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St. George's, Antigua and Barbuda, 1 to 5 June 2026**

Agenda Item 6: Seamless and Interoperable Air Navigation Services (ANS) that are Fit for the Future

A SEAMLESS AIRSPACE SYSTEM TO MEET THE NEEDS OF THE FUTURE

(Presented by International Coordinating Council of Aerospace Industries Associations and Civil Air Navigation Services Organization -ICCAIA)

EXECUTIVE SUMMARY

Aviation faces unprecedented challenges, including increasing traffic volumes, diverse airspace users, and heightened sustainability expectations. Air Traffic Management (ATM) is the backbone of the aviation system, ensuring the safe, efficient movement of passengers and goods. The world is at an inflection point where current, very mature and in some cases, outdated systems, are becoming limiting factors in airspace capacity. New technologies and implementation of currently available technologies have the potential to increase safety and operational efficiency. To realize these benefits, significant work has been completed in developing a future airspace system concept that enables seamless integration of current users and new entrants within a globally interoperable and digitally enabled environment. A seamless and globally interoperable airspace system would do more than accommodate new operational concepts or users by providing a common framework that leverages enhanced automation and real-time data sharing.

Action:	Under Section 4
<i>Strategic Objectives:</i>	<ul style="list-style-type: none">• Aviation is Environmentally Sustainable• Aviation Delivers Seamless, Accessible, and Reliable Mobility for All
<i>References:</i>	<ul style="list-style-type: none">• Aviation is Environmentally Sustainable• Aviation Delivers Seamless, Accessible, and Reliable Mobility for All• ICAO Global Air Navigation Plan (GANP – Doc 9750); ICAO Global ATM Operational Concept (Doc 9854); ICAO Annexes 2, 6, 10 and 11; and• Procedures for Air Navigation Services – ATM (Doc 4444)

1. Introduction

1.1 Aviation is on the precipice of a transformative era, driven by both growing traffic demand and the arrival of groundbreaking technologies. Over the next 20 years, global air travel is forecast to experience significant growth, with passenger air traffic projected to more than double. New concepts of operation are rapidly becoming available across the aviation industry sector. Many of these innovations

are possible through advancements in automation enabled by technologies such as big data, robotics, and artificial intelligence. Foundational change will be needed in the future to benefit from innovation and accommodate the anticipated growth in air transport as well as the integration of new and emerging forms of air transport at all strata of airspace. These innovations carry significant potential in improving aviation safety, sustainability, accessibility and affordability across the globe.

1.2 Today's airspace management system faces limitations. It operates under a patchwork of regulations, procedures and technologies, leading to challenges in coordination and communication between ANSPs, as well as service differences for airspace users. It remains highly fragmented, limiting flexibility in adapting to dynamic traffic demands. The lack of interoperability between legacy systems and emerging technologies also makes it difficult to manage increasing air traffic volumes and integrate new entrants. Furthermore, fragmented management complicates the implementation of global sustainability initiatives, such as reducing carbon emissions through optimized flight paths.

1.3 In addition, emerging forms of air transport are now mixing with conventional air traffic and operating in new airspace environments with different stakeholders. Drones, urban air mobility, commercial space operations and other types of higher altitude operations are rapidly becoming the norm and not the exception. Airspace is a finite resource, and the existing capacity of the global aerospace system will eventually limit air transport growth. It is widely recognized that we will eventually reach the limit of what current technologies can do, and innovative approaches are needed to safely allow air transport to grow.

2. Discussion

2.1 In response to the above-mentioned challenges, the Civil Air Navigation Services Organization (CANSO) brought together a coalition of over 80 organizations including regulators, Air Navigation Service Providers (ANSPs), airspace users, airports, academia, aerospace manufacturers, drone operators, and Unmanned Aircraft Systems Traffic Management (UTM) service providers to define a common vision and pathway for the future of ATM. Through this collaborative effort, the "Complete Air Traffic System (CATS) Global Council" developed the Concept of Operations for Future Skies (CATS CONOPS). This CONOPS serves as a strategic guide to creating a safe, seamless, efficient, and sustainable airspace management framework. It outlines a phased roadmap that would allow for a harmonized evolution of today's air traffic management system over the next two decades.

2.2 The CATS CONOPS also represents an important contribution to ICAO's ongoing work on a holistic vision for the Advanced Air Mobility (AAM) ecosystem and a forthcoming global concept for High Altitude Operations (HAO), both essential for achieving seamless airspace management. The CATS CONOPS long-term vision is an airspace where innovative and traditional users operate seamlessly within a globally interoperable and federated airspace system. However, full integration of ATM with UTM and HAO will require substantial transformation and collective effort.

2.3 The CATS CONOPS outlines the guiding principles and strategic objectives, the foundational transformation that will be needed in ATM to achieve the objectives, including critical enablers, and a three-phase structured pathway to delivering the future of Air Traffic Management. Each phase represents a crucial stage in the progressive integration of foundational and advanced capabilities, as follows:

- Phase 1) Airspace and Flight Optimization based on Advanced Digital Information Sharing – digital transformation enabling more efficient airspace management and trajectory-based operations, supported by the progressive introduction of service-oriented architecture (SOA).
- Phase 2) Advanced Automation and Real-Time Performance Management – shift towards integrating advanced automation into safety-critical ATM
- Phase 3) Seamless Airspace – final phase realizing seamless, fully integrated airspace

2.4 Since the introduction of air traffic control in 1920, visual flight rules (VFR) were sufficient to allow for safe operations. At that time, separation from other aircraft, obstacles and meteorology were the responsibility of the pilot. As air traffic increased and technology evolved, instrument flight rules (IFR) enabled pilots to fly in all-weather conditions when needed and the responsibility for preventing collisions moved to ATC due to increased surveillance capabilities and communications advancements. The use of high levels of automation and consequential re-distribution of some functions between operator, pilot and ATC will require the aviation community re-visit systems and assumptions to ensure that airspace remains safe, efficient and provides equitable access.

2.5 A highly automated air traffic management system will require a different approach to regulations. The focus will need to shift to specifying the required operational outcomes accommodating shorter innovation cycles, and new technologies to be tested in real-life environments while still maintaining a high standard of safety. Traditional software certification methods may not be adequate for highly automated complex systems. New certification approaches may be needed to address the complexities and dynamic nature of these systems.

2.6 Looking towards the future, the regulatory focus should shift to specifying the required operational outcomes accommodating shorter innovation cycles, and new technologies to be tested in real-life environments while still maintaining a high standard of safety. Regulatory sandboxes, offering controlled environments for experimentation, have emerged globally as valuable tools for enabling innovation without compromising safety or operational integrity. A regulatory sandbox in aviation is a controlled, time-limited environment where innovators can test new products, services, technologies, or operational concepts under the supervision of a regulator. The goal is to facilitate innovation safely and responsibly, while gathering evidence to inform future regulatory frameworks. Regulatory sandboxes have been used by several Civil Aviation Authorities and regional organizations throughout the world including Brazil (ANAC), Canada (Transport Canada), United Kingdom Civil Aviation Authority (UKCAA), and EASA.

2.7 ICAO should play a central role in bringing about this evolution in a consistent and harmonized fashion. A primary objective of ICAO, as specified in the Convention on International Civil Aviation, is to foster the “planning and development of international air transport”. The ICAO Global Air Navigation Plan (GANP), including the Global Aviation System Block Upgrades (ASBU), as well as the Global Air Traffic Management Operational Concept (GATMOC) are key planning documents used by the international civil aviation community and core mechanisms to achieve the ICAO objective. It will be essential to work through existing ICAO mechanisms to bring about change. The CATS CONOPS is intended to support and inform ICAO’s major framework documents, including the GANP, ASBUs, and the GATMOC. At the same time, as ICAO updates the Global Air Navigation Plan (GANP), it will be important to consider aligning with the principles outlined in the CATS CONOPS. This includes alignment of details into the basic building blocks (BBBs) of the Aviation System Block Upgrades (ASBUs).

2.8 As a global concept, the CATS CONOPS provides a structured industry vision that should be implemented regionally, with local focus and pace, ensuring it reflects the unique needs and priorities of each region. Regional coordination will play a vital role in adapting the transformations identified in the CONOPS to specific operational contexts. As a coordinated industry input to ICAO’s efforts, the CATS CONOPS promotes consistency and clarity, emphasizing the need for a cohesive pathway that integrates both traditional aviation and new entrants. A key challenge for the aviation ecosystem that needs to be addressed is achieving consistency and alignment across regions and globally, which is essential for realizing a harmonized airspace system. States within the NACC should familiarize themselves with the CATS CONOPS so that future regional air navigation plans can be informed by the CONOPS during this transition.

3. Conclusion

3.1 The global aviation system needs, and is on the precipice of, foundational change. A holistic analysis of the needs of a growing and evolving air transport sector has been completed that will enable such change. The collaborative work of numerous and varied stakeholders through the CATS Global Council, under the aegis of CANSO, has successfully arrived at a consensus of how air traffic management systems need to evolve over the next 20 years. While this will be evolutionary, involving several phases of development, the overall change will essentially change how air traffic is managed in the future. The CONOPS, including its roadmap, will be a living document for which industry holds itself accountable for progress, along with direct engagement with ICAO, States, standards organisations and regional and national regulators. The roadmap will be used to galvanise the industry and to enlist and engage stakeholders in the CATS vision for future skies and the necessary activities to get there.

4. Action by the Meeting

4.1 The Meeting is invited to:

- a) note the information provided in this paper;
- b) recognize the use of regulatory sandbox activities to facilitate hands on sustainable learning in real world scenarios to speed implementation of emerging technologies and procedures;
- c) encourage ICAO to consider aligning its Global Air Navigation Plan, including the Aviation System Block Upgrades; and Global ATM Operation Concept with the principles outlined in the Concept of Operations for Future Skies (CATS CONOPS); and
- d) encourage NACC States and organizations to familiarize themselves with the CATS CONOPS recognizing the essential role of regional groups in the implementation of any new air navigation concept.