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TECHNICAL COMMISSION

Agenda Item 24: Aviation Safety and Air Navigation Priority Initiatives

DEVELOPING A UNIFIED TRAFFIC MANAGEMENT SYSTEM FOR HIGH-DENSITY URBAN DRONE OPERATIONS: ESTABLISHING ICAO GUIDELINES FOR UTM INTEGRATION WITH ATM AT INTERNATIONAL AIRPORTS

(Presented by Kazakhstan)

EXECUTIVE SUMMARY

As urban drone activity and Urban Air Mobility (UAM) services continue to expand, especially in proximity to international airports, the aviation community faces new complexities in maintaining safe and efficient airspace management. ICAO has taken important steps by issuing high-level, non-binding guidance in the UTM Framework (Edition 4, 2023), but a gap remains in globally harmonized, binding provisions for Unmanned Aircraft System Traffic Management (UTM), particularly with respect to its integration into traditional Air Traffic Management (ATM).

This paper proposes that ICAO take further leadership in guiding States toward the development and adoption of a globally harmonized framework for UTM-ATM integration, with a specific focus on high-density urban environments and operations near international airports. Such a framework would help safeguard airspace integrity, support the scalability of UAM operations, and enhance interoperability worldwide.

Action: The Assembly is invited to:

a) acknowledge the increasing operational and safety complexity resulting from unstandardized UTM implementations near major international airports;
b) encourage ICAO to initiate the development of SARPs or PANS that define performance-based and integration requirements for UTM systems, with reference to existing guidance;
c) recommend the formation of a Study Group focused on UTM-ATM harmonization, comprising stakeholders from ANSPs, UAS developers, NAAs, different pertinent state authorities; and
d) urge Member States to engage in regional coordination initiatives, pilot projects, and knowledge sharing in support of UTM-ATM integration.

Strategic Goals:	This working paper relates to *Every Flight is Safe and Secure.*
Financial implications:	None
References:	Doc 10019, *Manual on Remotely Piloted Aircraft Systems (RPAS)* Doc 9750, *Global Air Navigation Plan* ICAO UTM Framework (Edition 4)

1. INTRODUCTION

1.1 Urban drone operations are increasingly being used for logistics, surveillance, and even passenger transport through electric vertical take-off and landing (eVTOL) aircraft. These developments present important opportunities and risks, especially in urban environments close to controlled airspace.

1.2 ICAO's unmanned aircraft system traffic management (UTM) Framework (Edition 4, 2023) lays foundational principles, but it does not provide enforceable standards needed for safety assurance, especially for operations near international airports.

1.3 In order to ensure safe, equitable, and scalable drone traffic management, particularly where UAM intersects with conventional air traffic, a structured and harmonized regulatory foundation is essential.

2. BACKGROUND AND CONTEXT

2.1 UTM systems are critical to managing autonomous and beyond visual line-of-sight (BVLOS) drone operations, especially in complex environments. Although intended to complement traditional air traffic management (ATM), a lack of clear integration standards poses risks.

2.2 Some States have taken early steps in developing national UTM systems; however, these vary widely in scope, technology, and oversight mechanisms.

2.3 Without global harmonization, the coexistence of drones and manned aircraft in urban settings may threaten both airspace integrity and the reliability of ATM systems—particularly in busy international hubs.

3. ANALYSIS

3.1 Effective integration of high-density drone operations into existing air traffic environments requires clear and interoperable standards. Current national approaches vary significantly in terms of airspace classification, digital identification protocols, and UTM-ATM communication interfaces.

3.2 This fragmentation results in:

a) operational inefficiencies and potential airspace conflicts;

b) gaps in digital surveillance and traffic prioritization; and

c) variability in how UTM services interact with existing air navigation infrastructure.

3.3 In particular, the absence of ICAO-endorsed Standards and Recommended Practices (SARPs) or Procedures for Air Navigation Services (PANS) leads to uncertainty for States, regulators, and service providers seeking to implement or scale drone operations safely and predictably.

4. IMPLEMENTATION STRATEGY

4.1 ICAO is encouraged to adopt a phased approach to strengthening UTM-ATM integration:

a) *Phase 1: Global gap analysis and stakeholder engagement.* Assess national-level implementations; - Convene a study group under the Air Navigation Commission (ANC) or the Remotely Piloted Aircraft Systems (RPAS) Panel to evaluate integration challenges.

b) *Phase 2: Development of PANS guidance.* Define best practices and minimum expectations for:

1) emergency coordination;

2) geo-fencing near critical infrastructure; and

3) data sharing across UTM and ATM systems.

c) *Phase 3: SARPs formulation.* Create performance-based SARPs covering:

1) surveillance and navigation standards;

2) interface protocols for UTM-ATM coordination; and

3) conflict management procedures.

d) *Phase 4: Capacity building and monitoring.* Facilitate workshops/demonstration projects and incorporate UTM integration into existing audit frameworks, where appropriate.

5. CONCLUSION

5.1 As drone operations expand, especially around international airports, ICAO has a vital role in ensuring that UTM systems evolve in harmony with ATM.

5.2 Strengthening global consistency through binding standards will help preserve the integrity of international air navigation, while also supporting the safe and sustainable growth of UAM and other drone services.

5.3 A globally coordinated approach—developed with input from diverse stakeholders—will support member States in navigating this complex transition

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