International Civil Aviation Organization

Twenty Eighth Meeting of the Communications/ Navigation and Surveillance Sub-group (CNS SG/28) of APANPIRG

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Agenda Item 5: Aeronautical Mobile Communications Service and Aeronautical Electromagnetic Spectrum Utilization

ADS-B 24-BIT ADDRESSING FOR SUB-ORBITAL AIRCRAFT AND URBAN MOBILITY UNMANNED AIRCRAFT SYSTEMS

(Presented by MALAYSIA)

SUMMARY

This paper addresses the need for distinct ADS-B 24-bit addressing schemes for sub-orbital aircraft and Unmanned Aircraft Systems (UAS) for urban mobility. The current standard does not adequately differentiate between manned aircraft, sub-orbital vehicles, and UAS, which is crucial for ensuring safe and efficient airspace integration as these technologies advance.

1. INTRODUCTION

The advent of sub-orbital aircraft and urban mobility UAS presents new challenges for air traffic management. Current ADS-B 24-bit addressing standards do not distinguish between manned aircraft and these new categories of vehicles, posing potential risks to safety and efficiency. This paper outlines the necessity of developing specific addressing schemes to cater to the unique requirements of sub-orbital and unmanned aircraft.

2. DISCUSSION

2.1 Need for Distinct ADS-B Addressing

As sub-orbital and unmanned aircraft technologies progress, they will increasingly share airspace with conventional manned aircraft. Differentiating these vehicles using ADS-B 24-bit addressing is essential for effective air traffic management and collision avoidance.

2.2 Sub-Orbital Aircraft

Sub-orbital aircraft operate at high altitudes and speeds, making them distinct from traditional aircraft. The current ADS-B addressing system does not account for these differences, leading to potential issues in surveillance and tracking.

2.2.1 Addressing Requirements

- **High-Altitude Operations:** Unique address codes for aircraft operating in near-space environments.
- **High-Speed Trajectories:** Real-time updates to track rapid changes in speed and direction.
- **Interoperability:** Seamless integration with existing air traffic management systems.

2.2.2 Technical Considerations

- **Signal Integrity:** Ensuring ADS-B signals remain reliable at high altitudes.
- **Frequency Management:** Avoiding interference with existing aviation communications.
- **Latency and Reliability:** Maintaining low latency and high reliability for safety-critical operations.

2.3 Urban Mobility Unmanned Aircraft Systems (UAS)

Urban mobility UAS will operate in dense, low-altitude environments, necessitating a distinct ADS-B addressing approach to manage the high volume of traffic.

2.3.1 Addressing Challenges

- **Density Management:** Managing numerous UAS in urban settings.
- **Integration with Urban Airspace:** Compatibility with existing urban airspace regulations.
- **Obstacle Avoidance:** Effective functioning amidst urban infrastructure.

2.3.2 Addressing Requirements

- **Compact and Lightweight Equipment:** Addressing needs for smaller, lighter ADS-B units.
- **Power Efficiency:** Ensuring prolonged operation for UAS missions.
- **Scalability:** Supporting a wide range of UAS operations from small drones to larger vehicles.

2.4 Recommendation

2.4.1 Regulatory and Standardization Efforts

There is a pressing need for ICAO and other regulatory bodies to develop and implement standards that distinguish between different types of aircraft in ADS-B 24-bit addressing. This includes:

- Establishing unique address blocks for sub-orbital vehicles and UAS.
- Harmonizing global standards to ensure interoperability.
- Promoting international cooperation to address these emerging challenges.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- Recognize the critical need for developing distinct ADS-B 24-bit addressing standards for sub-orbital aircraft and urban mobility UAS.
- Support initiatives aimed at global harmonization of ADS-B addressing regulations and standards.
- Encourage pilot programs and collaborative efforts to refine ADS-B technology specific to these emerging sectors.

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