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WORKING PAPER

TWELFTH AIR NAVIGATION CONFERENCE

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Agenda Item 6: Future direction
6.1: Implementation plans and methodologies

STRATEGIC APPROACH TO SECURE AVIATION FREQUENCY SPECTRUM

(Presented by Japan)

SUMMARY

This working paper highlights some invisible but critical issues accompanying the ATM modernization, and proposes actions to support the steady deployment of the future systems in terms of securing frequency spectrum for aviation safety services.

Recognizing the state of aviation spectrum in the environment where a variety of spectrum users for different radio services aggressively compete for their share, the surging need for a practical and effective measures to secure aviation spectrum and the role of States in International Telecommunication Union (ITU) fora, such spectrum issues need to be challenged collaboratively by ICAO, States and industry in a more strategic approach.

Action: The Conference is invited to consider this working paper and agree to the proposals in paragraph 3.

1. INTRODUCTION

1.1 The availability of frequency spectrum for aeronautical safety services is vital for the effective implementation and stable operation of both future and existing air navigation systems. ICAO, as a sole specialized UN body responsible for the sound development of international civil aviation, is working on aviation wide spectrum strategy and policy to ensure the availability of adequate frequency spectrum for the air navigation systems for the interest of aviation safety and efficiency. However, as demand of frequency spectrum, which is finite resource for the mankind, increases for the use of commercial services, frequency spectrum for aviation safety services is not necessarily protected as before and is subject to the risk of failing to obtain the required spectrum band.

1.2 WP/3 introduces the amendment of *Global Air Navigation Capacity and Efficiency Plan* (GANP, Doc 9750), aviation system block upgrades (ASBUs) framework and technology roadmaps, which function as a new planning and implementation vehicle for the ATM modernization at a global context. The importance of securing frequency spectrum for aviation safety use will increase as air navigation systems evolve to satisfy both operational and safety requirements of highly-integrated ATM operation.

1.3 The paper also remarks the need for frequency spectrum strategy, being ended with a proposed action (ref. paragraphs 4.4 and 7.3 d) of WP/3).

1.4 This working paper addresses frequency spectrum challenges for the whole aviation community, based on Japan's recent experiences in frequency coordination, ITU meetings and ICAO panels. The subject of

this paper spans all the ATM improvement envisaged in ASBUs to be enabled by CNS systems, all the life cycle of those systems and all the States concerned.

2. DISCUSSION

2.1 History and trend of the status of aviation safety spectrum

2.1.1 Historically, frequency spectrum for the use of aviation safety was, in general, allocated exclusively or highly prioritized under ITU constitution and pertinent radio regulations. Due to the increasing demand of frequency bands for various radio communication services and the aggressive requests from non-aviation sectors to release such aviation-preferred allocations, ITU/WRC, as a matter of fact, has released such exclusive allocations to non-aviation-safety services with certain condition of giving priority to aviation safety services. Such release can render aviation systems subject to the high probability of interference from other radio stations or incompatibility among multi-systems of different services in a common band. Failure to protect the aviation safety spectrum can jeopardize safety, efficiency and regularity of air navigation system.

2.1.2 It is observed that the change of operation and management regime of air navigation service provision in the last few decades, for instance, privatization or corporatization, has brought a shift in States' role and authority in terms of operational control of aeronautical radio systems and management policy on radio spectrum for such systems. Another observation is that some aviation systems comprise subsystems under control of different entities of different States. For instance, a satellite ATS data link communication system is composed of communication satellites by satellite operators, terrestrial communication network by data link service providers, ATC end systems by air navigation service providers (ANSPs), and airborne systems by aircraft operators. Thus, these subsystems belong to different entities of different States and are subject to different regulations of those States.

2.1.3 Securing required spectrum for the future air navigation system with certainty not solely enables ICAO and industry to timely and appropriately develop technical standards, but also allows ATM stakeholders for efficient implementation and stable operation of the future systems with confidence in future spectrum availability. Besides, industry and research institutes will be able to conduct research and development (R&D) with both planned resource allocation and adequate lead time.

2.2 ICAO strategy and policy guidance for securing aviation frequency spectrum

2.2.1 ICAO has so far developed and updated its strategy and policy materials for aviation frequency spectrum, which are packed in the *Handbook on Radio Frequency Spectrum Requirements for Civil Aviation* (Doc 9718). The Handbook as a supplement to the Standards and Recommended Practices (SARPs), assists civil aviation authorities and ANSPs, in coordinating with radio regulatory authorities in their States in preparing their national positions at ITU meetings. Below are the salient parts of the Handbook, which relate to the subject of this paper.

a) Chapter 7: "ICAO policy" on both the overall statement and the use of each aeronautical frequency band, by referencing to corresponding ITU Radio Regulations. New element, "Strategic Objective" is now under deliberation by ICAO to provide the strategic statement with each "ICAO Policy".

b) Chapter 8: Future spectrum requirements for five future systems; GNSS augmentation, synthetic vision system, HF datalink, ADS-B, and generic future communication systems.

c) Attachment E: "ICAO strategy" for establishment and promotion of "ICAO position" for ITU World Radio Conferences (WRCs). The attachment includes *Assembly Resolution A36-25*, a high-level framework for the development and support of "ICAO position".

d) Attachment F: the latest “ICAO position” for WRC, which undergoes regular amendment for each round of WRCs.

2.2.2 All the parts above in Doc 9718 have been of great assistance to States when they consider safeguarding spectrum for air traffic services as well as preparing for negotiations at ITU meetings. However, in light of the reader-friendliness for both policy makers and spectrum negotiators, the world-wide application of ASBUs framework to build up global ATM systems, the need for interdependency among ICAO documents concerned, a more strategic approach should be taken collaboratively by ICAO, States and industry so that they can make the best use of the common policy and guiding documents to reap the maximum benefit. Appendix A to this paper explains Doc 9718 structure with brief remarks on improvement of the said four sections and the following sections provides for more detailed observation from specific standpoints.

2.3 Effective sharing and presentation of ICAO policy and strategy

2.3.1 At present, Doc 9718 functions as a fundamental guidance for aviation personnel when dealing with spectrum issues. From recent Japan’s experiences in ITU conferences, it is crucial that such key materials as listed above, need to be recognized for effective sharing and usage among ATM stakeholders, being not limited to civil aviation authority, when negotiating with radio regulatory authorities of their own States.

2.3.2 In addition, it is important that aviation sector appeals not only to radio regulatory authorities but also to non-aviation sectors on aviation position (Doc 9718, Attachment F) together with its long-term spectrum requirement (Doc 9718, Chapter 8), hopefully with more quantified data rather than descriptive one, to make them understand clearly what, how much volume, and when aviation demand. An effort to make a projection of aviation spectrum demand to cover the ASBU blocks is needed when properly arguing the future aviation requirements.

2.3.3 Considering the efficacy and efficiency of the sharing and demonstration of aviation position and spectrum requirement, it is suggested that ICAO consider a methodology or improvement of current scheme to effectively share and publicize ICAO materials among ATM stakeholders.

2.4 Systematized documentation to clearly explain aviation frequency requirement

2.4.1 In order to properly appeal aviation frequency requirement to non-aviation sectors as well as radio regulatory authorities, aviation sector needs to demonstrate the requirements in a logical and systematic manner based on the internationally agreed materials. Such systematization of relevant documents will enable States personnel involved in system implementation to carry out planning and implementation systematically. Also, this will allow standardization bodies and industry to have assurance in future access to spectrum concerned, and future investment in the R&D of systems as well.

2.4.2 Since ATM community is pursuing the ultimate goal “One sky” in line with *Global ATM Operational Concept* (Doc 9854) and its appendices, these materials need to have coherence in frequency spectrum perspective as well as system and operational requirement. In addition, enlisting just five systems in Chapter 8 “Future spectrum requirement” and intricate usage of terminology such as “ICAO Strategy”, “Strategic Objectives”, “ICAO policy”, “ICAO position” in the current Doc 9718 should be reconsidered when further amending Doc 9718, with expected timeline by the 38th Session of ICAO Assembly (in 2013) or by the time of finalizing ICAO position for WRC-15 (by 2014).

2.4.3 With the above observation, it is proposed that structure and contents of Doc 9718 be reviewed from ASBUs deployment perspective. Hyperlink between ASBUs and its subjacent supporting materials and parts of Doc 9718 on an e-platform is suggested as an option which provides coherency between them.

2.5 **Aviation's presence in ITU fora**

2.5.1 At the next WRC, some critical issues which affect ASBUs deployment such as unmanned aircraft system (UAS) and wireless avionics intra-communication systems (WAIC), are to be planned for discussion. Subject to the evolving discussion at different States and regions toward WRC-15, and the progress of ATM modernization worldwide, new issues or new agenda items which critically challenge aviation spectrum may arise in the coming years. This implies that States need to be vigilant for the salient or underlying spectrum challenges.

2.5.2 As the history of WRC-related meetings indicates, in practice, it is the very States that exercise an influential power when formulating WRC Resolutions. Whereas, ICAO, being accorded an observer status, assists States in making their State position, and submit aviation position in the form of Information Paper under limited right (ref. Chapter 3 and 7-Ⅲ of Doc 9718).

2.5.3 In this context, it is suggested that ATM stakeholders, not limited to aviation authorities, recognize *Assembly Resolution A36-25* and influence of States' contribution at ITU for a (ref. Appendix B). Then, they are encouraged to act more vigorously in ITU fora as State delegate, as practically as possible, making the best use of ICAO materials including the GANP, Doc 9718 and SARPs. ICAO, having successfully conducted Special Implementation Programme (SIP) to assist States in preparing for WRC, should continue to allocate adequate resources to work programmes of this subject so that States and industry can best contribute to aviation policy making with adequate knowledge and increased awareness of the spectrum issues.

3. **CONCLUSION**

3.1 Based on the consideration in paragraphs 2.2 through to 2.5, and with reference to Item d), Recommendation 1/X in AN-Conf/12-WP/3, the Conference is invited to agree to the following recommendation. The said Item d) can be incorporated under the recommendation below as appropriate.

Recommendation 1/x – Frequency spectrum strategy

That the Conference request ICAO to:

a) consider a methodology which enables ATM stakeholders to effectively share ICAO materials on aviation frequency spectrum as a common guidance for securing aviation position;

b) consider structuring of Doc 9718 by using web-based platform as appropriate, which allows States and industry to systematically view long-term frequency spectrum requirements, radio systems in ASBUs and corresponding ICAO policy statement; and

c) continue to allocate adequate resources with a far-sighted approach to its work programmes regarding aviation spectrum challenges;

That the Conference request States, and ATM stakeholders as appropriate to:

a) recognize the consequence of Assembly Resolution A36-25 and influence of being State's delegates at ITU meetings; and

b) support ICAO activities relating aviation spectrum strategy and policy through relevant expert group meetings and PIRGs.

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APPENDIX A

OBSERVATION ON "*HANDBOOK ON RADIO FREQUENCY SPECTRUM REQUIREMENTS FOR CIVIL AVIATION" (Doc 9718)* FROM THE STANDPOINT OF ASBUs IMPLEMENTATION

- Chapter 1 : Introduction
- Chapter 2 : Objectives and Purpose
- Chapter 3 : The International Telecommunication Union
- Chapter 4 : The ITU Regulatory Framework for Aeronautical Radio Services
- Chapter 5 : ICAO Involvement in Frequency and Spectrum
- Chapter 6 : Overview of Spectrum Management Process
- Chapter 7 : Statement of Frequency Allocations, Technical Details and ICAO Policy

Contents : "ICAO policy" on the whole spectrum and the use of each aeronautical frequency band, by referencing to corresponding ITU Radio Regulations. New element, "Strategic Objective" is now being considered by ICAO to provide the strategic statement with respective "ICAO Policy".

Observation: Needs a systematic link with GANP supporting materials, and clear collation between Chapter 7 and ICAO Position in Appendix F

- Chapter 8 : Future Spectrum Requirements

Contents : General explanation on aeronautical radio systems and spectrum requirement for five(5) systems only: GNSS augmentation, synthetic vision system, HF datalink, ADS-B; and future communication system.

Observation: Needs an adequate coverage of ASBUs-envisaged future CNS systems , projection of spectrum demand in specific radio services or long-term spectrum requirement , and consequential alignment with that of Chapter 7 and other chapters as necessary

- Chapter 9 : Interference Protection Considerations

- ATTACHMENT A : Definitions and Terms Used in the ITU Radio Regulations Relevant to Aviation
- ATTACHMENT B : Acronyms and Abbreviations
- ATTACHMENT C: The Regulation of Radio in Aircraft
- ATTACHMENT D : Review and Update
- ATTACHMENT E: Strategy for Establishing and Promoting the ICAO Position for Future ITU World Radiocommunication Conference (WRC)

Contents : "ICAO strategy" for establishment and promotion of "ICAO position" for ITU World Radio Conferences (WRCs). The Attachment includes *Assembly Resolution A36-25*, a high-level framework for the development and support of "ICAO position".

Observation: Continues to be a basis for aviation wide position making process for WRCs, but more effective usage and proactive actions based on this material by ATM stakeholders are needed when formulating WRCs positions

- ATTACHMENT F : ICAO position for ITU WRC-12

Description : the latest "ICAO position" for WRCs.

Observation: Continues to be aviation wide basis for formulating positions on WRC agenda, but more effective usage and insistence based on this material by ATM stakeholders are needed when preparing for WRCs

- ATTACHMENT G : Technical information and frequency sharing criteria
- ATTACHMENT H : References relevant ITU Resolutions and Recommendations as listed in the ITU Radio Regulations

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APPENDIX B

ICAO ASSEMBLY RESOLUTION A36-25*:* SUPPORT OF THE ICAO POLICY ON RADIO FREQUENCY MATTERS

1. *Urges* Contracting States and international organizations to support firmly the ICAO position at WRCs and in regional and other international activities conducted in preparation for WRCs by the following means:

   a) undertaking to provide for aviation interests to be fully integrated in the development of their positions presented to regional telecommunications fora involved in the preparation of joint proposals to the WRC;

   b) including in their proposals to the WRC, to the extent possible, material consistent with the ICAO position;

   c) supporting the ICAO position and the ICAO policy statements at ITU WRCs as approved by Council and incorporated in the *Handbook on Radio Frequency Spectrum Requirements for Civil Aviation* (Doc 9718);

   d) undertaking to provide experts from their civil aviation authorities to fully participate in the development of States' and regional positions and development of aviation interests at the ITU; and

   e) ensuring, to the maximum extent possible, that their delegations to regional conferences, ITU study groups and WRCs include experts from their civil aviation authorities or other aviation officials who are fully prepared to represent aviation interests;

2. *Requests* the Secretary General to bring to the attention of ITU the importance of adequate radio frequency spectrum allocation and protection for the safety of aviation; and

3. *Instructs* the Council and the Secretary General, as a matter of high priority within the budget adopted by the Assembly, to ensure that the resources necessary to support increased participation by ICAO in international and regional spectrum management activities are made available.

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