

## **RADIO FREQUENCY MATTERS**

*(Submitted by WMO)*

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### **Summary and purpose of document**

This working paper provides guidance and background information to WMO Members on issues for the next World Radiocommunication Conference - WRC-2003.

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### **ACTION PROPOSED**

The meeting is invited to consider the information provided with regard to frequency bands used by meteorological satellites, in particular the Meteorological Satellite Service (MetSat) and Earth Exploration Satellite Service (EESS).

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## DISCUSSION

### GUIDANCE AND BACKGROUND INFORMATION ON WORLD RADIOCOMMUNICATION CONFERENCE 2003 ISSUES

#### 1. Possible frequency allocation to the Mobile-Satellite Service in portion of the 1670-1690 MHz band.

1.1 The 1670-1710 MHz band is an essential band for the operation of the Meteorological Aids (i.e. radiosondes) and the Meteorological Satellite (MetSat) Services. Possible allocations to the Mobile Satellite Service (MSS) in the band 1675-1710 MHz were considered by World Radiocommunication Conferences in 1995 (WRC-95), in 1997 (WRC-97) and in 2000 (WRC-2000). After considerable discussions with an active involvement of WMO, no changes were adopted to the present allocations, but WRC-2000 adopted Resolution 227 that requests ITU-R to assess, with the participation of WMO, the current and future spectrum requirements of the MetAids service and of the MetSat service in the band 1683-1690 MHz, with a view to a possible allocation to the MSS (Earth-to-space). It also calls for sharing studies to recommend alternative MSS (Earth-to-space) frequency bands in the 1-3 GHz range, should the band 1 683-1 690 MHz prove unsuitable.

1.2 The agenda of WRC-2003 (item 1.31) includes consideration of the possible allocations of portions of the 1670-1690 MHz bands to the MSS.

#### ***Meteorological Aids Service (MetAids)***

1.3 The band 1 670-1 690 MHz is allocated to the meteorological aids (MetAids) service as a primary service and is used for civilian and other meteorological radiosonde operations in many countries. Radiosonde observations in the atmosphere are vital for operational meteorology (weather analysis, warnings, forecasts, climate monitoring and satellite calibration and validation), coordinated in the framework of the World Weather Watch Programme of WMO. Radiosonde observations not only benefit the country that made the observation, but also a large number of other countries for medium and long-term weather forecasting.

1.4 Sharing studies indicate that co-channel sharing between MSS systems and Meteorological Aids operated in the band 1 670 - 1 690 MHz is not feasible. MetAids operations are planned to be concentrated in the sub-band 1 675-1 683 MHz. Some National Meteorological Services would continue to need the sub-band 1 670–1 683 MHz for the foreseeable future.

#### ***Meteorological Satellite Service (MetSat)***

1.5 The band 1 670-1 690 MHz is allocated to the meteorological-satellite (MetSat) service as a primary service and is used for geostationary meteorological satellites. Meteorological satellites are vital for operational meteorology (weather analysis, warnings and forecasts) in the framework of the World Weather Watch Programme of WMO, as well as for meteorological, climatological and research programmes. Observations, soundings and derived meteorological products from the system of meteorological satellites benefit all countries for a wide range of applications, including safety of life and property. In the future, the volume of data generated by enhanced space-borne systems to be transmitted to the MetSat earth station(s) will continue to increase. This increase should be accommodated in 1 675-1 690 MHz part of the band.

1.6 Sharing between MetSat and MSS earth stations would only be feasible if a typical separation distance of 70 to 105 km and up to 400 km in some cases are kept at all times. Due to the large number of MetSat earth stations, in particular GVAR (GOES Variable) or S-VISSR (Stretched - Visible and Infrared Spin Scan Radiometry) satellite earth stations in ITU Regions 2 (the Americas) and 3 (Asia & South Pacific), possible MSS operation would not be feasible on a

global basis in the range 1 683-1 690 MHz. On the other hand, there are relatively few main MetSat earth stations deployed in all three ITU Regions operating in the 1670-1683 MHz portion; sharing with MSS would be feasible in the 1670-1675 MHz, subject to acceptance of exclusion zones around these main Earth stations.

### ***Conclusions***

1.7 Future meteorological systems (MetAids and Met-Sat) operations will continue to require the entire portion of the band 1 675-1 690 MHz for providing vital services to a wide range of applications, including safety of life and property, not providing any commonly available spectrum for sharing with the MSS.

1.8 However, sharing possibilities with the MSS exist in the sub-band 1 670–1 675 MHz enabling a global allocation, provided that exclusion zones are ensured around the small number of main MetSat Earth stations, and that national MetAids operations continuing to use the sub-band 1 670–1 675 MHz be protected. Furthermore, the present allocation of 1675 - 1710 MHz to the Mobile Satellite Service in ITU Region 2 decided by WARC 92 (prior to any study) should be cancelled.

## **2. Frequency allocation to the Mobile-Satellite Service below 1 GHz**

2.1 WRC-2000 acknowledged meteorological requirements in the band 401-406 MHz for meteorological aids (radiosondes) and meteorological satellite operation for the foreseeable future. Resolution 219 (WRC-97), which requested the assessment of meteorological requirements in the band 401 - 406 MHz and the possible transition out of the band 405 - 406 MHz, was suppressed. This decision was an important achievement for meteorological operations, concluding a tough debate since 1992.

2.2 The issue may theoretically, however, be reconsidered by WRC-2003 under Resolution 214 (WRC-2000) and agenda item 1.20, which address frequency allocation for MSS below 1 GHz. There has not been any further study nor proposal on this issue.

### ***Conclusions***

2.3 Any new allocation in the band 401 - 406 MHz would damage meteorological operations and is not feasible.

## **3. Frequency allocations for space-borne passive remote sensing**

3.1 WRC-2000 re-organized the allocations to space-borne passive remote sensing in the Earth Exploration-Satellite (passive) and Space Research (passive) services in the frequency range 71-275 GHz were to meet present and foreseeable future requirements, taking into account technological and scientific advances. These decisions complement those taken by WRC-97 in the frequency range 50-71 GHz.

3.2 The various bands allocated are needed to meet present and foreseeable future requirements for a myriad of Earth observation applications including agriculture, climatology, meteorology and study of global change of the Earth and its environment. These include measurements of atmospheric parameters including temperature and water vapour profiles, ozone concentration, and other radiatively and chemically active trace gases, which can only be met by satellite passive sensors.

3.3 The allocations to space-borne passive sensing include protection of space-borne passive sensors, which are extremely sensitive to interference, with in many cases exclusive allocations. Several WRC-2003 agenda items (1.8.2, 1.13, 1.16) involve Earth Exploration-Satellite (passive) and Space Research (passive) services allocations. The adequate measures regarding the

protection of passive services from unwanted emissions from active radiocommunication services should be kept under continuous review (agenda item 1.8.2).

### ***Conclusions***

3.4 The utmost importance should be attached to safeguarding the adequate protection of spaceborne passive sensing (Earth Exploration-Satellite and Space Research services) that has an essential impact on the development of meteorology.

## **4. Frequency allocations for meteorological radars**

4.1 Under Agenda item 7.2, WRC-03 is requested to recommend items for inclusion in the next WRC (2005/2006) agenda. Potential items included consideration of the feasibility of sharing of the band 2 700-2 900 MHz, which is worldwide allocated to meteorological radars, with the Mobile Service for IMT-2000 operation (third generation of mobile phones). ITU-R studies showed incompatibility between IMT-2000 operation and meteorological radar operations. Meteorological radars have a crucial importance, in particular for forecasting and warning heavy rain and floods.

### ***Conclusions***

4.2 The band 2 700-2 900 MHz should be safeguarded for sustainable meteorological radar operation. An allocation to IMT-2000 in the band 2 700-2 900 MHz would damage meteorological radar operations. Therefore, consideration of potential sharing of the band with the Mobile Service (for IMT-2000 operation) should be deleted from the WRC-05/06 agenda.

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