

THE ROLE OF MOBILE NETWORK OPERATORS IN AN URBAN AIR MOBILITY (UAM) ECOSYSTEM

Early planning and public engagement will make connecting local authorities, mobile network operators and the aviation industry within future drone and urban air mobility eco-systems easier and more affordable.

A white paper prepared by:

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What the end-state of a mature urban drone/UAM system will look like

The era of urban air mobility is just around the corner, transforming our cities and the lives of our communities. The usable air space above Berlin could accommodate 1,200 cargo drones at any one time, enabling the possible delivery of up to four million parcels every year.¹ Small, electric vertical take-off and landing aircraft (eVTOLs) will allow for the rapid connectivity of passengers between places with few of the delays that ground-based transport networks encounter.

By 2050, around 100 cities worldwide will have implemented autonomous air vehicle passenger transport services, with on average 1,000 passenger drones in operation in each city². However, there will be a large spread of eVTOLs per city, ranging in 2050 from 60 eVTOLs for the smallest metropolitan areas to more than 6,000 in the largest ones.

Many city planners and technologists are convinced this new industrial revolution will transform the connectivity benefits, environmental footprint and the enjoyment of towns and city living.

This is no pipedream. Today, there are more than 450 urban drone/eVTOL programmes under way worldwide. The European Union Aviation Safety Agency (EASA) plans to certify the first passenger carrying eVTOLs for commercial operations in 2024, by which time several major cities – among them Dubai and Singapore – will have eVTOLs flying, underpinned by the research and engineering efforts of governments, Silicon Valley and traditional aerospace giants, such as Airbus and Bell.

But for the UAM market to reach its full potential it will need to be integrated within future ground transport systems and as part of wider Smart City development strategies. These will rely on a new generation of connectivity services which are being implemented today.

Urban Air Mobility is on an evolutionary path

- The current, first age, 2021-2024, will see the development of regulations and standards for passenger-based UAM services while the first cargo small unmanned air service (UAS) operations – including medical, fast-food and package deliveries – are trialled and commercially tested. Wing, EHang, Zipline are pioneers in this area. This stage will also see the formation of links between local authorities, regulators and UAS service operators which will provide the framework for future passenger operations
- The second age of UAM, 2025-2035, will see the introduction of piloted electrical eVTOL services, charging premium prices to individual passengers for city-centre to airport landing site routes, inter-city services and airport-to-airport transfers

¹ <https://www.rolandberger.com/en/Insights/Publications/Cargo-drones-The-urban-parcel-delivery-network-of-tomorrow.html>

² <https://www.rolandberger.com/en/Insights/Publications/Passenger-drones-ready-for-take-off.html>

- The third age of UAM, 2035 and beyond will be the age of autonomy, quiet flight and mass transport. The route network will have expanded to city-centre to city-centre flights, connecting regions with metropolitan centres. Electrically powered regional aircraft will connect cities via existing suburban airports.

The role of connectivity and infrastructure planning

Mobile networks are an integral part of everyday communications and a key enabler for future Smart Cities, where 5G, artificial intelligence (AI), cloud and edge computing will create new networks of connected, integrated communities. Over the past decade mobile networks have already transformed many ground mobility systems to provide smart connectivity and services for the public and private sectors. Today, trains, buses, trucks, vans, cars and even bikes use mobile networks for everything from navigation and communications to business fleet management.

Mobile networks will be a critical component of UAM. They have already started to play a vital and growing role in the current aviation eco-system by providing seamless passenger experiences, where travellers are connected throughout the whole journey (pre-flight, in-flight and post-flight). They are also finding new roles in flight operations and maintenance centres of airlines.

Mobile network communications are rapidly becoming key enablers for the small UAS industry, the precursor to the passenger-carrying eVTOL sector, where they provide pilots with data to ensure drones take the safest and quickest routes through the sky. In the UAM world, mobile connectivity is the prime candidate for air-to-ground communications, drone/eVTOL tracking and remote identification, command-and-control, UAS traffic management (UTM) and many other functions.

As a first major step into this connected urban aviation future the GSM Association (GSMA) and the Global UTM Association (GUTMA), through the Aerial Connectivity Joint Activity (ACJA), have jointly published the Network Coverage Service Definition³ whitepaper which describes a general architecture of stakeholders, services, interfaces and data models for the automated data exchange between mobile operators and the UTM ecosystem.

This is just the start. Mobile networks will be able to provide vital information on population density and other safety critical components needed for safe urban flying. Further benefit of mobile networks for UA and UTM are described in the GSMA whitepapers [Mobile-Enabled Unmanned Aircraft](#) and [Using Mobile Networks to Coordinate Unmanned Aircraft Traffic](#).

Local authorities and the future of Smart City communications

The availability of large amounts of bandwidth in new spectrum bands allows mobile operators to provide higher throughputs and lower latency, vital for scalable communications.

³ <https://www.gsma.com/iot/resources/acja-wt2-interface-for-data-exchange-between-mnos-and-the-utm-ecosystem/>

Right now, mobile networks connect over 5 billion people globally for an impressive 8.8 billion of connections⁴ - and the network is constantly growing. While 4G currently covers more than the 90% of the population, mobile operators have started their journey to improve their customers' service quality by stepping into the 5G era. The 4G evolution was driven by a need for more data consumption while 5G will provide a system of systems, with much more flexibility. It will support a diversity of services through ultra-high bandwidth, ultra-low latency and an ever-growing global network of connections⁵.

In the 5G era, we are seeing a combination of different radio technologies and a variety of spectrum bands (sub-GHz, 1-6 GHz and above 6GHz), which provide an invaluable toolset for mobile operators to accommodate their customers' needs. With virtualisation, network slicing and edge computing, non-public networks offer another level of flexibility. But while there is more flexibility, there is also more complexity. This means it is important now to engage early with all stakeholders to understand the future connectivity needs of Smart Cities, so data consumption hotspots (such as airports and potentially the new vertiports) can be properly planned.

Policy makers, regulators and local authorities are all playing a crucial role in unlocking the potential of 5G and the networks of the future. It is very important to find the right balance between incentivising competition and keeping prices accessible for consumers and supporting industry investment in next generation infrastructure. GSMA has identified the following regulatory levers⁶ that can foster infrastructure investment:

- Making additional affordable spectrum available,
- Facilitating access to site locations,
- Enabling small cell deployment,
- Facilitating deployment of backhaul,
- Permitting the freedom to establish network sharing agreements,
- Harmonizing power density limits.
- Providing financial support for developments
- Providing regulatory flexibility for B2B partnerships

While most governments have taken steps to formulate policies in some or all these areas, local authorities have a vital role to play in working with mobile network operators on decisions around infrastructure, installation, access, power, etc. It is important to work together to streamline the process as much as possible, so that mobile operators have a very time-and-cost effective process with which to benefit all stakeholders.

The need for consultation and balancing stakeholder interests

The mobile network and UAM industries understand that this is a complex process which relies on the principles of consent and approval.

The urban air mobility industry will only progress if the communities it serves and their leaders not only provide tacit approval but actively engage in its introduction and

⁴ GSMA Intelligence - <https://www.gsmainelligence.com/>

⁵ "The 5G Guide" - https://www.gsma.com/wp-content/uploads/2019/04/The-5G-Guide_GSMA_2019_04_29_compressed.pdf

⁶ [Realising 5Gs full potential setting policies for success MARCH20.pdf \(gsma.com\)](#)

development. This will require a structured process of public engagement, where the benefits and the disbenefits are clearly aired and appropriately addressed.

It may take time to engage the public in areas such as identifying and mitigating concerns, weighing up the trade-offs in specific choices and providing sufficient time and transparency so that informed planning decisions can be made which effectively incorporate and balance the needs of all stakeholders.

Setting out the reasons for decisions and providing a right of appeal can also improve the quality of decisions by protecting the rights of affected parties and ensuring decisions are reasonably based⁷.

Proper consultation will ensure that data used to support decisions has been correctly interpreted and is up to date. It will allow for stakeholders to understand the wider elements which will need to be taken into account, increase transparency and allow for people's concerns to be aired to help acceptance of the approach and methods.

At the same time, given the speed of development and roll out of these new technologies, consultation and discussion will be in parallel with initial deployment of some parts of the urban air mobility infrastructure. This may include the installation of networks which will ultimately be used for command and control and UTM. Indeed, pre-emptive roll out will in fact facilitate community engagement.

CIVATAglobal and the GSMA urge local authorities to take early action in determining their future requirements for building communications networks to support UAM development and both associations undertake to provide the most appropriate data and necessary advice in this regard.

⁷ <https://www.gov.uk/guidance/consultation-and-pre-decision-matters>

About the GSMA

The GSMA represents the interests of mobile operators worldwide, uniting more than 750 operators and nearly 400 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces the industry-leading MWC events held annually in Barcelona, Los Angeles and Shanghai, as well as the Mobile 360 Series of regional conferences.

The GSMA is actively working with the telecoms and aviation industries to maximise the use of beyond-visual-line-of-sight capabilities for UAS, develop new use cases and help create an open and trusted regulatory environment. There are two drone-related initiatives, making progress in this area - the [Drone Interest Group \(DIG\)](#) and [Aerial Connectivity Joint Activity \(ACJA\)](#).

For more information, please visit www.gsma.com/aviation

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About CIVATAglobal

The Civic Air Transport Association is the global trade association of the advanced air mobility (AAM) sector, bringing together cities and industries in a single global community. CIVATA is a forum to share experiences, plans, access information resources and work together on enabling the successful introduction of safe, profitable, environmentally responsible urban air mobility (UAM) operations, from small unmanned air system (SUAS) missions to urban air taxi networks and inter-city services.

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