PARALLEL WORKING GROUP SESSIONS

WORKING GROUP I: TELECOMMUNICATIONS

I/0 Introduction

As agreed at CGMS-32, Mr. Robert Wolf (EUMETSAT) and Mr Gordon Bridge (EUMETSAT) were elected as Chairman and Rapporteur, respectively, of Working Group I (WG I) on Telecommunications. WG I comprised representatives of the satellite operators from China, Japan, Russia, USA, Korea and EUMETSAT together with WMO (see Annex 4 for list of participants).

I/1 Co-ordination of Frequency Allocations

Preparation of future World Radio Conferences (WRC-07 and WRC 2010)

Documents WMO-WP-11, NOAA-WP-07, and JMA-WP-08 included information related to the preparation process for the World Radio Conference 2007 (WRC-07). A summary of the inputs is provided in this report to give information to CGMS Members who are not closely following the preparation process. The documents contained also information on the progress done within the regional groups (such as CITEL, CEPT, and APT) dealing with WRC preparations.

Among WRC-07 agenda items, the following three items concern frequency bands or issues of prime interest for Meteorological satellites co-ordinated by CGMS:

- agenda item 1.2: Extension of the 18 GHz METSAT allocation and protection of the 10.7 and 36 GHz EESS (passive) bands;
- agenda item 1.17: Protection of the 1.4 GHz EESS (passive) band;
- agenda item 1.20: Unwanted emissions in EESS (passive) bands.

In addition, the following agenda items do not directly concern Meteorological interests but, due to their wide open scope in terms of frequency ranges under study, might have an impact on frequency bands used for meteorological purposes.

- agenda item 1.5: Possible additional allocations for aeronautical telecommand and high bit-rate aeronautical telemetry between 3 and 30 GHz;
- agenda item 1.8: High Altitude Platform Stations (HAPS) in the 28 and 31 GHz band;
- agenda item 1.18: Pfd limits for Highly Elliptical Orbit (HEO) satellites in the frequency band 17.7-19.7 GHz.

WRC-07 is scheduled for the end of 2007 and the Conference Preparatory Meeting (CPM) early 2007. The year 2006 will be crucial for finalising the different positions and support from CGMS Members via their national frequency administrations to the relevant meetings will be of prime importance to support meteorological views.

Agenda item 1.2 (CPG/PT2)

a) Issue 1: Resolution 742 (WRC-03) on frequency band 36-37 GHz

As part of global passive measurements, the band 36-37 GHz is vital for the study of global water circulation since this band is able to monitor the rain, the snow, the ocean ice and the water vapour for ocean and land surfaces. Observations in the band for sensing the melting of snow near the surface are of very high interest. A number of passive sensors and radio altimeters are already using or are planned to use this frequency band in the near future (e.g., CMIS, MIMR, AMSR, AMSR-E, AMR, SMMR, SSM/I, SSMI/S, TMI, MEGHA-TROPIQUE and MWRS) for such measurements. These measurements are fully operational (regular use of the data, continuity of service, several usable data products) and are used on a worldwide basis. The retrieved data are used and exchanged between the meteorological organisations in all regions. The retrieved parameters are actually derived from a set of measurements performed at five frequencies which are interrelated (6, 10, 18, 24 and 36.5 GHz).

This band is shared between Earth Exploration Satellite Service (EESS) (passive) and Fixed (FS) and Mobile Services (MS). Studies are still ongoing to identify the maximum e.i.r.p for FS and MS links that could provide a means to ensure the protection of passive sensors in the 36-37 GHz.

b) Issue 2: Resolution 746 (WRC-03) on METSAT allocation at 18 GHz

This issue is the follow-up of a European proposal to WRC-03 and aims at covering next generation geostationary meteorological satellites requirement for satellites that are to be launched from 2015 onwards. These systems would require bandwidth of at least 300 MHz. This exceeds the 200 MHz (18.1-18.3 GHz) allocation as currently given in Radio Regulations footnote 5.519.

The required bandwidth of 300 MHz is mainly determined by the use of IR and UV sounding units and high-resolution imagers with a higher repetition rate of measurements and a higher number of spectral channels compared to present satellite systems. The spatial resolution will also be significantly increased compared to the current generation of geostationary meteorological satellites.

It seems that there is a general consensus to support such 100 MHz extension but the question is whether the extended band should be 18-18.1 GHz or 18.3-18.4 GHz. Some administrations are currently favouring the lower band but

there might be political problems due to the existing allocation of Broadcasting Satellite Service (BSS) in the band 18-18.1 GHz.

c) Issue 3: Resolution 746 (WRC-03) on frequency band 10.6-10.68 GHz

As part of global passive measurements, the band 10.6-10.7 GHz is of primary interest to measure rain, snow, sea state and ocean wind for ocean and land surfaces. A number of sensors are already using or are planned to use this frequency band in the near future (e.g. CMIS, MIMR, AMSR, AMSR-E and TMI) for such measurements. These measurements are fully operational (regular use of the data, continuity of service, several usable data products) and are used on a worldwide basis. The retrieved data are used and exchanged between the meteorological organisations in all regions and are actually derived from a set of measurements performed at five frequencies which are interrelated (6, 10, 18, 24 and 36.5 GHz).

A part from the 10.68-10.7 GHz band that is covered by the RR footnote **5.340** under which all emissions are prohibited, the band 10.6-10.68 GHz is also shared between Earth Exploration Satellite Service (EESS) (passive) and Fixed and Mobile Services. It has to be stressed that current deployments of Fixed Service links in certain administrations already create significant levels of availability degradation of passive measurements in this band. Additional constraints on the 10.6-10.68 GHz passive band would hence not be acceptable. Studies are still ongoing to identify the maximum e.i.r.p for fixed and mobile links or other regulatory solutions that could provide a means to ensure the protection of passive sensors in the 36-37 GHz.

Agenda item 1.17 (CPG/PT2): Protection of the 1.4 GHz EESS (passive) band

Under agenda item 1.16 (WRC-03) and acknowledging the non-completion of technical compatibility studies, last WRC-03 made a conditional secondary allocation to FSS for MSS feeder links nearby 1.4 GHz. Agenda item 1.17 (WRC-07) is the follow-up of this issue and request to finalise these technical studies in a view to determine whether these MSS feeder links are compatible with existing services and in particular with the passive service in the 1400-1427 MHz band.

For EESS, this band is a vital resource for measuring salinity and other aspects of the Earth and its atmosphere and, to that respect, is one of the passive bands quoted in footnote **5.340** that prohibits all emissions, emphasising its particular importance for the scientific community. A number of sensors are planned to use this frequency band in the near future (SMOS, HYDROS, AQUARIUS) for such measurements.

Based on a 10% apportionment of the EESS protection criteria, current technical studies have determined power limits for the uplink and downlink that could ensure compatibility between the MSS feeder links and EESS in the 1400-1427 MHz.

Agenda item 1.20 (CPG/PT2): Unwanted emissions in EESS (passive bands)

The issue of the protection of the Earth exploration-satellite service (passive) from unwanted emissions of active services has been on the agenda for the three last WRCs for which a number of administrations were supporting regulatory measures for the protection of passive services, and in particular the inclusion in the Radio Regulations of limits on the unwanted emissions of active services.

After difficult discussions up to the last few days of the WRC-03, no agreement to take such action was reached and a compromise solution was to continue the studies according to Resolution 738 and re-visit the issue at WRC-07.

Studies are still on-going in a specific ITU-R Task Group (TG 1/9) and agreement on adequate out-of-band levels to protect EESS passive sensors is likely to occur, at the main exception of the protection of the 1400-1427 MHz band from Fixed Service that might be of great concern.

Expansion of the Table of Frequencies in the Radio Regulations for Frequency Bands above 275 GHz

The Preliminary agenda for the World Radiocommunication Conference 2010 (WRC 2010) already includes an agenda item requesting to consider the expansion of the Table of Frequencies in the Radio Regulations of the ITU for frequency bands between 275 GHz and 3 000 GHz. WRC-07 will have to decide whether this agenda item will become part of the final WRC-210 agenda. Due to a very crowded draft agenda the item could be deleted if no sufficient support is received.

EUM-WP-21 summarises the activities carried over at the Space Frequency Co-ordination Group (SFCG) and ITU-R level in the preparation of the WRC-2007 for confirming an agenda item for WRC 2010 to include required frequency band allocations between 275 GHz and 3000 GHz with the appropriate protection measures, as currently there is only a footnote (5.565) that governs the use of a list of frequency bands in the range 275-1000 GHz.

The document also summarises EUMETSAT activities for the identification of appropriate frequency bands for passive sensors above 275 GHz, which recalls the outcome of a special study funded by EUMETSAT in 2001/2002. This study identified characteristics, sharing conditions and protection requirements of passive sensor bands in the 275 GHz to 1000 GHz band for future meteorological and climatological applications (EESS passive). The outcome of the study has been updated by EUMETSAT for the SFCG meeting of October 2005 with the most up-to-date knowledge of the existing and planned sensors, instruments and missions. No alternative study has been identified by EUMETSAT in the same frequency band (275-1000 GHz)

and no study exists for the 1000 GHz to 3000 GHz region of the band. It is worth noticing that for the 36 different frequency allocations identified in this table, 15 of these entries are covered by the RR but 21 entries are not covered by the Radio Regulations (i.e. they are not protected at all).

The Working Group I unanimously recognised the need of fostering, within their respective scientific communities, the need of identifying potential applications, missions and instruments that will be using the 275-3000 GHz (in the frame of EESS passive) and agreed in ensuring that this information is timely available to their SFCG representatives for the WRC-2007 preparation processes in order to secure the corresponding agenda item for WRC-2010.

Technical Information from the Space Frequency Co-ordination Group and ITU-R

CGMS is an observer to SFCG. NOAA accepted the task to report SFCG results to CGMS. NOAA-WP-08 discussed inputs to SFCG-24.

In the same document NOAA also provided information on the progress in the ITU-R Working Parties 7B and 7C (WP7B, WP7C). WP7B is concerned with space radio systems, i.e. the transmissions between the Earth and satellites, both uplinks and downlinks. WP7C covers applications in the EESS concerning active and passive sensors as well as MetAids, i.e. radiosondes.

In addition, NOAA discussed the activities of ITU Task Group 1/8 (TG1/8), compatibility between ultra-wideband devices (UWB) and radio communication services and the ITU TG1/9, Compatibility between passive and active services. Finally, NOAA reported on World Meteorological Organization (WMO) Commission for Basic Systems (CBS) Steering Group on Radio Frequency Coordination (SG-RFC). NOAA presented two papers at the meeting, one entitled “Assessment of Interference Potential between Short Range Radars on Automobiles and passive Microwave Sensors in the 23.6 to 24.0 GHz Band” and one entitled “Sample Characteristics and Sharing Criteria for Geostationary Meteorological Satellites in the Band 18-18.4 GHz”.

Other Frequency Management Issues

Introduction of UWB technology in passive sensor bands

As already reported during recent CGMS meetings Ultra Wide Band (UWB) applications represent new technologies that transmit very low power over very large bandwidth, up to several GHz. It represents a new challenge for frequency management since it is not possible to regulate these applications under the current Radio Regulations or national regulations. Apart from very specific devices, these applications are expected to be deployed on a very large scale and hence intended to operate on a licence exempt basis that would not allow any control (in number in particular) while authorised.

On this basis, and concerning meteorological satellites, these UWB devices can present a risk of for both passive sensors and Earth Stations receptions due to the aggregation of interference produced by multiple devices.

International discussions have been held in ITU-R within a specific Task Group 1/8 (TG 1/8), debate somehow complicated by the fact that the US Administration has already issued in 2002, its own regulations and authorised the use of such UWB applications on the basis of EIRP (Effective isotropically-radiated power) limits.

TG 1/8 has recently finalised its work, recognising the different national or regional regulations (US, Europe or Japan) and summarising up to date compatibility technical studies.

Two different bands are currently considered:
- 10.6 GHz band for “generic” UWB devices mainly for telecommunications and location tracking applications,
- 21.6-26.6 GHz for Automotive Short-Range Radars (SRR).

For the first band, it appears that the US regulations is not sufficient to protect most of the radiocommunications services but would be sufficient for meteorological satellites, either for the 1.4 GHz and 10.6 GHz passive bands or reception stations. Europe and Japan are currently in the process of adopting their own regulations and have either confirmed or even tightened the EIRP limits proposed by the US. It hence appears that, currently, the meteorological satellite operations would be safeguarded.

This is certainly not the case for the second band (21.6-26.6 GHz) covering the 23.6-24 GHz passive band. Indeed, this issue has been one of the most sensitive and discussed issues between the powerful automotive lobby and the whole scientific and meteorological community. In this case, the EIRP level regulated in the US has been shown as by far not being sufficient to protect the 24 GHz passive sensors band acknowledging the high car density and noting that between 4 and 8 radars are expected per car. On this basis, after tremendous amount of discussions and political pressure, Europe has also allowed in 2004 such use but only on a limited basis, in number (maximum 7% of the cars equipped) and in time (only up to 2013) after which SRR will have to be deployed in the 79 GHz band. It can also be noted that Canada has recently authorise such 24 GHz SRR but with a “notch” in the 23.6-24 GHz band with lower EIRP levels assumed to ensure the protection of passive sensors.

However, at this stage, and recognising the by nature worldwide measurements performed in this band, the US regulation still put at risk the global integrity of the measurements in the 23.6-24 GHz band. This is without saying that the European Regulations will not be jeopardised in the future and make sure that the limitations will be strictly applied. The meteorological community will certainly have to be vigilant with this respect.

It is finally worth noting that the ITU-R TG 1/8 has confirmed the non compatibility between these SRR and EESS (passive) presenting a negative margin higher than 30 dB!

COMS frequency notification process

At CGMS-32, KARI informed CGMS about the issue of the advanced publication for the COMS series with the ITU-R. In response to AI 32-05, KMA informed CGMS that the national meteorological payload of COMS would become part of the space-based GOS of the WMO.

KMA representative reported progress on the frequency coordination for the COMS satellite with concerned parties. KMA and KARI have had two informal technical meetings and one official Japan-Korea Satellite Frequency Co-ordination meeting with JMA and two meetings with CMA. Most part of the issues with CMA have been resolved, although further meeting is required to resolve the remained issues. Although many progresses have been made with JMA, there are still issues to be discussed, especially issues on the interference scenario between COMS-128.2 E and MTSAT-B-135 E. KMA representatives also commented that KMA and KARI would like to have next informal technical meeting with JMA as soon as possible. JMA commented that the schedule for this meeting was not yet fixed.

Potential problems for operational scenarios caused by frequency overlaps

Frequency plans for future polar-orbiting satellite systems indicate that there is potential for harmful interference of one system into another. Potential problems to the operations of polar-orbiting meteorological satellites were reported to CGMS-32. These could be caused by transmissions of direct readout services in frequency bands close to those used for the transmissions to main Earth stations. A particular problem was identified between future NOAA and EUMETSAT operations.

At the CGMS-32 Meeting in Sochi, Russian Federation, 17-20 May 2004, NOAA received the following two actions relating to interference from the NPOESS HRD downlink to the MetOp GDS downlink:

Action 32.06 NOAA and CMA to develop operational procedures to avoid interference of their direct broadcasts into the main data dump transmissions of MetOp in the frequency band 7750-7850 MHz. Deadline: CGMS-33

Action 32.07 NOAA to report back on the analysis of study results [by EUMETSAT] concerning potential interference between polar-orbiting meteorological satellites. Deadline: 31 December 2004.

NOAA-WP-18 and NOAA-WP22 were in response to AI 32.06 and AI 32.07. The working group was informed that studies were refined and an agreement

was implemented between NOAA and EUMETSAT by an exchange of letters. This agreement includes agreed changes of technical specifications including the reduction of transmission bandwidth as well as the change of centre frequencies.

Applying the new parameters it can be expected that interference in case of transmissions in the band 1698 -1710 MHz will be in the order of <3% which is acceptable for this type of service.

In the case of interference in the X-band the expected maximum interference after the agreed modifications would be 16 min /year calculating into 0.03 %. This would be at a level acceptable to EUMETSAT.

It was also noted that in case of interference exceeding the above levels there would be the technical feasibility to temporary switch off transmissions via operational means.

At CGMS-32 CMA indicated that they are also planning a direct read-out broadcast in the frequency band 7750 – 7850 MHz. For this reason CMA was included into AI 32.06. No response was received before CGMS-33. During the working group meeting CMA announced that the planned launch date for FY-3 is 2007. This creates the need for urgent co-ordination similar to the one performed between NOAA and EUMETSAT in this matter. It was agreed that CMA would provide a set of technical parameters of the planned X-band broadcast as a matter of urgency to allow studies. It will be necessary to agree operational measures to avoid interference to the data main data downlink of MetOp at the earliest possible date.

Action 33.11 CMA to provide as a matter of urgency technical and operational parameters of the planned data transmissions in the frequency band 7750 -7850 MHz to CGMS Members. Deadline: 1 December 2005

Action 33.12 EUMETSAT to perform sharing studies for X-band operations at MetOp stations and propose technical and operational measures to avoid interference. Deadline: 1 February 2006

ROSHYDROMET announced that they are also planning main data dump transmissions to their main data acquisition station operating in the band 7750 – 7850 MHz. There would be also a potential for interference from direct broadcast services into the planned ROSHYDROMET service. The impact of such interference needs to be evaluated. Study results therefore need to be made available to ROSHYDROMET to support their sharing studies.

It was stressed that for future use of the frequency band 7750 – 7850 MHz early co-ordination would be essential and SFCG Resolution 19-7R2 needs to be strictly applied. It was agreed that WG I will annually review the status of

frequency band use and plans for new systems to detect possible conflicts at the earliest possible time.

Action 33.13 WMO to provide a forum for discussion on data transmission from meteorological satellites, with a goal of resolving radio frequency conflicts, well in advance of notification to ITU, and adopting approaches to avoid them.

Concluding the discussion of frequency co-ordination matters, WMO announced that a workshop on radio frequency matters would be held on 20 – 21 March 2006, tentatively in Geneva (Switzerland). CGMS representation would be appreciated with presentations on current and future use of frequency bands for meteorological satellites.

I/2 Telecommunication techniques

There were no topics for discussion under this item.

I/3 Co-ordination of International Data Collection & Distribution

In working paper ROSH-WP-02, Russia informed CGMS that a batch of modernized DCPs had been installed at hydro-meteorological stations in the European and Ural regions of Russia. These DCPs are designed for operation within the Russian DCS via Meteosat (in a first phase) and, in a second phase, via the Electro-L N1 geostationary satellites. DCP signals are transmitted using Meteosat–7 International channels I25 and I26 (according to an Agreement between EUMETSAT and Roshydromet, and supported by CGMS). At present, these DCPs are working on an experimental basis, the major objective being to develop and test the Russian DCS ground segment up to the time Electro-L N1 is launched.

Data collection is carried out using the SRC PLANETA ground receiving station near Moscow. The decoded data (messages) are transmitted to the Roshydromet Main Communication Center for the subsequent transmission (in GTS code form) via ground telecommunication channels to GTS.

As stated at a previous meeting, satisfactory quality of data collection was not ensured for the DCPs allocated near the northern polar boundary of Meteosat-7 field of view. This is most likely the result of the higher Meteosat-7 inclination, which is no longer controlled. These DCPs have been re-allocated to new locations in European Russia.

On the basis of test results, DCPs have been modernized and, at present, they operate on an experimental basis.

ROSH-WP-02 also noted that the tentative launch date of the Electro-L N1 satellite is 2007, and according to current planning, the Electro-L N1 DCS will support the operation of 300 national, and 33 international channels, with the