International Civil Aviation Organization

SIXTH MEETING OF SPECTRUM REVIEW WORKING GROUP (SRWG/6)

Video Teleconference, 1 – 3 March 2022

Agenda Item 4: Frequency planning requirements for the Asia/Pacific Region

THE OUTCOME OF AD-HOC GROUP ACTIVITIES ON 50 kHz CHANNEL SPACING FOR VOR/ILS OPERATIONS

(Presented by India/Airports Authority of India)

SUMMARY

This paper summarizes the outcome of the Ad-hoc Group activities with regard to the implementation of 50 kHz channel spacing in the frequency band 108.000-117.975 MHz for VOR/ILS operation in the APAC region.

1. INTRODUCTION

1.1 SRWG/5 meeting discussed the possible shortfall of VOR channels with the current 100 kHz channel spacing and agreed to explore the feasibility of introduction of 50 kHz channel spacing for VOR and ILS/Localizer deployments in the frequency band 108.000-117.975 MHz in the APAC region.

1.2 Accordingly, the meeting decided to constitute an ad-hoc group led by India, under SRWG/5 Action Item A5-5 to further explore the issue of 50 kHz channel spacing in the frequency band 108-117.975 MHz for ILS (LOC)/VOR operations and provide the inputs to SRWG/6. The ad-hoc group members are ICAO, India, Thailand, China, Japan, Mr. Robert Witzen.

1.3 Resultantly, India prepared a draft paper with a questionnaire and provided to the Secretariat for circulation to Member States seeking their valuable comments.

1.4 In the absence of timely responses, India requested the Secretariat to coordinate and conduct an online meeting to discuss and understand the views of group members. Accordingly, the online meeting was held on 8, February 2022.

2. DISCUSSION

2.1 The Ad-hoc Group online meeting perused the draft discussion paper and the questionnaire prepared by India. After the discussion, the meeting appreciated the work.

2.2 The online meeting was of the considered opinion that the real challenges of implementing 50 kHz channel spacing is primarily with airspace users (airline operators) and not with ground segment. The need for active coordination between the stakeholders [ANSP, Civil/Military, Airline Operators (IATA)] was

also stressed. The ad-hoc meeting also noted that ICAO frequency finder tool fully supports 50 kHz channel spacing.

2.3 India presented the status of coordination within India and consultation with all stakeholders including IATA and Military Organizations. The stakeholders have consented for implementation of 50 kHz channel spacing within India.

2.4 During the online meeting, it was brought out that both China and Japan have already implemented 50 kHz channel spacing and they shared their experiences.

2.5 To speed up the process, the online meeting agreed to circulate the questionnaire to the State and Airline Operators including IATA through an ICAO APAC State Letter after concurrence of SRWG/6 meeting through an action item.

2.6 The questionnaire and discussion paper (perused by online Ad-hoc Committee meeting) are placed below at **Appendices A and B** respectively. SRWG/6 meeting may review and finalize the material to enable ICAO APAC office to issue state letter.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matter as appropriate

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APPENDIX-A

To explore the Implementation of 50 kHz channel spacing in the ARNS band 108-117.975 MHz for VOR/ILS (LOC) operation in the APAC Region

Aim:

The ARNS band 108-117.975 MHz (VOR/ILS operations) plays a critical role in ensuring safe and efficient aircraft operations. As the present 100 kHz channel spacing may not satisfy the growing needs of VOR/ILS channels, a review is considered necessary to alleviate the current and future forecasted frequency spectrum congestion/shortfall in this band. The review is aimed at a consultative process involving states/stakeholders.

The appended questionnaire is to elicit views of all the stakeholders in their respective states. The intent of questionnaire was basically to investigate infrastructure/equipage capabilities, implementation plans and exemption possibilities by states etc. States are encourage to complete questionnaire in a time bound manner to objectively complete the ongoing studies.

Survey Questionnaire for APAC states for possible introduction of 50 kHz channel spacing in the APAC region.

1. What are the total number of VOR operations (both civil and military) in your state?
2. Did your state observe any constraints in VOR allocation with current 100 kHz channel spacing? If so, please provide details and means adopted to overcome the constraints?
3. Did your state already implemented 50 kHz channel spacing for VOR/ILS (LOC) deployment? If so, please provide the planning principles/criteria employed to deploy VOR channels in the mixed 100 kHz and 50 kHz environment?
4. If yes to Q. No.3, whether any consultation with airline operators for equipage capability were made and their response therein.
5. Does your state plan to consider/explore the feasibility to introduce 50 kHz channel spacing for VOR/ILS(Localizer) operation? If so, please provide details.
6. Are there any licensed aircraft (defence, GA and Commercial) that are not capable to tuning to 50 kHz channel separation for ILS/Localizer VOR operation?
7. What is the status of equipage for the aircrafts at your state? Are the receivers on board an aircraft capable of tuning to both 50/100 kHz separation? Whether airline operators including defence in your state ready for compliance including equipage changes/retrofit?
8. Does your state consider granting specific exemption from the equipage requirements? If so, what measures are proposed.
9. Does your state foresee/identify any issues or reservations to implement 50 kHz channel spacing for VOR deployments?
10. If your state support 50 kHz implementation, what is the timeline required?
11. Whether your state envisage safety, economic or any other impacts.
12. Whether your ANSP need to carry out any safety impact assessment locally before implementation to comply with the extant procedures and regulations.
13. How can IATA help in getting the required information related to tuning of 50KHz channels by the commercial aircrafts in your state and from various aircraft manufacturers, if required?
14. Other relevant information, if any.

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APPENDIX-B

Discussion paper to explore the feasibility for 50 kHz channel spacing of VOR and Localizer (ILS) operation in Asia/Pac region

Introduction

Globally, the frequency band 108 - 117.975 MHz is earmarked for Aeronautical Radio Navigation Service (ARNS) and used for ILS (Localizer) and VOR operation. The band 108 - 112 MHz is used by ILS Localizer and VOR. Within the band 108-112 MHz, channels on odd multiples of 100 kHz (108.10, 108.30, ...) are used for ILS (LOC) and channels on even multiples of 100 kHz (108.20, 108.40, ...), are normally used for terminal VOR. The sub-band 112-117.975 MHz is exclusively used for VOR operations.

The frequency band 108-117.975 MHz is also used for the GNSS ground-based augmentation system (GBAS) VHF data broadcast (VDB) frequency allocation. The assignment of VDL 4 frequencies is also expected within this band.

Presently, the frequency assignment planning for radio navigation aids (NDB/VOR/ILS) in APAC Region is based on Conclusion 12/9 of ICAO Third Asia/Pacific Regional Air Navigation (ASIA/PAC/3 RAN) Meeting. VOR/ILS assignments are published by APAC Regional Office as Frequency List 2 (for the navigations facilities (VOR/DME and ILS) in the bands of 108-117.975 MHz and 960 – 1215 MHz). Only 100 kHz channel spacing is used for VOR assignment in band 112- 117.975 MHz in the APAC region.

Assignment of Frequencies for VOR facilities is in accordance with Annex 10, Volume I, 3.3.2.1 and Volume V, 4.2.1, 4.2.3 and 4.2.3.1. The associated DME channels is as per Table A of Chapter 3 of Volume I.

The introduction of SARPs to accommodate 50 kHz channel spacing for the ILS/Localizer and the VOR was agreed in 1972 at the Seventh Air Navigation Conference. To date, 50 kHz channel spacing has not been introduced in the APAC (as well as the AFI, CAR, MID and SAM Regions).

In line with the Conclusion 12/9 of ICAO ASIA/PAC/3 RAN Meeting, the criteria applied for the selection of VOR frequencies (100 kHz channel spacing) in the APAC region are as under:

i. For VORs used for en-route flight operations, the required geographic separations are: 550 NM between 200 NM/45K co-channel facilities, 705 NM between 300 NM/45K ER co-channel facilities, and 220 NM for adjacent channel facilities.
ii. For VORs providing service up to 60K, the required geographic separation between co-channel facilities is 720 NM.
iii. For VORs used in terminal areas, (40 NM / 25 K), the required geographic separations are: 200 NM for co-channel, and 60 NM for adjacent channel, (based on 100 kHz channel spacing)

To overcome the possible shortfall of VOR channels with 100 kHz channel spacing soon, both India and ICAO presented papers at the recent SRWG/5 meeting to explore the possibility of introduction of 50 kHz channel spacing for VOR and ILS/Localizer deployments in the APAC region. In the SRWG/5 meeting, China informed that they have already implemented 50 kHz channel assignments for VOR since 2015 after consultation with airlines and evaluation of ANSP readiness. Regarding the avionics equipage status for 50 kHz channel spacing, IATA during the SRWG/5 meeting informed that air transport aircraft would not have any major issues but that needs to be cross checked with the airlines.

Objective:

The need for introduction of 50 kHz channels for the Localizer and the VOR in APAC region

The use of ILS and VOR is expected to continue for a reasonable period of time. The 100 kHz spacing at times puts a constraint for allocation of suitable frequency due to congestion thus necessitating the requirement of reducing the channel spacing to 50 kHz for accommodating a greater number of VOR/ILS operations. Channel spacing of 50 kHz in the APAC Region can thus be explored for providing adequate number of channels.

For the introduction of 50 kHz channels for the Localizer and the VOR, the provisions in Annex 10 recognizes two options:

1. General use of 50 kHz channels: General use requires that all Localizer and VOR receivers on board an aircraft is capable of tuning to these channels and operate in accordance with the equipment characteristics as specified in Doc. 9718, Volume II.

2. Restricted use of 50 kHz channels: Restricted use of 50 kHz channels is intended to refer to the limited use of 50 kHz channels by only suitably equipped aircraft and in a manner that:
    a. The performance of ILS and VOR equipment NOT capable of operating on 50 kHz channels is protected from harmful interference.
    b. A general requirement for aircraft to be equipped with 50 kHz Localizer receivers is not imposed.
    c. Operational performance of receivers capable only to operate on 100 kHz channels is not derogated.

In both cases (General use or Restricted use) Annex 10, Volume V, requires a Regional Agreement. No such Regional Agreement has been established to date for any Region. However, in Europe, frequency assignment planning is solely based on 50 kHz frequency assignment planning criteria. **Since mixed use of both 100 kHz and 50 kHz are being examined for introduction in APAC region, Regional Agreement as mandated by Annex 10 Volume V seems prudent.**

Material Input and Support

1. Since Eurocontrol states have already implemented 50 kHz separation, active cooperation/coordination with Eurocontrol is necessary to finalize the frequency planning criteria for 50 kHz implementation in APAC region.
2. At the SRWG/5 meeting, China informed that the state has already implemented 50 kHz separation. China may share the complete information including frequency planning principles for mixed operation of both 50 kHz and 100 kHz channels.
3. JCAB, MLIT, Japan may provide technical inputs to the proposal.

Reference Documents
Annex 10, Volume V Chapter 4.2 on the utilization of frequencies in the band 108 - 117.975 MHz.
Doc 9718 Volume II, ICAO Frequency Handbook (Note: ICAO NSP has developed the materials for navaids and discussed/approved at FSMP WG/11 (March 2021) meeting)
ILS:

- Annex 10, Volume I, paragraphs 3.1.3.3 and 3.1.5.3 (localizer and glide path coverage)
- Annex 10, Volume I, paragraph 3.1.6 (localizer and glide path frequency pairing).
- Annex 10, Attachment C to Volume I, paragraph 2.6 (signal ratios, localizer and glide path receiver protection requirements and distance separations).

[Note: Frequencies for ILS facilities should be selected from the list at Annex 10, Volume I, 3.1.6.1 in accordance with the regional agreement permitted under Annex 10, Volume V, 4.2.2.1. Where DME is provided, the appropriate DME channel selected from Table A at Annex 10, Volume I, Chapter 3 should be used].

VOR:

- Annex 10, Volume I, paragraphs 3.3.2 (frequency band, channel spacing.
- Annex 10, Attachment C to Volume I, paragraphs 3.4 and 3.5 (geographical separations).

[Note: Frequencies for VOR facilities should be selected at 50 kHz points, in accordance with Annex 10, Volume I, 3.3.2.1 and Volume V, 4.2.1, 4.2.3 and 4.2.3.1. The associated DME channels should be selected from Table A of Chapter 3 of Volume I].

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