



International Civil Aviation Organization

SECOND MEETING OF SPECTRUM REVIEW WORKING GROUP (SRWG/2)

Bangkok, Thailand 12 – 14 May 2015

Agenda Item 5: Recommendations for improvement of VHF frequency planning

GLOBAL AND REGIONAL ALLOTMENTS

(Presented by the Secretariat)

SUMMARY

This paper presents measures envisaged at the global level regarding allotments in the VHF-COM frequency band 117.975 – 137 MHz to increase the efficiency of frequency management and calls for an impact assessment in the APAC region.

1. Introduction

1.1 Two main types of allotments apply to the VHF-COM frequency band 117.975 – 137 MHz (air/ground communications). These allotments, when strictly applied, cause undue constraints on efficient frequency assignment planning and use of this frequency band. This paper clarifies the use of these allotments and envisages modifications to the current provisions with the view to rationalize the future use of this frequency band.

1.2 Global allotments

Allotments of parts of the VHF-COM frequency band 117.975 – 137 MHz to international and national aeronautical mobile services are specified in Annex 10, Volume V, paragraph 4.1.1. The relevant provisions in Annex 10 are reproduced in **Appendix A**.

1.3 Regional allotments

In accordance with the provisions of Annex 10, Regions have agreed on Regional Allotment Plans that allot certain frequency bands to specific services. These allotment plans are, for the ease of reference, reproduced in **Appendix B**.

1.4 This paper reviews the relevant global and regional provisions and proposes modifications and/or clarifications on the application of these allotments.

2. Global allotments – Annex 10, Volume V.

2.1 Annex 10, Volume V, paragraph 4.1.1 contains provisions for the use of the VHF-COM band for National as well as for International applications in the aeronautical mobile service. These provisions are intended to keep to a minimum the coordination of frequency assignments for national and for international applications (re. *Note* to 4.1.1).

2.2 Annex 10, Volume V also stipulates that frequencies used for national applications shall be deployed in such a manner that no harmful interference is caused to frequencies in use for international applications (Annex 10, Volume V, paragraph 4.1.4.8), with the exception of frequencies in use for national applications in frequency bands specifically allotted for such national applications.

2.3 Requirements for international applications are typically those that have been agreed as per ICAO Regional Plan (re. FASID; Table CNS – Aeronautical Mobile Service). In the regional frequency assignment plan (COM list 3) these frequencies are notated with “ICAO”. Requirements for national applications are noted in the COM list 3 with “NAT”. In this regard it should be noted that the EUR frequency assignment plan no longer provides this information.

2.4 The allotment plan in Annex 10 provides for frequency bands that can be used only for national applications. Technically, these frequency bands cannot be used for international applications. No frequency bands are identified that can only be used for international applications. These bands are:

- 122.000 – 123.6917 MHz with the exception of the band 123.0583 – 123.1417 MHz (channels 123.060 – 123.140 which includes the 25 kHz channels 122.075, 123.100 and 123.125 (MHz)) which is used for the aeronautical auxiliary frequency (SAR) as well as the frequency 123.450 MHz which is the air-to-air communication channel which, may require protection as a channel with 25 kHz characteristics.
- 129.700 – 130.8917 MHz which may be used to meet the requirements for aeronautical operational control AOC communications.
Actual allotments for AOC are:

AFI: 131.400 – 132.975 MHz *

APAC: 128.900 – 132.025 MHz

CAR/SAM: 129.900 – 132.025 MHz

EUR: 131.400 – 131.975 MHz *

MID: 128.900 – 132.025 MHz

* AOC pool outside recommended frequency band

2.5 In practice, the distinction between national and international aeronautical mobile services / applications is not observed in frequency assignment planning. Generally, both categories are receiving the same level of protection from harmful interference and no priority is afforded to either of these services. In addition, the frequency band 122.000 – 123.6917 MHz, which is allotted exclusively for national aeronautical mobile services / applications is also used for international aeronautical mobile services / applications.

2.5.1 It is therefore proposed to modify the worldwide utilization for all frequencies within the band 117.975 – 137 MHz to both international and national aeronautical mobile services. In addition, the provision in Annex 10, Volume 5 (paragraph 4.1.4.8) requiring that frequencies used for national aeronautical mobile services should not cause harmful interference to frequencies in use for international aeronautical mobile services should be removed from Annex 10. From a technical perspective, harmful interference (which involves air-to-air interference) is always mutual. In addition, this provision may imply that frequencies in use for international aeronautical mobile services may cause harmful interference to frequencies in use for national aeronautical mobile services.

2.6 Proposed amendments to Annex 10.

2.6.1 Proposed detailed amendments to Annex 10 are in **Appendix A**.

2.6.2 In summary, these amendments include:

- Incorporate for the worldwide utilization in Table 4-1 for all frequency bands in the range 117.975 – 137 MHz provisions for *both* the national and international aeronautical mobile service; and
- Remove paragraph 4.1.4.8 from Annex 10, Volume V

Note: alternatively, all references to national and international mobile services, in the context of the Allotment table in Annex 10, Volume V may be deleted from the allotment table or replaced by a general note or provision.

2.6.1 Although outside the context of this paper, it is also proposed to modify Annex 10 to replace, wherever relevant, the expression “protected service volume” is to be replaced with the definition for Designated Operational Coverage. The expression “Designated Operational Coverage” is well defined in Regional Plans and the Handbook, Volume II. No definition is provided in Annex 10 for the use of “protected service volume” and may be open for interpretation. Should the SRWG agree, a more detailed proposal can be developed and presented to the SRWG meeting in May 2015.

3. Regional Allotment Plans

3.1 In accordance with the provisions of Annex 10, Regional Allotment Plans for the VHF-COM band 117.975 – 137 MHz have been developed by all ICAO Regions. For the ease of reference these allotment plans are reproduced in Appendix B.

3.2 These allotment plans allot parts of the VHF-COM band to specific services. These allotments are exclusive of certain services or for shared services which are similar in terms of frequency assignment planning constraints (minimum geographical separation distance, circular or area service). These allotment plans follow closely the principles of the allotment plan in Annex 10, volume V, as described in section 2 of this paper.

3.3 One of the benefits of this allotment plan is that, when assigning frequencies to service in the allotments, the use of the VHF-COM band is spread over the whole of the VHF-CM band. Also, manual frequency assignment planning is facilitated since no attention needs to be given to calculating

complex minimum separation distances between dis-similar services (services which require different minimum separation distances because of different range and / or height). Allotment to services that do not require protection from harmful interference such as Aeronautical Operational Control (AOC) increase efficiency in frequency assignment planning.

3.4 One of the drawbacks of the allotment is that certain frequency bands can become congested and saturated, making it difficult to find frequency assignments that follow the allotments in the allotment plan. This reduces efficiency in frequency assignment planning. This is recognized in the *Handbook on Radio Frequency Spectrum Requirements, Volume II, Frequency assignment planning criteria for aeronautical radio communication and navigation systems (Doc. 9718), paragraph 2.4.2* which recommends that in cases where a frequency assignment cannot be made from within the sub-band allotted to a specific service, other frequency bands may be considered to satisfy the requirement.

3.5 On the basis of the considerations in 3.3 and 3.4 above, it is proposed to maintain the principle of the allotment plans as they have been developed by different ICAO Regions. In cases where allotment restricts efficient frequency assignment planning, specific services may use other frequency bands. It is beneficial (and necessary) for efficient frequency assignment planning to keep unprotected services (for the APAC Region this only applies to AOC communications) within the same sub-band.

3.6 The current allotment plan for the APAC region has been developed some 50 years ago and was intended to meet the specific requirements for air/ground communication channels in the APAC Region at that time. A review and, if necessary, a revision of the allotment plan may therefore be relevant to secure that the allotment plan meets current and future requirements.

Note: Some frequency assignments in the APAC COM list 3 do not have a service and/or a DOC specified. For these frequency assignments, in order to correctly protect these from harmful interference, the relevant Service and DOC should be made available and incorporated in the COM list 3.

3.7 Specific allotments in the APAC allotment plan (the same would apply to the MID allotment plan which is identical to the APAC allotment plan) may require further attention. These include:

3.7.1 Sub-band for Aeronautical Operational Control (AOC)

The sub-band which is allotted for AOC communications in the APAC (and MID) Region is large compared to the sub-bands allotted to AOC in other Regions (Re. Appendix B). In this sub-band the sharing options of frequency assignments can be improved. Also, increased use of 25 kHz channels may reduce the overall size of the AOC sub-band, thus making frequency space available for ATC services.

3.7.2 Sub-bands which are not allotted.

3.7.2.1 The sub-band 122.000 MHz – 123.575 MHz is not allotted in the APAC Region to any specific Service (as well as in the MID, AFI and CAR/SAM Regions). This band is currently only available for national requirements, but in practice it is used for both national and international requirements. Services for which frequencies have been assigned in this band include ACC-U (36), AFIS (51), ATIS (2), AS (2), AOC (19), APP (82), FIS (54) and TWR (270). Without changing the current frequency assignments for (either national or international) ATC services it is proposed to modify the allotment in this band to TWR, AFIS and AS. This would restrict future use of this band to these services.

Note: Since the sub-band 122.000 MHz – 123.575 is currently not allotted to any service, Frequency Finder excludes this band for any new frequency assignment. Alternatively, this sub-band could be allotted to any ATC service with priority to TWR, AFIS and AS services

3.7.2.2 The sub-band 136.000 – 137.000 is allotted for use by VDL. Considering the limited use of air/ground data links in aviation, this allotment may be re-considered with the view to allow for the introduction of ATC services in this band.

3.8 Conclusions

3.8.1 In summary the measures envisaged are as follows:

- Measure 1: Abandon the discrimination between national and international aeronautical mobile services within the band 117.975 – 137 MHz and consequently amend Annex 10
- Measure 2: Replace the notion of “protected service volume” with the definition for Designated Operational Coverage
- Measure 3: Revise the allotment plan in APAC Region, based on handbook volume II principles
 - 3a: reduction of the band for AOC
 - 3b: in cases where allotment restricts efficient frequency assignment planning, specific services may use other frequency bands
 - 3c: incorporate in the APAC allotment plan the relevant DOC when missing
 - 3d: allot the sub-band 122.000 MHz – 123.575 MHz to TWR, AFIS and AS
 - 3e: introduce ATC services in a sub-band of 136.000 – 137.000

3.8.2 The measures envisaged at the global level have the intention to increase efficient frequency assignment planning in the VHF-COM band. Considering that the simulation outcomes of future spectrum requirements as presented in working paper 1 do not suggest congestion or saturation of the whole the VHF-COM band in the near future (2020 and beyond), there is no urgency in implementing these measures. However, given the fact that some of them (e.g. a reduction of the band for AOC) may require considerable time before being implemented), it may be useful to start developing an activity along the lines as suggested. These measures are expected to assist in pushing back the need for implementing 8.33 kHz channel spacing in the APAC Region back to probably beyond 2030.

3.8.3 If the measures are agreed in principle, a more detailed plan can be developed prior to the SRWG meeting in May 2015 for submission to the CNS-SG in July 2015.

4. Action by the meeting

4.1 The meeting is invited to:

- a) Note the information provided in the paper;
- b) Recognize the benefits of the measures summarized in para 3.8.1 for the efficiency of frequency management in APAC region; and
- c) Discuss their adoption in principle in APAC region and the way forward.

Appendix A

4.1.1 General allotment of frequency band 117.975 – 137.000 MHz

(Source: Annex 10, Volume V, paragraph 4.1.1; Amendment 88-A)

Note.— *The plan includes a general Allotment Table that subdivides the complete band 117.975 – 137.000 MHz, the chief subdivisions being the bands of frequencies allocated to both national and international services, and bands or frequencies for specific international (global) utilization. ~~the bands allocated to national services. Observance of this general subdivision should keep to a minimum the problem of coordinating national and international application.~~*

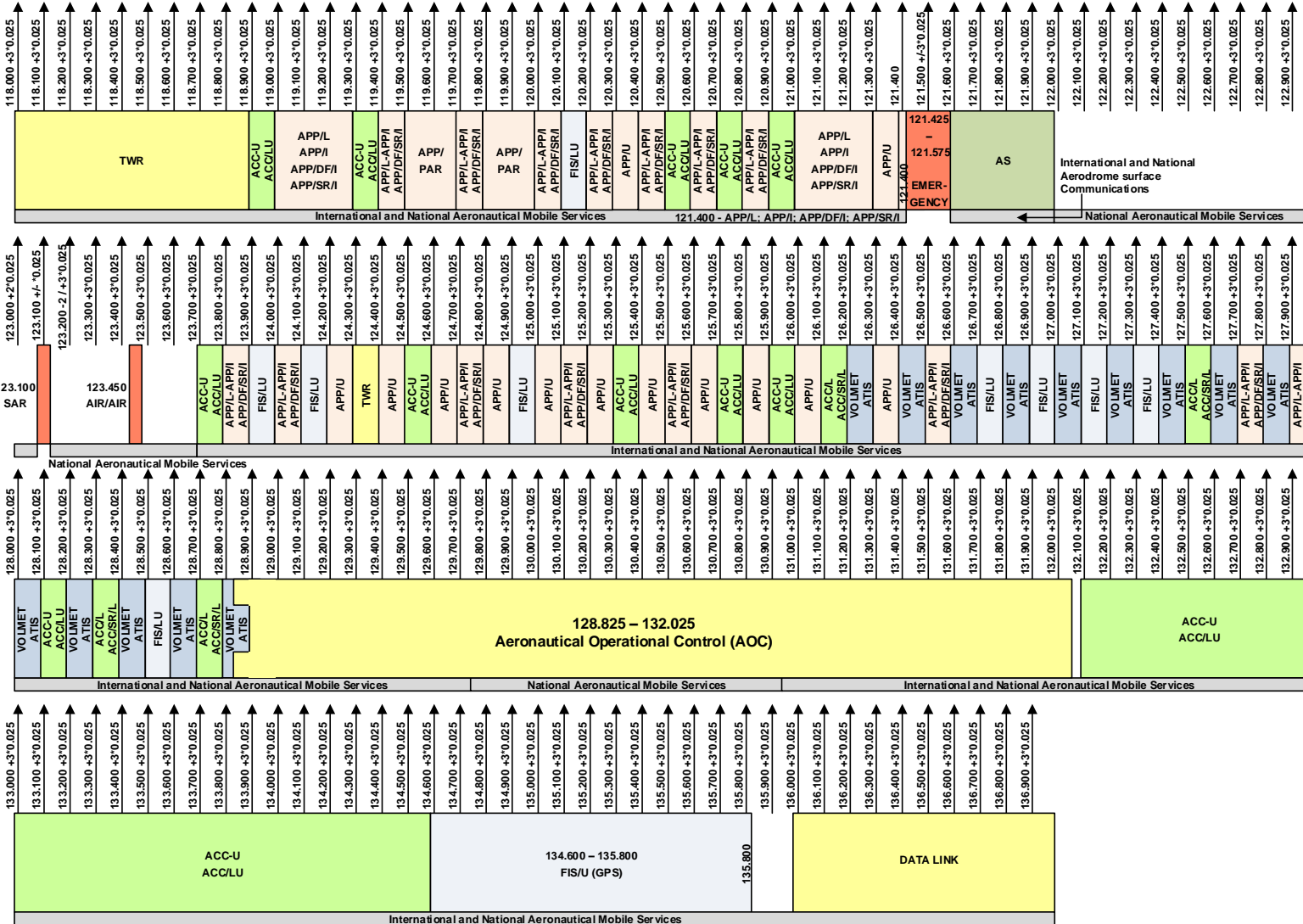
4.1.1.1 The block allotment of the frequency band 117.975 – 137.000 MHz shall be as shown in Table 4-1.

Table 4-1. Allotment table

<i>Block allotment of Frequencies (MHz)</i>	<i>Worldwide utilization</i>	<i>Remarks</i>
a) 118.000 – 121.450 inclusive	International and National Aeronautical Mobile Services	Specific international allotments will be determined in the light of regional agreement. National assignments are covered by the provisions in 4.1.4.8 and 4.1.4.9.
b) 121.500	Emergency frequency	See 4.1.3.1. In order to provide a guard band for the protection of the aeronautical emergency frequency, the nearest assignable frequencies on either side of 121.500 MHz are 121.450 MHz and 121.550 MHz
c) 121.550 – 121.9917 inclusive	International and National Aerodrome Surface Communications	Reserved for ground movement, pre-flight checking, air traffic services clearances, and associated operations.
d) 122.000 – 123.050 inclusive	International and National Aeronautical Mobile Services	Specific international allotments will be determined in the light of regional agreement Reserved for national allotments. National assignments are covered by the provisions of 4.1.4.8 and 4.1.4.9
e) 123.100	Auxiliary frequency SAR	See 4.1.3.4. In order to provide a guard band for the protection of the aeronautical auxiliary frequency, the nearest assignable frequencies on either side of 123.100 MHz are 123.050 MHz and 123.150 MHz
f) 123.150– 123.6917 inclusive	International and National Aeronautical Mobile Services	Specific international allotments will be determined in the light of regional agreement. Reserved for national allotments, with the exception of The frequency 123.450 MHz which is also used as an air-to-air communications channel (see g)). National assignments are covered by the provisions of 4.1.4.8 and 4.1.4.9
g) 123.450	Air-to-air communications	Designated for use as provided for in 4.1.3.2
h) 123.700– 129.6917 inclusive	International and National Aeronautical Mobile Services	Specific international allotments will be determined in light of regional agreement. National assignments are covered by the provisions in 4.1.4.8 and 4.1.4.9.
i) 129.700 – 130.8917 inclusive	International and National Aeronautical Mobile Services	Specific international allotments will be determined in the light of regional agreement. Reserved for national allotments but This band may be used in whole or in part, subject to regional agreement, to meet the requirements mentioned in 4.1.8.1.3. 4.1.6.1.2.
j) 130.900 – 136.875 inclusive	International and National Aeronautical Mobile Services	Specific international allotments will be determined in light of regional agreement. National assignments are covered by the provisions in 4.1.4.8 and 4.1.4.9.
k) 136.900 – 136.975 inclusive	International and National Aeronautical Mobile Services	Reserved for VHF air-ground data link communications.

~~4.1.4.8—In the frequency band 117.975 – 137.000 MHz the frequencies used for National Aeronautical Mobile Services, unless worldwide or regionally allotted to this specific purpose, shall be so deployed that no harmful interference is caused to facilities in the International Aeronautical Mobile services~~

VHF COM Frequency Utilization Plan for APAC



LEGEND	TWR	APP	ACC	FIS	VOLMET ATIS	AS	Special frequencies	National Aeronautical Mobile Services
	Aerodrome Control Service	Approach Contr of Service	Area Contr of Service	Flight Information Service	VOLMET broadcasts Automatic Terminal Information Service	Aerodrome Surface (Surface Movement Control)	(not assignable)	Allotment as per Annex 10