International Civil Aviation Organization

Fourth Meeting of the Asia/Pacific Air Traffic Management Automation System Task Force (APAC ATMAS TF/4)

Bangkok, Thailand, 28 - 30 June 2023

Agenda Item 3: Global and Regional ATM Automation System Updates

GLOBAL DEVELOPMENT UPDATES

(Presented by the Secretariat)

SUMMARY

This paper presents discussions during the Assembly 41, updates on the new GANP, and global development related to ATMAS TF for meeting information and reference.

1. INTRODUCTION

1.1 The 41st Session of the Assembly was held at the Montréal Headquarters of the International Civil Aviation Organization (ICAO) from 27 September–7 October 2022. 2,573 Ministers and high-ranking government officials from 184 States gathered in-person and virtually for the launch of the ICAO 41st Assembly at ICAO HQ, the first since the COVID-19 outbreak. The resolutions, report, presentations, and other materials can be accessed by the following link:
https://www.icao.int/Meetings/a41/Pages/default.aspx

1.2 This paper presents discussions during Assembly 41, updates on the new GANP, and global development related to ATMAS TF for meeting information and reference.

2. DISCUSSION

Assembly 41st and its Resolutions

2.1 Over 600 Working Papers (WPs) were submitted under 56 Agenda Items during the Assembly 41st, while the CNS related topics are mainly discussed under *Item 30* - Aviation Safety and Air Navigation Policy, *Item 31* - Aviation Safety and Air Navigation Standardization, *Item 32* - Aviation Safety and Air Navigation Regional Implementation Coordination Mechanisms, *and Item 33* - Other issues to be considered by the Technical Commission.

Updates on GANP

2.2 The Doc 9750 - Global Air Navigation Plan (GANP) is the ICAO's highest air navigation strategic document and the plan to drive the evolution of the global air navigation system. The purpose of the GANP is to equitably accommodate all airspace users operations in a safe, secure and cost-effective manner while reducing the aviation environmental impact. To this end, the GANP

provides a series of operational improvements to increase capacity, efficiency, predictability, and flexibility while ensuring interoperability of systems and harmonization of procedures.

2.3 The Sixth Edition of the GANP, Doc 9750, adopted at the 40th Assembly through *Resolution A40-1: ICAO Global Planning for Safety and Air Navigation* in 2019, which explains important details of the structure of several levels (global-regional-national) and the vision of the GANP on the "efficiency ambitions", the restructuring of the Aviation System Block Upgrade (ASBU) framework and the implementation of Basic Building Blocks (BBBs), emphasizing the level of compliance with the GANP.

2.4 The ICAO Assembly, at its 39th Session, agreed on the expansion of the GANP lifecycle through three-year minor and six-year major updates, as relevant, in order to provide for stability. While the sixth edition of the GANP, endorsed by the Assembly at its 40th Session, constituted a major update, a seventh edition, containing minor updates will be presented to the 41st Assembly for endorsement.

2.5 The WP/45 from ICAO Council which introduced the Seven Edition of GANP has been presented to the 41st ICAO Assembly Sessions, which is provided in **Appendix A** to this paper. The Commission reviewed A41-WP/45, which called for the endorsement of a minor update of the Global Air Navigation Plan (GANP, Doc 9750 – Seventh Edition), and proposed an outlook for the eighth edition. The seventh edition of the GANP, available via the GANP Portal (https://www4.icao.int/ganpportal), proposed an update to the safety key performance area of GANP performance framework, as well as a maintenance process to keep it current. It also proposed a mapping of the essential services outlined in the Basic Building Block (BBB) framework to the Protocol Questions (PQs) of the Universal Safety Oversight Audit Programme (USOAP) as well as minor updates to the BBB and the Aviation System Block Upgrade (ASBU) frameworks. The Commission supported the proposed outlook for the eighth edition of the GANP and proposed to consider making the GANP content available in a portable document format (PDF) for better readability.

2.6 The Fourth Edition of the Global Aviation Safety Plan (GASP, Doc 10004) and the Seventh Edition of the Global Air Navigation Plan (GANP, Doc 9750) were endorsed by A41 through **Resolution A41-6:** *ICAO global planning for safety and air navigation*. These important strategic plans guide States cooperation and actions on the basis of global aviation targets and technology roadmaps, enabling aligned worldwide progress on key priorities and challenges. The endorsement of the latest editions of ICAO's GASP and GANP will bring the aviation community together around common targets and pathways to achieve an agile, safe, secure, sustainable, high-performing and interoperable global air transport system. Cyber resilience of safety critical systems is a key priority in the next edition of the GANP.

Other Discussions Related to ATMAS

2.7 The papers discussed during the Assembly 41st which are related to ATMAS TF have been highlighted as follows:

Next Era of Air Traffic and Airspace Management - International Coordinating Council of Aerospace Industries Associations (ICCAIA), Civil Air Navigation Services Organisation (CANSO) (WP/87)

2.8 WP/87 mentioned that to date, the main role of automation was to provide information that can help humans (for example, pilots and air traffic controllers) carry out all cognitive functions, from routine tasks such as continuous monitoring in normal conditions to decision making and maneuvering traffic in abnormal conditions. Advancements in big data, artificial intelligence, and robotics will essentially change our concepts of what automation can do. Automation is expected to

evolve and become more focused on critical and decision-making tasks, as well as monitoring for non-normal events, as opposed to actively flying/controlling. The judicious use of the automation will be essential to accommodate the growth of conventional air traffic, as well as new modes of air transport in a safe, secure, and sustainable manner. The Commission agreed that the characteristics for the next era of air traffic and aerospace management system, outlined in A41-WP/87, be brought to the attention of the relevant expert groups.

Performance Framework to Assess Trajectory Based Operations (TBO) Concept - China and Singapore (WP/131) & Decarbonization through Improvement of Air Navigation System to Realize Future Sustainable Aviation Development – Japan (WP/133)

2.9 WP/131 and WP/133 both recognized the importance of realization of TBO. It was informed that to understand the ICAO global TBO concept and its operational values, a multi-regional trajectory-based operations (MR TBO) lab demonstration project was rolled out involving collaboration effort between Canada, Japan, Singapore, Thailand, and the United States. Project partners collaborated to design and simulate operational scenarios to investigate the workings of TBO within and across regions. Some of the operational values beneficial for better flight efficiency include: alignment of strategic plan and tactical actions, improved strategic planning and enhanced predictability. It is expected that when TBO is fully implemented, the benefits will extend to other areas including capacity and environment protection. Given TBO's benefits, and in preparation for traffic growth to pre-COVID levels and beyond, ICAO and the member States should continue to push for the implementation of TBO globally.

2.10 The Commission agreed that ICAO define new key performance indicators (KPIs) within the GANP performance framework applicable to the Trajectory Based Operation (TBO) concept. The Commission encouraged the aviation community to consider the use of such indicators, when available, to quantify the TBO benefits.

Remote Digital Aerodrome Air Traffic Services - Saudi Arabia (WP/526)

2.11 WP/526 from Saudi Arabia described the remote digital aerodrome air traffic service (ATS) and its technical enablers, and provided an overview on the implementation plan of remote aerodrome ATS adopted by the air navigation service provider in the Kingdom of Saudi Arabia (Saudi Air Navigation Services (SANS)).

Research on and Application of the RECAT Wake – China (WP/482)

2.12 WP/482 from China introduced the research on and application of the RECAT in China, which included relevant upgradation of ATM automation systems, and then proposed recommendations on the RECAT wake turbulence separation criteria and statistical parameters for RECAT test operation.

Charting Aviation's Future: Operations in An Info-Centric National Airspace System – USA (WP/599)

2.13 WP/599 from United States introduced the Info-Centric National Airspace System (ICN) vision document that describes the need for the National Airspace System to accommodate a diverse set of airspace users (crewed and un-crewed) in the 2035 timeframe. This vision also supports evolution towards a more digital information environment for decision making and ensuring continued safe and efficient operations.

Global Developments Related to CNS and Spectrum

2.14 To enhance the understanding of modifications on ICAO Standards documents and follow up the global development related to CNS and Spectrum, the presentation, provided by AOI Section and CNSS section, has summarized the upcoming PfAs related to CNS and spectrum in **Appendix B** to this paper.

2.15 Regarding the topics which might be related to ATMAS TF, the on-going activities are provided as follows:

- One Proposal for amendments (PfA) to Annex 10, Volume III, related to 24-Bit aircraft address has been circulated for comments.
  - *Refinement of provisions related to aircraft address allocation and assignment*: The addition of provisions for aircraft address assignment as a part of the registration process is proposed in this amendment to mitigate occurrences of operations with incorrect aircraft address.
  - *Increasing State allocation of aircraft addresses*
    - ✓ To fulfil the requests from some States who are facing a shortage of available allocated aircraft addresses due to air traffic growth, development of their air hubs, and increase in the number of State-registered aircraft, such as Timor-Leste, Tuvalu, etc.
    - ✓ Furthermore, given the future increase in States' address requirements due to the need for addresses for surface vehicles and unmanned aircraft systems to avoid frequent revisions to Annex 10, Volume III, a change of the smallest block allocation from 1 024 aircraft addresses to 2 048 aircraft addresses is proposed.
  - *Deletion of unused registers F1 and F2*: Recognizing unused transponder registers $F1_{16}$ and $F2_{16}$, the deletion of those unused assignments from the table 5-24 is proposed.
- ICAO (specifically the Surveillance Panel of the ICAO) is currently refining and updating transponder requirements for compatibility with a new 1 090 MHz extended squitter ADS-B version 3 format, which is based on recent RTCA/EUROCAE avionics standards.
- The SP/5 to be held 20-29 Sep 2023 is also planning to progress the PfA to Annex 10, Volume IV, related to :
  - technical provisions for the efficient use of the 1090 MHz radio frequency (RF), providing means and measurements to reduce 1090 MHz RF congestion, ensuring better performance of surveillance systems and continued use of 1090 MHz systems;
  - introduced ACAS III technical provisions, based on ACAS Xu (Unmanned Aircraft System) avionics standards developed by RTCA/EUROCAE; and
  - a proposed revision to Chapter 7 of Annex 10 Volume IV, which specifies technical requirements for airborne surveillance applications utilizing ADS-B IN.

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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International Civil Aviation Organization

A41-WP/45
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WORKING PAPER

ASSEMBLY — 41ST SESSION

TECHNICAL COMMISSION

Agenda Item 30: Aviation Safety and Air Navigation Policy
30.2: Latest developments related to the Global Air Navigation Plan (GANP)

A COMPREHENSIVE STRATEGY FOR AIR NAVIGATION: ENDORSEMENT OF THE UPDATED GLOBAL AIR NAVIGATION PLAN

(Presented by the Council of ICAO)

EXECUTIVE SUMMARY

The ICAO Assembly, at its 39th Session, agreed on the expansion of the GANP lifecycle through three -year minor and six-year major updates, as relevant, in order to provide for stability. While the sixth edition of the GANP, endorsed at the 40th Session of the Assembly, constituted a major update, a seventh edition, containing minor updates, is proposed in this working paper for endorsement by the ICAO Assembly during its 41st Session. In particular, this proposal includes an update to the safety key performance area of GANP performance framework, as well as a maintenance process to keep it current. It highlights the importance of a robust air navigation system for achieving the expected levels of safety and resilience, and maps the essential services outlined in the Basic Building Block (BBB) framework to the Protocol Questions (PQs) of the Universal Safety Oversight Audit Programme (USOAP). Minor updates to the BBB and the Aviation System Block Upgrade (ASBU) frameworks are also proposed. It also highlights the proposed focus of the eighth edition of the GANP based on the challenges faced by the aviation community to achieve its vision.

Action: The Assembly is invited to:

a) endorse the seventh edition of the *Global Air Navigation Plan* (GANP, Doc 9750), available in an interactive format via the GANP Portal;
b) request Member States, planning and implementation regional groups (PIRGs) and all members of the aviation community to continue improving the air navigation system in line with the GANP so that it adapts to global, regional and local opportunities and challenges in a timely and orderly manner; and
c) adopt the proposed revision to Assembly Resolution A40-1, as presented in Appendix B to this paper, in so far as it refers to the GANP.

Strategic Objectives:	This working paper relates to the Safety and Air Navigation Capacity and Efficiency Strategic Objectives.
Financial implications:	The ICAO activities referred to in this paper are expected to be undertaken within the resources available in the 2023-2025 Regular Programme Budget and/or from extra budgetary contributions as guided by the ICAO Business Plan 2023-2025.

References:	Doc 10160, *High-Level Conference on COVID-19 (Montréal, 12 to 22 October 2021). Report* Doc 10140, *Assembly Resolutions in Force (as of 4 October 2019)* Doc 10118, *Global Aviation Security Plan* Doc 10115, *Thirteenth Air Navigation Conference. Montréal, 9 – 19 October 2018. Report* Doc 10004, *Global Aviation Safety Plan* Doc 9883, *Manual on Global Performance of the Air Navigation System* Doc 9854, *Global Air Traffic Management Operational Concept* Doc 9750, *Global Air Navigation Plan, 6th Edition* Appendix C to the GSG-GIPEG/2-SD, *Development of a proposed update to the Safety Performance Framework in the GANP* (icao.int)

1. INTRODUCTION

1.1 The ICAO Assembly, at its 39th Session, agreed on the expansion of the GANP lifecycle through three-year minor and six-year major updates, as relevant, in order to provide for stability. While the sixth edition of the GANP, endorsed by the Assembly at its 40th Session, constituted a major update, a seventh edition, containing minor updates, is hereby proposed for endorsement.

1.2 The ICAO Assembly, at its 40th Session, endorsed the sixth edition of the Global Air Navigation Plan[1] (GANP, Doc 9750) through Resolution A40-1: ICAO global planning for safety and air navigation. This edition recognizes that a performance-driven, service-oriented and technologically advanced global air navigation system is critical to achieve the sustainability of the aviation sector worldwide. Furthermore, it recognizes safety as one of the fundamental principles of aviation performance, together with environment, security and economic sustainability.

1.3 In addition to these fundamental aviation principles, there are several performance requirements, in areas such as capacity and efficiency, that the air navigation system must meet to fulfil the expectations of the aviation community and society-at-large. The crisis caused by the COVID-19 pandemic in 2020 highlighted the importance of resilience of the aviation system, not only as a performance requirement but also as a fundamental principle, in terms of economic sustainability as well as safety management, to ensure that safety risks are effectively addressed. While it is anticipated that the reduced economic resources in the coming years due to the pandemic may affect the modernization of the air navigation system and jeopardize performance monitoring, neither safety nor resilience expectations can be achieved without a robust air navigation system. Two key aspects are needed to achieve such a system: the provision of essential air navigation services; and the oversight of these services.

1.4 The seventh edition of the GANP focuses on the global technical level and is the result of the accomplishments made by the GANP Study Group (GANP-SG) and its working groups, the Aviation System Block Upgrades Panel Project Team (ASBU PPT) and the GANP Performance Expert Group (GANP-PEG), since the 40th Session of the ICAO Assembly.

[1] Available at the GANP Portal at https://www4.icao.int/ganpportal/

2. SEVENTH EDITION OF THE GANP

Update of the GANP performance framework – Safety

2.1 The sixth edition of the GANP contains the GANP performance framework, which includes at the Global Strategic Level a series of performance ambitions within the eleven key performance areas (KPAs)[2] outlined in the Global Air Traffic Management Operational Concept (Doc 9854). At the Global Technical Level, the framework details focus areas, performance objectives and key performance indicators (KPIs) within the KPAs of capacity, efficiency and predictability.

2.2 In order to expedite the work on performance, Recommendation 4.3/1, *Improving the performance of the air navigation system,* of the Thirteenth Air Navigation Conference (AN-Conf/13), called upon ICAO to consider establishing a group of performance experts under the GANP-SG. ICAO, therefore, formed the GANP Performance Expert Group (GANP-PEG), formerly known as the Global ICAO Performance Expert Group (GIPEG), to maintain and evolve the performance framework of the GANP, focusing on its effective application by all members of the aviation community at the regional and national levels. One of the tasks of the GANP-PEG is to expand the performance framework of the GANP to cover the eleven KPAs and, in particular, to contribute to the coherency and consistency related to performance management aspects shared by the GANP, the *Global Aviation Safety Plan* (GASP, Doc 10004) and the *Global Aviation Security Plan* (GASeP) (Doc 10118).

2.3 ICAO called for safety experts to collaborate with the GANP-PEG and update, following the *Manual on Global Performance of the Air Navigation System* (Doc 9883), the safety performance framework for inclusion in the seventh edition of the GANP to: ensure an integrated approach to performance management; provide a link between the GANP and the GASP; and offer a coordinated approach to safety performance measurement, as requested by the High-Level Conference on COVID-19 (HLCC-2021). The proposed safety performance framework identifies a common high-level safety performance ambition as well as focus areas, performance objectives and key performance indicators (KPIs) that cover all aspects of the aviation system, allowing the GANP to consider safety in an integrated way within its other 10 KPAs. At the same time, it provides a shared safety related terminology for the GANP and the GASP, promoting consistency across the two global plans.

2.4 A summary of the proposed update to the safety KPA of the GANP performance framework, including a new performance ambition as well as new focus areas, performance objectives and KPIs, is presented in Appendix A to this working paper. Further details can be found at: https://www4.icao.int/ganpportal/GIPEGSafetyPerformanceFrameworkAnalysis.

2.5 To keep the GANP performance framework current and improve transparency, a maintenance process for the GANP performance framework is proposed in line with the maintenance process approved for the ASBU framework (see paragraph 2.13). The proposed GANP performance framework maintenance process is available in the GANP Portal (click **here**).

The Basic Building Blocks (BBBs) and the Universal Safety Oversight Audit Programme (USOAP)

2.6 The sixth edition of the GANP includes the BBB framework, which outlines the foundation of any robust air navigation system by identifying the essential services to be provided for international civil aviation in accordance to ICAO Standards. These essential services are defined in the areas of aerodromes, air traffic management, search and rescue, meteorology and aeronautical information, and

[2] The eleven KPAs of the GANP: safety, security, environment, cost-effectiveness, capacity, efficiency, flexibility, predictability, access and equity, participation by the ATM community and global interoperability.

implemented according to the Regional Air Navigation Plans. In addition to essential services, the BBB framework identifies the end users of these services as well as the assets (communications, navigation, and surveillance (CNS) infrastructure) that are necessary to provide them.

2.7 In 1999, ICAO launched the Universal Safety Oversight Audit Programme (USOAP), in response to widespread concerns about the effectiveness of aviation safety oversight around the world. USOAP audits focus on a State's capability to provide safety oversight by assessing whether the State has effectively and consistently implemented the critical elements (CEs) of a safety oversight system. This enables the State to ensure the implementation of ICAO's safety-related Standards and Recommended Practices (SARPs) and associated procedures and guidance material.

2.8 To provide the link between these two fundamental aspects of any robust air navigation system, the provision of essential services for international civil aviation and the capability to oversee them by the State, ICAO has mapped the essential services outlined in the BBB framework to the Protocol Questions (PQs) of the USOAP. The result of this mapping demonstrates that the BBBs relate primarily to critical elements six "CE-6 Licensing, certification, authorization and/or approval obligations" and seven "CE-7 Surveillance obligations" as detailed at this web portal https://www4.icao.int/ganpportal/bbbsusoapmapping. This mapping facilitates the analysis of the impact that the provision of essential air navigation services and the capability to oversee them, have on safety performance. The provision of essential air navigation services by an ANSP is measured through the deficiencies against the Regional Air Navigation Plans, whilst the capability of States to oversee said provision is measured through Effective Implementation (EI). The outcome of both aspects on safety performance can be measured through the KPIs proposed in Appendix A to this paper.

The Aviation System Block Upgrade (ASBU) framework and the Basic Building Block (BBB) framework

2.9 During its 40th Session, the ICAO Assembly approved the ASBU framework maintenance process available in the GANP Portal (click **here**). According to this process, the framework is to be updated on a three -year cycle and the present update is considered minor.

2.10 Following the maintenance process, the ASBU framework has been updated through a campaign whose scope was to update the content of ASBU framework from a factual perspective, e.g. process delays, change descriptions; review consistency, completeness and understanding; and prepare the scope/plan for the next (major) update. The report of the campaign, including its result, is available in the GANP Portal (click **here**). The review of the ASBU framework also resulted in an update to the BBB framework included in the report.

3. OUTLOOK FOR THE EIGHTH EDITION OF THE GANP

3.1 The Global Strategic Level of the GANP recognizes digital information management and full connectivity through the internet of aviation as key steps towards a total performance management system.[3] In a fully connected digital air navigation system, cyber threats, which are constantly evolving through the analysis of online behaviours and trends, pose a risk to the safety of flight operations that must be addressed. In addition to safety, environment and security are fundamental aviation principles recognized by the GANP.

3.2 The COVID-19 crisis has proven to be a challenge for the safety and resilience of the aviation system. Furthermore, the economic impact of the COVID-19 pandemic on the aviation industry

[3]See Global Air Navigation Plan Strategy (EN) - THE CONCEPTUAL ROADMAP | Rise (icao.int)

had forced the re-evaluation of priorities at regional and national levels that may risk the achievement of the GANP vision.

3.3 In order to ensure continuous progress in the evolution of the air navigation system, it is proposed that a fresh approach is developed to achieve the vision and performance ambitions outlined in the GANP. Therefore, it is proposed that the next edition of the GANP focuses on resilience and environment, and includes the following structural improvements:

a) the development of the link between the global strategic and technical levels;

b) the integration of innovation opportunities to embrace emerging technologies and accommodate new entrants;

c) the improvement of the performance dimension to ensure the optimum allocation of resources;

d) the development of evolution scenarios to provide opportunities for so-called leapfrogging, modernizing rapidly through the adoption of modern systems without going through intermediary steps; and

e) continue to ensure that the GANP is aligned with other ICAO Global Plans.

4. ASSEMBLY RESOLUTION

4.1 In accordance with Assembly Resolution A40-1, the GASP and the GANP support the Strategic Objectives of the Organization. The partial draft resolution presented in Appendix B to this paper focuses on the GANP, thus superseding A40-1: *ICAO Global planning for safety and air navigation*.

4.2 When reviewing the resolution in the appendix, and for the purposes of this paper, please refer only to the preamble and Appendix B, dealing specifically with GANP.

5. CONCLUSION

5.1 A performance-driven, service-oriented and technologically advanced global air navigation system is critical to achieve the sustainability of the aviation sector worldwide. Recognizing safety as one of the fundamental principles of aviation performance as well as the increasing importance of resilience in a hyperconnected aviation ecosystem, the seventh edition of the GANP presents an updated safety performance framework and maintenance process, reinforces the importance of having a robust foundation of the air navigation system and presents a minor update of the BBB and ASBU frameworks.

5.2 Also, based on the challenges faced by the aviation community to achieve the GANP vision, it is proposed that the eight edition of the GANP develops a fresh approach focusing on resilience and environment, while working towards the digitalization of a fully connected air navigation system.

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APPENDIX A

PROPOSED UPDATE OF THE GANP PERFORMANCE FRAMEWORK

Note. — Please note that only the bolded text with a grey highlight are proposed to be included in the seventh edition of the GANP.

1. The proposed update to the Global Air Navigation Plan (GANP) performance framework focuses on safety, one of the eleven Key Performance Areas (KPAs) of the GANP. The sixth edition of the GANP includes a safety performance ambition and safety performance objectives related to the operational improvements defined in the Aviation System Block Upgrade (ASBU) framework.

2. The main goal of this update to the safety performance framework in the GANP is to contribute to the coherency and consistency related to performance management aspects shared by the GANP, the Global Aviation Safety Plan (Doc 10004) and the Commercial Aviation Safety Team (CAST)/ International Civil Aviation Organization (ICAO) Common Taxonomy Team (CICTT)[1].

3. Safety performance ambition

3.1 Performance ambitions are outlined in the Global Strategic Level of the GANP. They are qualitative statements providing global priorities on the performance evolution of the global air navigation system. They should not be seen as a target to continuously monitor and report performance against, but rather as a catalyst for change.

3.2 Both the safety performance ambition and the aspirational safety goal, in the GANP and the GASP, respectively, seek the improvement of safety performance. However, the current safety ambition in the GANP[2] *"Zero ANS-related accidents and a significant 50 per cent reduction of –ANS-related- serious incidents"* shows a difference in scope from the aspirational goal defined by the GASP *"Achieve and maintain zero fatalities in commercial operations by 2030 and beyond"*. In particular: while the performance ambition covers all types of operations, the aspirational goal focuses on commercial operations; while the ambition focuses on air navigation service (ANS)-related causes, the aspirational goal covers all causes and contributing factors to occurrences; and while the ambition covers zero accidents and a reduction in incidents, including the amount of damage and its secondary impact, the aspirational goal focuses on zero fatalities.

3.3 In order to ensure a common direction in safety performance, it is important to harmonize the scope of the safety performance ambition in the GANP to address the combined scope of the GANP and the GASP. Therefore, the safety performance ambition in the sixth edition of the GANP is proposed to be updated as follows:

"Achieve continual safety performance improvement in aviation in each ICAO region"

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[1] Historically, in accident and incident investigations, safety occurrences are categorized in a different way namely using the CICTT occurrence categories Welcome (intlaviationstandards.org).

[2] While the highest safety expectation was referred to as safety performance ambition in the GANP, in the GASP it was called aspirational safety goal.

4. Safety focus areas

4.1 Focus areas are outlined in the global technical level of the GANP. They identify and delineate the broad areas in which there are intentions to establish a performance policy via the definition of performance objectives. There is a need for a minimum number of focus and sub-focus areas to attach the performance objectives within the sixth edition of the GANP and the goals in the GASP as well as to cover the areas in which safety data is collected and reported related to the CICTT.

4.2 The sixth edition of the GANP did not define safety focus areas. Therefore, in order to avoid overlapping of performance policies, the following focus and sub-focus areas within the safety KPA are proposed to be included in the seventh edition of the GANP:

KPA: Safety

Operational safety outcomes

- **Flight operations safety**
  - **Safety of traditional operations**
  - **Safety of new entrants**
    - **Safety of remotely piloted aircraft systems (RPAS) operations**
    - **Safety of very low level operations (typically operating below 500ft AGL)**
    - **Safety of higher airspace operations**
    - **Safety of advanced and urban air mobility**
- **Aerodrome operations safety**
- **Air navigation service provision safety**
- **Aircraft maintenance safety**
- **Design and manufacturing safety**

Organizational safety processes

- **State safety programme (including safety oversight)**
- **Safety management system**
- **Safety collaboration**

Provision of infrastructure and aviation services

- **Basic Building Blocks**
- **Operational safety improvements**

Note.— The scope within the operational focus areas is limited to aviation safety. For example, while each time an aircraft design flaw is identified during operations would count as an aviation

safety occurrence under design and manufacturing safety, an occupational health and safety event at the manufacturing premises of an aircraft is outside the scope of the design and manufacturing focus area and would not count as an aviation safety occurrence. Processes that impact the aviation safety outcomes should be found under organizational safety.

5. Safety performance objectives

5.1 Performance policy is defined through a set of specific, measurable, achievable, relevant and timely (SMART) objectives.

5.2 The performance objective for the safety KPA in the sixth edition of the GANP is to maintain or improve safety. Aligned with this performance objective, the following generic sub-objectives are defined within the proposed safety focus and sub-focus areas:

Note.— Sub-objectives in bold with grey highlights are new and are proposed to be included in the seventh edition.

- **Maintain or improve operational safety outcomes**
    - **Maintain or improve safety of flight operations**
        - **Maintain or improve safety of traditional operations**
        - **Maintain or improve safety of new entrants**
            - **Maintain or improve safety of remotely piloted aircraft systems (RPAS) operations**
            - Maintain or improve safety of very low-level operations
            - Maintain or improve safety of higher airspace operations
            - **Maintain or improve safety of advanced and urban air mobility**
    - **Maintain or improve safety of aerodrome operations**
    - **Maintain or improve safety of the air navigation service provision**
    - **Maintain or improve safety in aircraft maintenance**
    - **Maintain or improve safety in design and manufacturing**

- **Maintain or improve organizational safety processes**
    - **Strengthen State safety oversight capabilities**
    - **Increase the implementation of States' safety programmes**
    - **Improve safety management systems implementation**
    - **Increase safety enhancement initiatives**
    - **Improve safety collaboration at global, regional and national levels**

- **Maintain or improve the provision of infrastructure and aviation services**
    - **Enhance the implementation of the Basic Building Blocks**
    - **Optimize the implementation of operational safety improvements within the ASBU framework**

5.3 These performance objectives and sub-objectives allow for the mapping of the goals outlined in the GASP as follows:

a) Goal 1 of the GASP "*Achieve a continuous reduction of operational safety risks*" was mapped to the safety performance sub-objective "Maintain or improve safety of traditional flight operations" since the scope of Goal 1 was not limited to the set of five High Risk Categories (HRC) but covered all risk categories (the HRC are a subset of the full set of risk categories);

b) Goal 2 of the GASP *"Strengthen States' safety oversight capabilities"* was mapped to the sub-objective "Strengthen State safety oversight capabilities";

c) Goal 3 of the GASP *"Implement effective State safety programmes"* was mapped to the sub-objective "Increase the implementation of States' safety programmes";

d) Goal 4 of the GASP *"Increase collaboration at the regional level"* was mapped to two sub-objectives "Increase safety enhancement initiatives" and "Improve safety collaboration at global, regional and national levels";

e) Goal 5 of the GASP *"Expand the use of industry programmes and safety information sharing networks by service providers"* was mapped to two sub-objectives: "Improve safety management systems implementation" of the industry and "Improve safety collaboration at global, regional and national levels"; and

f) Goal 6 of the GASP *"Ensure the appropriate infrastructure is available to support safe operations"* was mapped to the sub-objectives: "Strengthen States' safety oversight capabilities", as well as "Enhance the implementation of the Basic Building Blocks" and "Optimize the implementation of operational safety improvements within the ASBU framework" under the sub-objective "Maintain or improve the provision of infrastructure and aviation services".

5.4 In addition, in order to address the CICTT occurrence categories as well as to integrate the safety performance sub-objectives of the GANP sixth edition and the expected safety outcomes from the implementation of certain operational improvements in the ASBU framework, the following performance sub-objective tree is proposed under "Maintain or improve safety of traditional operations":

Note.— Sub-objectives in bold with grey highlights are new and are proposed to be included in the seventh edition of the GANP; New sub-objectives from the mapping of the two approaches are marked with (*); those marked with (**) have safety contributions from ASBU Elements.

- **Maintain or improve safety of traditional operations**
    - **Maintain or improve safety on the ramp (aircraft not moving)**

- Maintain or improve safety during surface movement (**)
  - **Reduce the risk of taxiway and apron aircraft/aircraft collisions**
    - Improve collision avoidance during taxi operations (safety net) (**)
  - **Reduce the risk of other collisions while using taxiways and aprons**
    - **Avoid collisions with ground vehicles and mobile equipment on taxiways and aprons (*)**
    - **Avoid collisions with animals or humans on taxiways and aprons (*)**
    - **Avoid collisions with obstacles and buildings (*)**
    - **Avoid encounters with FOD and/or patches of poor taxiway or apron condition (*)**
  - **Reduce the risk of non-collision related occurrences associated with incorrect or unsafe usage of taxiways and aprons**
    - Avoid incorrect taxiing (cases of non-conformance with clearance) (**)
    - Avoid flights attempting to land/take-off on/from taxiways
    - Improve early detection of conflicting ATC Clearances (CATC) related to taxi operations (**)
- Maintain or improve safety on the runway (**)
  - **Reduce the risk of runway aircraft/aircraft collisions**
    - Improve runway collision avoidance (safety net) (**)
  - **Reduce the risk of other collisions while using the runway**
    - Improve runway collision avoidance (safety net) (**)
    - **Avoid bird strike while on the runway (*)**
    - **Avoid collisions with animals or humans on the runway (*)**
    - **Avoid encounters with FOD and/or patches of poor RWY condition (*)**
    - **Avoid wake vortex encounters on the runway (*)**
  - **Reduce the risk of non-collision related occurrences associated with incorrect or unsafe usage of runways**
    - Reduce number of runway incursions

- Avoid incorrect entries of aircraft or vehicles onto the runway protected area (without or contrary to ATC clearance or due to incorrect ATC clearance) (**)
- Avoid incorrect presence of vacating aircraft or vehicles onto the runway protected area (**)
- Avoid incorrect runway crossings by aircraft or vehicles (without or contrary to ATC clearance or due to incorrect ATC clearance) (**)
- Avoid incorrect spacing between successive arriving or arriving and departing or departing and arriving or successive departing aircraft
- Avoid landings without ATC clearance
- Avoid landings on wrong runway at right airport
- Avoid landings at wrong airport
- Avoid take-offs without ATC clearance

▪ Improve early detection of conflicting ATC Clearances (CATC) related to runway usage (**)

▪ Avoid runway excursions

- **Maintain or improve safety in the air**
  - **Reduce the risk of mid-air collisions (aircraft/aircraft)**
    - ▪ Improve mid-air collision avoidance (safety net) (**)
    - ▪ Improve separation provision (at a planning horizon > 2 minutes) (**)
    - ▪ Improve early detection of conflicting ATC Clearances (CATC) (en-route / departure / approach) (**)
  - **Reduce the risk of other collisions while airborne**
    - ▪ **Avoid bird strike while airborne (*)**
    - ▪ Avoid vertical & lateral navigation errors during flight (cases of non-conformance with clearance) (**)
    - ▪ Avoid unauthorized penetration of segregated airspace (**)
    - ▪ Avoid controlled flight into terrain (CFIT) and obstacle collision risk (**)
  - Reduce the risk of non-collision related occurrences
    - ▪ Avoid hazardous weather (including turbulence)
    - ▪ Avoid volcanic ash

- Avoid en-route wake vortex encounters (**)
- Avoid exposure to hazardous space weather
- **Avoid exposure to laser light (*)**
- **Avoid being shot down (*)**
- **Avoid flight into conditions which are in itself non-hazardous, but beyond the capabilities of aircraft or crew (*)**

- **Maintain or improve safety on-board**

Note.— The GANP performance framework is a living framework to be updated through a proposed Maintenance process (see paragraph 2.5 of the working paper). Performance indicators can be mapped at any level of the performance objectives and sub-objectives tree, however, they should be mapped at the lowest level possible.

6. Safety key performance indicators (KPIs)

6.1 Some objectives require precisely defined numerical performance indicators, which serve to establish quantitative measures that, collectively, will indicate progress towards achieving an objective. In order to facilitate this task, the sixth edition of the GANP contains, in its global technical level, a list of 19 KPIs[3] within the KPAs of capacity, efficiency and predictability. These KPIs are associated to the generic performance objectives in the GANP and can be tailored to regional and national instantiated performance objectives.

6.2 The following safety KPIs are proposed to be included in the seventh edition of the GANP:

KPI ID	**KPI20**
KPI Name	**Number of aircraft accidents**
Definition	'Accident' is defined in ICAO Annex 13, Chapter 1-Definitions ADREP: Accident Data Report
Measurement Units	Number of accidents / year
Operations measured	Aircraft accidents during all flight phases that occurred in a year within the State/Region of occurrence.
Variants	Variant 1 (GASP): Aircraft MTOW > 2 250 kg 1.1 National accident occurrence level 1.2 Regional accident occurrence level Variant 2: All aircraft 2.1 National accident occurrence level 2.2 Regional accident occurrence level
Object(s) characterized	The KPI is typically computed for individual State, or Region (selection/grouping based on geography)
Utility of the KPI	High-level measurement of safety performance of the aviation system as a whole.
Parameters	None
Data requirement	For each reported occurrence: Date of occurrence Occurrence Category State of occurrence

[3] The list and details of the KPIs are available at https://www4.icao.int/ganpportal/ASBU/KPI.

KPI ID	KPI20
Data feed providers	ICAO ADREP database iSTARS Application "ADREP et al."
Formula/ algorithm	Count accidents if: a) The local date of occurrence is in between 01 January and 31 December of the year in question; b) It is of the type that is notifiable to ICAO; c) The circumstances of the accidents match the definition of Annex 13 definition of 'Accident'; and d) If variant 1, the aircraft involved in the accident is of maximum take-off mass of over 2 250 kg.
References and examples of use	ADREP: Accident Data Report https://www.eurocontrol.int/archive_download/all/node/12148 https://www.eurocontrol.int/archive_download/all/node/9360#page45 https://www.easa.europa.eu/sites/default/files/dfu/easa_asr_2020.pdf https://www.gcaa.gov.ae/_layouts/download.aspx?SourceUrl=/EN/epublication/EPublications/Civil%20Aviation%20Regulations%20(CARs)/CAR%20X%20-%20SAFETY%20MANAGEMENT%20SYSTEM%20(SMS)%20REGULATIONS/CAR-SMS%20-%20SAFETY%20MANAGEMENT%20SYSTEM%20-%20ISSUE%2006%20(corrected).pdf

KPI ID	KPI21
KPI Name	**Number of runway incursions**
Definition	Number of occurrences at an aerodrome involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and take-off of aircraft. (CICTT Taxonomy definition)
Measurement Units	Number of runway incursions / year
Operations measured	The actual number of runway incursions at an aerodrome
Variants	None
Object(s) characterized	The KPI is computed for individual aerodrome
Utility of the KPI	This KPI gives an indication of the incorrect or unsafe usage of the runways and of the safety performance improvement on the runway.
Parameters	None
Data requirement	For each reported occurrence: Date of occurrence Airport of occurrence
Data feed providers	Airports and airlines
Formula/ algorithm	Count number of runway incursions: a) the local date of occurrence in between 01 January and 31 December of the year in question; and b) the circumstances of the occurrence match the definition of CICTF 'RI'; or the occurrence category has been determined to be runway incursion – vehicle, aircraft or person (RI-VAP).
References and examples of use	https://www.mot.gov.sg/docs/default-source/default-document-library/runway-incursion-by-vehicle-in-seletar-airport-7-apr-2018-final-reportcecc69af7fde4718ad39b5127822a05f.pdf https://www.eurocontrol.int/archive_download/all/node/12148 https://www.eurocontrol.int/archive_download/all/node/9360#page45 https://www.gcaa.gov.ae/_layouts/download.aspx?SourceUrl=/EN/epublication/EPublications/Civil%20Aviation%20Regulations%20(CARs)/CAR%20X%20-%20SAFETY%20MANAGEMENT%20SYSTEM%20(SMS)%20REGULATIONS/CAR-SMS%20-%20SAFETY%20MANAGEMENT%20SYSTEM%20-%20ISSUE%2006%20(corrected).pdf

KPI ID	KPI22
KPI Name	**Number of runway excursions**
Definition	Number of veer offs or overruns of the runway surface.
Measurement Units	Number of runway excursions / year
Operations measured	• Only applicable during either the takeoff or landing phase. • The excursion may be intentional or unintentional. For example, the deliberate veer off to avoid a collision, brought about by a Runway Incursion. In this case, code both categories. • Use RE in all cases where the aircraft left the runway/helipad/helideck regardless of whether the excursion was the consequence of another event.
Variants	None
Object(s) characterized	The KPI is computed for individual aerodrome
Utility of the KPI	This KPI gives an indication of the incorrect or unsafe usage of the runways and of the safety performance improvement on the runway.
Parameters	None
Data requirement	For each reported occurrence: Date of occurrence Airport of occurrence
Data feed providers	Airports and airlines
Formula/ algorithm	Count number of runway excursions: a) the local date of occurrence in between 01 January and 31 December of the year in question; b) the circumstances of the occurrence match the definition of CICTT 'RE'; and c) the Occurrence Category has been determined to be runway excursion (RE).
References and examples of use	https://www.mot.gov.sg/docs/default-source/default-document-library/t-50-runway-excursion-in-changi-airport-6-feb-18-final-report.pdf https://www.eurocontrol.int/archive_download/all/node/12148 https://www.eurocontrol.int/archive_download/all/node/9360#page45 https://www.easa.europa.eu/sites/default/files/dfu/easa_asr_2020.pdf https://www.gcaa.gov.ae/_layouts/download.aspx?SourceUrl=/EN/epublication/EPublications/Civil%20Aviation%20Regulations%20(CARs)/CAR%20X%20-%20SAFETY%20MANAGEMENT%20SYSTEM%20(SMS)%20REGULATIONS/CAR-SMS%20-%20SAFETY%20MANAGEMENT%20SYSTEM%20-%20ISSUE%2006%20(corrected).pdf

KPI ID	KPI23
KPI Name	**Number of airprox/TCAS alert/loss of separation/near midair collisions/midair collisions (MAC)**
Definition	Number of airproxes, TCAS alerts, loss of separation as well as near collisions or collisions between aircraft in flight.
Measurement Units	Number of airprox/TCAS alert/loss of separation/near midair collisions/midair collisions (MAC) / year
Operations measured	• Includes all collisions between aircraft while both aircraft are airborne. • Both air traffic control and cockpit crew separation-related occurrences are included. • Genuine TCAS alerts are included here.
Variants	Variant 1: Number of airproxes Variant 2: TCAS alerts Variant 3: loss of separation Variant 4: near midair collisions Variant 5: midair collisions (MAC)
Object(s) characterized	The KPI is computed for volumes of airspace as designated by the State.
Utility of the KPI	This KPI gives an indication of safety performance improvement in the air.
Parameters	None
Data requirement	For each reported occurrence: Date of occurrence

KPI ID	KPI23
	FIR of occurrence
Data feed providers	ANSPs and airlines
Formula/ algorithm	Count number of airproxes, TCAS alerts, loss of separation as well as near collisions or collisions between aircraft in flight: a) the local date of occurrence in between 01 January and 31 December of the year in question; b) the circumstances of the occurrence match the definition of CICTT 'MAC'; and c) the Occurrence Category has been determined to be airprox/TCAS alert/loss of separation/near midair collisions/midair collisions (MAC).
References and examples of use	https://www.eurocontrol.int/archive_download/all/node/9360#page45 https://www.easa.europa.eu/sites/default/files/dfu/easa_asr_2020.pdf https://www.gcaa.gov.ae/_layouts/download.aspx?SourceUrl=/EN/epublication/EPublications/Civil%20Aviation%20Regulations%20(CARs)/CAR%20X%20-%20SAFETY%20MANAGEMENT%20SYSTEM%20(SMS)%20REGULATIONS/CAR-SMS%20-%20SAFETY%20MANAGEMENT%20SYSTEM%20-%20ISSUE%2006%20(corrected).pdf

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APPENDIX B
DRAFT RESOLUTION FOR ADOPTION BY THE 41ST SESSION OF THE ASSEMBLY

A41-xx: ICAO global planning for safety and air navigation

Whereas ICAO strives to achieve the goal of a safe and orderly development of civil aviation through cooperation among Member States and other stakeholders;

Whereas to realize this goal, the Organization has established Strategic Objectives, including objectives for safety and for capacity and efficiency;

Recognizing the importance of global frameworks to support the Strategic Objectives of ICAO;

Recognizing the importance of effective implementation of regional and national plans and initiatives based on the global frameworks;

Recognizing that further progress in improving the global safety, capacity and efficiency of civil aviation is best achieved through a cooperative, collaborative and coordinated approach in partnership with all stakeholders under the leadership of ICAO; and

Noting the approval by the Council of the ~~third~~ 2023-2025 edition of the Global Aviation Safety Plan (GASP) and of the ~~sixth~~ seventh edition of the Global Air Navigation Plan (GANP);

The Assembly:

1. *Endorses* the ~~third~~ 2023-2025 edition of the Global Aviation Safety Plan (GASP) and the ~~sixth~~ seventh edition of the Global Air Navigation Plan (GANP) as the global strategic directions for safety and air navigation, respectively;

2. *Resolves* that ICAO shall implement and keep current the GASP and the GANP to support the relevant Strategic Objectives of the Organization, while ensuring necessary stability;

3. *Resolves* that these global plans shall be implemented and kept current in close cooperation and coordination with all concerned stakeholders;

4. *Resolves* that these global plans shall provide the frameworks in which regional, subregional and national plans will be developed and implemented, thus ensuring consistency, harmonization and coordination of efforts aimed at improving international civil aviation safety, capacity and efficiency;

5. *Urges* Member States to develop sustainable solutions to fully exercise their safety oversight and air navigation responsibilities which can be achieved by sharing resources, utilizing internal and/or external resources, such as regional and subregional organizations and the expertise of other States;

6. *Urges* Member States to demonstrate the political will necessary for taking remedial actions to address safety and air navigation deficiencies, including those identified by Universal Safety Oversight Audit Programme (USOAP), through the GASP, the GANP and the ICAO regional planning process;

7. *Urges* Member States, the industry and financing institutions to provide the needed support for the coordinated implementation of the GASP and GANP, avoiding duplication of efforts;

8. *Calls upon* States and invites other stakeholders to cooperate in the development and implementation of regional, subregional and national plans based on the frameworks of the GASP and GANP;

9. *Instructs* the Secretary General to promote, make available and effectively communicate the GASP and the GANP; and

10. *Declares* that this resolution supersedes Resolution ~~A39-12~~ A40-1 on ICAO global planning for safety and air navigation.

APPENDIX A

Global Aviation Safety Plan (GASP)

. . .

APPENDIX B

Global Air Navigation Plan (GANP)

Whereas the enhancement of the safety, capacity and efficiency of aviation operations is a key element of the ICAO Strategic Objectives;

Having adopted Resolution ~~A40-4~~ A41-xx, a consolidated statement of continuing ICAO policies and associated practices related specifically to air navigation;

Recognizing the importance of GANP as an operational strategy and part of the basket of measures to achieve ICAO's global aspirational goals on CO_2 emissions; and

Recognizing that many States and regions are developing new air navigation plans for their own air navigation modernization;

The Assembly:

1. *Instructs* the Council to use the guidance in the Global Air Navigation Plan (GANP) to develop and prioritize the technical work programme of ICAO in the field of air navigation;

2. *Urges* the Council to provide States with a standardization roadmap, as announced in the GANP, as a basis for the work programme of ICAO;

3. *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 which establish priorities, targets and indicators consistent with globally-harmonized objectives, taking into account operational needs;

4. *Calls upon* States to take into consideration the GANP guidelines for the implementation of operational improvements as part of their national strategy to reduce the environmental impact, including CO_2 emissions, from international aviation;

5. *Calls upon* States, PIRGs, and the aviation industry to provide timely information to ICAO, and to each other, regarding the implementation status of the GANP, including the lessons learned from the implementation of its provisions;

6. *Invites* PIRGs to use ICAO standardized tools or adequate regional tools to monitor and, in collaboration with ICAO, analyse the implementation status of air navigation systems;

7. *Instructs* the Council to publish the results of the analysis on the regional performance dashboards ~~and in an annual global air navigation report~~ including, as a minimum, the key implementation priorities and accrued environmental benefits associated with the implementation of the operational improvements outlined in the ASBU framework;

8. *Urge*s States that are developing new air navigation plans, for their own air navigation modernization, to coordinate with ICAO and align their plans so as to ensure global compatibility and harmonization; and

9. *Instructs* the Council to continue developing the GANP, keeping it current with evolving technology and operational requirements.

— END —

ICAO

INTERNATIONAL CIVIL AVIATION ORGANIZATION

A UN SPECIALIZED AGENCY

GLOBAL DEVELOPMENTS RELATED TO CNS

RECONNECTING THE WORLD

GLOBAL DEVELOPMENTS RELATED TO CNS

BY CNSS SECTION AND AOI SECTION

For the ATMAS TF/4 Meeting (Bangkok, 28-30 June 2023)

ICAO

Presentation Overview

01 COMMUNICATIONS

02 NAVIGATION

03 SURVEILLANCE

04 SPECTRUM

05 INTEGRATED CNS & SPECTRUM

06 OTHER CNSS ACTIVITIES

COMMUNICATIONS

The 6th meeting of the Data Communication Infrastructure Specific Working Group of the Communications Panel (CP-DCIWG/6) was held 17-20 October 2022. Several deliverables, proposals for amendment to Annex 10 Volume II and Volume III, are expected from CP-DCIWG/6.

- **Provisions on the exchange of information using the aeronautical telecommunication network over the internet protocol suite**

  (SARPS on Aeronautical Telecommunications Network using the Internet Protocol Suite (ATN/IPS) with VOIP)

COMMUNICATIONS

- **Provisions on the exchange of information using the aeronautical telecommunication network over the internet protocol suite**

  (SARPS on Aeronautical Telecommunications Network using the Internet Protocol Suite (ATN/IPS) with VOIP)

An IP-based network for ATM is a key enabler for developments such as SWIM, FF/ICE, TBO and RPASs and many others. However there are complex issues that need to be addressed to ensure network security and mobility across various media. Some of these include stringent performance requirements (especially for A/G); higher availability requirements, accommodation of the ICAO 24-bit aircraft address, a robust network architecture and interfaces, naming conventions unique to aviation. The PfA will assist introduction of global harmonized provisions to make consistent and unique addressing to provide protection from random intrusions.

The Air Navigation Commission (ANC) will carry out its preliminary review in May 2023.

COMMUNICATIONS

- Update SATCOM SARPs

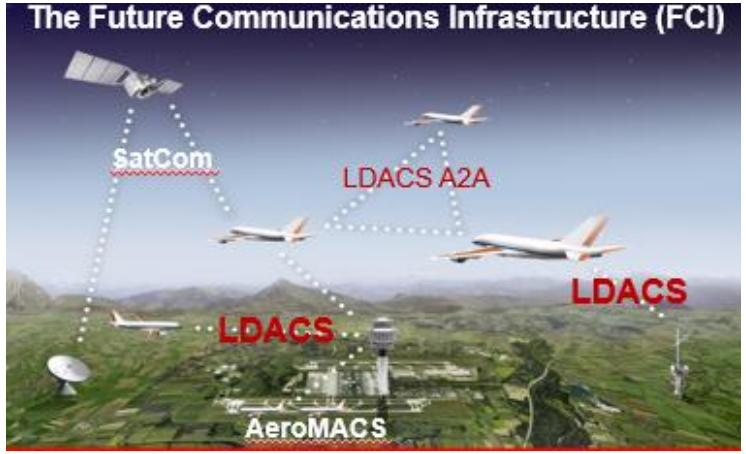
ATM Operations in the ASBU Block 1 and 2 timeframe will require capacity, performance and ease of use, that cannot be met by the satellite systems in use today. New SATCOM systems referred to as SATCOM Performance Class B systems, offer better overall performance compared to the existing systems, while maintaining continuity with existing legacy ground-based and airborne equipment.

- PfA preliminary review is expected in Q1 2025

COMMUNICATIONS

Several deliverables, proposals for amendment to Annex 10 Volume II and Volume III, are expected from CP-DCIWG/5. Cont

- SARPS on L-Band Terrestrial Data Link System (LDACS)



Future ATM Operations will require capacity and performance that cannot be met by the terrestrial data link systems in use today. hence new data link systems are required. The development of new ATM operational procedures and increasing demands for operational and business continuity require greater robustness, resilience and security in communications systems. These can be realized through the introduction of LDACS. LDACS, a broadband system based on Orthogonal Frequency-Division Multiplexing (OFDM) like current/future mobile radio standards, applies modern and highly efficient transmission concepts and advanced recover design for interference robustness. LDACS is highly flexible and scalable and, thus, enables long-term evolution. LDACS supports high-rate data communications and voice, which enables important future applications.

- PfA preliminary review is expected in Q1 2025

COMMUNICATIONS

- Also CP-DCIWG/6 discussed and approved

- New editions of Doc 9880 and Doc 9869
- Updates to the CP-DCIWG job cards and
- New job card on Development and standardization of emerging aeronautical communication technologies and systems operating in VHF frequency band

NAVIGATION

Amendment 93 to Annex 10 — Aeronautical Telecommunications, Volume I — Radio Navigation Aids, regarding:

- support of the introduction of dual-frequency, multi-constellation (DFMC) global navigation satellite system (GNSS) by adding provisions for additional frequencies of operation for the global positioning system (GPS), the global navigation satellite system (GLONASS) and the satellite-based augmentation system (SBAS), and by introducing provisions for the new BeiDou Navigation Satellite System (BDS) and Galileo system; and
- support of ionospheric gradient mitigation for the ground-based augmentation system (GBAS).

ICAO NEWS RELEASE

GNSS milestone achieved as ICAO Council adopts new dual-frequency multi-constellation standards

https://www.icao.int/Newsroom/Pages/GNSS-milestone-achieved-as-ICAO-Council-adopts-new-dualfrequency-multiconstellation-standards.aspx

NAVIGATION

- support of the introduction of dual-frequency, multi-constellation (DFMC) global navigation satellite system (GNSS) by adding provisions for additional frequencies of operation for the global positioning system (GPS), the global navigation satellite system (GLONASS) and the satellite-based augmentation system (SBAS), and by introducing provisions for the new BeiDou Navigation Satellite System (BDS) and Galileo system; and
- support of ionospheric gradient mitigation for the ground-based augmentation system (GBAS).

- The proposed amendment arose from the sixth meeting of the Navigation Systems Panel (NSP/6).
- After consultation with States and international organizations and final review by the Air Navigation Commission, the amendment was adopted by the ICAO Council on 20 March 2023.
- It will become effective on 31 July 2023 and applicable on 2 November 2023.

NAVIGATION

Amendment 93 to Annex 10 — Aeronautical Telecommunications, Volume I — Radio Navigation Aids cont.

Impact on States:

- Implementation of DFMC GNSS (any element) is not mandatory and will be driven by the specific cost/benefit and policy considerations that apply to individual States.
  - For most States that choose to implement DFMC GNSS, no additional infrastructure costs will be involved.
  - For DFMC GNSS provider States (core satellite constellation, SBAS) typically infrastructure costs will not be carried by aviation users given that the related infrastructure is of universal utility and aviation users represent a small fraction of the user community.
- Implementation of the GBAS changes would consist of a minor modification to existing material.

NAVIGATION

Ongoing NAV developments (after Amendment 93):

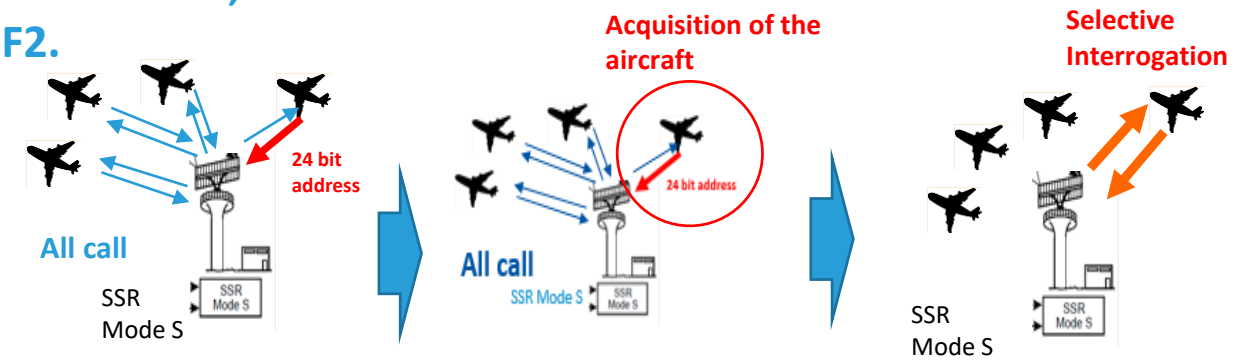
- ARAIM (Advanced RAIM)
- SBAS authentication
- DFMC GBAS
- GNSS interference mitigation
- APNT (alternative position, navigation and timing)

SURVEILLANCE

Proposal for amendments (PfA) to Annex 10, Volume III, related to 24-Bit aircraft address

On 29th Nov 2022, the Air Navigation Commission (ANC) carried out the preliminary review of the PfA to Annex 10, Volume III, related to 24-Bit aircraft address. This PfA includes:

a) refinement of provisions related to aircraft address assignment;
b) increasing State allocation of aircraft addresses; and
c) deletion of unused registers F1 and F2.



SURVEILLANCE

Proposal for amendments (PfA) to Annex 10, Volume III, related to 24-Bit aircraft address Cont

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Tel.: +1 514-954-8219 ext.6082

Ref.: AN7/1.3.95-22/106 22 December 2022

Subject: Proposed amendments to Annex 10, Volume III, related to 24-Bit aircraft address stemming from the fourth meeting of the Surveillance Panel (SP/4)

Action required: Comments to reach Montréal by 22 June 2023

Sir/Madam,

1. I have the honour to inform you that the Air Navigation Commission, at the sixth meeting of its 221st Session held on 29 November 2022, considered a preliminary review of amendment proposals to Annex 10 — *Aeronautical Telecommunications*, Volume III — *Communication Systems* —arising from the fourth meeting of the Surveillance Panel (SP/4). The Commission authorized the transmission of these proposals to Contracting States and appropriate international organizations for comments.

2. The background for the aforementioned proposals is provided in Attachment A. The proposal for amendments to Annex 10, Volume III is contained in Attachment B. Rationale boxes providing more information have been included, where appropriate, immediately following each proposal.

3. In examining the proposed amendments, you should not feel obliged to comment on editorial aspects as such matters will be addressed by the Air Navigation Commission during its final review of the draft amendments.

4. May I request that any comments you wish to make on the amendment proposals be dispatched to reach me not later than 22 June 2023. To facilitate the processing of replies with substantive comments, I invite you to submit an electronic version in Word format to icaohq@icao.int. The Air Navigation Commission has asked me to specifically indicate that comments received after the due date may not be considered by the Commission and the Council. In this connection, should you anticipate a delay in the receipt of your reply, please let me know in advance of the due date.

5. In addition, the proposed amendments to Annex 10, Volume III are envisaged for applicability on 28 November 2024. Any comments you may have thereon would be appreciated.

999 Robert-Bourassa Boulevard Montréal, Quebec Canada H3C 5H7 Tel.: +1 514-954-8219 Fax: +1 514-954-6077 Email: icaohq@icao.int www.icao.int

The State Letter (AN7/1.3.95-22/106) was published on 22 Dec 2022 and circulated to States and international organizations for their comments.

The due date for those comments is 22 June 2023.

The Secretary will present the results of the consultation for final review by the ANC during its 224th Session (Fall 2023).

The expected applicability date for the PfA is 28 November 2024.

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SURVEILLANCE

On going activities

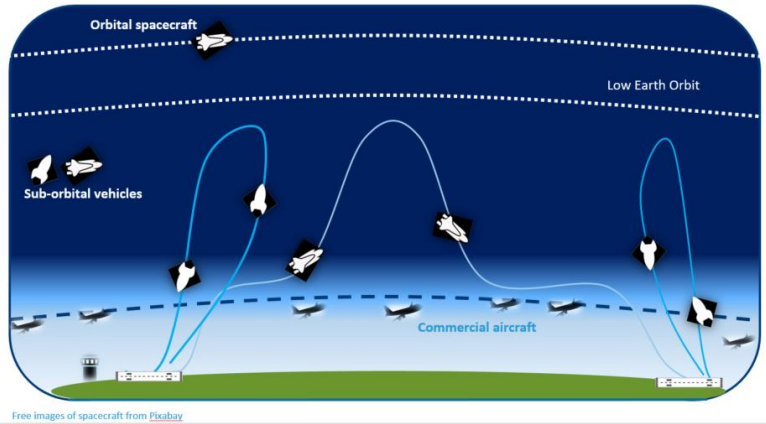
The 5th meeting of the Surveillance Panel (SP/5) to be held 20-29 Sep 2023 is planning to progress the PfA to Annex 10, Volume IV, related to updates to transponder requirements for compatibility with the new 1090 MHz extended squitter ADS-B version 3 Format.

ADS-B version 3 will provide new capabilities including :

- autonomous distress tracking support
- information to support future interval management operations;
- broadcast of aircraft–based derived weather data;
- Broadcast of lost C2 Link state for UAS/RPAS;
- broadcast of 1030/1090 MHz spectrum monitoring data; and
- functionality to support sub-orbital vehicle operations.

This is related to:

➢**WRC-23 Agenda item 1.6 and 1.8**



SURVEILLANCE

On going activities Cont.

The SP/5 to be held 20-29 Sep 2023 is also planning to progress the PfA to Annex 10, Volume IV, related to :

- technical provisions for **the efficient use of the 1090 MHz radio frequency (RF),** providing means and measurements to reduce 1090 MHz RF congestion, ensuring better performance of surveillance systems and continued use of 1090 MHz systems;

- introduced ACAS III technical provisions, based on **ACAS Xu** (Unmanned Aircraft System) avionics standards developed by RTCA/EUROCAE; and

- a proposed revision to Chapter 7 of Annex 10 Volume IV, which specifies technical requirements for **airborne surveillance applications utilizing ADS-B IN**.

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FREQUENCY SPECTRUM MANAGEMENT

- **ICAO Position for the International Telecommunication Union (ITU) World Radiocommunication Conference 2023 (WRC-23)**

  - The ICAO Position was approved by the ICAO Council and sent to all ICAO Contracting States and relevant international organizations under cover of ICAO State letter E 3/5-21/37 dated 18 August 2021.

  - It looks like the WRC-23 to be held 20 Nov- 15 Dec this year will be busier than ever for aviation. WRC-23 Agenda Items 1.6, 1.7, 1.8, 1.9, 1.10 and 9.2 address issues where aviation is seeking action by the WRC.

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Tel.: +1 514-954-8219 ext. 7130

Ref.: E 3/5-21/37 18 August 2021

Subject: ICAO Position for the International Telecommunication Union (ITU) World Radiocommunication Conference (2023) (WRC-23)

Action required: To consider the ICAO Position when developing your State's position for WRC-23 and to support the ICAO Position during WRC-23

Many WRC agendas are directly related to CNS & Spectrum expert activities!

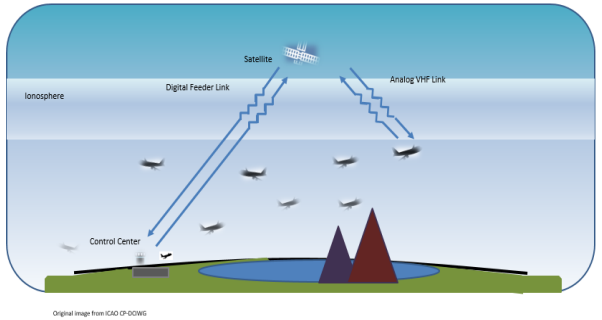
FREQUENCY SPECTRUM MANAGEMENT

- **ICAO Position for the International Telecommunication Union (ITU) World Radiocommunication Conference 2023 (WRC-23)**

  - Active support from States is deemed to be the only means to ensure that the results of the WRC-23 reflect civil aviation's need for spectrum.

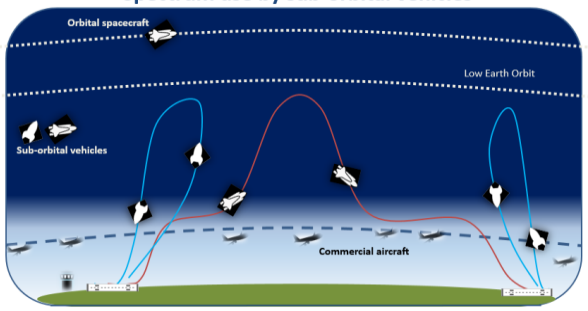
  - Frequency Spectrum Management Panel (FSMP) reviewed and approved changes to the ICAO Position in February 2023. The ANC will review these changes on 16 May 2023 and the ICAO Council will review the updates for their approval around June 2023 timeframe.

WRC-23 Agenda Item 1.7:
Potential facilitation of aeronautical VHF over satellite



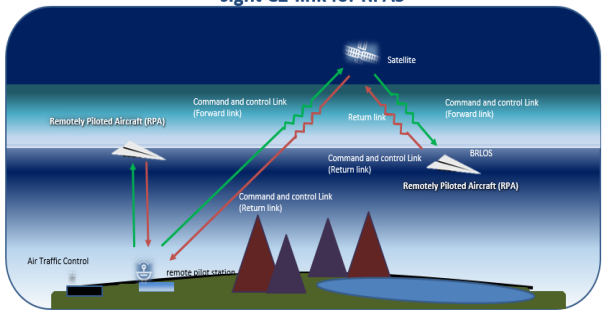
Original image from ICAO CP-DCIWG

WRC-23 Agenda Item 1.6:
Spectrum use by sub-orbital vehicles



Free images of spacecraft from Pixabay

WRC-23 Agenda Item 1.8:
Finalization of a satellite allocation enabling beyond-line-of-sight C2-link for RPAS



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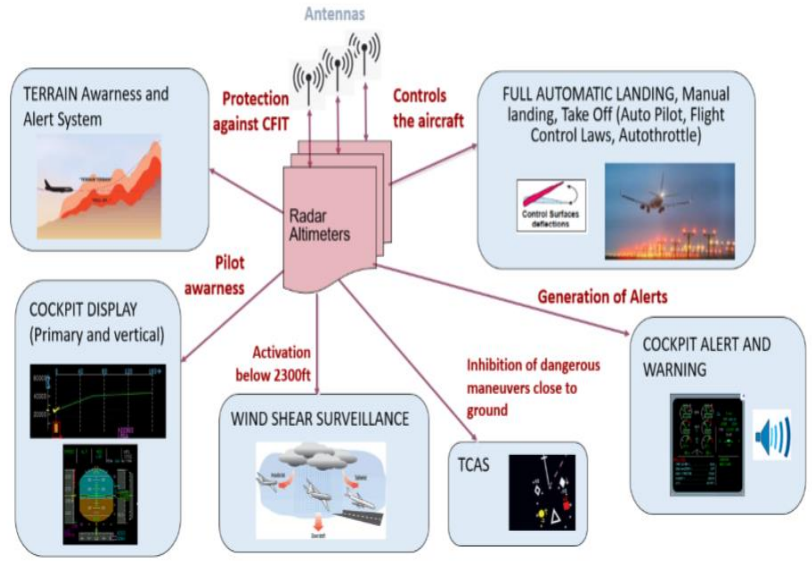
FREQUENCY SPECTRUM MANAGEMENT

Potential interference to Radio Altimeters and development of relevant SARPs

- A number of administrations are currently considering or have already begun deploying new cellular broadband technologies (such as 5G) in the frequency bands close to the radio altimeter's frequencies of operation (4.2-4.4 GHz).

- The international aviation industry has noted with concern that these broadband technologies may cause harmful interference to radio altimeters, which is a mandated critical aircraft safety system used to determine an aircraft's height above terrain. If not properly mitigated, harmful interference to the function of the radio altimeter during any phase of flight may pose a serious safety risk to passengers, crew and people on the ground.



FREQUENCY SPECTRUM MANAGEMENT

Potential interference to Radio Altimeters and development of relevant SARPs Cont.

- ICAO has received studies from several States and organizations regarding the interference potential to radio altimeters. These studies generally conclude that some radio altimeters will be impacted if high power cellular systems are implemented near the frequency band used by the radio altimeters.

- ICAO published a State Letter (Refer to SP 74/1-21/22 published on 25 March 2021) which encourages States and the aviation industry to consider as a priority, public and aviation safety when deciding how to enable cellular broadband/5G services in radio frequency bands near the bands used by radio altimeters.

- A41 Outcome related to ICAO policy on radio frequency spectrum matters: Requested ICAO and its Member States to continue taking necessary measures and efforts to ensure that radio altimeters and other aeronautical systems are free from harmful interference, including implementation of mitigation measures, sharing of best practices, as well as development of relevant provisions and guidance.

International Civil Aviation Organization | Organisation de l'aviation civile internationale | Organización de Aviación Civil Internacional | Международная организация гражданской авиации | منظمة الطيران المدني الدولي | 国际民用航空组织

Tel.: +1 514-954-8219 ext. 7130 25 March 2021

Ref.: SP 74/1-21/22

Subject: Potential safety concerns regarding interference to radio altimeters

Action required: As indicated in paragraph 5

Sir/Madam,

1. I have the honour to bring your attention to an ongoing initiative by the International Civil Aviation Organization (ICAO) to ensure continued public and aviation safety.

2. During recent meetings of ICAO experts, concerns about interference to radio altimeters on-board aircraft have been raised. A number of administrations are currently considering or have already begun deploying new cellular broadband technologies (such as 5G) in the frequency bands close to the radio altimeter's frequencies of operation (4.2-4.4 GHz), a critical aviation safety system. The international aviation industry has noted with concern that these broadband technologies may cause harmful interference to radio altimeters.

3. The radio altimeter[1] is a mandated critical aircraft safety system used to determine an aircraft's height above terrain. Its information is essential to enable several safety related flight operations and navigation functions on all commercial aircraft as well as a wide range of other civil aircraft. Such functions and systems include terrain awareness, aircraft collision avoidance, wind shear detection, flight controls, and functions to automatically land an aircraft. If not properly mitigated[2], harmful interference to the function of the radio altimeter during any phase of flight may pose a serious safety risk to passengers, crew and people on the ground.

4. ICAO has received studies from several States and organizations regarding the interference potential to radio altimeters[3]. These studies generally conclude that some radio altimeters will be impacted

[1] In some aviation publications it is also known as the radar altimeter or Low Range Radar Altimeter.
[2] General guidance on Interference Protection Considerations can be found in Chapter 9 of the *Handbook on Radio Frequency Spectrum Requirements for Civil Aviation – ICAO spectrum strategy, policy statements and related information* (Doc 9718, Volume I)
[3] Report by RTCA – https://www.icao.int/safety/FSMP/MeetingDocs/FSMP%20WG11/FP/FSMP-WG11-IP07_RTCA_Report.docx

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FREQUENCY SPECTRUM MANAGEMENT

Potential interference to Radio Altimeters and development of relevant SARPs Cont.

Planned ICAO Circular in 2023: Guidance on Safeguarding measures to protect Radio Altimeter from potential harmful interference from Cellular 5G Communications

See:
FSMP WG/16 WP/02 Attachment, available for download at FSMP website

Note.- The draft Circular is based on the MID document, while also including/accomodating several comments received by the FSMP members.

TABLE OF CONTENTS

FREQUENCY SPECTRUM MANAGEMENT

- **Develop and maintain SARPs and guidance to prevent WAIC / Radio Altimeter interference**

  - WRC-15 agreed to changes to the international radio frequency regulations which provide for sharing of the frequency band 4 200 – 4 400 MHz by Wireless Avionics Intra-Communications (WAIC) systems under the aeronautical mobile (route) service, and radio altimeters under the aeronautical radionavigation service.
  - The associated ITU Resolution 424 (WRC-15) requires that the WAIC systems protect the operation of the radio altimeters and operate in accordance with SARPs as contained in Annex 10.

FREQUENCY SPECTRUM MANAGEMENT

Develop and maintain SARPs and guidance to prevent WAIC / Radio Altimeter interference

- A WAIC System provides wireless communications between points on board a single aircraft for aircraft applications related to the safety and regularity of flight using the aeronautical mobile (route) service (AM(R)S) allocation in the frequency band 4 200 – 4 400 MHz.
- FSMP/3 held in September 2022 approved the draft WAIC SARPs, which will prevent interference between WAIC systems and radio altimeters in order to ensure the safe operation of aircraft.
- The Air Navigation Commission will carry out its preliminary review in May 2023 and its relevant State Letter will be circulated to States and international organizations for their comments in Q2-Q3 2023. The expected applicability date for the PfA is Nov 2025.
- WAIC SARPs will be included in Chapter 4 of Annex 10, Volume V, under a new section 4.5 dealing with the frequency band 4200-4400 MHz. That section will also then be appropriate for the radar altimeter SARPS once they are completed.

INTEGRATED CNS AND SPECTRUM

(Long Term Evolution of CNS and Spectrum matters)

In addition to the continued engagement in the ITU spectrum management process, aviation also needs to engage in a proactive and long-term evolution of the CNS systems

AN-Conf/13 Recommendation 2.2/1

› ICAO to launch a study on evolving the required CNS and spectrum access strategy in the long term, to ensure that CNS systems remain efficient users of the spectrum resource

› request States to engage in the spectrum regulatory process to ensure the continued necessary access and protection of the safety critical aeronautical CNS systems

Work is being initiated to undertake this study. This activity is expected to benefit the development of aeronautical CNS systems and their spectrum use in the medium to longer term and eventually the formulation of the ICAO spectrum policy for future WRCs

INTEGRATED CNS AND SPECTRUM

The Global concept for Integrated Communications, Navigation, Surveillance (CNS) and Spectrum

The ICNSS-TF is drafting the **global concept for Integrated Communications, Navigation, Surveillance (CNS) and Spectrum**, which will include the following deliverables:

a) a roadmap of CNSS evolution including a blueprint for CNS systems evolution; and

b) a new and streamlined framework for CNSS standardization which delivers:

Relevant WPs were discussed under the agenda item 31 (Aviation Safety and Air Navigation Standardization) at the 41st Assembly (27 Sep to 7 Oct 2022).

The draft Global Concept for Integrated CNS & Spectrum was shared with States and aviation community through the link embedded in the A41-WP/58.

(For more information, refer to the Integrated CNSS project: Pages - Integrated CNSS Project (icao.int))

INTEGRATED CNS AND SPECTRUM

The Global concept for Integrated Communications, Navigation, Surveillance (CNS) and Spectrum Cont.

Feedback received was very positive and lead to the following strong support:

“The Commission reviewed A41-WP/58, presented by the Council, which contained information on progress achieved by the Integrated Communications, Navigation, Surveillance and Spectrum (ICNSS) project.

Noting that the ultimate objective of the ICNSS project was to propose a set of recommendations for endorsement by the next Assembly, the Commission expressed its satisfaction with the efforts underway and encouraged States, international organizations and other stakeholders to support the continued development and implementation of a medium to long-term roadmap for the evolution of ICNSS and a new streamlined framework for communications, navigation, surveillance (CNS) and frequency spectrum standardization”.

OTHER CNSS ACTIVITIES

Refinement of Frequency Finder (FF)

- In order to better support States and ICAO regional offices, ICAO has successfully further enhanced and implemented the following features to Frequency Finder tool:

  Plotting interference contours in the NAV module; and

  A global database for Mode S II/SI code assignments.

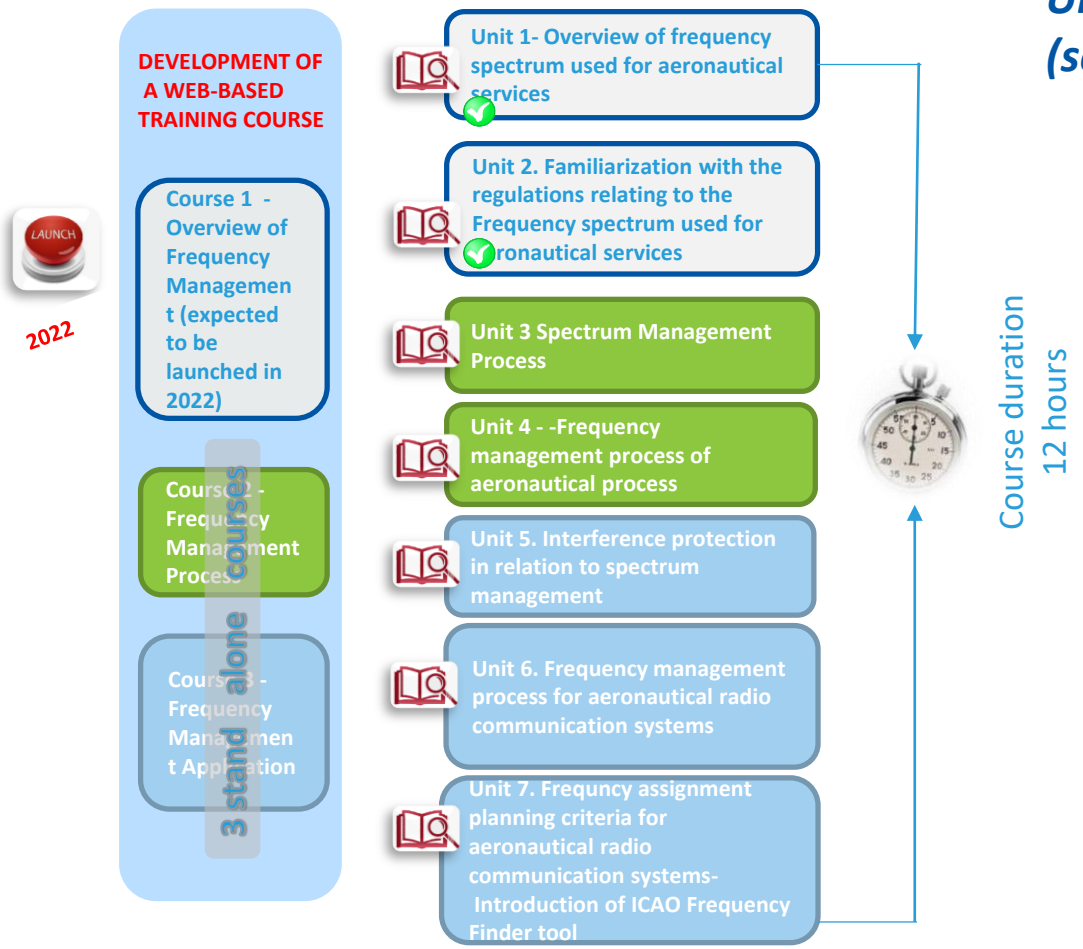
  Furthermore, there are several other enhancements planned to be developed and implemented (such as adding simulation capability, better cyber resilience of the tool) to facilitate efficient use of spectrum, assisting States and ICAO regional offices to visualize the current and future frequency congestions as well as to identify the optimal spectrum assignment globally and regionally

Workshops to promote Frequency Finder (FF)

- Several workshops were/will be conducted to assist States in use of FF

Development of the online course, frequency management for civil aviation (refer to the next slide)

ONLINE COURSE DEVELOPMENT RELATED TO FREQUENCY MANAGEMENT FOR CIVIL AVIATION



Unit 1 was launched in 2022! (see next slide)

Coordination with Global Aviation Training Section

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ONLINE COURSE DEVELOPMENT RELATED TO FREQUENCY MANAGEMENT FOR CIVIL AVIATION

Aeronautical Spectrum Use with Special Focus on VHF (ASU) | ICAO Store

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Goal

This course aims to provide the fundamentals of frequency and spectrum management, focusing mainly on Very High Frequency (VHF) used by aeronautical communications systems, as well as a description of the specific terms used in frequency management in civil aviation including a brief discussion about aeronautical communications and navigation systems.

Course Description

The course starts by providing clear explanations of key terms to help you understand Very High Frequency (VHF), in addition to providing an overview of key concepts related to Frequency Management. It further enables you to explore the aeronautical services carried out in VHF and helps you to identify the frequency bands for a wide variety of uses in communications, navigation and surveillance (CNS).

ICAO

Thank You

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