

International Civil Aviation Organization



ICAO

**Twenty Fifth Meeting of the Communications/
Navigation and Surveillance Sub-group (CNS SG/25) of
APANPIRG**

Video Tele-Conference, 18 – 22 October 2021

Agenda Item 4: Aeronautical Mobile Communications Service and Aeronautical electromagnetic spectrum utilization

4.2 Review Report of the Fifth Meeting of Spectrum Review Working Group (SRWG/5);

REVIEW REPORT OF THE FIFTH MEETING OF SPECTRUM REVIEW WORKING GROUP (SRWG/5)

(Presented by the Secretariat)

SUMMARY

This paper presents the report of the Fifth Meeting of the Spectrum Review Working Group (SRWG/5) of APANPIRG, which was held via video tele-conferencing from 15 to 17 March 2021, for review and action.

1. INTRODUCTION

1.1 The Fifth Meeting of the Spectrum Review Working Group (SRWG/5) of APANPIRG was held via video tele-conferencing from *15 to 17 March 2021*. The meeting was attended by **109** participants from **18** States/Administrations and **3** International Organization.

1.2 The meeting considered **Fourteen** (14) Working Papers, **Eight** (8) Information Papers, and **Two** (2) flimsies under **Eight** Agenda Items. The working papers, information papers, flimsies, meeting report, and other resources of SRWG/5 are available at:
<https://www.icao.int/APAC/Meetings/Pages/2020-SRWG5.aspx>

2. DISCUSSION

APANPIRG/31 outcome of relevant Meetings

2.1 This paper summarized relevant information and updates with the highlight on the outcomes of SRWG/4 reviewed by CNS SG/24 and noted by APANPIRG/31.

2.2 With reference to the **ACTION ITEM 24-6 of CNS SG/24** on *Space-based VHF Communications* in 117.975-137 MHz frequency band, the Secretariat coordinated with SRWG chair, ACSICG chair and Singapore to see how to track and monitor the initiative, to take the concerns from States on a regional level. Singapore presented the latest updates to SRWG/5 on space-based VHF issue through **Flimsy 02**. The summary are flimsy 02 is provided in following section.

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Space-based VHF Communications updates – Singapore

2.3 By Flimsy 02, Singapore informed that the space-based VHF frequency compatibility study has commenced in International Telecommunications Union (ITU) Working Party 5B (WP5B) meetings and the ICAO Frequency Spectrum Management Panel (FSMP) is the designated ICAO point of liaison with ITU WP 5B. At the FSMP Working Group 11 (FSMP WG/11) meeting held from 1 to 12 March 2021, it was noted that ITU WP5B had requested for technical information pertaining to aircraft VHF and the future space-based VHF system for the purpose of the compatibility study for space-based VHF (WRC-23 Agenda Item 1.7), and Singapore also presented the latest updates on space-based VHF to FSMP WG/11.

2.4 The SRWG is the contributory body reporting through CNS SG with focus on aeronautical spectrum related issues in APAC region. The meeting discussed the point-of-contact of SRWG to track and monitor and to take the suggestions for improvement as well as concerns on the space-based VHF issue, and ICAO secretariat was requested to take this role whether the information be provided by Singapore on a voluntary basis, updates from an FSMP WG meeting, from States or from other appropriate sources. **ACTION ITEM 5-1**

Draft ICAO position for ITU WRC-23

2.5 IP/02 reviewed the agenda items for the International Telecommunication Union (ITU) World Radiocommunication Conference 2023 (WRC-23) as presented in CNS SG/24 meeting. The paper discussed points of aeronautical interest and provides the ICAO Position for these agenda items. The ICAO Position for the ITU WRC-23 was initially developed in 2020 with the assistance of the FSMP and was reviewed by the Air Navigation Commission at the seventh meeting of its 215th Session on 27 October 2020. Following the review by the Commission, it was submitted to ICAO Contracting States and relevant international organizations for comment. After a further review of the ICAO Position in light of the comments received by the Commission in April/May 2021, the ICAO Position will be reviewed and approved by the ICAO Council in June 2021.

2.6 States and international organizations were requested to make use of the ICAO Position, to the maximum extent possible, in their preparatory activities for the WRC-23 at the national level, in the activities of the regional preparatory group meetings and in the relevant meetings of the ITU, and support ICAO Position. Australia informed that ICAO draft position has been reviewed by FSMP WG/11 from 1 March 2021 to 12 March 2021 and some changes have been made in agenda item 1.2 and 1.3 related to radio altimeter.

2.7 Meeting proposed that after the lift of travel restriction, ICAO APAC Regional Office would host a regional preparatory meeting for WRC-23 upon coordination with ICAO HQ. **ACTION ITEM 5-2**

Updates on the Prominent List of the Outcomes of FSMP WG/11 Meeting - India

2.8 Through the flimsy01, India provided updates to the meeting on the outcomes of the recent 11th Working Group Meeting FSMP/WG-11 held on 1-12 March, 2021.

Review the ToR and action items - Sec

2.9 One of the main outcomes of the SRWG/4 was to make revision of the Terms of Reference (ToR). The keynote for this revision was to conduct simulation on VHF COM frequency assignment and expand its scope of work to cover Navigation systems with highlight on GBAS implementation. The CNS SG/24 meeting adopted the proposed revision by SRWG/4 through **Decision CNS SG/24/9 (SRWG/4/4)**. SRWG/5 reviewed ToR adopted by CNS SG/24 and further reviewed and updated the Action List provided with the paper. The revised Action list is attached in **Appendix A** to the paper.

Review of Regional Process

2.10 Through WP/04, the secretariat presented an overview of the frequency coordination process that is being used in the APAC Region. ICAO APAC Regional Office is maintaining Frequency List 1, 2 on Frequency Manager, which is a standalone application, while the Frequency List 3 is with Frequency Finder, the free ICAO tool provided to States/Administrations and Regional Office by HQ, which is the basis for global database. With the support of member States, ICAO APAC Regional Office has successfully registered hundreds of frequencies submitted via e-submission to global database. The ICAO Secretariat presented some administrative measures that have been implemented to improve the efficiency of the current process with the adoption of conclusion **CNS SG/24/8(SRWG/4/3) Establishment of a list of focal points responsible for the operation of Frequency Finder in States. Frequency Finder installation status table** updated by the meeting is provided in the **Appendix B**. Meeting was informed that ICAO holds the view that frequency assignments that have been coordinated with ICAO have priority over those that have not been coordinated. For reported interference caused by frequency implemented by States/Administrations without coordination and registration with Regional Office, it may be considered as discrepancy to the regional planning requirements, and be further identified as deficiency upon harmful impact report on international operations

2.11 Australia queried about the date of release of new version of Frequency Finder (FF) which was presented by ICAO Headquarters in WP/12. Australia further asked if the computer that has Frequency Finder installed is connected to firewall, would there be a problem connecting with the server in ICAO HQ. ICAO secretariat responded that as per WP/12, once ICAO plots the interference areas in the Frequency Finder tool, and has performed enough testing to ensure the new release is error free to the extent possible, the latest version will be released to States. The meeting was also informed that ICAO APAC Regional Office has already installed new NAV demo module and it is working well. Regarding the firewall query, it was noted that as of the Frequency Finder update performed in January/February this year, the Runtime version used by States communicates with the ICAO Server using the https protocol (TCP port 443), which should be open in most firewalls.

Propose use of terrain data for frequency assignment planning in Frequency Finder - Thailand

2.12 By WP/09, Thailand proposed to explore the possibilities and benefits of using terrain data in Frequency Finder to increase the efficiency in frequency assignment planning for the frequency band 117.975 – 137 MHz based on the result of the analysis conducted by Thailand. Thailand has been using an additional radio frequency propagation software tool for frequency assignment planning purposes in addition to FF. Thailand shared that for a requirement of a new frequency to support the air traffic control operation at U-Tapao International airport, 127.200 MHz was requested to support approach control service. The result from Frequency Finder, where terrain is not taken into account, showed an overlap in coverage for the facility in Chiang Mai and U-Tapao, making the reuse of the frequency impossible due to co-channel interference. However, when the alternative software was used, where terrain was taken into account, the overlapping coverage area between the two facilities was

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reduced, allowing for reuse of the frequency. As the results indicated, there is a potential to increase the number of VHF channels for future assignment.

2.13 ICAO secretariat reminded the meeting about the role of Frequency Finder. The meeting was informed that Frequency Finder can be considered as electronics version of Frequency List-3 managed by ICAO and a tool for frequency coordination. The need for different States may varies based on geographical location. Therefore, States may use additional tools for internal frequency requirements need and analysis. It was further reminded that Frequency Finder has a function of forced input. In cases where States are assured that no interference will result from a particular frequency assignment, the frequency can be forcibly entered into Frequency Finder after proper coordination. ICAO secretariat was requested to inform ICAO HQs to consider the feasibility incorporating terrain data into future version of Frequency Finder. **ACTION ITEM 5-4**

Updating process of Frequency List no. 1 and 2 - Indonesia

2.14 By WP/10, Indonesia reviewed updating process and coordination procedure for aeronautical facilities and services operating in the Frequency List No. 1 and Frequency List No. 2. Coordination and assignment for Frequency List No. 3 is already using ICAO tools named Frequency Finder but the assignment for Frequency List No. 1 and 2 are still going through the State Letter, and the update list is published by ICAO Regional Office through the documents.

2.15 Indonesia informed that through State Letter dated *January 14th 2016*, ICAO Regional Office for APAC delivered a letter regarding the Frequency List No. 1, 2 and 3. Following up, Indonesia responded by sending an update of the Frequency List for CNS facilities through State Letter dated *April 12th 2016*. On April 1st 2020, by State Letter ICAO inform State members that Frequency Lists have been updated and published through documents Frequency List No. 1 Thirty-Fourth edition and Frequency List No. 2 Thirty-Third edition. However, there are differences in the numbers of data from those documents compared to frequency allocation which has been reported by Indonesia in 2016. Accordingly, Indonesia coordinated with ICAO APAC Regional Office to clarify the issue.

2.16 The ICAO secretariat informed the meeting that ICAO has always encouraged States to update Frequency List 1, 2, and 3. The request of Indonesia to update Frequency List 1 and 2 was in batch processing, which were delayed because of limited resources at ICAO. States were urged to update their frequency list regularly and in timely manner with the coordination with ICAO APAC Regional Office. However, ICAO secretariat informed the meeting that ICAO APAC Regional Office has already updated the Frequency List-1 for Indonesia and Frequency List-2 is being updated.

Review of VOR frequency assignment criteria in APAC region - India

2.17 India shared the experience in VOR frequency allocations and anticipated shortfall of new VOR channels by WP/11. In India, around 164 VOR frequency assignments are already existing. Further, there are growing needs for increased number of VOR channels. India is facing constraints to identify suitable candidate frequencies. India proposed consideration of following measures in APAC region to probably ease the shortfall of VOR channels:

- The sub-band 108-111.975 (presently used for ILS localizer in the APAC region) is shared between ILS localizer and VOR in an interleaved frequency arrangement for Short range Terminal VOR.

- Presently, the frequencies for VOR operation in the sub-band are allocated with 100 kHz channel spacing. Channel spacing of 50 kHz in the APAC Region can be considered for providing adequate number of channels.
- The implementation of above measures requires regional agreements and APANPIRG mandate.

Introduction of 50 kHz Channel Spacing in the APAC region

2.18 By IP/08, ICAO secretariat presented material on the use of 50 kHz channels for the ILS/Localizer and VOR. To date, 50 kHz channel spacing has not been introduced in the APAC (as well as the AFI, CAR, MID and SAM Regions). For the introduction of 50 kHz channels for the Localizer and the VOR, the provisions in Annex 10 recognizes two options: *General use of 50 kHz channels and restricted use of 50 kHz channels*. In both cases Annex 10, volume V requires a Regional Agreement. No such Regional Agreement has been established to date for any Region.

2.19 In Europe, frequency assignment planning is solely based on 50 kHz frequency assignment planning criteria. Considering that the implementation of 50 kHz channels has taken place in some Regions without the need for any formal Regional Agreement, it may be argued that such implementation can be agreed on a Regional level without the need for a formal Regional Agreement and considering the long period that has been elapsed since the introduction of 50 kHz channel spacing characteristics, it may be argued that general use of equipment only capable to tune to 100 kHz channels. States and possibly also IATA may provide relevant information. China informed that they have already implemented 50 kHz channel assignments for VOR since 2014 after consultation with airlines and evaluation of ANSP readiness. Regarding the avionics equipage status for 50 kHz channel spacing, IATA informed that air transport aircraft would not have any major issues but they need to cross check with the airlines.

2.20 ICAO secretariat proposed to have an ad-hoc group to be led by India to further explore the issue along with China, and IATA. This ad-hoc group is tasked to provide the inputs to SRWG/6. Mr. Robert Witzel and Thailand presented their interest to join the group. Secretariat will coordinate with Japan to participate in ad-hoc group, and set up the discussion at a preferable time for members. **ACTION ITEM 5-5.** The necessary coordination is done with Japan and Japan is participating in the ad-ho group.

Updates to Frequency Finder

2.21 By WP/12, Ms. Fabiola Chouha from ICAO Headquarters shared the latest updates brought to Frequency Finder. The module for the coordination of SSR Mode S Interrogator Identifier codes has been implemented and is in operation. The work on the development of module for VHF navigation systems (ILS, VOR, DME and GBAS) is near completion and is under evaluation. This module has incorporated the planning criteria for ILS, VOR and DME and GBAS based on Annex 10 - Aeronautical Telecommunications - Volume I - Radio Navigational Aids and the updates of the Handbook on Radio Frequency Spectrum Requirements for Civil Aviation (DOC 9718), Volume II, as recently agreed by NSP and FSMP. The export function through e-submission in the VHF-COM was improved and introduced in VHF-NAV and can now provide the State (user) with the capabilities to provides brief instructions to the user (the State) on the next step, the State (user) can through a dialogue box, consult the excel file prior submission to the ICAO Regional Office (RO) and the State would then follow the procedure of sending an email to the RO with the attached excel file through the email software she/he uses. This same function has also been introduced in the SSR module in order to be consistent with the two other modules.

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2.22 The import function was also improved in the VHF-COM and introduced in the VHF-NAV and SSR modules to provide the RO with the possibility to select the file and upload it to the server after having saved the excel file received from the State. Interface standardization and consistency among modules was also another important element that was implemented for the new version of Frequency finder. Plotting interference areas in the VHF- Navigation systems (VHF-NAV) need to also be implemented in the NAV module. Frequency Finder will therefore be modified to plot interference areas on the google map, in a manner similar to the COM and SSR II modules. ICAO plans to implement this new functionality in the Frequency Finder tool before releasing the latest version to States.

2.23 Secretariat also informed the meeting about an online course development related to frequency management for civil aviation. This course will provide the background necessary to ensure that Officials from Member States are adequately prepared for the workshops by providing the necessary frequency management basics. The overall ICAO competency-based training methodology will support in this regard. It will serve as the prerequisite to the regional workshops that ICAO HQ organizes based on requests from Regional Offices and States. In addition, it will promote the frequency management knowledge to a broad, worldwide, targeted audience. Secretariat further informed that the web-course material is currently under development, and it will be ready for launch by the end of the year 2021. Prior to the launch, the web-course will require validation by target expert audience to provide feedback on the course. It was informed by Ms. Fabiola that the tool will be available at the end of this year and interested States may contact Regional Officers at ICAO APAC Regional Office for course registration.

2.24 The meeting was informed that the delivery and implementation of Frequency Finder NAV module (Frequency List 2) would follow a similar practice for COM module (Frequency List 3), and the installation management of Frequency Finder in a States would be based on the coordination between ICAO APAC Regional Office and the respective CAA.

Frequency Assignment Planning Tool to support communication via Satellite and New Emerging Technologies- Thailand

2.25 Thailand by WP/13 proposed to have in place frequency assignment planning tool to support voice communication via satellite and emerging technologies. New technologies such as High-altitude platform station (HAPS) system are now emerging that could potentially be used as a communication relay platform to provide communication between aircraft and air traffic control centres in remote areas or oceanic areas. WRC have agreed to allocate frequencies for worldwide use by HAPS. In APAC, the procedure and software tool used to assist with frequency assignment planning have been mainly for terrestrial-based VHF communication services. Frequency assignment planning tool to support voice communication using satellite and emerging technologies as relay platform is necessary. The meeting requested ICAO to take appropriate follow up action to improve the awareness on the potential of emerging technologies and the necessity to consider the development of software tool like Frequency Finder to support the frequency assignment planning at regional office in future. **ACTION ITEM 5-6.** The meeting also concluded to wait for the outcome of WRC-23 or relevant ICAO SARPs in place for further action on frequency assignment planning tool to support voice communication using satellite and emerging technologies.

Draft of Asia Pacific Frequency Management Guidance Material- China

2.26 SRWG/4 considered the development of a regional guidance material on aeronautical frequency spectrum management for APAC States. The current 26-page draft document was presented. The meeting thanked China for their effort in drafting the Asia Pacific Frequency Management

Guidance Material. It was informed by ICAO secretariat that the guidance material started with VHF COM and the section on NAV will be drafted later. However, there will not be any surveillance part as these frequencies are universal.

VHF Com Simulation for 2030.

2.27 By WP/05, the secretariat presented a plan to simulate the VHF COM for APAC in 2030. CNS SG/24 adopted the **Conclusion CNS SG/24/7(SRWG/4/2) – Simulation of VHF COM Frequency requirements for next 10 years** to conduct a new round of simulation for VHF COM frequency assignment based on new operational requirements of States to 2030 as necessary. The primary purpose of this simulation is to determine if a congestion in the use of frequencies can be foreseen that would require the implementation of 8.33 kHz channel spacing in any parts of the APAC Region. States were requested to check if all frequency assignments that are in use are also registered in the Frequency List 3. Considering not all States have the installation of Frequency Finder, a copy of Frequency List 3 for a State is available at Regional Office upon request. The meeting invited States/Administrations to submit these requirements to the APAC Regional Office by **15 June 2021**. On the basis of requirement, the APAC Regional Office will undertake an analysis that is aimed at determining whether these requirements can be assigned a frequency within the available 25 kHz channels. Based on European experience, the introduction of 8.33 kHz channel separation would require a retrofit of airborne/ground equipment. ICAO secretariat will issue State Letter with clear actions and guidance for States to submit necessary data for VHF simulation, as a response to the Conclusion CNS SG/24/7. **ACTION ITEM 5-7. The State Letter Ref: T 8/8.6-AP058/21 (CNS) dated 9 April 2021 Subject: Simulation of VHF COM Frequency requirements for next 10 years** has been issued by ICAO Secretariat. Responses from **7 States/Administrations** namely *China, Hong Kong China, Japan, Republic of Korea, Singapore, Thailand and USA* have been received.

Indian VHF Projections for 2030 Based On Future Operational Requirements and Need for Objective Review of 8.33 kHz Channel Spacing Requirements in APAC Region - India

2.28 By WP/07, India presented Indian VHF projections for 2030 based on future operational requirements and objective review to implement 8.33 kHz channel spacing in a limited manner in APAC region. India had projected requirement of around 130 new frequencies for the period 2015-20, whereas the actual assignments for various services are around 204 frequencies. In India, presently a total of around 1000 VHF frequencies are operational and the requirement is further expected to grow significantly in the coming years. Given the trends, 50-60 new VHF assignments per year are envisaged as of now. The total number of new frequency assignments for the period 2021-2030 in India for Civil Aviation use would be around 600, besides additional requirements for military organizations. Though the projections are for a ten-year period up to 2030, but the jump may be exponential. It may be inferred that the continuing trends predict VHF congestion over the period may be beyond 2023-25, which may necessitate the introduction of 8.33 kHz channel spacing in the APAC region at least for some States. India suggested that SRWG should deliberate and simulate a transition scenario for voice communication within APAC region from the current 25 kHz to 8.33 kHz channel spacing by taking into consideration the lead time for implementation and equipage. The meeting was further informed that in 2021 it is difficult to predict surge in the usage of frequencies. It was decided by the meeting to review the outcome of the simulation before any further action is taken. IATA suggested to have a transition plan for future. If India predicts need of 8.33 kHz spacing need in 2030, it should be done in timeline approach to ensure a buffer window for operators, normally 5 years.

Review POC for States - Sec (WP/06)

2.29 By WP/06, ICAO Secretariat informed that current process for frequency coordination is based on a minimum bureaucracy when performing the frequency coordination and registration.

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However, due to the turnover of staff in ICAO APAC Regional Office and in civil aviation organization of States, regular review of the POC is deemed necessary. A drafted POC list based on participant list of SRWG/4 was provided and it was suggested to nominate one main POC plus two associate POCs for one State/Administration which is capable to do so, to ensure the effective communication between Regional Office and the State/Administration, for normal frequency coordination and emergency coordination under unforeseeable harmful frequency interference to international operations. The operator of Frequency Finder could be one of the POCs. It was informed by ICAO secretariat that many states sent email using yahoo or Gmail which are not organization email. In this case private emails should be registered by POC with ICAO. In case of any change the revised information should be send to ICAO by registered email of states with ICAO. ICAO wants to do coordination with states with minimum bureaucracy but if state wish they may send it by state letter too.

2.30 In response to a query of Australia if states can contact each other by the POC directly without the information to ICAO secretariat, ICAO secretariat informed that for operational issues states may contact each other directly but for frequency coordination they should go through ICAO secretariat only. It was further stated that since not all states are present in the meeting, ICAO secretariat will issue a state letter about updating the POC list by states. USA suggested to create a POC for all CNS matters as it is for ATM and compile them in APANPIRG POC. ICAO secretariat appreciated the suggestion and decided to take necessary action for that. **ACTION ITEM 5-8.** The **State Letter Ref:** T 8/8.9 - AP057/21(CNS) dated 8 April 2021 Subject: Focal Point for Frequency Coordination was sent by ICAO Secretariat. **Response from 16 States** have been received namely Australia, Cambodia, China, Hong Kong China, Fiji, India, Indonesia, Japan, Lao PDR, Pakistan, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, and USA

Actions Taken in France to Mitigate Interference into The Radio Altimeters Systems from 5G/MFCN in the band 3.4-3.8 GHz - France (WP/08)

2.31 Meeting was informed that in June 2020, ICAO secretary at HQ was brought the attention by the FSMP members a Liaison Statement informing ECC about the issue of potential interference to aeronautical Radio Altimeters operating in the 4200 - 4400 MHz frequency band, caused by IMT systems currently operating or planned to operate in the frequency band 3400 - 3800 MHz in Europe. The recent RTCA Report SC-239 raised another risk from MFCN (5G in the band 3.7-3.98 GHz) into some radio altimeters. DGAC (French Civil Aviation) and the French Aeronautical and Space Industries Group (GIFAS) considered that there is a need to have more thorough assessment of the risk of 5G interference in the frequency band 3.4-3.8 GHz and a need to clarify the assumptions to be used. Three immediate preliminary measures have been decided for the protection of radio altimeters. It includes implementation of only downward tilt, take measures to avoid grating lobes as far as practicable, and special protection zones applied to all IFR aerodromes and to some helicopter platforms. In phase two from February 2021, it was decided to limit applications of mitigation techniques only to airport with runway CAT II or/and CAT III, also to heliports previously identified. France concluded that although DGAC has received a lot of support from the aeronautical world, there is no much involvement of other European CAAs. The Japanese mitigations have shown that France is not alone in the world, but this situation will not be sustainable without active support from European countries. Australia thanked France for the useful information and expressed their intention to work with France for the preparation of technical framework on 5G licensing so that appropriate document can be prepared without harmful specifications for radio altimeter.

Protection of interference to radio altimeters from 5G applications in the Asia-pacific-Boeing Australia

2.32 By IP/03, Australia informed that 5G technology applications has an ability to transmit vast amounts of data across multiple devices. The 5G broader spectrum is in C Band and Radio altimeters are allocated to the nearby 4 200-4 400 MHz frequency band. The higher power and widespread terrestrial usage of 5G applications can cause harmful interference to the operation of aviation radio altimeters in the adjacent frequency band. The European Radio Regulators agreed to establish a draft Working Item that calls for compatibility studies between 5G in the 3 400-3 800 MHz frequency range with radio altimeters in the 4 200-4 400 MHz frequency band. Australian spectrum regulators proposed their re-planning of the 3 700-4 200 MHz frequency range. EASA published a Continuation Airworthiness Review Item (CARI) ‘Investigation into vulnerability of Radio Altimeter to interference from 5G Telecommunications Base Stations’. The New Zealand Civil Aviation Authority released a safety message to operators on 17 November 2020 ‘Do not use 5G devices inflight if you have a radar altimeter’. The Canadian regulator, Innovation, Science and Economic Development (ISED) proposes to allow terrestrial 5G up to 3 980 MHz and then apply a 220 MHz separation band to protect radio altimeters. The General Civil Aviation Authority (GCAA), UAE published Safety Alert 2021-01, Requirements to mitigate 5G Interference Operational Risks. Boeing Stated that it is global issue and consequently necessary to address this risk for the Asia-Pacific region. ICAO regional administrations are encouraged to work with respective national spectrum regulators to build awareness, recommend temporary precautionary mitigation measures and collaborate with 5G operators to share technical characteristics and consider adoption of temporary limitations. Japan has also implemented mitigations by using less power of 5G base station. It was informed by France that as per ITU there is no regulation for power limit from the base station. ICAO was requested to take necessary follow up action at regional level, to support CAAs working with State’s spectrum regulators to avoid the future safety issues on radio altimeter due to 5G implementation. **ACTION ITEM 5-9.** ICAO Headquarter issued **State Letter Ref.:** SP 74/1-21/22 dated 25th March 2021 on the subject: Potential safety concerns regarding interference to radio altimeters.

Status report radio frequency interference in the band 117.975 – 137 MHz- Thailand

2.33 By IP/04, Thailand presented a status report on the current interference situation in the band 117.975 – 137 MHz in Thailand. Radio frequency interferences from unlicensed FM community radio stations have been one of the major issues affecting the safety of aircraft operating into Thailand into major and high traffic density airports. The FM community radio stations were competing with each other to gain a larger audience by increasing their transmitter power and mounting their antennas high to boost the coverage area. The Office of the National Broadcasting and Telecommunication Commission (NBTC), the telecommunication regulator, collaborated with Aeronautical Radio of Thailand (AEROTHAI) to resolve the interference issue by stakeholder engagement. This encompassed a range of activities such as advising and providing consultation on technical issues, educating the radio stations owners on the effect of radio interference on aircraft operations, and air navigation safety zone declaration. A database of radio stations located around the airport was created to contact station owners for prompt remedial action. Spare frequencies were also assigned by NBTC to AEROTHAI. The number of interferences from 2016 to 2020 was provided in a graph which indicated that after measures were implemented there is a downward trend to the number of interferences.

Protection of Instrument Landing System (ILS) critical and sensitive areas in three-dimensional and ILS facility performance category requirements - Hong Kong, China

2.34 Hong Kong, China shared (IP/05) their observations on potential impacts of departing aircraft on arriving aircraft under runway mixed-mode operation with respect to LOC signal fluctuations. There were cases reported by pilots of arriving aircraft at the Hong Kong International Airport (HKIA) that there were Localizer (LOC) signal fluctuations when departing aircraft on the same runway flew over the LOC antenna which occurred during single runway mixed-mode operation.

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States/Administrations are invited to note the importance of extending protection of ILS CA/SA from 2D (horizontal) context to 3D, especially for LOC. It has been presented in a WP/21 and discussed in the CNS SG/24 of APANPIRG. In view of the significance in the protection of ILS CA/SA in 3D, CNS SG/24 adopted the Conclusion CNS SG/24/11 Protection of ILS Critical and Sensitive Areas in Three Dimensional and ICAO APAC Regional Office forwarded the WP/21 and its presentation file to secretary of the ICAO NSP for consideration by Conventional Nav-aids and Testing Working Group (CNTWG).

Analysis of GPS signals interference based on QAR data - China

2.35 By IP/06, China introduced a new initiative in detecting and positioning the source of GPS Radio Frequency Interferences. China described that the use of QAR data analysis has achieved positive results. In order to detect and identify the sources of GPS radio frequency interferences effectively, CAAC used the quick access recorder (QAR) data collected by the Flight Operational Quality Assurance (FOQA) station. CAAC verified and confirmed that the special monitoring of GPS signal interference could be done on the Boeing B737NG, B757, Airbus A320 series and A330. In 2020, the QAR data analysis application had been identified and located dozens of GPS interference sources such as GPS signal jammer installed in parking lots or personal vehicles.

Operation of ILS/DMEs Using the Same Frequency but Different Identifiers at Beijing Daxing International Airport - China

2.36 China introduced the operation of ILS/DMEs using the same frequency with different identifiers at Beijing Daxing International Airport in IP/07, as a possible way to improve frequency utilization efficiency. Beijing Daxing International Airport has three north-south runways and one east-west runway. Due to the shortage of radio frequency resources, for the three north-south runways, the ILS/DMEs at both ends of each runway use the same frequency with different identifiers. By installing an interlock system, it is ensured that if one direction ILS/DME is in operation, the other remains shut-down simultaneously. China notified that when switching directions, the navigation signal continuity is interrupted, and air traffic control needs to optimize and adjust procedures so as to adapt to this operation mode. Mr. Robert shared that the interference and coordination range for localizer is very small, therefore frequency congestion would not be an issue. The issue will be more decrease if 50 kHz channel spacing is used. China clarified that China had implemented 50 kHz channel spacing for ILS/VOR.

Date and Venue for the Next Meeting

2.37 Meeting was agreed that FF workshop will be conducted after new release of Frequency Finder by ICAO along with online course proposed by ICAO HQ for new release of Frequency Finder is available. **ACTION ITEM 5-10.** The meeting recognized the need to organize a face to face meeting in 2022 to review the outcome of simulations for States and progress the tasks listed in the Terms of Reference. Next meetings were tentatively scheduled as follows:

- 5-day workshop on Frequency Finder (Advanced training), 2022.
- SRWG/6: 1 March - 3 March 2022.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper and follow up on the relevant matters; and
- b) discuss any relevant matter as appropriate.

CNS SG/25
Appendix A to WP/08

Reference	Who	What	Due date	Status	Completed on	Result	Comment
A 2-7	All	to check consistency between global database and frequency list 3	on going			Information in original Frequency List3 now kept and updated in FF	
A 4-4	All	Experience sharing on Frequency Finder use	30-Mar-21	Open		In progress	
A 4-5	All	States to provide ICAO Regional Office with information of all facilities that are in operation to improve the currency of Frequency lists	30-Mar-21	Open		In progress	
A 4-6	ICAO	Frequency Finder workshop on COM module, and new NAV Module (Mode S SSR II Code module as necessary).	30-Mar-21	Open		Under coordination subject to the pandemic situation	
A 4-7	All, Robert Witzten	Creat ad hoc group to draft Table of Content first, then develop the regional guidance material on aeronautical frequency spectrum management in a shared way by States.	30-Mar-22	Open		CAAC volunteered to share a draft and lead the adhoc group. Decided to be contined in SRWG/5.	1.follow up VTC on 3 July. 2. Ad hoc drafting group meeting with CAAC on 10 July
A4-8	Robert Witzten, All	to run new VHF COM simulations	20-May-21	Open		To be conducted with required raw data submission from States/Administration	
A5-1	ICAO, States	ICAO secretariat acts as a point-of-contact of SRWG to track and monitor and to take the suggestions for improvement as well as concerns on the space-based VHF issue whether the information be provided by Singapore on a voluntary basis, updates from an FSMP WG meeting, from States or from other appropriate sources	21-Mar-22	Open			
A5-2	ICAO	to host a regional WRC-23 preparatory meeting upon coordination with ICAO HQ after lifting of travel restriction.	22-Nov-21	Open			
A5-3	ICAO	to resolve firewall query of Australia for FF installation and use.	31-Mar-21	Open			
A5-4	ICAO	to inform ICAO HQ to consider the feasibility incorporating terrain data into future version of Frequency Finder	30-Apr-21	Open			
A5-5	ICAO, India, Thailand, China, Japan, Mr. Robert Witzten	ad-hoc group led by India 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. To coordinate with Japan to participate in ad-hoc group.	31-Mar-22	Open			

CNS SG/25
Appendix A to WP/08

Reference	Who	What	Due date	Status	Completed on	Result	Comment
A5-6	ICAO	to take appropriate follow up action to improve the awareness on the potential of emerging technologies and the necessity to consider the development of software tool like Frequency Finder to support the frequency assignment planning at regional office in future.	31-Mar-22	Open			
A5-7	ICAO	to issue a State Letter with clear actions and guidance for States to submit necessary data for VHF simulation, as a response to the Conclusion CNS SG/24/7	31-Mar-21	Open			
A5-8	ICAO, States	to create a POC for all CNS matters as it is for ATM and compile them in APANPIRG POC.	31-Dec-21	Open			
A5-9	ICAO	to take necessary follow up action at regional level, to support CAAs working with State's spectrum regulators to avoid the future safety issues on radio altimeter due to 5G implementation.	31-Mar-22	Open			
A5-10	ICAO	to conduct a workshop after new release of FF along with online course proposed by ICAO HQ for new release of FF is available	31-Mar-22	Open			

FREQUENCY FINDER INSTALLATION STATUS IN APAC

No.	States/ Administrations	FF Installed?	FF version	Organization name	Contact	Remark
1	Australia	Yes	FF2020.06R	AsA	Spencer.Robinson@AirservicesAustralia.com	
2	China	Yes	FF2020.04R	CAAC	zhangjia@caac.gov.cn	
3	India	Yes	FF2020.04R	AAI	Freq Mgmt, CHQ afsmcnschq@AAI.AERO	
4	Indonesia	Yes	FF2020.04R	DGCA-INS	Abdul Aziz azizsabdul@gmail.com	
5	Malaysia	Yes	FF2020.04R	CAAM	Syahroni Bin Chek Rus syahroni@caam.gov.my	
6	Thailand	Yes	FF2020.04R	CAAT	Mr. Chavalit Ithiapa chavalit.i@caat.or.th	