)

The 25th meeting of SFCG was held in Beijing, China from 12-20 October 2005 and SFCG-26 met in Bonn, Germany between 19-27 September. This ad hoc international group meets annually to discuss radio frequency matters of interest to the various civil space agencies. SFCG is the pre-eminent radio-frequency collegiate of space agencies and related national and international organizations through which global space systems spectrum resources are judiciously husbanded for the benefit of humanity. The input documents are usually attributed to one of several working groups. The two working groups of most importance to metsats are the "ITU Matters and preparation for WRC-07" and the "EES and Metsat". (Note: EES = Earth exploration satellite).

NOAA inputs to SFCG-25 summarized the April 2005 passive microwave workshop held in Silver Spring, Maryland; presented a compatibility analysis of the services allocated in the 6-7 GHz band, including EES passive; analyzed potential interference in the 7750-7850 MHz band from proposed future operations of Metop and NPOESS satellite networks; presented results of ambient environment and noise floor measurements in the U.S.; and provided a list of present and future radio frequency requirements of NOAA satellite networks.

NOAA inputs to SFCG-26 summarized the June 2006 passive microwave workshop held in Silver Spring, Maryland; presented alternatives for resolving 6-7 GHz band EES compatibility issues; proposed changes to the SFCG resolution covering metsat operations in the 7750-7850 MHz band; discussed ways to protect downlinks in 25.5-27 GHz used for manned missions; and provided an updated list of present and future radio frequency requirements of NOAA satellite networks.

At both SFCG-25 and -26 the working group on ITU Matters and preparation for WRC-07 updated the resolution dealing with WRC-07 agenda items of importance to the SFCG membership. Those items critical to metsats are discussed in detailed in CGMS-XXXIV USA-WP-XX. At both SFCG meetings the working group on EES and metsat reviewed many input documents and focused its discussion on active and passive sensors, meteorological issues (metaids and metsats), and ultra wideband devices. The group also reviewed the many resolutions and recommendations attributed to EES and metsats. Of interest to CGMS are the discussions on

protection of passive sensor frequencies and the communications links used by metsats.

International Telecommunication Union – Radiocommunication (ITU-R) sector Working Parties 7B and 7C (WP7B, WP7C)

The ITU-R WP7B and WP7C met twice in the last 12 months (8-14 November 2005 and 28 August – 1 September 2006). WP7B is concerned with space radio systems, i.e. the transmissions between the Earth and satellites, both uplinks and downlinks. A major topic of interest to CGMS under consideration in this WP is furthering technical studies toward gaining approval of expanding the existing geostationary metsat space-to-Earth allocation at 18.1-18.3 GHz by 0.1 GHz, i.e. by 50%. As a result of inputs from EUMETSAT and continued coordination with the fixed-satellite service, much progress was made at the 2 meetings. The draft Conference Preparatory Meeting (CPM) text that supports the expansion of this metsat allocation was approved at the latter meeting of the group for consideration at the CPM in February 2007.

WP 7B also considers all of the ITU Radiocommunication Bureau recommendations dealing with communication links to and from metsats. At its last meeting, WP 7B considered revisions to ITU-R Recommendation SA.1026 entitled "Interference criteria for space-to-earth data transmission systems operating in the earth exploration-satellite and meteorological-satellite services using satellites in low-earth orbit". This recommendation is in need of a major update to include, among other changes, the necessary interference criteria for the NPOESS satellite network. Work on the update to this recommendation should conclude at the next meeting of the working party in February 2007.

WP7C covers applications in the EES concerning active and passive sensors as well as metats, i.e. radiosondes. The major thrust in WP7C during the last two meetings of interest to CGMS is to address the WRC-07 agenda item concerning sharing in 10.6-10.68 and 36-37 GHz between passive sensors and the active fixed and mobile services. There has been much exchange of information concerning protection of passive sensors between WP7C Task Group (TG) 1/9 (Compatibility between passive and active services, i.e. unwanted emissions into passive sensors).

ITU Task Group 1/8 (TG1/8) – Compatibility between ultra-wideband devices (UWB) and radiocommunication services

UWB devices operate at low power across relatively large frequency bandwidths. The uses for such devices are many, including ground penetrating radars to locate hidden objects such as bodies buried in rubble caused by natural disasters such as earthquakes and hurricanes and automobile radars that are intended to avoid collisions and otherwise improve automobile safety. Unlike metsats, UWB is not a recognized ITU radio service, but because such devices use radio frequencies and are likely to become widespread in use, the ITU deemed it prudent and useful to investigate their compatibility with existing services. In the United States such devices are approved for operation under Part 15 of the Federal Communications Commission's rules (and found in the Federal Code of Regulations, section 47 Telecommunication). Part 15 devices operate on a non-interference basis, that is,

such devices must accept interference and they may not cause harmful interference to other authorized radio devices in the frequencies which UWB devices operate.

The main concern to meteorological satellites from UWB operations is the widespread proliferation of proposed automobile radars operating in the exclusively passive Earth exploration-satellite service (EESS) allocation in 23.6-24 GHz. This band continues to be used by metsats for monitoring and calibration of atmospheric water vapor, important for use in numerical weather prediction models. While the energy emitted by a single automobile radar is quite small, the aggregate from concentrations of large numbers of automobiles operating such radars in major metropolitan areas will likely be sufficient to cause harmful to metsat sensors. Since the United States has approved the use of UWB automobile radars, such policy must be espoused by all Federal agencies, including NOAA.

At its concluding meeting in October 2005, Task Group 1/8 summarized its concern with regard to automobile radars operating across the 23.6-24 GHz exclusively passive band by stating: "The result of interference analysis using specific EESS systems characteristics or generic methodology, concludes that a 100% deployment of SRR operating at 24 GHz results in interference exceeding the EESS threshold up to 35 dB with a 1% apportionment of the interference criteria." Note that 35 dB equates to more than 3000 times the threshold.

The CGMS membership is encouraged to lobby among their administrations that such safety devices could also operate successfully near 77 GHz. Such use was approved in the United States (See CFR 47 section 15.253) prior to those at 24 GHz. In fact, devices operating near 77 GHz are currently being developed within the United States.

ITU TG1/9 – Compatibility between passive and active services

Agenda item 1.20 for the 2007 World Communication Conference (WRC-07) is to "consider the results of studies, and proposals for regulatory measures, if appropriate, regarding the protection of the Earth exploration-satellite service (passive) from unwanted emissions of active service". Bands included in the agenda item used by passive sensors on metsats are 23.6-24 GHz, 31.3-31.5 GHz and 50.2-50.4 GHz. As a result of this agenda, TG1/9 (Compatibility between passive and active services) was created to study the issues and prepare text for the Conference Preparatory Meeting (CPM) for resolution of unwanted emissions into the various bands.

The group met five times with very limited inputs from the United States. However, at the recently completed meeting in September 2006, the U.S. presented several documents leading to the finalization of the draft CPM text which includes mandatory limits on the fixed-satellite service systems operating in bands adjacent to the exclusively passive band at 50.2-50.4 GHz. This band is used operationally by the AMSU passive sensor flown on NOAA polar-orbiting satellites.

3. World Meteorological Organization (WMO) Commission for Basic Systems (CBS) Steering Group on Radio Frequency Coordination (SG-RFC)



The WMO's SG-RFC met twice in 2006 to discuss topics related to metajds and metsats. The major topic of interest to metsat operators discussed at these meetings dealt with updates to the handbook entitled "Use of Radio Spectrum for Meteorology". It is expected that revisions to the handbook will be completed by the end of 2006 and that a new edition will be available sometime in 2007.