

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

The next World Radio Conference (WRC 2003) is scheduled to take place in May and June of the year 2003. The location of the Conference is not confirmed yet but candidate host cities are Caracas (Venezuela) and Geneva (Switzerland).

The World Radio Conference 2000 (WRC 2000) established the agenda for WRC 2003 and drafted a provisional agenda for WRC 2006. Several items of interest to the meteorological user community have been included into the agenda.

Preparations for the WRC 2003 are underway on many different levels including national, regional and global working groups (including CEPT, WMO, SFCG). Furthermore there are many activities in the framework of the International Telecommunication Union (ITU) to establish the technical baseline for the Conference. The main working parties of interest to the meteorological user community are working parties WP 7C, 7D, 7E and WP8D.

The technical baseline for WRC 2003 will be discussed and agreed at the Conference Preparatory Meeting (CPM) of the ITU, which is scheduled for November 2002. This meeting will take place in Geneva. It is therefore very important to submit technical inputs into the ITU working parties before summer 2002.

EUMETSAT participates in meetings of the CEPT and the Space Frequency Co-ordination Group to harmonise technical requirements with other users of the frequency spectrum. CEPT maintains co-ordination groups with other regional organisations such as CITELE and APT.

EUMETSAT is also actively supporting working parties and task groups of the ITU and the World Meteorological Organisation (WMO) by submission of input documents, studies and draft CPM text.

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2 AGENDA ITEM 1.13 - HAPS (HIGH ALTITUDE PLATFORM SYSTEMS) UPLINK EMISSIONS AROUND 31.3 GHZ

This agenda item considers regulatory provisions and possible identification of existing frequency allocations for services, which may be used by high altitude platform stations, taking into account S5.5RRR and the results of ITU-R studies in accordance with Resolutions 122 and 734 (COM5/14). Frequency bands between 18 and 32 GHz have already been of great interest to other services for several years.

The band 31.3 – 31.8 GHz and, in particular, the sub-band 31.3 – 31.5 GHz are used for passive sensor applications. A new fixed service system application, referred to as HAPS (High Altitude Platform System), plans an expansion of services to the band just below 31.3 GHz. A modification to Resolution 122 was adopted at WRC-2000 which requests the ITU-R to urgently conduct studies on the feasibility of identifying suitable frequencies focussing particularly on the band 31.0-31.3 GHz. In addition, a footnote S5.5RRR was adopted which allows already now the use of the band 31.0-31.3 GHz for HAPS in a number of Region 3 countries. However, this footnote states that HAPS systems shall not cause harmful interference to passive services in the band 31.3-31.8 GHz based on Recommendation SA.1029. It is also emphasised that the deployment of HAPS shall be limited to the subband 31.0-31.15 GHz until WRC-2003 reviews this item.

Planned Activity:

A first series of studies on out-of-band interference impact on passive sensing has been conducted by EUMETSAT and Japan to identify potential restrictions for the operation of HAPS systems. The study results need to be promoted in ITU-R and updates based on information from other working parties need to be carried out. In view of the sensitivity of this exclusively passive band, out-of-band emissions from potential HAPS stations are likely to exceed required protection levels. It is necessary to address the interference impact on current and future EESS passive sensing applications and establish protection measures to be forwarded via appropriate mechanisms to the ITU-R.

A careful maintenance of the studies submitted to Working Party 7C and Working Party 4-9S will be required, as assumptions have been made which indicate that actual operation of such systems will not be in compliance with the currently assumed system characteristics. This has also happened in the past with other services, where operational systems caused orders of magnitude more interference than established through ITU-R studies. It may be necessary to oppose the use of this band by HAPS or at least restrict the operating conditions. Contributions to Working Party 7C, 9D and 4-9S, which has been assigned the lead for preparation of CPM text regarding agenda item 1.13 for WRC-2003, need to be prepared as well as monitored.

The detailed assessment of interference will require a computer simulation model as analytical models allow only a worst case assessment with an approximation for the probability of the worst case. It is nearly impossible to assess the interference situation with respect to the specified ITU-R protection criteria without a simulation model.

It is therefore foreseen to extent the capability of already existing simulation programs within ESA and EUMETSAT to include passive sensors applications.

This activity includes support of CEPT FM34, PT3 and CPG meetings for presentation of studies and drafting of a favourable CEPT position.

Status of Activity:

On behalf of EUMETSAT, several study contributions were submitted to ITU-R Working Parties 7C and 4-9S. These contributions demonstrated that restrictions on HAPS operations would be required in order to protect passive sensor operations. Japan submitted also studies which showed that the required protection levels can be met by careful design of RF equipment and some limitations on HAPS operations. Draft CPM text has been agreed at WP7C and WP4-9S levels which proposes currently a stringent out-of-band power density limitation on HAPS transmitters in compliance with passive sensor protection requirements. The situation was also discussed at CEPT-FM34 where favourable text was agreed for the European position in the interest of passive sensors.

The situation looks favourable at the moment but it is not unlikely that HAPS operators submit further studies to ITU-R demonstrating that the specified percentage of time in ITU-R Recommendation SA.1029 would allow much higher power density levels. In order to counteract such an attempt to relax the current specifications, it is still very advisable to proceed with the planned modifications to existing RFI assessment software in order to include passive sensors.

3 AGENDA ITEM 1.16 - NEW MSS FEEDER LINK ALLOCATIONS IN BANDS NEAR 1400-1427 MHZ

Agenda Item 1.16 considers allocations on a world-wide basis for feeder links in the 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 provided that due recognition is given to passive services taking into account S5.340.

WRC-2000 adopted a modification to Resolution 127, which addresses studies in support of an allocation to the Mobile Satellite Service in bands near 1.4 GHz. This resolution requests the ITU-R to continue studies and to carry out additional tests and demonstrations to validate these studies with respect to facilitating sharing in portions of the band 1390-1393 MHz between existing and currently planned services and feeder links (Earth-to-space) for non-GSO mobile satellite service systems with service links below 1 GHz. The same studies and validations are also called for the related downlink bands foreseen for the sub-band 1429-1432 MHz.

Planned Activity:

Several preliminary studies from various administrations and organisations are already available. These studies need to be reviewed and revised in time for drafting relevant CPM report text. The detailed assessment of interference will require a computer simulation model as analytical models allow only a worst case assessment with an approximation for the probability of the worst case. It is nearly impossible to assess the interference situation with respect to the specified ITU-R protection criteria without a simulation model. With the same objective as given for A.I. 1.13, it is required to extend the capability of already existing simulation programs within ESA and EUMETSAT to include passive sensors applications.

This activity includes support of CEPT FM28, PT2 and CPG meetings for presentation of studies and drafting of a favourable CEPT position.

Status of Activity:

Several studies have been submitted to Working Party 7C, and then to Working Party 8D via a liaison statement from WP7C. These studies concluded that use of the band 1390-1393 MHz for MSS uplinks would require an out-of-band emission attenuation of up to 128 dB. An earlier study conducted within WP 8D concluded that up to 114 dB attenuation would be required in the worst case. Such high levels, even though theoretically feasible, would in practice be nearly impossible to achieve. It is evident that this required attenuation is quite a burden on the MSS systems, which raises the question, whether use of the band 1390-1393 MHz would be practical. The situation for the proposed MSS feeder downlink band 1 429-1 432 MHz is less constraining, but these out-of-band emission levels also go beyond any usual specifications for out-of-band attenuation.

An important issue is also the secondary allocation to EESS (passive) in the band 1 370-1 400 MHz. Whilst use of this band is currently feasible even under a secondary allocation, this would not be possible any longer if a primary allocation to the MSS would be made.

WP8D is the lead working party for CPM text and preliminary elements were already agreed during the WP8D meeting in May 2001 based on a proposal drafted in WP7C. This text forms the basis for a liaison statement from WP8D to WP7C to be discussed at the next WP7C meeting in spring 2002. In summary, the situation looks rather favourable in the interest of passive sensors.

4 AGENDA ITEM 1.31 – ADDITIONAL MSS ALLOCATIONS IN THE RANGE 1-3 GHZ

This agenda item considers additional allocations to the MSS in the range 1-3 GHz in accordance with Resolutions 226 (COM5/29) and 227 (COM5/30). WRC-2000 decided to continue sharing studies between the Mobile Satellite Service and the Meteorological Satellite Service in the frame of the new Resolution 227. This time, the bandwidth under consideration has been narrowed from 1675-1710 MHz to the band 1683-1690 MHz accepting the results of earlier ITU-R studies that sharing in the other bands was not feasible.

Of particular interest are the identification of new coordination parameters for GVAR and S-VISSR stations as well as a review of existing separation distances in view of modifications adopted for Appendix S7. This will necessitate careful monitoring of this issue in all relevant ITU-R Working Parties and CEPT preparatory groups. The Mobile Satellite Service has already a primary allocation in Region 2 and attempts will be made again to obtain a primary allocation worldwide in parts of the band 1675 – 1710 MHz.

The problem of adjacent interference to user stations operating in the band 1690-1698 needs to be addressed as well.

Planned Activity:

Appropriate documents for ITU-R and CEPT need to be prepared which will justify the continued use of this band by the meteorological satellite service and insist on the conclusions regarding the sharing potential in line with currently established ITU-R recommendations, in particular SA.1158-2. Protection requirements need to be defended and the sharing feasibility has to be reviewed in the interest of the meteorological community. Contributions should be based on current and future use of this band by EUMETSAT and other agencies or administrations, worldwide.

ITU-R recommendation SA.1158 has established separation distances based on signal diffraction. Whilst this is sufficient in most cases, it cannot be excluded that larger separation distances are required under certain circumstances. A study on layer ducting and troposcatter effects should therefore be conducted in order to verify any potential impact on increased separation distances between mobile satellite terminals and meteorological earth stations in the band 1683–1690 MHz. The corresponding results should be forwarded to the ITU-R with a proposal to update recommendation SA.1158.

Of additional significance is adjacent band interference from transmitting mobile terminals in the band below 1690 MHz next to a sensitive receiving user station just above 1690 MHz. A guard band needs to be established to protect user stations worldwide. Ideas have also been noticed to consider bands in the vicinity of 1675-1690 MHz, such as the band 1670-1675 MHz. Such proposals should be actively supported.

Status of Activity:

Study contributions were prepared and submitted to ITU-R working parties 7C and 8D. These studies showed that, based on the modifications to Appendix S7, much wider separation distances than previously established would be required between transmitting MSS terminals and receiving meteorological earth stations. In addition, studies for the GVAR and S-VISSR stations demonstrated, that due to the large number of stations, sharing would be unpractical in Regions 2 and 3. Unfortunately, this conclusion cannot be justified for Region 1, including Europe.

On behalf of EUMETSAT and WMO, modifications were also proposed regarding ITU-R recommendation SA.1158 to include layer ducting and troposcatter effects. The underlying studies are the basis for the significantly wider separation distances. The problem of guard bands near 1690 Mhz has also been adressed and presented at the relevant ITU-R working parties.

The new partition of the band 1670 – 1710 MHz as agreed by CGMS XXVIII has been included into the new draft resolution SA.1158.

Despite very good preparations at WP7C, the proposed text to WP8D for the CPM report was not accepted and significantly changed by WP8D. The current CPM text cannot be considered satisfactory and steps are required to better represent the interest of the meteorological community. One of the key events will be the WP8D meeting in spring 2002 where an additional series of studies together with a good representation of meteorological representatives is proposed.

During CEPT meetings EUMETSAT proposed to restrict potential new MSS allocations in the band 1670 – 1710 MHz to the lower sub-band between 1670 and 1675 MHz. This band was planned to be used by the public telephone system TPTS. This system has not been successfully implemented and it is considered to stop implementation. In this case spectrum could be made available to MSS.

5 AGENDA ITEM 1.20 : METEOROLOGICAL SATELLITE SERVICE IN THE BANDS 401 – 403 MHZ AND 7/8 GHZ

There are still activities from MSS to achieve primary allocations in a part of the frequency band 401 – 406 MHz as defined in the revised ITU Resolution 214. Although presently there are no plans to have such allocation in the 401 – 403 MHz subband it is necessary to carefully watch inputs to the ITU and especially into the preparatory work for WRC 2003.

The allocations for MetSat around 7/8 GHz will be used for transmissions from geostationary and polar orbiting meteorological satellites. The two allocations have a footnote limiting the use to either of the two satellite types. In the band allocated to polar orbiting satellites (non-geostationary) there are several plans for transmissions which have to be carefully coordinated.

Proposed Activity

Monitor developments and plans in the use of the bands 401 – 403 MHz and around 7/8 GHz allocated to the Meteorological Satellite Service. Monitor proposals to allocate spectrum for MSS in the bands.

6 OTHER ACTIVITIES

These activities are not directly covered by WRC 2003 agenda items but are still vital for present and future operations of meteorological services.

6.1 Allocations to EESS above 275 GHz

Recent WRCs have improved EESS allocations in the bands 50 – 71 GHz and 71 GHz to 275 GHz. A first attempt to put allocations above 275 GHz on the agenda of WRC 2003 failed. It was argued that active services are presently not able to identify bands for their operations and don't want to be restricted by allocations for EESS (passive) at a later time. A provisional item was put on the inputs for future WRCs. So far EESS bands are identified in FN S5.565 of the RR which was updated at WRC 2000.

Proposed activity

Studies are required to identify bands for future measurements of EESS passive. The studies have to identify bandwidth and protection requirements, and should give an indication on the possibility to share the band. It is necessary to indicate which type of measurements is planned in the future.

EUMETSAT is in process of preparing a study on this topic. The output is expected to be available early 2002.

After completion of studies it will be necessary to promote study results with administrations in Europe and via SFCG. It will be necessary to find support to include this topic into the agenda of WRC 2006.

6.2 Sharing conditions of EESS (passive) below 40 GHz

Several important frequency bands used for operational measurements below 40 GHz are not sufficiently protected.

6.2.1 4.2 – 4.4 GHz

The band 4.2 – 4.4 GHz has a secondary allocation. Question ITU-R 229/7 addresses sharing conditions in this band. Agenda point 2.7 (WRC-2006) is addressing this issue.

6.2.2 10.6 – 10.68 GHz

This band is essential for measurements of land and sea surface temperatures, soil moisture, wind intensity and precipitation over sea in combination with other windows between 1 and 40 GHz. The allocation is co-primary with FIXED, MOBILE, Radioastronomy and Space Research. Limits on transmission characteristics are contained in FN S5.482. More than 30 countries do not apply these values. No relevant sharing studies exist in this band.

6.2.3 31.5 – 31.8 GHz

The band 31.5 to 31.8 GHz is allocated on a primary basis to EESS (passive). The band is also allocated on a secondary basis to the FIXED and MOBILE services in ITU Regions 1 and 3 with S5.546 listing some (20) countries in Region 1 which have a primary allocation for FIXED and MOBILE services.

Proposed Activity

A new question was agreed by WP 7C about sharing conditions in the bands 10.6 to 10.68 GHz and 31.5 to 31.8 GHz. Together with existing questions it has to be expected that activities be started. It will be necessary to prepare sharing studies for the above listed bands and to process these studies through ITU WPs and Study Groups.

Eventual requests for modifications of RR Art S5 would require preparatory work in CEPT, SFCG. Furthermore it would be necessary to promote activities with administrations and the get support.

EUMETSAT will support studies on this subject in 2002.

6.3 Interference from Ultra Wide Band (UWB) systems

UWB technology is being heavily promoted in the US and similar activities are expected to take place elsewhere in the near future. The principles on which the UWB is based relate strongly to those used by spark-gap transmitters as used in the earliest days of radio. The UWB transmit sparks of an extremely short duration but using an extremely broad frequency band. UWB claims that, due to the short duration they would not interfere with other transmissions in the frequency bands covered by the spark. This is questionable and careful monitoring of the implementation is required.

Presently UWB implementations are planned in lower parts of the spectrum, but extending up to a few tens of GHz. UWB systems target very high density applications.

The major threat of the new service is that no regulatory steps are planned, i.e. no registration with ITU will be required.

Preliminary studies have shown that these systems may have very negative impact on sensors integrating their measurements over large bandwidth.

Proposed Activity

Monitor closely activities related to the implementation of UWB. Follow studies on this subject and activities raised by other users (GPS etc) in accordance with this new service.