International Civil Aviation Organization

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Agenda Item 5: ATM Systems (Modernization, Seamless ATM, CNS, ATFM)

URBAN AIR MOBILITY (UAM) AND THE SAFE OPERATION OF AIR TRAFFIC MANAGEMENT (ATM)

(Presented by China)

SUMMARY

This paper presents an overview of urban air mobility and addresses its potential challenges for ATM. It also proposes that ICAO establish the standards and practices on such innovations to ensure the safe operation of the ATM.

1. INTRODUCTION

1.1 There is increasing market demand in Urban Air Mobility (UAM) like the electric Vertical Takeoff and Landing (eVTOL) vehicles as potential solutions to urban congestion while making flights greener and quieter.

1.2 China has been committed to promoting the low-altitude aeronautical industry and attach great importance to the innovative development of the new aviation industry, incubating global UAM industry leaders like Ehang(Nasdaq: EH) and Auto Flight, which boast extensive experience in the research, development, production, and operations of autonomous aerial vehicles (AAV) for passengers or cargos. China's first eVTOL air route is expected to launch in Oct. 2023, turning a lengthy 3-hour drive into a quick 15-minute air commute from Shenzhen to Zhuhai.

1.3 While the low-altitude aeronautic brings conveniency and prosperity, it is necessary to propose operational solutions, guidance, and risk assessment methodologies, to support the safe and collaborative implementation of the future UAM activities in low-altitude airspace in urban and suburban environments for the safe operation of ATM.

2. DISCUSSION

Challenges for Air Traffic Management

2.1 Just like unmanned aerial systems (UAS), Urban Air Mobility (UAM) presents distinctive operational challenges for the existing Air Traffic Management (ATM) framework. Emerging aircraft types such as eVTOL (Electric Vertical Takeoff and Landing) can be either piloted or autonomous, operating in the low-altitude airspace. However, UAM has yet to receive type certification, and specific systems and standards for these aircraft are still pending definition. UAM aircraft differ significantly from traditional aircraft in terms of their operational environment and areas of operation, particularly with respect to their operation in densely populated urban areas at low altitudes. Consequently, there is a need to establish airspace regulations that accommodate both UAVs (Unmanned Aerial Vehicles) and

existing low-level powered aircraft like helicopters. This is especially crucial since UAM may eventually be regarded as a combination of these two types of aircraft.

2.2 According to ICAO *Model UAS Regulations*, A person operating a UA more than 4km from an aerodrome boundary and above 120 m AGL shall ensure that the operation remains within uncontrolled airspace and shall: operate in segregated airspace designated for that purpose; or ensure that at least 24 hours before the operation, a person authorized by an approved person or approved aviation organization, notifies the air navigation service provider (ANSP), for the issuance of a NOTAM, containing information including the maximum height AGL for the operation.

2.3 According to the existing ATM, the aircraft operating at low altitudes are mainly general aviation aircraft and helicopters used for government and private activities. The current ICAO *Annex 2 — Rules of the Air* provisions do not allow flying over congested areas of cities, towns, or settlements or over an open-air assembly of persons at a height less than 300m above the highest obstacle to permit, in the event of an emergency arising, a landing to be made without undue hazard to persons or property on the surface.

2.4 Even if the automation of a highly advanced UAM were adequate to facilitate its flight in low-altitude airspace, and provide strategic deconflict and separation, without the pertinent regulations as listed in 2.2 and 2.3, the UAM aircraft operating in low altitude airspace would still conflict with other airspace users including UAS, low altitude general aviation aircrafts, commercial aircrafts, or military aircrafts, as well as persons or property on the surface.

Possible solutions in the aspect of ATM

2.5 Propose the adaptation of existing aviation regulations to accommodate the unique requirements of UAM operations. Establish safety standards such as operating procedures, flight rules, weather conditions and separations with other airspace users based on the airworthiness of the UAM aircraft.

2.6 Standardize communication, navigation and surveillance (CNS) performance requirements, including frequency spectrum, performance-based navigation (PBN), and real-time monitoring system to provide surveillance capabilities to integrate with the current ATM operation.

2.7 Formulate contingency plans to handle abnormal situations for UAM aircraft under controlled airspace for ATC or relevant stakeholders, including, but not limited to, engineering problems, low batteries, sudden weather condition changes, loss of datalinks or interrupted connections, communication failure, level bust/route deviation, fire on board, traffic conflict, etc. Reciprocally, contingency plans on dealing with UAM aircraft for air traffic control, such as unidentified or unlawful UAM activities in controlled airspace particularly in the vicinity of an aerodrome or on the traffic pattern routes, should also be addressed.

2.8 Encourage collaborative efforts between APAC states governments, civil aviation administrations, ATM authorities, technology developers, etc., for ATM with UAM systems to create a safe and efficient environment for the booming low-altitude economy by:

a) building new platforms on traffic management automation, e.g., the Trajectory based operations (TBO) and the collaborated decision making (CDM) systems

b) setting up ATM automatic systems for surveillance and defense, e.g., real-time monitoring and geo-fencing), etc.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) facilitate the process to set up regulatory standards, support harmonization and ensure global consistency on the operations of the fast-developing UAM for the safe operation of ATM.

c) discuss any relevant matters as appropriate.

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