



WORKING PAPER

THIRTEENTH AIR NAVIGATION CONFERENCE

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COMMITTEE A

- Agenda Item 5: Emerging issues**
5.2: Operations below 1000 feet

**CONCEPTS TO ENABLE DRONE OPERATIONS TO SEAMLESSLY INTEGRATE
WITH AIR TRAFFIC MANAGEMENT**

(Presented by the International Coordinating Council of Aerospace Industries Associations (ICCAIA),
the International Federation of Air Traffic Controllers' Associations (IFATCA) and
the International Federation of Airline Pilots' Associations (IFALPA))

EXECUTIVE SUMMARY

This paper outlines some of the critical, foundational issues that must be examined further to enable the integration of unmanned aircraft systems (UAS) or drones into national airspace systems. Fundamental principles of aviation are being challenged by new entrants into aviation. It is incumbent on the aviation industry to maintain the safety-first culture and establish an operating framework that includes national regulations, performance-based Standards and cyber-secured, core airspace management functions enabling the safe operation of manned and unmanned systems in common airspace.

Action: The Conference is invited to agree to recommendation contained in paragraph 3.2.

1. INTRODUCTION

1.1 The introduction and acceptance of unmanned aircraft systems (UAS) or drones is significantly disrupting conventional aviation. Drones offer significant economic benefit for public service and commercial usage. Many experts suggest that the global UAS market will exceed \$ 11 billion USD by 2020. The United States Federal Aviation Administration (FAA) estimates that there will be more than four million small UAS in operation in the airspace within this same time frame. The Single European Sky ATM Research (SESAR) Joint Undertaking forecasts the growing European drone marketplace could reach a valuation in excess of EUR 10 billion annually by 2035.

1.2 Currently, a patchwork, regulatory framework exists country by country but there are efforts to harmonize the integration of small UAS (<25 kg). ICAO efforts have largely been focused on

¹ Arabic, Chinese, English, French, Russian and Spanish versions provided by ICCAIA.

the integration of remotely piloted aircraft systems (RPAS) and has just recently begun to address the emergence of the smaller UAS and their viability to provide services through the Joint Authorities for Rulemaking of Unmanned Systems (JARUS). Other policy and standards bodies including the Civil Air Navigation Services Organisation (CANSO), RTCA and European Organisation for Civil Aviation Equipment (EUROCAE), continue to promote concepts and ideas on how to safely use drones in the existing manned aviation construct. There is still much work to be done as many key issues remain unanswered which could help the UAS industry to grow even more.

1.3 With pressure mounting on global standards bodies, civil aviation authorities and their corresponding air navigation services providers (ANSPs) must act now with a focus on the development of comprehensive guidelines that are uniformly understood, will encourage innovation and will maintain the safety of the global airspace system. There must be a sustained, holistic approach that uniformly promotes global harmonization and standardization of UAS traffic management (UTM) functionality, including the interoperability with air traffic control (ATC) and the inclusion of urban air mobility (UAM).

2. DISCUSSION

2.1 Industry is developing solutions for UTM to facilitate the planning and execution of the drone mission while complementing the air traffic management (ATM) infrastructure. The environment in which drones operate is important to understand. This work will help further refine how the drone is classified and how it will interact with other unmanned and manned aircraft. Performance segmentation will help to dictate what equipment is required and can lead to general agreement on remote identification. UAS performance capability should include multiple levels of geo-referencing (position determination accuracy) and geofencing (navigation capabilities). Likewise, varying levels of services from the UTM provider will allow drone operators to select services that mitigate the risks imposed by their operation and are appropriate for their drone's performance. Geofencing data should be published and shared via an authoritative source. This data is mission critical and if not handled safely and securely and published using appropriate measures, the data could introduce a hazard into the airspace system. Both geofencing and geo reference data should be standardized based on appropriate performance standards.

2.2 The UTM environment as envisioned is different from the existing, traditional, ATM environment, though they must be integrated. As the concept continues to evolve, it is clear that a common set of UTM core services will need to be implemented to support the increasing level of autonomous capabilities that will be used by the drones themselves. The industry is in need of a set of core principles; ones that will ultimately define how low-altitude airspace is managed and by whom, standards surrounding the development of UTM systems, data exchange models, cyber security requirements, and the validation of data sources so that every UTM provider or UAS services supplier (USS) is operating from the same guidelines and regulations. Without these core principles, the industry risks creating safety hazards that will lead to catastrophic results.

2.3 While most regulations focus on small UAS operations in low-altitude airspace outside of controlled airspace, many States are implementing their own policies for drone integration. Many of these policies establish a framework at the national level while some may allow rules and ordinances to be implemented by local municipalities. The focus remains primarily on which UAS can operate where and under what conditions and in most cases applies a segmentation based on weight, type of operations (visual line-of-sight (VLOS)/beyond visual line-of-sight (BVLOS)) and ground population density (urban/sub-urban/rural). Regulations will be required to establish common operator rules. With the emergence of the UTM concept, it is now possible for commercial operators to oversee, organize and

provide services on behalf of the ANSP at a much more localized level. There are some elements that must be addressed before this sort of delegation can be enabled.

2.4 Today all small UAS (<25kg and under) are characterized as a single class of unmanned systems when in reality performance characteristics and capabilities could vary drastically. The further segmentation of the small UAS market into specific capabilities that can undergo appropriate levels of certification must also be considered. There is currently no discussion or decision on appropriate development standards for this segment of the industry. Whether or not aviation globally adopts traditional ATM development guidelines, such as DO-178C or DO-278, or some other appropriate, performance-based baseline must be examined more broadly. Identifying how to establish an approach to this must be a prioritized topic for discussion in the near term. Incremental steps can be taken, however. Standards bodies must focus on capability assessment methodologies that will segment small UAS' into multiple categories. Test organizations should apply these standards clearly establishing the capabilities of the craft and the services its operator is able to receive from the UTM system. Services ultimately provided by a UTM system will be based on the capabilities of the drone and its pilot in command (PIC), even when the pilot in command is a combination of software systems on the vehicle and a ground segment. Segmentation of the drone's capability will help to categorize drones for certain operations and missions and seek to better organize and prioritize (e.g. – best equipped, best served) airspace usage.

2.5 Once performance criteria are established, the issue of remote identification can then be satisfactorily addressed. While most agree that there must be some level of electronic registration and identification, critics argue the opposite that; there is a perceived violation of individual privacy rights. A universal concept that can be transferred to any country to register and remotely identify a user or an organization is critical. By first identifying a drone's particular performance capabilities, this will dictate how an operator can be identified. Whether it's traditional methods (via avionics or transponders) or by a specific radio frequency (RF) identifier (LTE registration, SIM card), performance characteristics and capabilities can help alleviate the perception of privacy invasion, provide a mechanism to identify known players from bad actors and to allow casual users to be separated from routine, commercial and public safety users. Standardization of electronic identification must accommodate various levels of capabilities of the drone platform. Availability of infrastructure must also be considered in electronic identification. To fully ensure that remote identification is plausible, a method for authentication and a standard that defines data integrity of the electronic identifier must also be enacted. Through segmentation of capabilities and an equitable, secure, remote identification methodology will help to advance the industry and allow for industries to leverage drones for their many operations while quenching the desire to know who is operating these platforms.

3. CONCLUSION

3.1 As discussed throughout this paper, with the introduction of more drones operating within controlled airspace, challenges will continue to emerge for the ANSP to safely manage the interactions between manned and unmanned systems and the interactions between them within the same airspace system.

3.2 To ensure that this is achieved with safety and efficiency in mind, the Conference is invited to agree to the following recommendation:

Recommendation 5.2/x – Operations below 1000 feet

That the Conference:

- a) invite States to note that the implementation of drone capability levels will help to add clarity to airspace system development at low altitudes and provide a mechanism to allow for performance-based airspace access;
- b) request ICAO to continue to develop a comprehensive, electronic registration mechanism and database structure capable of supporting remote identification and pilot capability/qualification information;
- c) urge States to mandate an acceptable approach for the implementation of development standards that incorporate robust software and hardware guidelines that are consistent with aviation industry norms;
- d) urge States to encourage UTM providers to implement the highest level of cyber security standards that are consistent with aviation community expectations and guidelines for low altitude airspace operations; and
- e) urge States to implement centralized airspace management services including, but not limited to, geofencing and geo-referencing to ensure that UTM operators have validated data sources to plan and execute missions within the airspace system.

— END —