



WORKING PAPER

THIRTEENTH AIR NAVIGATION CONFERENCE

Montréal, Canada, 9 to 19 October 2018

COMMITTEE A

Agenda Item 1: Air navigation global strategy

1.3: Air navigation roadmaps

AIR NAVIGATION ROADMAPS

(Presented by the Secretariat)

EXECUTIVE SUMMARY

This paper presents a new approach to the development of the roadmaps provided in the Global Air Navigation Plan (GANP). This approach will maintain the original objective of the roadmaps, to assist States and stakeholders in their planning and investment decisions, while also allowing the civil aviation community to accommodate new classes of airspace user and to embrace and integrate new technology when it becomes available.

Action: The Conference is invited to approve Recommendation 1.3/xx – Air navigation roadmaps, in paragraph 3.

<i>Strategic Objectives:</i>	This working paper relates to the Safety and Air Navigation Capacity and Efficiency Strategic Objectives.
<i>Financial implications:</i>	<i>Impact for the aviation community:</i> None. <i>Impact for ICAO (relative to the current Regular Programme Budget resource levels):</i> Since ICAO's current Standards and Recommended Practices (SARPs) development and implementation roll-out will continue over the next triennia, additional resources are required, both financial and human, to support ICAO's efforts in global air navigation planning.
<i>References:</i>	Doc 9750, <i>Global Air Navigation Plan, Fourth Edition, 2013</i> Doc 9750, <i>Global Air Navigation Plan, Fifth Edition, 2016</i> Assembly Resolution A39-12: ICAO global planning for safety and air navigation AN-Conf/13-WP/20 AN-Conf/13-WP/19 A37-WP/14-TE/5

1. INTRODUCTION

1.1 The fourth edition of the Global Air Navigation Plan (GANP) introduced the aviation system block upgrades (ASBUs), supported by the technology roadmaps. The roadmaps were the result of A37-WP/14-TE/5, which described them as an initiative intended to “assist States and stakeholders in their planning and investment decisions”.

1.2 The format of the roadmaps has been straightforward. Each roadmap provided timelines related to a particular discipline. The timelines indicated the phased introduction of new technologies and capabilities with increasing performance and functionality over the Block 0 – Block 3 timeframe. For each block, a linkage from the technology and the supported service or capability to the relevant ASBU module was provided.

1.3 In the coming years, the technology roadmaps will also need to support:

- a) operations by new classes of airspace user;
- b) greater flexibility in the choice of technologies for airspace users; and
- c) quicker adoption of new technologies and operational capabilities as they emerge.

1.4 This working paper expands upon these challenges and proposes a new approach whereby the roadmaps will support each of the above.

2. DISCUSSION

2.1 Problem Statement

2.1.1 Despite their simplicity, the roadmaps revealed much more beyond the utility of a given technology. For example, many roadmaps showed lengthy transitional periods between the introduction of new technologies/capabilities and their complete adoption, resulting in periods where systems with different capabilities would coexist and would have to be supported.

2.1.2 Since the endorsement by the 39th Session of the Assembly of the fifth edition of the GANP, the following concerns have come to the fore;

- a) new classes of aircraft have emerged, ranging from small unmanned aircraft to unpiloted urban taxis, high altitude manoeuvrable balloons and hypersonic aircraft. These new entrants have significantly different operational characteristics and will place new demands on the airspace system;
- b) the rate of technological development is increasing and new technologies have emerged, such as cloud computing, virtualization and artificial intelligence, as well as functionally agile radio systems. The latter are discussed in AN-Conf/13-WP/20);
- c) the issues in a) and b) above will further drive the adoption of performance-based approaches to technology selection. A performance-based approach would allow airspace users to choose the best technology available at a given time, for their particular needs. This will satisfy both the new and existing classes of airspace user.

The current roadmaps, however, are not suited to this as they are technology driven and not performance based.

2.2 **Proposed approach**

2.2.1 The focus of the roadmaps will need to change from the current technological perspective to a more performance-based and capability-driven approach aligned with the evolution of the air navigation system described in the GANP and its embedded ASBU framework (AN-Conf/13-WP/19). By so doing, the technology roadmaps will become air navigation roadmaps, requiring a change in the content and format of the roadmaps as further explained below.

2.2.2 It is recognized that new entrants into the aviation sector may require their own roadmap, especially since they will present different challenges.

2.2.3 A performance-based approach to the proper technology selection will necessitate the development of performance requirements and acceptable means of compliance instead of prescriptive technical Standards. This will also allow further use of commercially available services, which by their nature may be shared with users outside of the aviation sector. ICAO may therefore need to consider business continuity and security as well as performance as part of the acceptable means of compliance.

2.2.4 With their new focus, the air navigation roadmaps will provide information on:

- a) operational performance and capabilities linked to ASBU elements. In some cases, further research and development may be required and would be indicated;
- b) the acceptable means of compliance needed to ensure that a chosen solution (which may comprise single or multiple technologies in combination) can support the required operational performance and capabilities; and
- c) known solutions that can support specific operational performance requirements and capabilities.

2.2.5 The roadmaps must accommodate all the above in a way that is understandable and informative.

2.2.6 Key to this achievement will be the timely availability of information on States' modernization plans and the equipage plans of airspace users.

3. **CONCLUSION**

3.1 A new approach to the development of air navigation roadmaps is proposed, which would maintain the original objective of the roadmaps, to assist States and stakeholders in their planning and investment decisions, while also allowing the civil aviation community to accommodate new classes of airspace users and to embrace and integrate new technology when it becomes available.

3.2 In light of the above, the Conference is invited to agree on the following recommendation:

Recommendation 1.3/xx – Air navigation roadmaps

That the Conference:

- a) request ICAO to provide air navigation roadmaps in the Global Air Navigation Plan (GANP) which support:
 - 1) new airspace users and emerging technologies;
 - 2) greater flexibility in the choice of technologies for airspace users;
 - 3) earlier adoption of new technologies and operational capabilities as they emerge;
- b) urge States and international organizations to provide ICAO with timely information on States' modernization plans and the equipage plans of airspace users; and
- c) urge States and international organizations to work collaboratively with ICAO to adopt a performance-based approach for developing performance requirements and acceptable means of compliance to support the implementation of the GANP.

— END —