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Global Air Navigation Plan

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INTERNATIONAL CIVIL AVIATION ORGANIZATION



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EXECUTIVE SUMMARY

The powerful socio-economic driver represented by the aviation industry is facing a variety of challenges. Air traffic, with its movement of passengers and goods around the world, is expected to double within the next 15 years. At the same time, new demands on the aviation system, emerging technologies, innovative ways of doing business and the shifting human role are bringing not only challenges but also opportunities that call for an urgent transformation of the global air navigation system so that aviation can continue to boost social well-being worldwide.

Acknowledging that aviation has entered a new era and that a good future is not an extrapolation of the past, but emerges to face the challenges of the future, the sixth edition of the Global Air Navigation Plan (GANP) responds to these challenges.

In aviation's fast and ever-changing landscape, achieving sustainable growth of international air transport strongly relies on a high-performing and seamless global air navigation system. The GANP brings the aviation community together to achieve an agile, safe, secure, sustainable, high-performing and interoperable global air navigation system.

Developed in collaboration with and for the benefit of stakeholders, the GANP is a key contributor to the achievement of ICAO's Strategic Objectives and has an important role to play in supporting the United Nations 2030 Agenda for Sustainable Development. A key goal that relates to the GANP is Sustainable Development Goal (SDG) 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. In addition to developing the GANP, ICAO has developed global plans for the specific areas of safety and security: the *Global Aviation Safety Plan* (GASP, Doc 10004) and the *Global Aviation Security Plan* (GASeP, Doc 10118). These three global plans are complementary.

The content of the GANP is organized into a multilayer structure with each layer tailored to different audiences. This allows for better communication with both high-level and technical managers with the objective that no State or stakeholder is left behind. The four-layer structure is made up of global (strategic and technical), regional and national levels, and provides a framework for alignment of regional, sub-regional and national plans. The four-layer structure facilitates decision-making by providing stable strategic direction for the evolution of the air navigation system and, at the same time, timely relevance in the technical content.

In addition, to enable different stakeholders to access and use relevant information, all four levels of the GANP have been made available via a printer-friendly, interactive, web-based platform – the GANP Portal (<https://www4.icao.int/ganportal>). The platform ensures a common entry point to, and consistency between, all four levels of the GANP.

Global strategic level

The global strategic level is presented as an electronic document, written in executive language and available in the six working languages of ICAO. It provides high-level strategic direction for decision-makers to drive the evolution of the global air navigation system.

The vision of this document is the creation of a globally interoperable air navigation system, as well as a proactive, integrated and common approach to emerging challenges and opportunities stemming from aviation and technological trends. The evolution, driven by this vision and reflected in the conceptual roadmap, will create a high-performing global air navigation system that will meet the ever-growing expectations of society and reduce global disparities. The conceptual roadmap is aimed at transforming

the air navigation system based on strengths and opportunities, rather than to simply improve it, by providing a more holistic approach to its evolution.

The realization of this vision requires strong commitment and investment from all members of the aviation community. The global air navigation system is becoming more complex as it accommodates new demand. Transformation is, therefore, not an end goal in itself, but the way to achieve the vision. The strategy for transforming the air navigation system responds not only to performance ambitions but also to the ambitions of many States and regions wanting to make increased use of available and emerging technologies.

The aviation industry needs to ensure its position at the forefront of innovation by adopting an increasingly cross-domain and global perspective. There is much at stake for the global economy and for citizens if the modernization of the global air navigation system does not continue.

Global technical level

The realization of the global air navigation system transformation relies on technical managers who, with the support of the decision-makers they report to, continue to improve the air navigation system. While one size does not fit all and there is no set end date for the evolution of the air navigation system, continuous improvements will ensure that the system adapts to global, regional and local opportunities and challenges in a timely and orderly manner.

Derived from the global strategic level, the global technical level is designed to support technical managers in planning the implementation of basic services and new operational improvements in a scalable and cost-effective manner and according to specific operational and performance needs, while ensuring interoperability of systems and harmonization of procedures.

Regional and national levels

The regional and national levels of the GANP ensure consistency from the development of operational improvements to their implementation. Such levels provide the global aviation community with a common basis for short- and medium-term implementation planning.

The regional level addresses regional and subregional performance and operational needs, differences, constraints and opportunities through the ICAO Regional Air Navigation Plans and other regional initiatives aligned with the global strategic and technical levels.

The national level focuses on State planning. The development of national air navigation plans, in coordination with relevant stakeholders and in alignment with regional and global plans, is a strategic part of the State's national aviation planning framework and is crucial to achieve the common vision being developed in the GANP.

The leadership demonstrated by the creation of this Plan and ICAO's vision contained therein ensure that there will be a relevant air navigation evolution for all stakeholders and that no country will be left behind.

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GLOSSARY

DEFINITIONS

Air navigation system. A system that supports the safe and orderly development of international civil aviation through the collaborative integration of humans, information, technology, facilities and services. Within the technical scope, the system comprises aerodrome operations, air traffic management, meteorology, aeronautical information and search and rescue services supported by air, ground and space-based communications, navigation and surveillance (CNS) capabilities. Within the operational scope, the system encompasses en-route to en-route operations to integrate airport operations and flight turnaround. Within the community scope, the system comprises all stakeholders involved in the provision of, or requiring the use of, air navigation resources.

Air navigation service providers (ANSPs): Within the context of the GANP, ANSPs refer to all stakeholders involved in the provision of air navigation services in the areas of aerodrome operations, air traffic management, meteorology, aeronautical information and search and rescue.

Airspace users. Organizations or individuals operating flights using aircraft and/or vehicles in the airspace. Three classifications of airspace users are considered in the GANP:

- a) ICAO-compliant manned flight operations (the largest segment);
- b) ICAO non-compliant manned flight operations; and
- c) flight operations of unmanned aircraft systems (UAS).

ICAO-compliant manned flight operations are those conducted in accordance with ICAO provisions (Standards and Recommended Practices (SARPs) and Procedures for Air Navigation Services (PANS)). ICAO-compliant airspace users include:

- a) all civil aircraft operators (i.e. those engaged in commercial air transport (passenger, mail and cargo services), aerial work, air taxi operators, business aviation, private air transport, sporting and recreational aviation, etc.); and
- b) the portion of States' users operating State aircraft using civil air traffic rules.

ICAO non-compliant manned flight operations are those conducted by State aircraft which cannot comply with ICAO provisions for operational or technical reasons.

Flight operations of unmanned aircraft systems (UAS), a growing segment of airspace users, include both civil and military applications of UAS technology. In certain situations, UAS technology is seen as a more cost-effective solution than the use of conventional aeroplanes or helicopters.

In some circumstances, using UAS proves to be safer and more effective, whereas in other cases it may be the only way to get a job done. However, the operation of civil UAS in the same airspace as that for manned operations is an emerging requirement, and the regulatory framework for such operations is under development.

Aviation System Block Upgrade (ASBU) framework. A group of operational improvements and associated performance benefits organized in key feature areas of the air navigation system and scheduled according to time of availability.

Aviation community. All stakeholders involved in the provision of, or requiring the use of, air navigation resources, including:

- a) ICAO and other aviation standards-making organizations;
- b) States in the role of regulators, airspace sovereigns and sometimes ANSPs;

- c) the aerodrome community;
- d) ANSPs, including, information service providers;
- f) airspace users;
- g) State aviation;
- h) aircraft and equipment manufacturers;
- i) research and development organizations; and
- j) international organizations including professional staff organizations.

Aviation system. A system that comprises all activities, economic and non-economic, related to air transportation.

Basic building block (BBB) Framework. Framework outlining the foundation of a robust air navigation system. It identifies basic services to be provided for international civil aviation in accordance with ICAO Standards. These basic services are defined in the areas of aerodromes, air traffic management, search and rescue, meteorology and information management. The BBB framework also identifies the end users of these services as well as the assets (CNS infrastructure) that are necessary to provide them.

Conceptual roadmap. A series of transformational operational changes providing a holistic approach to the evolution of the air navigation system, based on its strengths and opportunities.

Key performance area (KPA). A way of categorizing performance subjects related to high-level ambitions and expectations. ICAO has defined 11 KPAs: safety, security, environmental impact, cost effectiveness, capacity, flight efficiency, flexibility, predictability, access and equity, participation by the ATM community and global interoperability.

Performance ambition. A qualitative statement providing global priorities regarding the evolution of the performance of the global air navigation system. The performance ambition should not be seen as a target against which performance is continuously monitored and reported, but rather a catalyst for change. It is performance-oriented, time-bound and challenging, and at the same time, realistically considers the public environment, timing and available resources.

Performance objective. A qualitative and focused statement that defines a desired trend from today's performance (e.g. improvement).

ABBREVIATIONS AND ACRONYMS

ANC	Air Navigation Commission
ANSP	Air navigation services provider
ASBU	Aviation System Block Upgrade
ASBU PPT	ASBU Panel Project Team
ATM	Air traffic management
BBB	Basic building block
CNS	Communications, navigation and surveillance
FIR	Flight information region
GA	General aviation
GANP	Global Air Navigation Plan
GASP	Global Aviation Safety Plan
GASeP	Global Aviation Security Plan
GATMOC	Global Air Traffic Management Operational Concept
GMVT	GANP Multidisciplinary Vision Team
ICAO	International Civil Aviation Organization
KPA	Key performance area
KPI	Key performance indicator
PANS	Procedures for Air Navigation Services
PIRG	Planning and Implementation Regional Group
RASG	Regional Aviation Safety Group
SARPs	Standard and Recommended Practices
SDG	Sustainable Development Goal
UAS	Unmanned aircraft system

CHAPTER 1: INTRODUCTION

1.1 GENERAL

1.1.1 Aviation is an integral part of society, connecting people and transporting goods worldwide, and an important driver of economic growth and sustainable development, improving the standard of living of people around the world through the safe and reliable operation of over 120,000¹ flights every day. Forecasts confirm robust air traffic growth within the next 20 years owing to positive economic, political and societal changes.²

1.1.2 The achievement of sustainable growth within the international air transport system strongly relies on a high-performing and seamless global air navigation system. The global air navigation system supports the safe and orderly development of international civil aviation through the collaborative integration of humans, information, technology, facilities and services. Within the technical scope, the system comprises aerodrome operations, air traffic management, meteorology, aeronautical information and search and rescue services supported by air, ground and space-based communications, navigation and surveillance (CNS) capabilities. Within the operational scope, the system encompasses en-route to en-route operations to integrate airport operations and flight turnaround. Within the community scope, the system comprises all stakeholders involved in the provision of, or requiring the use of, air navigation resources.

1.1.3 A performance-driven, service-oriented and technologically advanced global air navigation system is therefore critical to achieve greater connectivity of passengers and goods, ensuring the sustainability of the growing aviation sector worldwide. In addition to the fundamental aviation performance principles of safety, security and environmental and economic sustainability, there are several other performance requirements that must be satisfied to meet the needs of society. As such, the need for performance should drive the evolution of the air navigation system.

1.1.4 ICAO's objective is to achieve sustainable growth of the global civil aviation system. To this end, ICAO sets the necessary standards and policies to ensure the safe and orderly development of international civil aviation by serving as a global forum among its 193 Member States.³ With the GANP, ICAO brings the aviation community together to achieve an agile, safe, secure, sustainable, high-performing and interoperable global air navigation system.

1.2 What is the GANP?

1.2.1 The GANP is an important planning tool for setting global priorities to drive the evolution of the global air navigation system and ensure that the vision of an integrated, harmonized, globally interoperable and seamless system becomes a reality.

¹ https://aviationbenefits.org/media/166344/abbb18_full-report_web.pdf

² <https://www.icao.int/sustainability/Pages/eap-fp-forecast-scheduled-passenger-traffic.aspx>

³ <https://www.icao.int/about-icao/Council/Pages/vision-and-mission.aspx>

1.2.2 Developed in collaboration with and for the benefit of stakeholders,⁴ the GANP is a key contributor to the achievement of ICAO's Strategic Objectives⁵ and plays an important role in supporting the United Nations SDGs.⁶

1.2.3 The GANP's content is organized into four levels, as shown in Figure 1. This allows for better communication with both high-level and technical managers and enables the different stakeholders to access and use the information at the level of detail that is most relevant to their area of interest. In this regard, the global strategic level, the GANP's highest level, addresses policymakers and executives, while the target audience of the GANP's subsidiary levels are subject-matter experts.

1.2.4 This electronic document represents the strategic angle of the GANP at the global strategic level. Its main purpose is to provide decision-makers with a strategic direction to drive the evolution of the global air navigation system for 2040 and beyond by outlining a vision, the associated performance ambitions and a conceptual roadmap. The global strategic level also ensures the stability of the GANP within the defined timeframe and provides a clear view of the performance and technical frameworks described at the global technical level, for which it serves as the reference.

1.2.5 The global technical level includes two technical frameworks, the basic building blocks (BBBs) and Aviation System Block Upgrades (ASBUs), with its associated performance framework, which includes performance objectives and key performance indicators (KPIs). The BBB framework outlines the foundation of a robust air navigation system. It can also be viewed as the commitment of the State, under the *Convention on International Civil Aviation* (Doc 7300), to provide essential air navigation services for the safe and orderly conduct of international civil aviation.

1.2.6. With the implementation of the BBBs, an air navigation system will be able to deliver the essential services to be provided for international civil aviation. The subsequent performance of these air navigation systems can then be improved through the application of the ASBU framework. The ASBU framework drives the evolution of the global air navigation system towards the achievement of the identified performance ambitions⁷ by defining operational improvements and associated performance benefits, derived from specific concepts of operations defined in the different evolutionary steps of the conceptual roadmap.⁸ Once validated and made available for deployment, these operational improvements support the adoption of a holistic, performance-based approach towards modernizing the air navigation system in a cost-effective manner. The adoption of a globally harmonized performance management process for the modernization of the air navigation system is necessary to align global, regional and national plans.

1.2.7 The two remaining regional and national levels of the GANP ensure consistency from the initial development of operational improvements to final implementation. These levels provide the global aviation community with a common basis for short- and medium-term implementation planning. The regional level of the GANP addresses regional and subregional performance and operational needs, differences, constraints and opportunities through the ICAO regional air navigation plans and other regional initiatives aligned with the global levels. The national level of the GANP, under the responsibility of the State, focuses on national planning. The development by States, in coordination with relevant stakeholders, of Air Navigation Plans as a strategic part of their national aviation planning

⁴ See Chapter 2

⁵ <https://www.icao.int/about-icao/Council/Pages/Strategic-Objectives.aspx>

⁶ <https://www.un.org/sustainabledevelopment/>

⁷ See Chapter 5

⁸ See Chapter 6

frameworks and their alignment with relevant regional and global plans are crucial to achieving the common vision being developed in the GANP.

1.2.8 All four levels of the GANP are available for interactive consultation via the [GANP Portal](#).

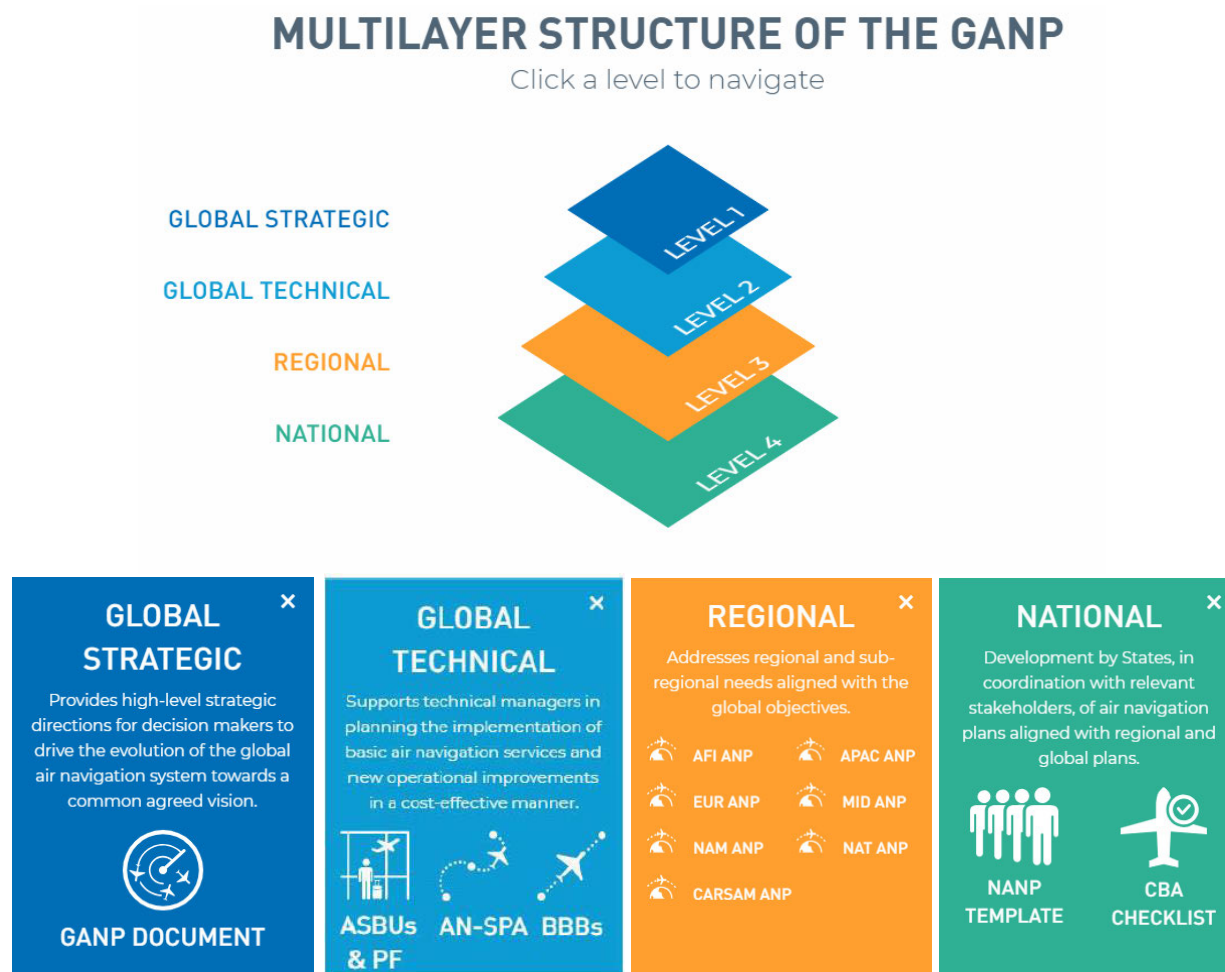


Figure 1: The multilayer structure of the GANP

1.3 GANP MAINTENANCE PROCESS

1.3.1 To provide stable strategic direction for the evolution of the air navigation system while ensuring timely relevance, each level within the multilayer structure of the GANP is subject to a different maintenance process. The strategic directions within the GANP are stable and not subject to change in the short term. This facilitates a smooth transition towards the improved implementation of interoperable and harmonized air navigation planning around the world. However, it is essential that the technical content of the GANP evolves over time in response to new technologies, different operational environments, new types and growing volumes of air traffic demand, and emerging priorities.

1.3.2 The global strategic level of the GANP is reviewed prior to each triennial session of the ICAO Assembly, and is updated as necessary.

1.3.3 Following the endorsement of the fifth edition⁹ of the GANP by the 39th Session of the ICAO Assembly in 2016, a GANP Multidisciplinary Vision Team (GMVT) was established to support ICAO in the development of the GANP's global strategic level. This team, made up of executives of key industry and research and development stakeholders, developed the vision, performance ambitions and conceptual roadmap presented to the Thirteenth Air Navigation Conference (AN-Conf/13), held from 9 to 19 October 2018 in Montréal, Canada. The Conference welcomed these initiatives whilst highlighting that commercial airspace vehicles should be considered as spacecraft rather than aircraft.

1.3.4 At the global technical level, the multidisciplinary ASBU Panel Project Team (ASBU PPT), composed of independent professionals from relevant ICAO expert groups, was established to support ICAO in updating the ASBU framework. The air navigation system is constantly evolving. In updating the ASBU framework, it was highlighted that, in order for the framework to remain meaningful, it was necessary to define a change management process to keep the framework's content up to date and ensure transparency by tracking the proposals, evaluation, approval and implementation of any amendment thereto.

1.3.5 The ASBU framework is therefore reviewed and updated as follows:

- a) a change to the ASBU framework can be submitted to ganp@icao.int by any member of the aviation community by filling in the template available on the GANP Portal with the proposed changes shown as a markup of the original text together with the rationale and impact assessment for the change. Supporting documentation should also be submitted, if applicable;
- b) the ICAO Secretariat, with the support of the ASBU PPT, will conduct an initial evaluation of the proposal and prepare it for further consideration;
- c) if the proposal relates to ICAO Standards and Recommended Practices (SARPs) or Procedures for Air Navigation Services (PANS), the Air Navigation Commission (ANC) will review and approve, modify or reject the proposal in accordance with the established process. If the proposal is unrelated to SARPs or PANS, the ASBU PPT and ICAO Secretariat will review and accept, modify or reject the proposal; and
- d) if the proposal, as amended through the above steps, is approved or accepted, the ICAO Secretariat will include it in the ASBU framework within the following six months. If the proposal is rejected, the ICAO Secretariat will notify the originator and provide the rationale for refusal.

1.3.6 The BBB framework will take into account amendments to ICAO air navigation SARPs and PANS and will be updated by the Secretariat on a biannual basis.

1.3.7 The AN-Conf/13 requested ICAO to establish a group of performance experts to continue to expedite the work on performance related to the GANP (referred to in Recommendation 4.3/1 — Improving the performance of the air navigation system), due to its criticality for the establishment of a globally harmonized performance management process for the modernization of the air navigation system.

⁹ <https://www.icao.int/airnavigation/pages/ganp-resources.aspx>

1.3.8 At the regional level of the GANP, it is the responsibility of ICAO regional offices to coordinate the review and update ICAO regional air navigation plans. Regional offices follow a well-established amendment process, which was approved by the ICAO Council on 18 June 2014 and is detailed in Volume I, Part 0, Appendix A of any regional air navigation plan.

1.3.9 The national level of the GANP is the responsibility of States. States are encouraged to develop and implement policies and procedures specifying the interval and methodologies for updating their national air navigation plans.

1.3.10 As recommended by the AN-Conf/13, ICAO is establishing a GANP study group to steer and manage the teams that are reviewing and updating the GANP.

1.3.11 The ANC reviews the GANP as part of its regular work programme and consults, as necessary, with States and non-governmental organizations on proposed amendments. The consultation is conducted via the State letter process or, alternatively, through an Air Navigation Conference or High-level Safety Conference. The GANP is then presented to the Council for approval. After approval by the Council, the GANP is presented to the following ICAO Assembly for endorsement by Member States.

1.4 RELATIONSHIP WITH OTHER DOCUMENTS

1.4.1 The *Global Air Traffic Management Operational Concept* (GATMOC, Doc 9854) presents a vision for a common operational concept of an integrated, sustainable, harmonized and globally interoperable air traffic management (ATM) system. The operational concept is independent of technology and is a statement of the envisaged “what”. The timely development of a sustainable aviation system based on the GATMOC requires a collaborative, synchronized and maintained planning tool such as the GANP. Hence, the vision, performance ambitions and conceptual roadmap embedded in the GANP refer directly to the GATMOC. The GATMOC’s companion manuals, which include, inter alia, the *Manual on Air Traffic Management System Requirements* (Doc 9882) and the *Manual on Global Performance of the Air Navigation System* (Doc 9883), will continue to evolve and provide the sound conceptual basis and focus for an integrated, sustainable, harmonized and globally interoperable air navigation system.

1.5 RELATIONSHIP WITH OTHER GLOBAL PLANS

1.5.1 Key to the operational concept is a clear statement of the expectations of the aviation community. These expectations are defined in 11 key performance areas (KPA)s¹⁰ and stem from efforts to document the end user’s requirements. Although all these areas are equally important, as they are interrelated and cannot be considered in isolation, some areas are more visible to society than others. The 11 KPAs are listed in Figure 2. The GANP considers all these areas through the performance ambitions outlined in Chapter 5.

¹⁰ *Manual on Global Performance of the Air Navigation System* (ICAO Doc 9883)