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**AERONAUTICAL COMMUNICATIONS PANEL (ACP)**

**THIRTIETH MEETING OF WORKING GROUP F**

**Pattaya, Thailand 13 - 19 March 2014**

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| **Agenda Item 7** | Development of material for ITU-R meetings |

**Considerations on the Preparation of CPM Text for  
WRC-15 Agenda Item 1.17**

(Presented by Uwe Schwark)

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| **SUMMARY** |
| This paper is intended to summarize the current status of discussions on the preparation of CPM Text for WRC-15 agenda item 1.17 and to initiate a discussion within Working Group F on the most preferable way to implement regulatory provisions in support of future WAIC systems. |
| **ACTION**  To consider the discussions on the CPM text options contained in this Working Paper and if possible agree within Working Group F on a way forward in finalizing der development of the CPM text for WRC-15 agenda item 1.17. |



# INTRODUCTION

Agenda item 1.17 resolves that WRC-15 considers, based on the results of ITU-R studies, possible regulatory actions, including appropriate aeronautical allocations, to support the implementation of wireless avionics intra-communications (WAIC), while taking into account spectrum requirements for WAIC and protection requirements for systems operating in accordance with existing allocations.

According to Resolution 423 (WRC-12), the ITU-R is to first consider radio frequency bands allocated to the AMS, AM(R)S, and ARNS (aviation frequency bands) below 15.7 GHz, and then consider radio frequency bands above 15.7 GHz if spectrum requirements cannot be met in the aforementioned frequency bands. All of the aviation frequency bands between 960 MHz and 15.7 GHz were analyzed. After an initial assessment some frequency bands were considered for additional sharing and compatibility studies between WAIC systems and incumbent services in the bands 2 700-2 900 MHz, 4 200-4 400 MHz, and 5 350-5 460 MHz. Of these bands, the band 4 200-4 400 MHz was found to be compatible with the intended use for WAIC systems.

Furthermore, it is agreed amongst civil aviation and the involved Administrations, that WAIC is an application of the AM(R)S. Hence, all proposals for CPM Text in support of WRC-15 agenda item 1.17 contain as the central element the introduction of a new AM(R)S allocation into the frequency band 4 200-4 400 MHz reserved exclusively for WAIC systems. The proposed methods to satisfy agenda item 1.17, however, do differ with regard to the question if and how text from either a yet to be agreed Recommendation on WAIC (Rec. ITU-R M.[WAIC]) should be incorporated by reference into the Radio Regulations or whether referencing Resolution 423 (or a revision thereof) is appropriate. These CPM Text proposals were first discussed on ITU-R level at the November 2013 meeting of Working Party 5B (WP 5B) as well as within Project Team C (PT C) of the Conference Preparatory Group (CPG) of CEPT in its recent meeting in February 2014.

Working Group F is invited to consider the discussion contained in the following section 2 and the conclusions thereof contained in section 3, when preparing its view on the most preferable method to satisfy WRC-15 agenda item 1.17 in support of the introduction of WAIC systems.

# Discussion

Throughout the following a brief discussion of the open questions with respect to the finalization of CPM Text for WRC-15 agenda item 1.17 is provided.

## Proposed methods

An overview on the various proposals of the methods to satisfy WRC-15 agenda item 1.17 currently discussed within CPG PT C, ITU-R WP5B and the industry group of WAIC proponents is provided below.

### Status of discussions within CEPT CPG PT C

The following elements constitute the CPM Text proposal currently under discussion within CPG PT C.

* add an AM(R)S allocation to the Table of allocations in Article 5 of the Radio Regulations
* modify existing footnote 5.438 (see below)
* exclusively reserve the newly introduced AM(R)S allocations for WAIC systems by introducing new footnote 5.XXX (see below)
* introduce new footnote 5.YYY (see below)

**4 200-4 400 MHz**

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| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 4 200-4 400 AERONAUTICAL RADIONAVIGATION MOD 5.438  AERONAUTICAL MOBILE (R) ADD 5.XXX  5.439 5.440 ADD 5.YYY | | |

Modify footnote (same as ITU-R WP 5B proposal 1):

5.438 Use of the band 4 200-4 400 MHz by the aeronautical radionavigation service is reserved exclusively for radio altimeters installed on board aircraft and for the associated transponders on the ground.

Add a new footnote (differs with WP 5B proposal 1 in the way reference is made to WAIC):

**5.XXX** The use of the frequency band 4 200-4 400 MHz by the aeronautical mobile (R) service is reserved exclusively for WAIC systems operating in accordance with international aeronautical standards and in accordance with [Resolution **423 (Rev.WRC 15)****/** Recommendation ITU-R M.[WAIC]. In order to protect radio altimeters, AM(R)S stations installed on a single aircraft shall be compliant with the limitation of aggregate e.i.r.p. defined in the Recommendation ITU-R M.[WAIC].]

Add a new footnote (essentially the same as in WP 5B proposal 1):

**5.YYY** Passive sensing in the Earth exploration-satellite and space research services may be authorized in this band on a secondary basis.

### Status of discussions within ITU-R WP 5B

In WP 5B there are currently 2 options under discussion. The first option discussed below is the result of the agenda item 1.17 drafting group activities during the last WP 5B meeting, while the second option is the outcome of discussions on the matter at WP 5B Aeronautical Plenary level during that same WP 5B meeting.

**Option 1**

The following elements constitute the first CPM Text option currently under discussion within WP 5B:

* add an AM(R)S allocation to the Table of allocations in Article 5 of the Radio Regulations
* modify existing footnote 5.438 (see below)
* exclusively reserve the newly introduced AM(R)S allocations for WAIC systems by introducing new footnote 5.XXX (see below)
* introduce new footnote 5.YYY (see below)

**4 200-4 400 MHz**

|  |  |  |
| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 4 200-4 400 AERONAUTICAL RADIONAVIGATION MOD 5.438  AERONAUTICAL MOBILE (R) ADD 5.XXX  5.439 5.440 ADD 5.YYY | | |

Modify footnote (in accordance with CPG PT C proposal):

**5.438** Use of the band 4 200-4 400 MHz by the aeronautical radionavigation service is reserved exclusively for radio altimeters installed on board aircraft and for the associated transponders on the ground.

Add a new footnote (differs with CPG PT C proposal in the way reference is made to WAIC):

**5.XXX** Use of the frequency band 4 200-4 400 MHz by the aeronautical mobile (R) service is limited to internationally standardized aeronautical systems (wireless avionics intra-communications) [in accordance with Resolution 423 (Rev.WRC-15).]

Add a new footnote (essentially the same as in CPG PT C proposal):

**5.YYY** Passive sensing in the Earth exploration-satellite and space research services may be authorized in the frequency band 4 200-4 400 MHz on a secondary basis (no protection is provided by radio altimeters or by wireless avionics intra-communications).

**or**

**Option 2**

The following elements constitute the second CPM Text option currently under discussion within WP 5B:

* add an AM(R)S allocation to the Table of allocations in Article 5 of the Radio Regulations
* exclusively reserve newly introduced AM(R)S allocations for WAIC by modifying existing footnote 5.438 (see below)

**4 200-4 400 MHz**

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| --- | --- | --- |
| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 4 200-4 400 AERONAUTICAL RADIONAVIGATION  AERONAUTICAL MOBILE (R)  5.439 5.440 MOD 5.438 | | |

Modify footnote:

**5.438** Use of the band 4 200-4 400 MHz by the aeronautical radionavigation service is reserved exclusively for radio altimeters installed on board aircraft and for the associated transponders on the ground and by the aeronautical mobile (route) service reserved exclusively for internationally standardized wireless avionics intra-communications [in accordance with Resolution **423 (Rev.WRC-15)]**. However, passive sensing in the Earth exploration-satellite and space research services may be authorized in this band on a secondary basis (no protection is provided by the radio altimeters nor by wireless avionics intra-communications.

### Proposal discussed within industry group of WAIC proponents

**4 200-4 400 MHz**

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| Allocation to services | | |
| Region 1 | Region 2 | Region 3 |
| 4 200-4 400 AERONAUTICAL RADIONAVIGATION MOD 5.438  AERONAUTICAL MOBILE (R) ADD 5.XXX  5.439 5.440 ADD 5.YYY | | |

Modify footnote (same as CPG PT C proposal and ITU-R WP 5B proposal 1):

5.438 Use of the band 4 200-4 400 MHz by the aeronautical radionavigation service is reserved exclusively for radio altimeters installed on board aircraft and for the associated transponders on the ground.

Add a new footnote (differs with CPG PT C and WP 5B proposals in that no explicit reference is made to Resolution 423 or Recommendation ITU-R M.[WAIC]):

**5.XXX** The use of the frequency band 4 200-4 400 MHz by the aeronautical mobile (R) service is reserved exclusively for WAIC systems operating in accordance with international aeronautical standards.

Add a new footnote (same as ITU-R WP 5B proposal 1):

**5.YYY** Passive sensing in the Earth exploration-satellite and space research services may be authorized in this band on a secondary basis.

Add a new definition in Article 1:

## 1.XXX Wireless Avionics Intra-Communications: radiocommunication between two or more aircraft stations located on a single aircraft; supporting the safe operation of the aircraft and its systems.

## Issues/Questions to be solved

### Need for a definition of WAIC

Some of the proposed methods to satisfy WRC-15 agenda item 1.17 discussed above contain the term “WAIC” without any further explanation or reference to text which may contain a definition. This makes it necessary to explicitly define WAIC within the Radio Regulations. The perhaps cleanest way for solving this issue is to introduce a definition of WAIC into Article 1 of the Radio Regulations. Such a definition could read like the following:

*“Wireless Avionics Intra-Communications: radiocommunication between two or more aircraft stations located on a single aircraft; supporting the safe operation of the aircraft and its systems”*

An alternative approach which does not require an Article 1 modification is to use the following generic language and a reference to Resolution 423 as proposed as one option in the method discussed within CPG PT C:

*“… reserved exclusively for WAIC systems operating in accordance with international aeronautical standards and in accordance with Resolution 423 …”*.

The necessary information defining WAIC is already contained in Resolution 423. Alternatively, such definitions could also be included into Recommendation M.[WAIC] and this Recommendation could be incorporated by reference instead.

### Need for incorporating technical provisions for WAIC into the RRs

Within CPG PT C one Administration proposed to incorporate certain technical requirements, or “limitations” into the proposed footnote 5.XXX. The proposed text reads as follows:

*“In order to protect radio altimeters, AM(R)S stations installed on a single aircraft shall be compliant with the limitation of aggregate e.i.r.p. defined in the Recommendation ITU-R M.[WAIC].]”*

It is understood, that in particular for studies on WAIC outside systems, certain assumptions on maximum e.i.r.p. levels generated by an aircraft equipped with WAIC systems were made, and that these assumptions have to be respected for future WAIC system implementations. However, given the fact, that the only primary users of the band are radio altimeter systems, the question arises, whether ITU-R should be in charge of imposing these technical requirements or “limitations” or whether this aspect should be taken care of by ICAO and other competent aeronautical standards bodies in the process of developing SARPS and technical standards for WAIC systems.

### Need for incorporating material by reference into the Radio Regulations

For reasons discussed in sections 2.2.1 and 2.2.2 above, there might be a need/desire for incorporating text by reference into the RRs. If so, two possibilities exist, either putting the required text into Recommendation M.[WAIC] or a revision of Resolution 423 (if the needed provisions are not already included) and linking either of these documents (or parts thereof) into the proposed new footnote 5.XXX using appropriate language making the quoted provision mandatory. In this respect it does not make any difference whether a Recommendation is “incorporated by reference” in accordance with Resolution 27, which contains the principals for the “Use of incorporation by reference into the Radio Regulations” or a Resolution is referenced in an appropriate way. There is however a procedural difference in the development of a Resolution and a Recommendation. While a Recommendation or an update thereof can be developed and approved in the course of a study cycle by the corresponding Study Group, Resolutions can only be developed or evolved by a WRC. In both cases, however, the referenced text must be accepted by a WRC, since, as explained above, it becomes part of the Radio Regulations. In summary one can say that the result is the same irrespectively of the fact whether text from a Recommendation is incorporated by reference or a Resolution is quotes in a footnote of the RRs, but the processes for developing and evolving the text differ in their flexibility.

This leads to two questions:

1. What are the provisions that shall be incorporated?
2. Which part of these provisions can be considered stable or should be fixed and where flexibility in terms of updates is needed?

Should for instance the decision be to incorporate a definition of WAIC systems by reference into the RRs, this could easily be done by Resolution 423 (or a revision thereof), since it can be assumed, that such definition will not change over time. Technical provisions, such as technical characteristics and protection criteria of WAIC systems may evolve over time and hence corresponding ITU-R documentation needs to be updated. For these cases, a Recommendation incorporated by reference may be more suitable.

# Conclusions

The discussion of the existing CPM Text proposals for WRC-15 agenda item 1.17 on ITU-R and CEPT levels lead to the following list of issues to be clarified:

1. decide on definition for WAIC and where to put it
2. agree on the roles of ITU and ICAO in imposing technical requirements/limitations on WAIC system implementations for ensuring coexistence with radio altimeters
3. agree on content to be incorporated by reference
4. decide which content might need flexibility in terms of future evolvements and which should be fixed (e.g. definitions shouldn’t change)
5. agree on overall CPM Text for WRC-15 agenda item 1.17 amongst civil aviation

Working Group F is invited to consider these issues in the course of building consensus amongst civil aviation on the most preferable way to implement regulatory provisions in support of the introduction of WAIC systems.