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Urban Air Mobility Implications for Intelligent Transportation Systems
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Abstract

Urban Air Mobility concerns the introduction of manned and unmanned aircraft within urban environments, while Intelligent Transportation Systems have traditionally considered only terrestrial vehicles operating on city streets and highways. This document considers the implications for introduction of low-altitude aircraft within urban environments operating in harmony with ground transportation.

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This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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1. Introduction

Urban Air Mobility (UAM) concerns the introduction of manned and unmanned aircraft within urban environments. NASA has initiated a program known as the Urban Air Mobility grand challenge with the goal to promote public confidence in UAM safety and facilitate community-wide learning while capturing the public's imagination [UAM].

Autonomy will play a pivotal role in the acceptance of low-altitude operations for aerial vehicles operating in harmony with traditional ground transportation and pedestrian traffic. The UAM vision therefore builds on evolving works on Unmanned Air Systems (UAS), including the NASA UAS Traffic Management (UTM) service model [UTM].

Use cases for autonomous aircraft in the UAM vision are endless, and include personal air vehicles, flying taxis, parcel delivery, law enforcement and countless others. Major industry leaders such as Airbus [AIRBUS] and Boeing [BOEING] have accordingly begun to articulate their UAM strategies. Programs such as Uber Elevate [UBER] anticipate deployment as early as within the next 2-5 years.

With the advent of the UAM vision and its related initiatives, questions arise as to how the new model will be harmonized with the existing terrestrial mobility environment. Directions for modernizing terrestrial mobility are emerging in programs such as the US Department of Transportation's Intelligent Transportation Systems

[ITS] and anticipate an increasing role for Vehicle to Vehicle (V2V) and Vehicle to Infrastructure (V2I) communications. The IETF recognizes this need and has formed the IP Wireless Access in Vehicular Environments (IPWAVE) working group with charter to produce a document that will specify the mechanisms for transmission of IPv6

datagrams [RFC8200] over dedicated short-range wireless communications media.

This document anticipates a need to provide a unified V2V and V2I service for all urban mobility agents, including both terrestrial and airborne. Urban air vehicles will employ Vertical Takeoff And Landing (VTOL) and will operate at altitudes below 400 feet, such that coordinations with terrestrial vehicles will be inevitable and commonplace. This work therefore proposes that urban air vehicles also employ a short-range V2V / V2I communications capability using the same types of wireless networking gear used in the terrestrial domain (e.g., DSRC, C-V2X, etc.).

As stated by the Boeing CEO in a January 23, 2019 press release, think of the urban mobility landscape as evolving from a two dimensional to a three dimensional environment. Vehicles both on the ground and in the air will therefore need to coordinate with one another on a V2V and V2I basis even when supporting communications infrastructure such as cell towers are unavailable or otherwise too congested to support realtime exchanges. The ipwave working group is therefore advised to consider the rapidly emerging and inevitable Urban Air Mobility future.

2. Terminology

Terms such as Intelligent Transportation Systems (ITS), Urban Air Mobility (UAM), Unmanned Air Systems (UAS), UAS Traffic Management (UTM) and many others apply to the emerging urban mobility landscape. IETF keywords per [RFC2119] are not applicable within the scope of this document.

3. Applicability

Urban Air Mobility and Intelligent Transportation System concepts apply within all major urban areas worldwide.

4. Implementation Status

Early prototyping and testing are underway.

5. IANA Considerations

This document introduces no IANA considerations.

6. Security Considerations

Communications networking security is necessary to preserve the confidentiality, integrity and availability necessary for V2V and V2I coordinations.

7. Acknowledgements

Discussions on the IETF ipwave list (its@ietf.org) helped motivate this document.

8. References

8.1. Normative References

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[RFC8200] Deering, S. and R. Hinden, "Internet Protocol, Version 6 (IPv6) Specification", STD 86, RFC 8200, DOI 10.17487/RFC8200, July 2017, <https://www.rfc-editor.org/info/rfc8200>.

8.2. Informative References

[AIRBUS] "https://www.airbus.com/innovation/Urban-air-mobility-the-sky-is-yours.html", November 2018.

[BOEING] "http://www.boeing.com/NeXt/common/docs/
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