
APPENDIX A
**AMENDMENTS TO THE ICAO POSITION ON WRC-2003
AGENDA ITEMS 1.4, 1.11, 1.15, 1.28 AND 7.2**

Proposed changes to the ICAO position on WRC-2003 agenda items 1.4, 1.11, 1.15, 1.28 and 7.2 (Attachment to State Letter E 3/5-01/79 refers) are shown below in redline/strikeout format.

WRC-2003 — Agenda Item 1.4

Agenda Item Title: To consider the results of studies related to Resolution 114 (WRC-95), dealing with the use of the band 5 091 - 5 150 MHz by the fixed-satellite service (Earth-to-space) (limited to non-GSO MSS feeder links), and review the allocations to the aeronautical radionavigation service and the fixed-satellite service in the band 5 091 - 5 150 MHz

Discussion:

Resolution 114 (WRC-95) calls, *inter alia*, for a review of allocations to both the aeronautical radionavigation service and the fixed-satellite service (FSS) in this band. ICAO is specifically invited to further review the detailed spectrum requirements and planning for international standard aeronautical radionavigation systems in the band. This band is reserved to meet requirements for MLS assignments which can not be satisfied in the band 5 030 - 5 091 MHz. In accordance with S5.444, MLS has precedence over other uses in the band 5 030 - 5 150 MHz.

Footnote S5.444A permits use of the band 5 091 - 5 150 MHz by the fixed-satellite service on a primary basis until 1 January 2010, subject to the requirements of S5.444 to protect MLS assignments and to not causing interference to the aeronautical radionavigation service. After 1 January 2010, the fixed satellite service is expected to revert to a secondary status. Sharing between the two services in this band is not feasible. ITU-R Recommendation S.1342 specifies the separation distance required to protect MLS services in the band 5 030 - 5 091 MHz from FSS use in this band.

Within the framework of the current ICAO strategy for introduction and application of non-visual aids to approach and landing (Annex 10, Vol. I, Attachment B refers), alternative GNSS technology for precision approach is under development and feasibility studies on GNSS support of Category II/III operations are under way. It is not known with certainty at present when this GNSS capability will be implemented, or when a transition to GNSS could be completed. There are also limitations and potential problems with the continued use of ILS which could require the implementation of an alternative system before a GNSS all-weather operations capability is available. It is therefore necessary to retain the capability to implement MLS for the foreseeable future to enable the implementation of the current ICAO strategy.

In accordance with ~~resolves~~ *resolves* 1 of Res.114, ICAO has developed a procedure to establish the spectrum requirements for MLS and other potential aeronautical applications, in order to support the future allocation requirement for the band 5 091 - 5 150 MHz. The results ~~should be available around end 2001~~. This procedure includes:

- ~~— update of the MLS requirements by States;~~
- ~~— review of the operational requirements of MLS (Ref. Annex 10, Volume I – Radio Navigation Aids);~~
- ~~— replanning of MLS assignments to establish spectrum requirements;~~
- ~~— identification of future of the ICAO studies have demonstrated that there is uncertainty on the prospective spectrum requirements for other aeronautical systems;~~
- ~~— presentation and discussion of results in ICAO; and~~
- ~~— presentation of results to ITU.~~

MLS for Category II/III operations in relation to the services that can be offered by GNSS. As a result, most of these MLS requirements are expected to be met in the band 5 030 - 5 091 MHz. Until these uncertainties have been fully addressed, the band 5 091 - 5 150 MHz must remain available for MLS purposes under a globally harmonized allocation. The current regulatory mechanism, with an extension from 2010 to 2018 of the date beyond which the FSS must revert to secondary status, would meet the current aviation requirements. The date beyond which no new assignments shall be made to the FSS (1 January 2008) should remain unchanged.

Future aeronautical use of this band will also include the accommodation of requirements for other ARNS systems operating under the current allocation. The potential use of the band for other types of aeronautical applications is also under study.

ICAO Position:

No change to footnote S5.444 and S5.444A. (Further material to be presented when results of studies are available)

Maintain the current regulatory mechanism, accepting the extension from 2010 up to 2018 of the date beyond which the FSS must revert to secondary status.

Agenda Item Title: 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)

Discussion: This extension of the present secondary allocation to include the aeronautical mobile satellite service, as considered in Res. 216 (Rev. WRC-2000), addresses non-safety ~~communications with aircraft, and~~ **broadband¹ communications by passengers and operators of commercial aircraft.** It will not form part of the aeronautical mobile satellite (R) service since a secondary allocation is not acceptable for any aeronautical safety-of-life service. The latter is governed by Article ~~S43~~**43.1** of the Radio Regulations, which defines the conditions for communications relating to safety and regularity of flight between aircraft and ground.

The modification under consideration can be supported on the basis that the service has the potential to promote the general efficiency of aircraft operations.

ICAO Position:

Provide support where applicable to the extension of this allocation to include the aeronautical mobile satellite service.
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¹ “Broadband” is a generic descriptive term, often synonymous with “wideband”. It should not be confused with “ultra-wideband”, which is a specific method of communication not considered under this agenda item.

Agenda Item Title: To review the results of studies concerning the radionavigation-satellite service in accordance with Resolutions 604 (WRC-2000), 605 (WRC-2000) and 606 (WRC-2000)

Discussion:

The radionavigation-satellite service (RNSS) is the ITU generic designation that includes, but is not limited to, the ICAO-defined GNSS. The allocation of new frequencies to the RNSS was an item of major aviation concern at WRC-2000. Two aeronautical radionavigation bands were selected for the introduction of the RNSS (space-to-Earth): the band at 1 164 - 1 215 MHz used by the DME and the radar band at 1 260 - 1 300 MHz. Two RNSS systems were concerned: the GPS system, with the new L5 frequency in the DME band, and the Galileo system, with components both in DME band and the radar band.

Resolution 605 (WRC-2000) relates to the introduction of the RNSS (space - Earth) in the band 1 164 - 1 215 MHz (S5.328A refers). The band is allocated worldwide on a primary basis to the aeronautical radionavigation service (ARNS) and is currently intensively used by DME.

Resolution 606 (WRC-2000) relates, inter alia, to the introduction of the RNSS (space-Earth) in the band 1 215 - 1 300 MHz. The band is allocated worldwide on a primary basis to the radiolocation service and in several countries, to the ~~aeronautical radionavigation service~~ ARNS or the radionavigation service (RNS). It is currently used by long-range primary radars for en-route surveillance.

Both Resolutions call for ITU-R studies on the technical, operational, and regulatory aspects of the new allocations. ICAO has been specifically invited to participate in these studies, because of the great importance of these bands to international civil aviation.

Within this agenda item, the main civil aviation interest is to assure the protection and expansion, as required, of the present systems in the bands (DME and primary radars), which are a vital part of the air traffic infrastructure and will remain so for many years ahead, while at the same time supporting the implementation of RNSS that can offer civil aviation future benefits. WRC-2000 gave RNSS operators the desired allocation of frequencies, but only under the condition that existing ~~aeronautical radionavigation services~~ ARNS systems be fully protected from interference that could be caused by the RNSS (which itself could not claim any protection from ARNS services). Accordingly, the focus of aviation interest is now on achieving the desired protection through the definition of appropriate design constraints on future RNSS systems.

In the **band 1 164 - 1 215 MHz**, addressed by Resolution 605, the ICAO GNSS and AMC Panels ~~are currently studying the appropriate value of power flux density (pfd) limit and other relevant aspects of~~ **have concluded that** the protection of DME, with a view to presenting contributions to the ITU-R studies which are requested under Res. 605. The Resolution highlights the ICAO finding indicating that a provisional pfd value should be in the range of -115 - to -119 dB **can be ensured by establishing a**

limit of $-121.5 \text{ dB(W/m}^2\text{)}$ in any 1 MHz in the band for the aggregate of all RNSS systems. The finding will be refined further by the ICAO work.

for the equivalent power flux density (epfd) generated by the emissions of all RNSS space stations, taking into account the reference DME receiving antenna characteristics described in the relevant ITU-R Recommendation. This result was agreed by the ITU-R Conference Preparatory Meeting (CPM) as the basis of the only method contained in the CPM report to WRC-2003 to satisfy this agenda item with regard to Resolution 605.

In the **band 1 215 - 1 300 MHz**, addressed by Resolution 606, similar considerations apply. Aviation is seeking the incorporation of an agreed pfd limit in the Radio Regulation. However, the principle of such incorporation has been disputed by some countries at WRC-2000. Resolution 606 calls for studies on the need for, and the value of, an appropriate pfd limit. **The principle of incorporating such a pfd limit was disputed by some countries at WRC-2000.** It is a firmly held view in international civil aviation that a **pfd limit single regulatory mechanism in the whole 1 215 - 1 300 MHz band, applicable to current and future RNSS systems**, is necessary to **give protection to prevent harmful interference from RNSS into radionavigation systems** employed to establish and maintain separation between aircraft. **ICAO will therefore support work to develop appropriate**

As a single regulatory mechanism, aviation has been seeking the incorporation of an agreed pfd limit in the Radio Regulations. Several studies have been submitted in the ITU-R and ICAO framework on the impact of RNSS emissions on radars. However, it has not been possible to reach a firm conclusion on which pfd value is necessary to protect radars without unduly restricting RNSS. One of the reasons is the fact that no international standards for ATC primary radars exist and radars utilize different operating parameters throughout the world. Furthermore, the application of an inappropriate pfd limit would not guarantee the protection of radars and might not be retroactively applicable to RNSS systems notified prior to WRC-2003.

Regulatory mechanisms other than a pfd limit have been proposed, such as a footnote applicable to current and future RNSS, to give protection to radars. These mechanisms may not necessarily prevent harmful interference being caused to the radionavigation service, which is unacceptable. Furthermore, identification, reporting and removal of such interference, where feasible, will represent a substantial burden on all administrations and civil aviation authorities involved and on the ITU Radiocommunication Bureau.

As a consequence, administrations authorizing radar systems used for civil aviation purposes in this band. **The pfd limit should be derived from a compatibility analysis based on the interference threshold level for ATC radar receivers, taking into account the relevant aeronautical safety margin. Further studies are underway to validate the recommended method for compatibility analysis are encouraged to conduct close consultations with their civil aviation authorities with regard to the best means to achieve protection of these systems.**

ICAO Position:

To support an appropriate a value of $-121.5 \text{ dB(W/m}^2\text{)}$ in any 1 MHz for a ~~pdf~~ ~~epfd~~ limit for the aggregated interference of all RNSS systems in the band 1 164 - 1 215 MHz, as a necessary protection for aeronautical DME systems currently in operation, and to support the incorporation of the agreed ~~pdf~~ ~~epfd~~ limit within an adequate regulatory framework having full mandatory force.

To support the ~~need for a pdf limit for RNSS in the~~ ~~incorporation of a single regulatory mechanism applicable to RNSS in the whole~~ band 1 215 - 1 300 MHz as a necessary protection for ~~important radionavigation systems providing safe separation to aircraft in flight radars used for civil aviation purposes,~~ and to support the incorporation of the agreed ~~pdf limit~~ ~~mechanism~~ within an adequate regulatory framework having full mandatory force ~~for current and future RNSS systems.~~

***Agenda Item Title:** **To permit the use of the band 108 - 117.975 MHz for the transmission of radionavigation satellite differential correction signals by ICAO Standard ground-based systems**

Discussion: A new aviation requirement has emerged for the transmission of augmentation data for GNSS, to be used by aircraft receivers to satisfy the stringent accuracy and integrity requirements for GNSS applications. According to SARPs in Annex 10, the new ground-based augmentation systems (GBAS) shall operate in the present VOR/ILS band at 108 – 117.975 MHz (initially 112 – 117.975 MHz).

ICAO has also developed standards for systems in which data derived from navigation systems onboard aircraft are transmitted over a data link to other aircraft and to air traffic control. Such systems can support navigation and surveillance functions, and one such system is designed to operate also in the band 108 – 117.975 MHz.

The selected band is currently allocated to the aeronautical radionavigation service. It has been argued that the above-mentioned new systems do not fall within the definition of a radionavigation service (i.e. using the propagation properties of radio waves) and that an amendment to the allocation of this band is required. An appropriate additional allocation would therefore need to be made to allow these systems to operate in the band 108 - 117.975 MHz. **In particular, it would be acceptable to aviation if assignments to the new systems were initially limited to the sub-band above 112 MHz, until all compatibility issues with the broadcasting service in the band 87.5 - 108 MHz have been addressed. This solution would be consistent with the “Method B” described in the CPM Report.**

Actual introduction of these systems will be internationally coordinated by ICAO, through the development of the relevant standards and compatibility and frequency planning criteria. This will ensure that the different aeronautical radio systems already operating (VOR/ILS) or planned to operate in this band can safely coexist and will not cause harmful interference to each other.

With regard to adjacent bands, aeronautical systems must also conform to the relevant ITU provisions on unwanted emissions. Compatibility with FM broadcast services in the band 87.5 - 108 MHz would be ensured through conformity with ITU-R Recommendation **ISM.1009**.

Support an allocation permitting the use of the band 108 - 117.975 MHz by ICAO Standard systems supporting navigation and surveillance functions, on the condition that priority and protection be given to the aeronautical radionavigation service.

Ensure conformity with ITU-R Recommendation **ISM.1009** regarding compatibility with the FM broadcast services in the band 87.5 - 108 MHz

Agenda Item Title: **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)

Discussion:

This agenda item addresses the preliminary agenda for WRC-20067, which will be developed by WRC-2003. Items of aeronautical interest that should appear in the WRC-20067 include:

- a) Deletion of footnote S5.203A

This footnote enables the operation of the fixed and mobile, except aeronautical mobile, service in the aeronautical VHF band 136 - 137 MHz in some countries. As pointed out above (WRC-2003 Agenda Item 1.1 refers), the expiry date of the footnote is 2005. The date should not be extended and the footnote should be deleted by WRC-20067.

- b) Review of results of studies conducted in accordance with Resolution 222 (WRC-2000)

Resolution 222, *inter alia*, calls for ITU-R studies to ensure spectrum availability and protection for the aeronautical mobile-satellite (R) service in the 1.5 - 1.6 GHz band. The result of such studies should be reviewed by WRC-20067 with a view to assessing the need of changes to the Radio Regulation to satisfy AMS(R)S spectrum requirements in the band. Participation by aviation experts to the relevant ITU-R studies is required.

- c) AM(R)S allocations on the HF bands

The draft agenda for WRC-20067 includes items relating to a review of allocations in the HF bands. A review of these allocations should exclude any of the bands allocated to the aeronautical mobile (R) service and which are part of the allotment plan for the aeronautical mobile (R) service in Appendix S 27.

- d) Additional spectrum for aeronautical systems

Shortage of aeronautical frequencies is currently being experienced in some bands and regions. Accordingly, the need to find frequencies for aeronautical systems that may be introduced in the medium and long term has been identified.

Finally, with regard to Item 3.1 of the preliminary agenda contained in Resolution 801 (“to consider results of ITU-R studies on the feasibility of sharing in the band 2 700-2 900 MHz between the aeronautical radionavigation service, meteorological radars and the mobile service, and to take appropriate action on this subject”), it is noted that ITU-R studies have indicated that sharing of this band between the MS (IMT-2000) and ARNS and meteorological radars is not feasible. Deletion of this item from the WRC-2007 agenda is therefore recommended.

ICAO Position:

To support the deletion of footnote of footnote S5.203A by WRC-20067.

To support the inclusion in the agenda of WRC-20067 of an item addressing the review of results of studies conducted in accordance with Resolution 222 (WRC-2000).

⊖To oppose any review of frequency bands allocated to the aeronautical mobile (R) service between 2 850 - 22 000 MHz and of the allotment plan in Appendix S 27 on

the basis that the frequency bands concerned are already suffering congestion and insufficient frequencies are available for international operations.

To support a review by WRC-2006⁷ of the need for additional spectrum for aeronautical systems that are considered for introduction in the medium and long term.

To support the deletion of item 3.1 in the preliminary agenda contained in Resolution 801, as ITU-R studies have indicated that sharing of the band 2 700 - 2 900 MHz between the MS (IMT-2000) and ARNS and meteorological radars is not feasible.
