

United States of America

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.5: to consider spectrum requirements and possible additional spectrum allocations for aeronautical telecommand and high bit-rate aeronautical telemetry, in accordance with Resolution **230 (WRC-03)**;

Background Information: This agenda item seeks to address a growing demand for spectrum that is allocated for wideband aeronautical telemetry and associated telecommand. There is a large and growing shortfall in spectrum that is necessary to conduct aeronautical telemetry. The shortfall is exacerbated by the loss of telemetry spectrum diverted to other than telemetry applications. As indicated in the responses to ITU-R Question 231/8, additional spectrum is necessary due to rapidly increasing data rates associated with the testing of new and emerging technologies. For example, newer technologies rely increasingly on high-resolution video for monitoring aircraft functions or increased use of computer based aircraft systems. Without access to additional spectrum, aeronautical development would be subject to escalating delays and costs, and the growth of the aerospace industry would be impaired (including equipment manufacturers, civilian programs and test ranges, and airlines). New worldwide telemetry spectrum will aid numerous countries and the international aeronautical community as administrations continue to support their national airlines and some administrations initiate their own test programs. Existing international allocations used for aeronautical telemetry will need to remain available.

Aeronautical mobile telemetry (“AMT”) is an application within the mobile service. Depending on the extent to which new AMT spectrum requirements can be fulfilled using Primary Mobile Service allocations, it is important that the suitability of additional spectrum for AMT be studied (“suitable” as defined below). International recognition of bands suitable for AMT will not only encourage international harmonization of test equipment, but also provide assurance to Administrations that, based on technical studies conducted in the ITU-R, implementation of wideband telemetry systems can be accomplished by those Administrations wishing to do so without disrupting other services using the bands. This will also enable manufacturers to offer prospective customers aircraft with common test equipment packages, and thus help airlines achieve additional economies in the aircraft life-cycle cost. Moreover, by establishing conditions under which AMT use of a band would be suitable, incumbent users of the spectrum can be assured that they will not experience unacceptable interference, and manufacturers and test ranges will have a measure of additional certainty for the substantial investment in range infrastructure that will be incurred in equipping aircraft to use new bands deemed suitable for AMT.

The need for additional spectrum has been studied by several administrations. The requirement may differ depending on national and regional needs. It is not necessary to fulfil all AMT requirements in only one band. The U.S. requires an additional 650 MHz of spectrum for aeronautical flight test telemetry. The new requirements for aeronautical telemetry are only in the air-to-ground direction inasmuch as telecommand functions (i.e., ground-to-air transmissions) can be accommodated in other bands used for telemetry. In addition, this new AMT spectrum will not be used for the protection of life and property. The latter AMT applications will continue to be accommodated in other bands used for telemetry (see Nos. **5.342**, **5.343**, and **5.394** in the Radio Regulations). Hence, aeronautical mobile telemetry applications in new spectrum will not require the level of protection associated with operations in other telemetry bands.

ITU-R WP 8B conducted numerous studies of bands that could be used to satisfy the requirements of wideband aeronautical telemetry applications. Several bands were studied for suitability to implement AMT given the other co-primary services in the band. These are the 4 400-4 940, 5 925-6 700, and 5 091-5 150 MHz bands. It is expected that the implementation of wideband telemetry may require avoiding co-frequency operations with other co-primary services that utilize these bands in the same geographic area. This will likely mean that the spectrum requirement for AMT would be satisfied using portions of each of the bands studied and considered to be suitable for AMT implementation. Suitable means, in this context, that AMT can be implemented compatibly with other co-primary services utilizing the band, assuming the implementation is in accordance with the criteria set forth in the resolutions attached.

The ITU-R studies have demonstrated that aeronautical mobile telemetry for flight test purposes can be implemented in these bands without adversely affecting the operation of existing systems and allocated services. However, the ability to implement AMT in some areas and in some portions of the bands may be restricted based on deployment intensity of other co-primary service stations that are ground-based, such as the Fixed Service (FS) stations, in the same vicinity. Application of frequency coordination will ensure that AMT is implemented such that other services and systems are not negatively impacted. The studies also show that there would not be undue constraints placed on future deployment of systems in the co-allocated services, provided applications are limited to flight testing conducted in specific geographic areas.

In cases where AMT operations are in radio LOS of Radio Astronomy observatories as could be determined using a 500 km coordination distance, it may be possible to arrange AMT time-sharing with those observatories to enable AMT use of the 4825-4835 MHz band.

Rather than the more aggressive approach of “designating” or “identifying” bands for AMT on a global basis, which could lead to a perception that other services in the bands may have a lesser status, the approach for regulatory accommodation of AMT has been to simply determine the suitability of certain bands for the implementation of AMT based on compatibility studies. This approach was in part based on the realization that the necessary AMT operational or implementation constraints will influence decisions on AMT implementation in each administration. Since the conditions under which AMT could be implemented can vary by administration, the approach maximizes the flexibility of implementing AMT.

Any authorization of AMT operations within these bands would be decided by individual administrations, and would be specifically limited to testing of aircraft at designated flight test areas in the air-to-ground direction within those individual countries. According to No. **5.444** of the Radio Regulations, the 5 091-5 150 MHz band is to be used by the MLS (Microwave Landing System) with precedence given to this international standard system. However, the band 5 091-5 150 MHz is not yet in use by MLS.

The 5 091-5 150 MHz band is already allocated to the Aeronautical radio navigation service (ARNS) on a primary basis in all Regions and is also allocated to the fixed-satellite service (FSS) (Earth-to-space) on a primary basis. This FSS allocation is limited to feeder links of non-geostationary mobile-satellite systems in the mobile-satellite service and is subject to coordination under No. **9.11A**. Test aircraft are not intended to use ground-to-air transmissions in this ARNS band. WP 8B is also considering the band 5 091-5 150 MHz under agenda item 1.6 for the purpose possible allocation to the aeronautical mobile (R) service.

Proposal

USA/ /01 ADD

5.XXX The bands 4 400-4 940 MHz and 5 925 - 6 700 MHz are suitable for the implementation of aeronautical mobile telemetry applications for flight test transmissions by aircraft stations to aeronautical stations. Any such use does not preclude the use of these bands by other mobile service applications or by other services to which these bands are allocated on a co-primary basis and does not establish priority in the Radio Regulations. Resolution **XXX (WRC-07)** shall apply. (WRC-07)

Reasons: A footnote as above could be used to satisfy a portion of the 650 MHz spectrum requirement. The advantage of having such a footnote is it merely states that the bands are suitable and that, via the provisions of Resolution XXX, AMT for flight test could share spectrum without causing undue constraints on other co-primary services in the band(s). Furthermore, a finding that spectrum is suitable for AMT implementation inherently would not preclude use of the bands by other co-primary services. Resolution **XXX (WRC-07)**, to be finalized upon receipt of WP9D's response to a WP8B liaison statement, will outline the sharing conditions in the band(s).

USA/ /02 ADD

5.ZZZ The band 5 091-5 150 MHz band is also allocated to the aeronautical mobile service and is limited to flight test telemetry transmissions by aircraft stations to aeronautical stations. This does not preclude the use of this band by other services to which this band is allocated on a co-primary basis and does not establish priority in the Radio Regulations. Resolution **ZZZ (WRC-07)** shall apply. (WRC-07)

Reasons: This allocation is necessary for implementation of AMT in the band 5 091-5 150 MHz. The footnote will ensure that the new allocation to AMS is limited to air-to-ground flight test telemetry only. Resolution **ZZZ (WRC-07)**, to be finalized, will outline the sharing conditions in the band.

USA/ /03 MOD

5.442 In the band ~~bands 4 825—4 835 MHz and~~ 4 950-4 990 MHz, the allocation to the mobile service is restricted to the mobile, except aeronautical mobile, service. In the band 4 825 – 4 835 MHz applications in the aeronautical mobile service are limited to flight test telemetry transmissions by aircraft stations to aeronautical stations, and Resolution XXX (WRC-07) shall apply.

Reasons: This modification to No. **5.442** exempts AMT from the aeronautical mobile exclusion, consistent with compatibility studies, and the Resolution specifies an appropriate coordination trigger.

USA/ /04 MOD

2 700-4 800 MHz

| Allocation to services | | |
|------------------------|--|----------|
| Region 1 | Region 2 | Region 3 |
| | | |
| 4 400-4 500 | FIXED MOBILE <u>ADD 5.XXX</u> | |
| 4 500-4 800 | FIXED FIXED-SATELLITE (space-to-Earth) 5.441 MOBILE <u>ADD 5.XXX</u> | |
| | | |

4 800-5 570 MHz

| Allocation to services | | |
|------------------------|---|----------|
| Region 1 | Region 2 | Region 3 |
| | | |
| 4 800-4 990 | FIXED MOBILE <u>MOD 5.442</u> <u>ADD 5.XXX</u> Radio astronomy 5.149 5.339 5.443 | |
| 5 030-5 150 | AERONAUTICAL RADIONAVIGATION 5.367 5.444 5.444A <u>ADD 5.ZZZ</u> | |
| | | |

5 570-7 250 MHz

| Allocation to services | | |
|------------------------|---|----------|
| Region 1 | Region 2 | Region 3 |
| | | |
| 5 925-6 700 | FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B MOBILE <u>ADD 5.XXX</u> 5.149 5.440 5.458 | |
| | | |

Reasons: The appropriate modifications to the table of allocations have been made to reflect proposals 1 through 3.

RESOLUTION XXX (WRC-07)

Use of the bands 4 400-4 940 MHz and 5 925-6 700 MHz by an Aeronautical Mobile Telemetry (AMT) application in the mobile service

The World Radiocommunication Conference (Geneva, 2007),

considering

- a) that studies have been conducted within the ITU-R concerning the compatibility of aeronautical mobile telemetry for flight testing with other services in the bands 4 400 - 4 940 and 5 925 – 6 700 MHz;
- b) that studies have shown that the bands 4 400 – 4 940 and 5 925 – 6 700 MHz are suitable for implementation of AMT when the criteria in resolves 2 are used in the implementation;
- c) that spectrum efficiency is enhanced in situations where new applications can be implemented compatibly in bands that are heavily occupied;
- d) that AMT applications for flight testing present unique and well-defined operating parameters;
- e) that depending on frequency usage by other systems and services in the vicinity of flight test ranges, coordination may reveal that some portions of the bands 4 400 – 4 940 and 5 925 - 6 700 MHz may not be available for AMT or may be restricted with respect to AMT use,

recognizing

- a) the bands 4 400 - 4 500 MHz and 4 800 - 4 940 MHz are allocated to the fixed and mobile services on a primary basis, and for the band 4825-4835 MHz No. **5.442** applies;
- b) the band 4 500 - 4 800 MHz is allocated to the fixed, fixed-satellite (space-to-Earth), and mobile services on a co-primary basis;
- c) the band 5 925 - 6 700 MHz is allocated to the fixed, fixed-satellite (Earth-to-space), and mobile services on a co-primary basis;

d) that under No. 5.441, the use of the bands 4 500 - 4 800 MHz (space-to-Earth) by the fixed satellite service shall be in accordance with the provisions of Appendix 30B;

noting

a) that the criteria used and assumptions made in sharing studies between aeronautical mobile telemetry flight test applications and other co-primary services should not be considered applicable to other sharing situations,

resolves

1 that administrations take into account that AMT applications for flight test purposes can be implemented in the bands 4 400 – 4 940 MHz and 5 925 – 6 700 MHz ;

2 that administrations shall coordinate use of the band 4 825 – 4 835 MHz for AMT applications for flight test purposes with authorities of any Radio Astronomy observatories;

3 that administrations shall coordinate any proposed frequency assignments for AMT use with frequency assignments of earth stations in the fixed satellite service and stations in the fixed and mobile services;

4 that administrations choosing to implement aeronautical mobile telemetry for flight test purposes shall utilize the criteria set forth below:

- transmissions limited to those from an aircraft station to an aeronautical station (that is, in the air-to-ground direction);
- the peak e.i.r.p. density shall not exceed -2.2 dBW/MHz;
- transmissions limited to designated flight test areas, where flight test areas are airspace designated by Administrations for flight testing within their territories;

RESOLUTION ZZZ (WRC-07)

Use of the band 5 091- 5 150 MHz by the aeronautical mobile service for the implementation of aeronautical mobile telemetry applications

The World Radiocommunication Conference (Geneva, 2007),

considering

- a) the current allocation of the frequency band 5 030-5 150 MHz to the aeronautical radionavigation service;
- b) the current allocation of the 5 091 - 5 150 MHz band to the fixed-satellite (FSS) (Earth-to-space), which is limited to feeder links of non-geostationary satellite (non-GSO) systems in the mobile-satellite service (MSS)) services;
- c) the band 5 000-5 150 MHz is also allocated to the aeronautical mobile-satellite (R) service on a primary basis, subject to agreement obtained under No. 9.21;
- d) that this conference has allocated the 5 091-5 150 MHz band for the aeronautical mobile service (AMS) limited to air-to-ground flight test telemetry applications,

recognizing

- a) that spectrum efficiency is enhanced in situations where new applications can be implemented compatibly in heavily occupied bands;
- b) that studies have been conducted within the ITU-R concerning the compatibility of aeronautical mobile telemetry (AMT) for flight testing with other services in the band 5 091-5 150 MHz;
- c) that precedence is to be given to the microwave landing system (MLS) in accordance with No. 5.444 in the frequency band 5 030-5 150 MHz,

noting

- a) that ITU-R Report [5GHz] describes methods for ensuring compatibility between the AMS and FSS operating in the band 5 091-5 150 MHz;

b) that the requirements for protection of MLS from AMS are contained in Recommendation [MLS-AMS],

resolves

1 that administrations take account that the band 5 091-5 150 MHz has been allocated to AMS limited to implementation of aeronautical mobile telemetry applications for flight test purposes based on the ITU studies referred to in *noting a) and b)* above;

2 that administrations shall coordinate AMT frequency use with earth stations in the fixed satellite (Earth-to-space) service;

3 that administrations shall coordinate AMT frequency use with Microwave Landing Systems located with the coordination distance determined in Annex A [INSERT AS ANNEX A THE COORDINATION DISTANCE DEVELOPED IN WP 8B];

4 that administrations choosing to implement aeronautical mobile telemetry for flight test purposes in the band 5 091-5 150 MHz shall utilize the criteria set forth below:

- transmissions limited to those from an aircraft station only (that is, transmissions in the air-to-ground direction);
- transmissions limited to designated flight test areas, where flight test areas are airspace designated by Administrations for flight test within their territories;
-