



WORKING PAPER

TWELFTH AIR NAVIGATION CONFERENCE

Montréal, 19 to 30 November 2012

Agenda Item 6: Future direction

6.2: Standardization – approach to SARPs development in support of One Sky

DEVELOPMENT OF ICAO TECHNICAL PROVISIONS AND STATES' INVOLVEMENT

(Presented by Japan)

SUMMARY

Evolving air navigation system (ANS) and deployment of future ANS in line with the Fourth amendment of *Global Air Navigation Capacity and Efficiency Plan* (GANP, Doc 9750) suggest that ICAO provisions such as Standards and Recommended Practices (SARPs) and Procedures for Air Navigations (PANS) will continue to have its significant roles in terms of effective and timely implementation of future ANS as well as global ATM harmonization.

This working paper, being associated with AN-Conf/12-WP/23, underscores issues regarding ICAO's standardization practice, and proposes actions regarding development of ICAO provisions for future ANS, maintenance of ASBUs and improvement of informed decision environment for States.

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

1. INTRODUCTION

1.1 Evolution of ANS and future ANS deployment in line with the new Global Air Navigation Plan (GANP) signify that ICAO's role in standards development for aeronautical safety, efficiency and regularity of civil aviation will continue to be important. This equates to the notion that Standards and Recommended Practices (SARPs), Procedures for Air Navigations (PANS) and other ICAO technical documents will continue to be regulatory basis for implementing and operating ANS.

1.2 Since the GANP amendment and its supplements have been developed through close collaboration among a wide spectrum of ATM stakeholders, it is expected that ICAO will develop these provisions¹ under a close coordination with both States and industry to properly respond to the global needs or requirements of future ANS.

1.3 This working paper, in reference to AN-Conf/12-WP/23, addresses issues regarding development of ICAO technical provisions, based on Japan's recent experiences in its own ATM renovation programme (CARATS), and research and development (R&D) activities on CNS systems.

¹ The term "technical provisions" and "provisions" in this working paper refer to SARPs, PANS, Documents and other supplemental documents such as circulars developed by ICAO to aid in SARPs and PANS implementation.

2. DISCUSSION

2.1 Features of future ANS to be taken into account for standardization

2.1.1 The post-AN-Conf/11 has witnessed many changes in ANS, which has progressed to meet complex and diversified operational and technical requirements of air transportation. Considering the technological advancement and paradigm shift in ATM operation envisioned in the new GANP and *Global ATM Operational Concept Document* (Doc 9854), this trend will be observed at unprecedented pace.

2.1.2 Complex and rapid technology advancement necessitate efficient process of standardization to properly respond to the future ATM requirements, taking into consideration of the features of future CNS systems as listed in Appendix A. Some of which have already become remarkable in the post-AN-Conf/11 or around the turn of the Twenty-first Century.

2.2 Principles of formulation of SARPs and PANS

2.2.1 States have been implementing ANS and contributing to ICAO standards development work in line with Assembly Resolution A37-15 (ref. B-1 to B-2 of Appendix B), which sets forth principles for the development of technical provisions, role of ICAO Air Navigation Commission panels and SARPs implementation. These principles are and will continue to be a vehicle for assisting States and ATM stakeholders in implementing ANS in a globally harmonized fashion.

2.3 Discussion at the 37 Session of the ICAO Assembly on technical standards for future ANS

2.3.1 The 37th Session of the ICAO Assembly endorsed a six-pillared-resolution under Assembly Resolution A37-12 (ref. B-3 of Appendix B), of which elements mainly relates to this working paper are:

- a) ICAO to amend the GANP including a framework for ICAO to analyze the impact of States' ATM modernization plan on the global system to ensure global harmonization; and
- b) States to share their respective ATM modernization programmes in a timely manner with ICAO for its review and assessment to ensure global compatibility and harmonization.

2.3.2 These were formulated, with the background of the development or genesis of several ATM modernization programmes around that time, in view of the uncertainty of relations between individual CNS systems and ATM operational improvement and requirements. Also, ATM operators and air navigation service providers (ANSPs) had been encountered with difficulty of future investment due to feeble confidence in the future direction the global ATM community heads for. Lack of an instrument to be shared by States and ICAO for ensuring ATM global harmonization necessitated the said resolution.

2.4 Consideration on ICAO provisions development for ASBUs deployment

2.4.1 In response to A37-12, GANP has been amended incorporating technology roadmap, regional air navigation form (RANF) and other States guiding tools. WP/23 suggests the way forward on ICAO standardization process with a focus on "the use of technical expert groups". In order for the ATM community to effectively capitalize on the GANP components and philosophy there to reap the maximum benefits, additional actions are suggested to augment the way forward in WP/23 in the following respects.

Maintenance of ASBUs and roadmaps

2.4.2 Paragraph 6 of WP/3 explains how to validate and maintain the new GANP after this Conference. ASBUs and roadmaps need to have coherence and currentness when ATM stakeholders apply these documents

into individual system implementation. Seemingly, SARPs and PANS, in general, have been developed separately by individual ICAO expert groups, with intergroup coordination when required, especially for overarching matters.

2.4.3 Given the fact that extensive industry and States consultation successfully drew out ASBUs, that each module in ASBUs is or will be supported by a bundle of ICAO provisions concerned, and that ATM operational improvement entails complicated block-building work as mentioned in 2.1 above, it is suggested that ASBUs and roadmaps be maintained systematically through a review of expert groups or other scheme where multi-disciplinary consideration and analysis can be undertaken, rather than relying on Annex-based approach. Efficiency of work, properly-balanced representation of stakeholders, capability to command multi-disciplinary work, and other elements as raised in WP/23 should be elaborated when devising a new ICAO scheme.

“Informed Planning and Decision”: Better informed, more involvement and more proper planning and implementation

2.4.4 Currently, it is not until the post-preliminary review by ICAO that all the member States and eligible industry organizations are consulted on draft amendment of SARPs and PANS in the form of State Letter, which are appended with rational and background information. However, States, especially those who have had little involvement in expert groups, always have difficulty in clearly understanding the relation between CNS system provisions and operational ones, consequences the amendment delivers in an ATM system or State’s air traffic services, systematized view of the provisions concerned, and the whole timeline and status of the amendment process.

2.4.5 Japan’s experience in R&D in CNS systems, system design and development, air navigation services provision have indicated that facing the 2013-2028 timeframe of the ASBUs, ANSPs, research organizations and industry need to have a prospective regarding standardization not merely by ICAO but also by other major standards bodies from an early stage. Thus, States can lay out regulatory framework with far-term horizon in their own planning exercise. Whereas, research institutes and manufactures can conduct their work through a phased approach taking into account the standardization implication.

Use of technical expert groups and States involvement

2.4.6 WP/23 addresses primarily on how to make use of ICAO technical bodies when undertaking standardization work for future systems. In addition to the recommendations in that WP, in light of the complex and multi-disciplinary natures of future systems as mentioned in 2.1 above, it is suggested that a stronger leadership be maintained in expert groups or ICAO Secretariat when dealing with multi-disciplinary or hierarchical tasks, which most of ASBUs modules require. Also, regional pictures on ANS implementation need to be systematically analyzed and reflected into the standardization work of expert groups by effectively using results of PIRGs discussion or other new schemes to be incorporated into GANP.

2.4.7 On the States side, they are continuously encouraged to contribute to ICAO work on provisions development through the rectified scheme considered in WP/23, and to publicize their ATM modernization programmes including supplement materials useful as catalyst for regional or global ATM harmonization in such a way as ICAO, States and industry can share such information in an efficient and effective manner. This is still in line with the spirit of Assembly Resolution A37-12. Industry are also expected their continued contribution as they have thus far displayed in GANP development.

3. CONCLUSION

3.1 Based on the consideration of the three subjects in 2.4 above, and with a mind in augmenting Recommendation 6/x in WP/23, the Conference is invited to agree to the following recommendation:

Recommendation 6/x - Development of ICAO technical provisions

That the Conference request ICAO to:

- a) consider a clarification of a scheme to maintain the aviation system block upgrades and technical roadmaps in terms of coherence, currentness, transparency and cross-domain oversight, and reflect the scheme in the Fourth Edition of Global Air Navigation Plan as appropriate;
- b) improve the current ICAO practice in order to better inform States, and other air traffic management stakeholders as appropriate, in terms of standardizations state and process, and systematic viewing of the provisions concerned, implication of the provision amendment;
- c) consider a systematic and efficient methodology beside the use of the regional air navigation form, by which ICAO can capture the regional implementation and challenges, and to reflect them into a standardization process to effectively support the aviation system block upgrade deployment.

That the Conference requests States and industry:

- a) continue to support ICAO standardization activities with cognizance of Assembly Resolution A37-15; and
- b) share their own air traffic management (ATM) modernization programmes including supplement materials useful for regional or global ATM harmonization through an ICAO established scheme in line with Assembly Resolution A37-12.

APPENDIX A

FEATURES OF FUTURE AERONAUTICAL SYSTEMS AND THE IMPLICATION OF STANDARDIZATION

Note.— The summary below is prepared with an intention of drawing attention of those involved in standardization, system design, and system R&D work to the features of future aeronautical systems, which need to be taken into account when effectively advancing standardization work.

- **From the viewpoint of system design and engineering**

- A system will be highly integrated with subsystems of communication, surveillance and/or navigation systems, while many of legacy CNS systems work independently and a single system functions in a closed or simple radio signaling loop.
- Systems will be interconnected capitalizing on advanced networking, computer, and radio communication technology, with a heavier weight on software function and performance.
- There would be less distinguished physical boundary between communication, surveillance and navigation systems.
- The more integrated, complex and sophisticated the future systems design becomes to suit the future ATM requirements, the more essential, challenging and complicated it will be to achieve compatibility and interoperability between systems.
- Systems based on satellite-based communication and navigation technologies can provide service beyond an FIR to cover some FIRs, up to regions and ultimately to the globe.
- Security, contingency, human machine interface (HMI) requirements need to be adequately reflected in the design of a system and the architect of a whole aviation system.

- **From the viewpoint of standardization**

- SARPs will transform into more descriptive and more performance-based stipulation, which resultantly entails the placement of supplementary technical details onto the outside SARPs and PANS.
- Performance requirements such as integrity, continuity, availability and security will be more significant in designing a system and evaluating the compliance of the systems with international standards.
- Consideration of a variety of ATM requirements originating from aircraft operators, environment challenge, HMI and social-economic demand are needed.
- To define an ASBU Module or a system in that Module, a set of provisions of individual sub-systems need to be clearly defined and systematically represented under the framework of ICAO standards and provisions, taking into account of coherence, interdependency, hierarchical status of provisions ranging from high-level SARPs to low-level or detailed documents including industry standards.
- Up-to-dated and consistent ASBUs documents and Technology Roadmaps as well as out-of-SARPs technical documents will have graver influence to States' regulators, ANSPs, aircraft operators, and R&D institutes in terms of practical implementation of aeronautical systems and virtual interoperability.

- Standardization of aeronautical systems and that of ATM operations need to be synchronized and adequately coordinated to ensure systems implementation in a harmonious and synchronized manner.
- Expansion or augmentation of ICAO technical provisions for aeronautical systems or ATM improvements which are regarded cross-regionally or globally “essential” or “imminent” need to be undertaken by ICAO with high priority.

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APPENDIX B

RELEVANT ICAO ASSEMBLY RESOLUTIONS

A37-15: Consolidated statement of continuing ICAO policies and associated practices related specifically to air navigation

Note.— Only Appendix A and C to Resolution A37-15 are excerpted hereunder since these relates to the subject matter of Section 2.2 of this working paper.

APPENDIX A

Formulation of Standards and Recommended Practices (SARPs) and Procedures for Air Navigation Services (PANS)

1. SARPs and PANS shall be amended as necessary to reflect changing requirements and techniques and thus, inter alia, to provide a second basis for regional planning and provision of facilities and services;
2. subject to the foregoing clause, a high degree of stability in SARPs shall be maintained to enable the Contracting States to maintain stability in their national regulations. To this end amendments shall be limited to those significant to safety, regularity and efficiency, and editorial amendments shall be made only if essential;
3. SARPs and PANS shall be drafted in clear, simple and concise language. SARPs shall consist of broad, mature and stable provisions specifying functional and performance requirements that provide for the requisite levels of safety, efficiency and interoperability. Supporting technical specifications, when developed by ICAO, shall be placed in separate documents to the extent possible;
4. in the development of SARPs, procedures and guidance material, ICAO should utilize, to the maximum extent appropriate and subject to the adequacy of a verification and validation process, the work of other recognized standards-making organizations. Material developed by these other standards-making organizations may be deemed appropriate by the Council as meeting ICAO requirements; in this case such material should be referenced in ICAO documentation;
5. to the extent consistent with the requirements of safety and regularity, Standards specifying the provision of facilities and services shall reflect a proper balance between the operational requirements for such facilities and services and the economic implications of providing them;
6. Contracting States shall be consulted on proposals for the amendment of SARPs and PANS before the Council acts on them, except when the Council may deem urgent action to be necessary. Furthermore, subject to the adequacy of the verification and validation process, technical specifications may be acted upon by the Council without consultation with States. Such material shall however be made available to States upon request;
7. The applicability dates of amendments to SARPs and PANS shall be so established as to allow the Contracting States sufficient time for their implementation;
8. No Annex or PANS document shall be amended more frequently than once per calendar year.

APPENDIX C

Panels of the Air Navigation Commission (ANC)

1. panels of the Air Navigation Commission shall be established when it is necessary to advance the solution of specialized technical problems which cannot be solved adequately or expeditiously by the Air Navigation Commission through other established facilities;
2. the terms of reference and the work programmes of panels shall support the ICAO Business Plan, be clear and concise with timelines and shall be adhered to;
3. the progress of panels of the Air Navigation Commission shall be reviewed periodically and panels shall be terminated as soon as the task assigned to them has been accomplished. A panel shall be allowed to continue in existence for more than four years only if its continuation is considered justified by the Air Navigation Commission; and
4. panel activity shall support a performance-based approach to SARPs development to the extent possible.

A37-12: ICAO global planning for sustainability

Note.— This Resolution is excerpted as a reference to Section 2.3 of this working paper.

1. *Instructs* the Council to amend the GANP to include a framework that will allow ICAO to easily analyze the impact of States' air navigation modernization plans on the global system and then take appropriate action as needed to ensure global harmonization;
2. *Calls upon* States, planning and implementation regional groups(PIRGs) and the aviation industry to utilize the guidance provided in the GANP for planning and implementation activities;
3. *Urges* Contracting States, industry and financing institutions to provide the necessary support for coordinated implementation of the GANP, avoiding duplication of effort;
4. *Urges* States that are developing new generation plans for their own air navigation modernization to share their plans in a timely manner with ICAO to ensure global compatibility and harmonization;
5. *Instructs* the Council to ensure that the GANP is continuously maintained up to date in light of further operational and technical developments, in close collaboration with States and other stakeholders; and
6. *Instructs* the Council to organize a Twelfth Air Navigation Conference in 2012, to develop longer-term planning for ICAO based on an update of the GANP.