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GENERAL ASPECTS

IAFI[1]

PROPOSAL FOR A NEW ITU-R REPORT ON USAGE OF IMT FOR AIRCRAFT TO EVERYTHING (A2X) COMMUNICATIONS

1 Introduction

The Question ITU-R 262-1/5 addressing usage of the terrestrial component of IMT systems for specific applications was approved. The considerations and questions are requested by the Question:

1 What are the specific industrial and enterprise applications, their emerging usages, and their functionalities, that may be supported by the terrestrial component of IMT?

2 What are the technical characteristics, operational aspects, and capabilities associated with specific industrial and enterprise applications of using the terrestrial component of IMT?

Aircraft to Everything (A2X) enables direct communication from air to anything e.g. drone-to-drone communications, enhancing situational awareness and collision avoidance without relying on network connectivity. This technology is crucial for Beyond Visual Line of Sight (BVLOS) operations and can support millions of drones simultaneously using IMT technologies. A2X also complements Unmanned Aircraft System (UAS) Traffic Management (UTM) services by providing real-time messages and tactical deconfliction. The text highlights the transformative benefits of drones in various sectors, including PPDR, infrastructure monitoring, and economic growth.

The benefits of low-flying drones (i.e., drones flying no higher than 400 feet above ground level) are plentiful and transformative. Along with delivering packages, they can deliver critical medical supplies and aid in the inspection and monitoring of critical infrastructure like pipelines, power lines, roads, and bridges. Drones also can provide meaningful public protection benefits by providing post-natural disaster assessments, surveilling hazardous situations, and supporting PPDR

[1] IAFI is a sector Member of ITU-R. For more details, please see https://iafi.in

personnel with search, rescue, and investigation tasks. There are also economic benefits to the proliferation of drones.

To realize these benefits, drone operations must be safe and scalable. Collision management of drones and obstacle avoidance (for both fixed and temporary obstacles) must be addressed on two fronts to prevent dangerous in-flight collisions. The first is strategic deconfliction, which includes the planning and coordination aspects of a flight and — where network connectivity is available — real-time flight monitoring and plan modifications. Work is already underway in some countries to develop strategic unmanned aircraft system (UAS) traffic management systems (UTM) that address this first component, which leverages real-time beyond visual line of sight (BVLOS) communications between drones and UTM.

However, as low-flying drone operations begin to scale, UTM services alone won't be able to successfully manage safe drone operations in heavily congested airspace with large concentrations of drone flights occurring simultaneously. For instance, UTM services may not timely address the evasion of unforeseen flying objects or may fail to react in real-time when a drone suddenly faces technical difficulties and needs to land immediately in a busy transportation corridor. UTM services also will face limitations when network connectivity is unavailable, overloaded, or severely degraded, or when drones in potential conflict are administered by different UTM service providers.

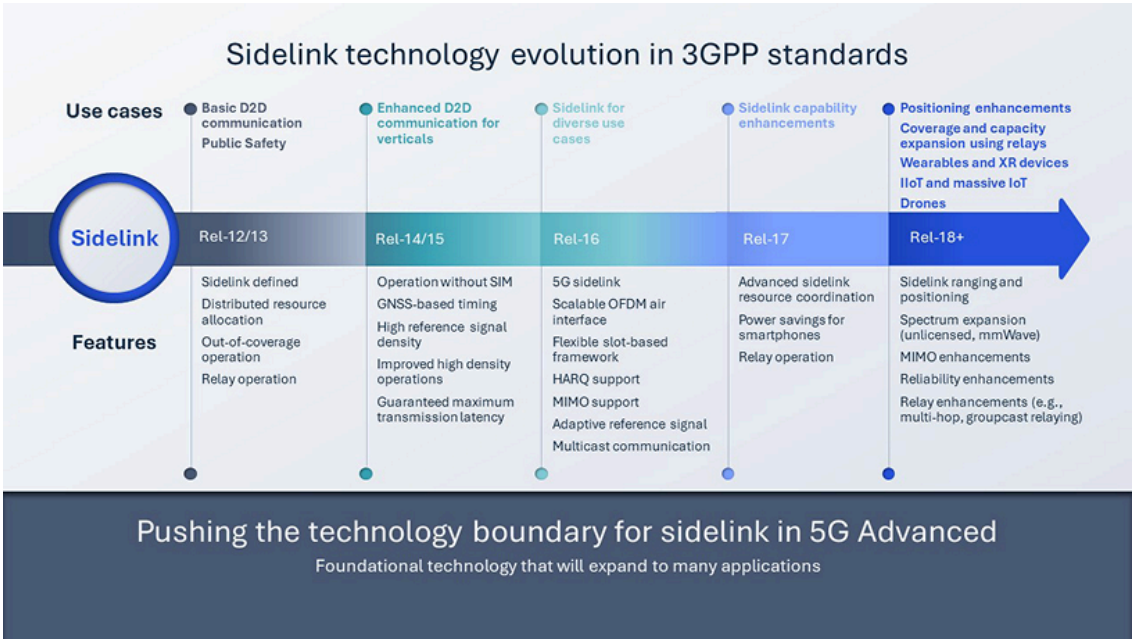
A2X is ideal for ensuring safe flights in BVLOS scenarios, where the pilot's visual awareness of the drone is unavailable and where the command-and-control link (i.e., the communications link used to monitor and control the drone) is spotty. Because A2X is independent of network connectivity, resources like timing/configuration from the network are not necessary for a drone to determine its position relative to other drones. A2X uses timing and positioning provided by Global Navigation Satellite Systems (GNSS). And even if GNSS connectivity is unavailable, a drone can use ranging to determine the distance between itself and other drones to avoid in-air collisions.

A2X-equipped drones broadcast basic messages to other drones over several kilometers in real-time, providing low-latency IMT communications, on the order of single-digit milliseconds. Thereby, drones can quickly recognize and avoid each other in areas with heavy air traffic, where drones are flying at vastly different speeds, altitudes, and trajectories. A2X also allows drones to communicate directly with each other using a unicast channel to resolve potential conflicts.

Beyond collision avoidance, A2X also can coordinate traffic separation in a variety of shared airspace environments, including around airports. Scalability is inbuilt into A2X technology. Consistent with 3GPP cellular standards that have a history of seamlessly connecting millions of devices simultaneously, A2X can support millions of drones at a given time in a given area/geography. A2X can support this while providing low-latency communications in dense operating environments, guaranteed quality of service, and interference management.

A2X was developed through 3GPP under the foundational technology called sidelink. See Figure 1 below. 3GPP specifications are open, thereby promoting interoperability and fostering innovation. A2X standardization through 3GPP facilitates widespread adoption of the technology by enabling inter-vendor system interoperability, so equipment manufacturers can reach economies of scale, resulting in lower deployment costs. Standardization also encourages new entrants at every vertical of the supply chain to innovate and compete successfully.

Figure 1: 3GPP Sidelink Technology Evolution



A2X's foundational technology is being successfully deployed worldwide for vehicle roadway safety: Cellular-vehicle-to-everything (CV2X) supports direct vehicle communications to other vehicles, infrastructure, and vulnerable road users, to enhance roadway safety. C-V2X is being deployed in the U.S., China, Europe, Korea, and other countries.

2 Proposal

Taking into account the above, IAFI proposes WP 5D to start development of a new ITU-R Report on communications applications between an Aircraft and everything using a user equipment (UE) supported by the terrestrial component of IMT.

Attachments

1 – Outline working Document

2 – Draft Workplan

ATTACHMENT 1

Working Documents towards a Preliminary Draft New ITU-R Report M.[IMT.A2X] - Application of the terrestrial component of International Mobile Telecommunications for Aircraft to Everything (A2X)

(YYYY)

TABLE OF CONTENTS

Scope

To address non-safety communications applications between an Aircraft and everything using a user equipment (UE) supported by the terrestrial component of IMT.

ATTACHMENT 2

Detailed workplan for Report ITU-R M. [IMT. A2X]

Title	Non-safety communications applications of the terrestrial component of International Mobile Telecommunications connecting Aircraft to Everything
Identifier	M.[IMT.A2X]
Document Type	Report
ITU-R WP 5D Lead Group	WG General Aspects
Sub-working group	SWG Specific Applications
Sub-working group Chair	Mr. Jitendra Singh; jitendra@qti.qualcomm.com
Editor	TBD
Focus for scope and work	This report is intended to address non-safety communications applications between an Aircraft and everything using a user equipment (UE) supported by the terrestrial component of IMT.
Related documents	Question ITU-R 262/5
	Meeting No. 47 (October 2024, Geneva) 1 Consider input documents 2 Develop a workplan **Meeting No. 48 (February 2025, [TBD])** 1 Consider input documents 2 Develop a working document towards a PDNR **Meeting No. No. 49 (June 2025, [TBD])** 1 Consider input documents 2 Develop a working document towards a PDNR **Meeting No. 50** 1 Consider input documents 2 Develop a working document towards a PDNR **Meeting No. 51** 1 Consider input documents 2 Finalize the PDNR 3 Upgrade the document to Draft New Report and send to ITU-R SG 5 for approval

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