

PREPARATION OF THE WORLD RADIO CONFERENCE 2003

This document presents the status of preparatory activities for the World Radio Conference 2003 related to the Meteorological Satellite Service, Space Research Service, and Earth Exploration Satellite Service.

The document shall give an overview on the present status of preparations. The document is structured in accordance with the WRC 2003 agenda. Items of interest to the meteorological user community are listed, followed by a summary of the problems, the intended preparatory work is described and the status of activities is given.

EUMETSAT activities in the framework of ITU, CEPT, WMO are listed.

PREPARATION OF THE WORLD RADIO CONFERENCE

1 INTRODUCTION

This status report shall inform on the progress of the topics relevant to EUMETSAT which are on the agenda of the World Radio Conference 2003 (WRC-2003). The conference will not be in Caracas as planned. The government of Venezuela has withdrawn its invitation and ITU is presently investigating alternatives. Most probably the WRC-2003 will take place in Geneva during June/July of 2003. The ITU Plenipotentiary Conference in Marrakech (Marocco) will confirm the venue and dates by the end of September 2002.

The Conference Preparatory Meeting (CPM) of the ITU is scheduled for 18 November to 1 December and will be in Geneva. The CPM establishes the technical baseline for the Conference and creates the so-called CPM-Report, which will be used during WRC-03 work.

Preparatory work has been conducted in the framework of the CEPT, WMO, ITU, CGMS, and SFCG. EUMETSAT has contributed to many working groups and has issued several technical studies to support the position of the Meteorological Satellite Service (MetSat) and the Earth Exploration Satellite Service (EESS). In particular the EUMETSAT Frequency Manager and/or his consultant have been participating in the following groups:

CEPT: Frequency Management Group (FM)
 Conference Preparatory Group (CPG-03)
 Spectrum Engineering Group 24 (SE24)
 FM Project Team 34

WMO: CBS Steering Group on Radio Frequencies

ITU: ITU-R Working Party 7C (MetSat and EESS)
 ITU-R Working Party 7E (WRC-03 inputs)
 ITU-R Working Party 8D (Mobile Satellite Service)

CGMS: Annual meetings of the Co-ordination Group of Meteorological Satellites

SFCG: Annual Meetings of the Space Frequency Co-ordination Group

EUMETSAT works in close co-operation with CNES and ESA on topics of common interest and has issued several studies with these organisations. Furthermore there was support of Météo France in several topics related to EESS (passive). These activities are now co-ordinated by EUMETNET.

The WRC-03 agenda points of interest were identified after WRC-2000 and the main contributor was defined in a workplan agreed by these organisations. Progress in the various areas was regularly monitored. Due to the limited resources it was necessary that representatives of one organisation were also supporting activities for the other organisations.

2 STATUS OF RELEVANT WRC-03 AGENDA ITEMS

Agenda items are listed in numerical order, not by importance to EUMETSAT. The most important agenda items for EUMETSAT are: 1.5 (JASON), 1.13 (HAPS), 1.31 MetSat/MSS), and 7.2 (Future agenda points). Sensor issues in the EESS (passive) service are under agenda items: 1.8, 1.12, 1.16, 1.38, and 7.2.

The text for the relevant agenda items as defined by WRC 2000 is quoted in italic letters.

2.1 Agenda Item 1.3 (Identification of harmonized bands for public protection services)

ITU Resolution 645 requests

“to consider identification of globally/regionally harmonized bands, to the extent practicable, for the implementation of future advanced solutions to meet the needs of public protection agencies, including those dealing with emergency situations and disaster relief, and to make regulatory provisions, as necessary, taking into account Resolution 645”.

Initially this resolution listed various bands for consideration. One of the bands was 1544-1545 MHz, which is allocated to EESS (active).

Status: Only bands in the range 380 – 395 MHz are currently under consideration. No proposals have been made for the band 1544 – 1545 MHz.

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

ITU Resolution 736 (WRC-2000) requests

“to consider, in accordance with Resolution 736 (WRC-2000), regulatory provisions and spectrum requirements for new and additional allocations to the mobile, fixed, Earth exploration-satellite and space research services, and to review the status of the radiolocation service in the frequency range 5 150-5 725 MHz, with a view to upgrading it, taking into account the results of ITU-R studies”

Proposals for new primary Mobile Satellite (MS) allocations for RLANs (Radio-LANs) in the bands 5150 – 5350 MHz and 5470 – 5725 MHz will be forwarded by several administrations. Studies on the feasibility of sharing between RLANs and EESS (active) indicate that sharing

is feasible if RLANs respect the following limitations: indoor use only; 200 mW max EIRP; use of transmitter power control (TCP) and dynamic frequency selection (DFS) features. Outdoor use and higher EIRP appear to be detrimental to the possibility of sharing between the two services.

On the initiative of the administration of France the CEPT is presently discussing to include in the European Common Proposal (ECP) on this agenda point the extension of the present EESS (active) allocation from 5250 – 5460 MHz up to 5570 MHz. This is required to fully protect the required bandwidth of 320 MHz for future operations of JASON. Studies have shown that JASON operations will not cause constraints to MS.

So far there is only little support from European countries on this topic. It would be necessary to have at least 10 supporting administrations to include this request into the ECP.

2.3 Agenda Item 1.8(Unwanted emissions)

“to consider issues related to unwanted emissions:”

Agenda Item 1.8.1

“consideration of the results of studies regarding the boundary between spurious and out-of-band emissions, with a view to including the boundary in Appendix **S3**”

Agenda Item 1.8.2

“consideration of the results of studies, and proposal of any regulatory measures regarding the protection of passive services from unwanted emissions, in particular from space service transmissions, in response to recommends 5 and 6 of Recommendation **66 (Rev.WRC-2000)**;”

It will be necessary to ensure that the boundary between spurious and out-of-band emissions is defined, with a view to include the boundary into Appendix S3 of the ITU Radio Regulations (RR).

Band-by-band studies have been performed to ensure that space science passive systems will be adequately protected. EUMETSAT has supported several of these studies which have been forwarded to ITU TG 1/7. Active service proponents dominate Task Group 1/7 proceedings making progress in this area difficult.

CEPT is supporting EESS positions related to agenda item 1.8.1 but has not clearly decided on 1.8.2. Band specific proposals have been prepared by several administrations. ITU TG1/7 has not fully completed its work.

2.4 Agenda Item 1.11 (Use of the band 14-14.5 GHz)

“to consider possible extension of the allocation to the mobile-satellite service (Earth-to-space) on a secondary basis in the band 14-14.5 GHz to permit operation of the aeronautical mobile-satellite service as stipulated in Resolution 216 (Rev.WRC-2000);”

The secondary allocation to the Space Research Service (SR) in this band needs to be protected. Sharing between the aeronautical mobile-satellite and the space research services, on a co-equal secondary basis, should be shown to be feasible prior to any allocation action.

CEPT has not generated an ECP on this topic but is principally supporting the SR position.

2.5 Agenda Item 1.12 (Issues related to the Space Science Service)

“to consider allocations and regulatory issues related to the space science services in accordance with Resolution 723 (Rev.WRC-2000) and to review all Earth exploration-satellite service and space research service allocations between 35 and 38 GHz, taking into account Resolution 730 (WRC-2000)”

There are several different issues covered by this agenda item. Regarding EESS (active) it is requested (mainly by Japan) to remove the footnote RR S5.551A from the RR. The EESS (active) allocation was made by WRC-97 and the footnote was attached to protect existing services in this band. Although the EESS allocation is on a primary level, the footnote practically makes the allocation secondary.

It is unlikely that there will be sufficient support to remove the footnote, which was introduced on the request of many administrations in 1997.

2.6 Agenda Item 1.13 (Issues related to HAPS)

“to consider regulatory provisions and possible identification of existing frequency allocations for services which may be used by high altitude platform stations, taking into account No. S5.543A and the results of the ITU-R studies conducted in accordance with Resolutions 122 and 734 (WRC-2000)”

The objective is to ensure the protection of the passive sensors in the band 31.3 – 31.8 GHz from interference created by Earth-to-HAPS (High Altitude Platform Service) links in the 31 – 31.3 GHz band by supporting suitable limitations on HAPS out-of-band emissions in the Radio Regulations.

WRC-2000 made an allocation to HAPS in the band 31 – 31.3 GHz for transmissions in the Earth-to-HAPS direction (i.e., similar to a satellite uplink). On request of the EESS community this allocation was limited by footnote **S5.543A/S5.5RRR** to the lower half of the band (31 – 31.15 GHz) until WRC-2003 due to possible interference into the passive sensors

operating in the adjacent band from 31.3 – 31.8 GHz. Studies performed by EUMETSAT indicate that an out-of-band transmitter power density limit on the order of –100 dB(W/MHz) would be required to comply with the protection requirements specified in Recommendation ITU-R SA.1029. The study results were discussed in the relevant ITU working groups and it was agreed to introduce the limit into the RR. The relevant CPM text includes this.

CEPT supports this and has created a corresponding ECP. No additional frequency bands for HAPS are proposed.

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

“to consider allocations on a world-wide basis for feeder links in bands around 1.4 GHz to the non-GSO MSS with service links operating below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolution 127 (Rev.WRC-2000), provided that due recognition is given to the passive services, taking into account No. 5.340”

It is necessary to protect the EESS (passive) allocations in the band 1400 – 1427 MHz from unwanted emissions originating from proposed MSS feeder links near 1.4 GHz,

The band 1400 – 1427 MHz is a vital resource for measuring ocean salinity, soil moisture content and other aspects of the Earth and its atmosphere. It is necessary to protect this allocation from interference due to unwanted emissions from active services allocated in nearby bands. Studies within the ITU-R have shown that it may be theoretically feasible for MSS feeder link operations to restrict their emissions into the nearby 1400 – 1427 MHz band by using advanced modulation and filtering techniques to meet the protection criteria of the passive services in this band. This has not yet been demonstrated in practice and is in significant disagreement with current specifications for out-of-band emissions for the MSS contained in ITU-R Recommendations SM.1541 and M.1343. Studies have shown that it is unlikely that the required out-of-band attenuation levels can be met with the proposed MSS feeder link bands at 1390-1393 MHz and 1429-1432 MHz. It will be necessary to specify appropriate out-of-band power density limits in the Radio Regulations for the up-link stations if an allocation to the MSS is made near the 1400-1427 MHz band. Studies indicate that a maximum out-of-band attenuation level of 128 dB would be required. Significant out-of-band attenuation on the space-to-earth transmissions would also be required to protect all passive services in this band.

So far there is strong opposition to allocation of additional spectrum for MSS feeder links in this band. CEPT has issued a corresponding ECP.

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

“to consider additional allocations on a world-wide basis for the non-GSO MSS with service links operating below 1 GHz, in accordance with Resolution 214 (Rev.WRC-2000)”

This issue is 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. It can be expected that the issue will finally be removed from the agendas of future WRCs.

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

“to consider the additional allocations to the mobile-satellite service in the 1-3 GHz band, in accordance with Resolutions 226 (WRC-2000) and 227 (WRC-2000)”

This agenda item specifically has targeted the bands 1518 – 1525 MHz (downlink) and 1683 – 1690 MHz (uplink), but is open to examining other possibilities 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 have shown that MSS (Earth-to-space) cannot reasonably share with the Met-Sat or Met-Aids services. 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 hundreds of user stations for geostationary meteorological satellite systems as well as 1698 – 1710 MHz due to downlink of polar orbiting meteorological satellites to user stations and main Earth terminals. Therefore, any MSS allocation in the 1675-1710 MHz band was opposed.

An alternative band that may be feasible for sharing is 1670-1675 MHz. This band is presently licensed to the so-called TFTS, a system supporting telephone services between Earth stations and aeroplanes. The service has not been successfully implemented and it is foreseen to withdraw the license. The alternative band is considered suitable but does not fully satisfy the MSS requirement for 7 MHz. There are ongoing discussions whether 2 additional MHz could be found in the neighbourhood of the band.

The present text for the ITU Conference Preparatory Meeting (CPM) still includes 1683 – 1690 MHz but also supports 1670 – 1675 MHz.

CEPT favours 1670 – 1675 MHz but still maintains 1683 – 1690 MHz as a valid option.

In all scenarios it is clearly indicated that full protection is given to meteorological services in the band 1 – 3 GHz.

2.10 Agenda Item 1.38 (8.3) (Use of the band 420-470 MHz)

“to consider provision of up to 6 MHz of frequency spectrum to the Earth exploration-satellite service (active) in the frequency band 420-470 MHz, in accordance with Resolution 727 (Rev.WRC-2000)”

The need for such an allocation, at a radio spectrum wavelength of approximately one meter (P-band), is important because experiments have shown good correlation of backscatter radiation with biomass and soil moisture, which are parameters needed for forest monitoring. The need for such forest monitoring was emphasised at the United Nations Conference on Economic Development (UNCED) (Buenos Aires - 1992). Subsequent to UNCED 1992, studies have identified a minimum bandwidth requirement of 6 MHz to satisfy mission objectives.

Additional inputs in the ITU-R have identified this band as also being useful for studying Arctic and Antarctic ice. Studies indicate that lower power, lower sidelobe SAR designs will enhance the sharing situation in some areas of this frequency range.

There was only little support to this new allocation at earlier conferences, but during preparation of WRC-2003 this situation has changed in such a way that a secondary allocation in the band 432 – 438 MHz is supported by many administrations. It has been concluded that a secondary allocation would be sufficient to operate P-band SAR.

CEPT has drafted a corresponding ECP on this topic.

2.11 Agenda Item 7.2 (Possible Agenda Items for future conferences)

“to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, taking into account Resolution 801 (WRC-2000)”

One of the outputs of World Radio Conferences is to establish the agenda for the following WRC. WRC-2003 will therefore discuss and conclude on the WRC-2006 agenda. Already during WRC-2000 there were discussions on some topics, which could not be agreed for the WRC-2003 agenda but were provisionally listed for the agenda WRC-2006. Points of relevance for MetSat and EESS are as follows:

WRC-05/06 Agenda Item 2.3

“to review studies and consider allocations in the frequency bands above 275 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.

EUMETSAT has performed a study on the needs of EESS in the band 275 – 1000 GHz. The study was reviewed by other EESS organizations and was forwarded to CEPT (via the administration of France) and to ITU. The study shall serve as a starting point on the modifications to the Radio regulations and shall support the necessity to maintain the agenda point for WRC-2006.

This is presently supported by CEPT. Proposals from the US on this matter are also in preparation.

WRC-05/06 Agenda Item 2.7 and Agenda Item 2.13

“to consider potential for sharing at around 4 300 MHz between radio altimeters and space-based passive earth sensors”

“to review No. S5.332 in respect of the frequency band 1 215-1 260 MHz and No. S5.333 in respect of the frequency band 1 260-1 300 MHz, concerning the Earth exploration-satellite (active) service and other services”

The band 4200-4400 MHz is very important to monitor sea surface temperature continuously to study global warming. ITU-R studies have shown that sharing between the aeronautical radionavigation service and the EESS (passive) and the SRS (passive) is feasible in this band. Based on these positive study results, it is foreseen to request primary allocations to EESS (passive) and SRS (passive) in the band 4200 – 4400 MHz (footnote RR S5.438 may be consequentially suppressed).

Mission objectives for spaceborne SAR such as SIR-C, PALSAR, Light SAR, and TerraSAR which can observe Earth’s environment and disasters under all weather and day and night conditions need to be satisfied by new allocations for EESS (active) in the bands 1215 – 1260 MHz and 1260 – 1300 MHz.

So far there is only little support to maintain these items on the agenda for WRC-2006. CEPT

administrations have not expressed any positions on these items.

3 FUTURE PREPARATORY WORK PRIOR TO WRC-2003

The next major milestone in the preparation of WRC-2003 is the Conference Preparatory Meeting, which will be hosted by the ITU in Geneva from 18 November to 1 December 2002.

CEPT will continue their preparations by conducting Conference Preparatory Meetings (four more are planned). The group will finalise ECP's and will agree on briefing information for their members. CEPT is also conducting regular consultations with other regional organisations such as CITEL (America), APT (Asia/Pacific), and Arabic countries. Members of such organisations are participating in CPGs as observers and publish the progress of their preparations towards WRC-2006.

The Space Frequency Co-ordination Group (SFCG) will finalise its resolution: SFCG Objectives for WRCs at its annual meeting in October 2002 (Italy).

The WMO hosts a workshop on Radio Frequencies for Meteorology in October 2002 with the aim to help NMHSs in their co-ordination with their respective national radiocommunication authorities.