

REPORT ON THE WORLD RADIO CONFERENCE 2003

The World Radio Conference (WRC-03) took place in Geneva from the 9th of June to the 4th of July 2003. More than 2300 delegates attended the Conference, representing about 150 national administrations and several so-called Sector Members.

The document gives a summary on the results of the Conference and an outlook on the following Radio Conferences.

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1 INTRODUCTION

The World Radio Conference (WRC-03) took place in Geneva from the 9th of June to the 4th of July. More than 2300 delegates attended the Conference, representing about 150 national administrations and several so-called Sector Members.

The issues of interest to EUMETSAT at WRC-03 can be broadly split into the following areas:

- Meteorological Satellite Service
- Earth Observation
- Space Science

The following acronyms as defined by the International Telecommunication Union (ITU) are used in the next section of the document:

MetSat = Meteorological Satellite Service
 MSS = Mobile Satellite Service
 EESS = Earth Exploration Satellite Service
 GSO = Geo-Synchronous Orbit
 Non-GSO = Non Geo-Synchronous Orbit

2 METEOROLOGICAL SATELLITE SERVICE

There were two agenda items involving the Meteorological Satellite Service, i.e. agenda items 1.20 and 1.31. The results were as follows:

2.1 Agenda Item 1.20 (Non-GSO MSS service links in bands below 1 GHz)

This issue was on WRC agendas since 1992. The MSS seeks spectrum below 1 GHz for so-called "Little LEOs", i.e. low earth orbiting satellites performing mobile services such as paging, data collection etc. Several candidate bands have been identified including parts of the band 401 – 406 MHz. This band is used for radiosonde operations (MetAids) and part of the band for Data Collection Systems of meteorological satellites (LEO and GEO). WMO has

conducted studies on the future requirements for the band and has submitted documents to ITU and WRC. A dedicated resolution pointing to the band 401 – 406 MHz was deleted during WRC-2000.

In discussions in the ITU as well as CEPT there has been no support for new MSS allocations. For the band 401 – 406 MHz there has been strong opposition to the MSS request.

Outcome of WRC 2003: No new MSS allocations were made and Resolution 214 on this issue was finally suppressed. This issue will not be allowed for future WRC agendas any more. The MetSat allocations in the band 401 – 403 MHz are therefore safe.

2.2 Agenda Item 1.31 (MSS in the 1-3 GHz band)

This agenda item targeted specifically the bands 1518 – 1525 MHz (downlink) and 1683 – 1690 MHz (uplink), but was open to examining other frequency bands between 1 and 3 GHz.

The band 1675 – 1700 MHz is allocated to both the Met-Aids and Met-Sat services with the Met-Sat allocation extending up to 1710 MHz, and is vital to the operations of the WMO as well as other meteorological services in many administrations. The band is essential for EUMETSAT programmes MTP, MSG and EPS (METOP).

Studies in the ITU-R, including several submissions by EUMETSAT, have shown that MSS (Earth-to-space) cannot share with the Met-Sat or Met-Aids services without undue constraints. For example, three independent studies have shown that sharing between the MSS and MetSat in the 1683-1690 MHz band would be very difficult due to the hundreds of GVAR/S-VISSR stations, including a number of mobile GVAR earth stations. Earlier studies have proven that sharing is not feasible in the bands 1690 – 1698 MHz due to thousands of user stations for geostationary meteorological satellite systems as well as 1698 – 1710 MHz due to downlinks of polar orbiting meteorological satellites to user terminals and main Earth stations. Therefore, any MSS allocation in the 1675-1710 MHz band was considered practically unusable and consequently opposed.

Outcome of WRC-03: A primary allocation to the MSS was made in the band 1668 – 1675 MHz for all ITU regions. Footnotes to protect existing services were added to the allocation. This outcome of the WRC 2003 was the desired one and is totally acceptable to the meteorological community in view of the very limited use of this band and the protection afforded to existing meteorological stations. On a global scale, the band 1670 – 1675 MHz is only used by very few data downlinks, which can be protected. There are no EUMETSAT downlinks in this band.

Existing MSS allocations in region 2 within the band 1675 – 1700 MHz were deleted. Resolution 227 was also deleted which implies that this issue will not be included on future WRC agendas.

The new allocation and the consequent deletion of other allocations terminate now an ongoing activity from MSS to obtain additional spectrum. This activity was on all agendas of WRCs since 1992.

3 EARTH OBSERVATION

Several items at this WRC were of interest for Earth Observation (EESS in ITU terminology):

- a) New allocation in the 432-438 MHz for P-band SAR applications
- b) Protection of the band 31.3-31.5 GHz (used by AMSU on METOP) from unwanted emissions by HAPS (High Altitude Platform System) in the adjacent band
- c) Protection of the 1.4 GHz band (to be used by SMOS) from unwanted emissions by new Mobile Satellite feeder links in nearby bands
- d) Protection of the band 50.2-50.4 GHz (used by AMSU on METOP) from unwanted emissions by High Density Fixed Satellite Systems (HDFSS) operating uplinks in the lower adjacent band
- e) Protection of the EESS active sensors operating in the band 5250-5350 MHz (e.g. SAR on ERS-1 and ENVISAT) from new wireless LANs to be deployed in this band
- f) Extension of the allocation to EESS active sensors in the 5 GHz range from the current 210 MHz bandwidth to 330 MHz (Main application: future high resolution altimeters or SARs in C-band)
- g) Elimination of some legal uncertainty on the use of the 35.5-36 GHz band by rain radars
- h) Definition of regulatory limits for unwanted emissions into bands reserved for EESS passive sensors only
- i) Protection from proposed allocations to mobile satellite systems in various bands used by meteorological satellites.

3.1 Agenda item 1.38: New allocation in the 432-438 MHz for P-band SAR applications

This long-standing issue, already discussed unsuccessfully at WRC-97, has finally been positively resolved with a 6 MHz secondary allocation at this Conference. The operational limitations to be applied to the SARs operating in this band (ITU-R Recommendation SA.1260-1) will still allow them to cover forest biomass and Antarctic ice measurements, the two main observation targets identified for this type of instrument, with a spatial resolution of 100 meters. This result has been possible on the basis of an agreement that all future operators of these satellites will publish in advance on the Space Frequency Coordination Group (SFCG) web site the observation areas and schedule of their campaigns, so that the other users of the band can be aware of the planned use beforehand.

3.2 Agenda item 1.13: Issues related to HAPS

This agenda item is of interest to EUMETSAT in order to protect the sensor band 31.3 – 31.5 GHz used by AMSU on Metop and NOAA satellites from unwanted emissions by High Altitude Platform Systems (HAPS) in the adjacent band.

Outcome of WRC 2003: Very stringent limits on the unwanted (out-of-band and spurious) emissions (-100dBW/m²) by HAPS uplink stations have been put in the ITU Radio Regulations. This will guarantee the protection of the “window” for the meteorological vertical sounders and at the same time will allow the development of HAPS systems around 31 GHz in a number of interested countries, mainly in Asia, but including also Russia. This regulation represents also the very important first case of having a hard limit specified for unwanted emission levels in the Radio Regulations; this should open the door for similar protection levels needed for other bands used for satellite passive sensing.

3.3 Agenda Item 1.16 (Non-GSO MSS feeder links in bands around 1.4 GHz)

This item deals with the protection of the 1.4 GHz band (to be used by SMOS) from unwanted emissions by new Mobile Satellite feeder links in nearby bands

The US industry made a strong attempt to get an allocation for MSS feeder link despite the unfavourable conclusions of compatibility studies conducted by the relevant ITU-R Working Parties and the incompleteness of these studies.

The CEPT had submitted an ECP for no allocations to MSS feeder links to WRC-03 which was signed by 35 European administrations. Moreover, around 60 other administrations submitted proposals for no allocations to MSS feeder links. Despite this very strong position expressed by almost 100 countries, the USA, supported only by 3 other administrations, pushed its desire for an allocation by using all available means.

Outcome of WRC 2003: After lengthy and heavy debates, it was finally possible to limit the allocation for MSS to a secondary status restricted to the bands 1390-1392 MHz for uplinks and 1430-1432 MHz for downlinks. Furthermore, and very importantly, the allocations are only provisional and tied to a Resolution which does not allow the use of these bands for MSS feeder links before completion of all ITU-R studies to be reviewed by WRC-07.

3.4 Agenda Item 1.5 (Use of the frequency range 5 150-5 725 MHz)

3.4.1 Protection of the EESS active sensors operating in the band 5250-5350 MHz (e.g. SAR on ERS-1 and ENVISAT) from new wireless LANs (RLAN) to be deployed in this band

This has been one of the most difficult issues at WRC-03. The ITU studies conducted on this issue in preparation of WRC-03 had concluded that a proper protection of the EESS active

sensors could only be achieved by limiting the RLAN to indoor use only and by imposing some additional technical constraints. This conclusion was supported by the European RLAN industry, which confirmed that these constraints were acceptable to them. Compatible European regulations in this area have been put in place already since 3 years. Unfortunately the US and Canadian national regulations allowed outdoor usage of these equipments as well as higher power and therefore these Administrations, supported by the North American wi-fi industry, objected to the results of the ITU studies. While the Canadian problem has been solved with a compromise that will allow limited outdoor usage only with antennas with strong attenuation above the horizontal plane, it has been very difficult to deal with the US objections.

Outcome of WRC 2003: The solution has been to introduce regulatory text that invites Administrations to encourage “predominantly indoor” systems, but at the same time allows Administrations to use alternative methods to protect the EESS systems. What these alternative methods may be is unclear, since all the technically meaningful methods have been analysed.

A new footnote has been introduced in the Radio Regulation for this band, stating that no harmful interference shall be generated by the RLAN devices towards the EESS sensors. This implies that demonstrated interference shall lead to the obligation of switching off the RLANs.

3.4.2 Extension of the size of the allocation to EESS active sensors in the 5 GHz range from the current 210 MHz bandwidth to 320 MHz.

This frequency extension was requested to allow future high-resolution altimeters or SARs in C-band (eventual JASON-2 follow-on).

Outcome of WRC 2003: The extension of the band allocated from 5250-5460 MHz to 5250-5570 MHz has been achieved at this WRC. The allocation has been given in the same band also to Space Research active systems (to be used for planetary exploration).

3.5 Agenda Item 1.8 (Unwanted emissions)

This agenda item dealt with unwanted emissions from adjacent bands into passive sensor bands. Several bands were identified where regulations are required to protect passive sensors. Active services were very reluctant to establish mechanisms for such protection and there was no conclusive output from 2003. The agenda point will be put on the agenda of the next competent WRC 2003.

One of the problems discussed was related to the protection of the band 50.2-50.4 GHz (used by AMSU on METOP) from unwanted emissions by High Density Fixed Satellite Systems (HDFSS) operating uplinks in the lower adjacent band. It has been possible to insert in the associated Resolution some text inviting Administrations to limit HDFSS uplink deployments in the frequencies next to 50.2 GHz until proper ITU studies will have identified mechanisms to protect the sensors in the 50.2-50.4 GHz band. Although the threat is not imminent (some

even question if these high frequency bands are really suitable for HDFSS applications), studies are needed in this area in the future.

Outcome of WRC 2003: Despite strong resistance by some important Administrations, the WRC decided that the problem of unwanted emissions into passive bands will have to be studied and technical regulations should be put in place. This will constitute one of the most complex issues to be covered in the next ITU study cycle.

4 SPACE SCIENCE

The following WRC-03 agenda items were of interest to Space Research and the following results were achieved:

- a) Primary allocation to Space Research at 26 GHz for wideband data downlink.
- b) Simplified coordination procedures for telecommand links around 7 GHz.
- c) Elimination of an allocation to Inter-satellite Service in a band around 32 GHz used for deep-space satellites data downlink.
- d) Confirmation of the Space Research data downlink allocation near 38 GHz.
- e) Extension of the C-band allocation for Space Research active sensors.

5 AGENDA FOR THE FUTURE WRCS (WRC-07 AND WRC 2010)

As usual the agenda for the next WRC-07 contains quite a mix of different subjects. 21 Agenda Items have been included. Both agenda items proposed by EUMETSAT were agreed and will be on the agenda of the next competent WRC. These two items are:

5.1 Expansion of MetSat Allocation

EUMETSAT has forwarded via CEPT the request to include a new agenda item concerning the expansion of the present footnote allocation for the Meteorological Satellite Service in the band 18.1-18.3 GHz by 100 MHz. The new allocation either in the band 18.1 – 18.4 GHz or 18.0 – 18.3 GHz should be on a primary status and could be used for geostationary meteorological satellite downlinks (for example METEOSAT third generation). The agenda item was accepted and was put on the agenda for WRC 2007. It was combined with other EESS activities as follows:

“AI 1.2, related to sharing studies in the bands 10.6-10.68 GHz and 36-37 GHz between passive EESS sensors and terrestrial services, as well as to the extension by 100 MHz of the current Meteorological Satellite downlink band 18.1-18.3 GHz (to cover the higher data rates required by the next generation of Geostationary Meteorological Satellites).”

5.2 Consideration of the use of frequencies between 275 and 3000 GHz

It is necessary to provide suitable frequency allocations for passive sensor atmospheric measurements in the EESS (passive) and SRS (passive). There are already spaceborne passive sensors utilising frequency bands above 275 GHz. Planned and existing instruments include MLS (USA), SMILES (Japan) as well as other sensors which use spectra above 275GHz.

Protection is presently only given by footnote S.5.565 that was revised by WRC-2000. This footnote is quoting that the band 275 – 1000 GHz may be used for experimentation and development of various active and passive services. A list of frequencies is contained in the footnote but this list is not complete. Operations of sensors in such frequency bands are not adequately protected. It is therefore necessary to open the table of frequencies to include frequencies up to 1000 GHz.

An agenda item was put on WRC 2010 to consider the expansion of the table of frequencies up to 3000 GHz. A corresponding resolution (COM7/1) was adopted.

6 SUMMARY

The results of WRC 2003 were very good for EUMETSAT and the meteorological user community. The main positive results were:

- The termination of activities to allocate spectrum to MSS in bands presently used by Meteorological Satellite Service. The only allocation MSS achieved (1668 – 1675 MHz) is in a band not used by EUMETSAT. Other CGMS members operate a few downlinks in this band. These links will be protected by the footnotes attached to the new MSS allocation.
- The inclusion of hard limits on HAPS operations neighbouring to the band 31.3 – 31.8 GHz. This was based on results of EUMETSAT studies successfully forwarded through ITU working parties and study groups
- The expansion of EESS (active) allocation from 210 MHz to 320 MHz bandwidth for altimeters in the band 5250 – 5570 MHz.
- The inclusion of the new agenda item related to the expansion of the Meteorological Satellite Service footnote allocation in the band 18.1-18.3 GHz by 100 MHz to the WRC 2007 agenda
- The inclusion of the opening of the table of frequencies from 275 GHz to 3000 GHz as an agenda item to WRC 2010.

It has to be noted that these good results were only possible due to the excellent co-operation between Frequency Managers of CGMS members and the very important support from administrations of CGMS member agencies.