

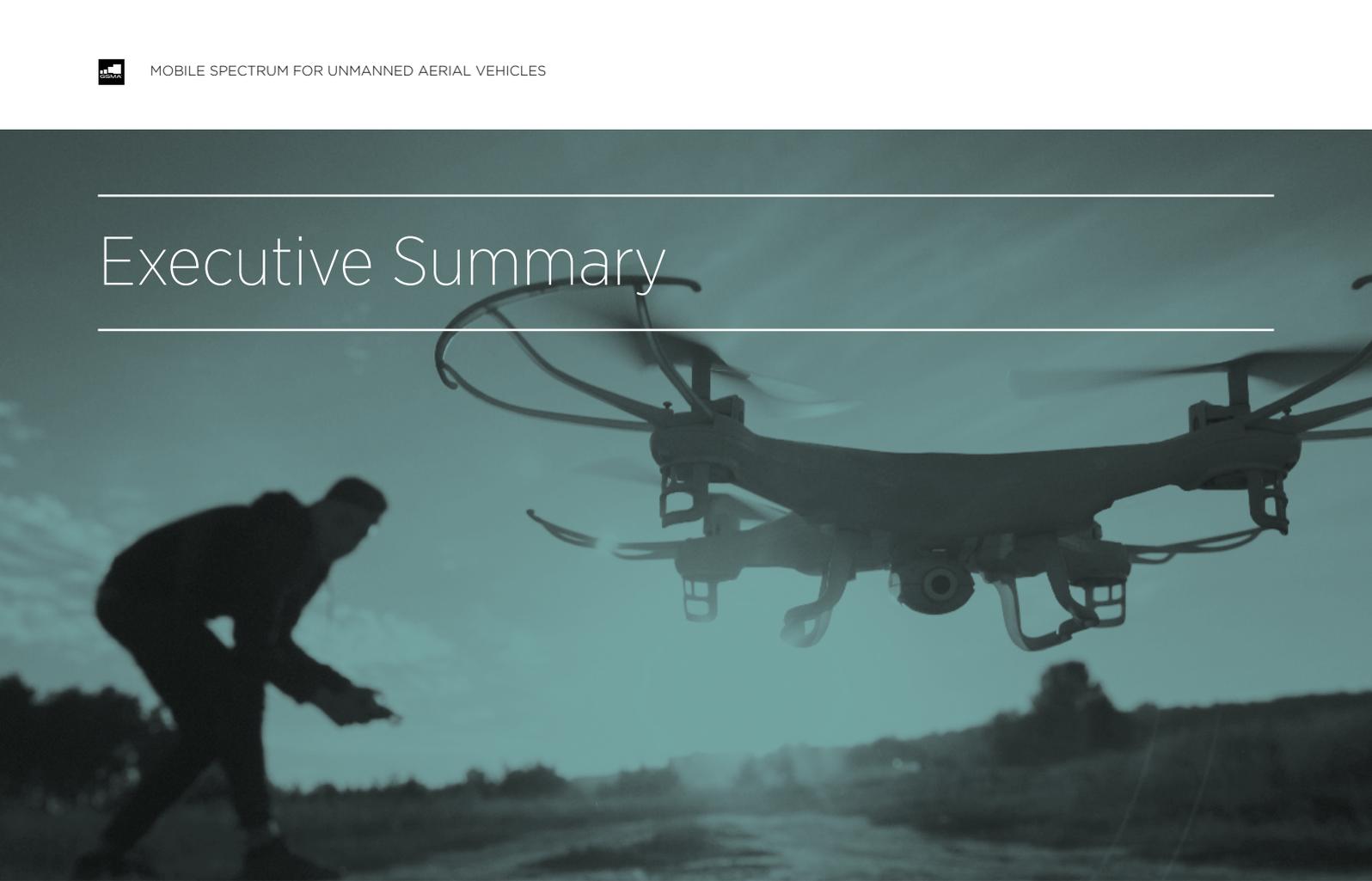


Mobile spectrum for Unmanned Aerial Vehicles

GSMA Public Policy Position

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Executive Summary



Unmanned Aerial Vehicles (UAVs), also known as drones, are becoming increasingly popular and look set to improve a wide variety of industries and services. But it is essential that the tools are in place to authenticate, monitor and track this growing fleet of vehicles. Mobile networks and the humble sim card look set to play a vital role in meeting this challenge.

However, governments must adopt a supportive regulatory framework in order to enable efficient and effective drone connectivity using mobile networks - especially as it pertains to spectrum. This paper outlines the GSMA's positions relating to spectrum for UAVs:

- 1. Licensed mobile spectrum enables widespread, high quality connectivity for UAVs with sufficient capacity to support competitive services and rising usage levels**

- 2. Licensed mobile spectrum can support affordable UAV connectivity worldwide**
- 3. It is essential there are no unnecessary barriers to using licensed mobile spectrum to connect UAVs**
- 4. Regulators should adopt a service and technology neutral framework to fully support UAVs**

Background

UAVs have the potential to deliver profound socioeconomic benefits. From transforming how businesses deliver their products, to supporting life-saving services like drug delivery in remote areas and enabling first responders to rapidly assess emergency incidents.

However, this is all contingent on effective UAV authentication, monitoring and connectivity. In Europe alone there are expected to be over 400,000 commercial and government UAVs by 2050¹. It is essential that the technology and networks are in place to ensure safe operation and management of this rapidly growing new fleet of aerial vehicles. Mobile networks stand ready to play a central role in overcoming this challenge.

Current aeronautical communication systems are not designed to manage such a huge new fleet of vehicles, nor can they enable them to operate effectively in built-up urban areas and support high bandwidth traffic like streaming video. Similarly, satellites services will struggle to support high bandwidth mobile connectivity at a reasonable price point.

Mobile networks already provide wide area broadband connectivity and sim cards are a trusted authentication mechanism. Trials² have shown that terrestrial mobile networks are able to safely support UAV connectivity at altitudes of at least

400 feet³. This means the mobile systems are already in place to support rapid growth of the UAV market – so no new technology or network investment is needed.

Mobile networks can provide the connectivity to support an air traffic management system for UAVs, as well as enabling no-fly zones and issuing commands such as flight path updates. Reliable UAV identification and registration are possible using on-board sim cards and a mobile connection – to assist with air traffic control and law enforcement. Mobile networks also have a proven track record for maintaining privacy and data protection thus helping to ensure UAVs meet the highest security standards.

But these significant benefits can only be realised if regulators remove barriers in the way of using of mobile networks to support UAVs - most notably those associated with the use of licensed mobile spectrum. This paper outlines the GSMA's positions on the important benefits licensed mobile spectrum bring to the UAV market and the regulatory challenges that threaten its use.



1. According to the 'European UAVs outlook study 2016' by Sesar (a body addressing future air traffic control)
2. Several trials have taken place including by Nokia and Qualcomm (Qualcomm has published its findings)
3. 400 feet is the maximum permitted altitude for UAVs in many jurisdictions. Mobile networks could support higher altitudes but trials have been unable to verify this due to existing altitude rules

Positions

1. Licensed mobile spectrum enables widespread, high quality connectivity for UAVs with sufficient capacity to support competitive services and rising usage levels

Licensed mobile spectrum is well placed to support competitive, high quality, wide area cellular service offerings for the UAV market. Mobile services in licensed bands are well established worldwide in mature networks, so could be used to support UAV connectivity today if regulators permit it.

Mobile operators typically have exclusive access to coverage spectrum (i.e. below 1 GHz) to reliably cover very wide areas and capacity spectrum (i.e. above 1 GHz bands) which supports very fast data speeds. Taken together this means operators can support very safe, reliable, wide area broadband connectivity for UAV. This allows UAVs to be monitored, commands to be issued, as well as the ability to carry all types of payload - ranging from low-data rate telematics to high bandwidth video streaming.

As the spectrum is typically exclusively licensed, these networks provide high quality of service guarantees for wide-area UAV connectivity. Contrastingly, unlicensed spectrum is intrinsically less suited to non-line of sight UAV connectivity as coverage is limited due to low permitted power levels, and quality of service cannot be guaranteed because the spectrum is shared.

2. Licensed mobile spectrum can support affordable UAV connectivity worldwide

Mobile spectrum bands are often harmonised regionally or globally, so economies of scale already exist to support affordable radio equipment for UAVs. This will help reduce barriers to entry, helping the UAV market to grow rapidly. Internationally harmonised mobile spectrum also means networks can support reliable UAV flights in border areas as well as between countries, where permitted.

3. It is essential there are no unnecessary barriers to using licensed mobile spectrum to connect UAVs

Regulatory decisions that restrict the use of mobile spectrum licences to support UAV connectivity could damage the significant benefits cellular connectivity delivers. This could happen if regulators decide that mobile spectrum licences may not be used to provide connectivity to devices that are 'off-the-ground'. Alternatively, if regulators choose to classify mobile services for UAVs as an 'aeronautical mobile service' then the bands mobile operators can use may be restricted. This would adversely affect the coverage and capacity of the resulting LTE services as well as market competition to provide such services.

It is not clear that any such restrictions on the use of mobile spectrum would be justified given there is no evidence that mobile-connected UAVs present interference concerns to other wireless services. Nevertheless, the GSMA is happy to discuss and support coexistence studies for specific bands as required by regulatory authorities.

4. Regulators should adopt a service and technology neutral framework to fully support UAVs

It is essential that governments provide a regulatory framework for licensed spectrum that facilitates the development and growth of UAV connectivity, and does not impose service or technological restrictions that hold back innovation. Operators should not be prevented from deploying any mobile technology in their spectrum to support UAVs. Spectrum licences which are technology specific may limit the ability to provide high speed data connectivity for UAVs (e.g. 3G or 4G), or new IoT-specific cellular technologies that could provide simple narrow-band authentication and identification (e.g. NB-IoT or LTE-M).

4. Aeronautical mobile service restrictions are listed in the ITU's Radio Regulations which allocate frequency bands to various types of wireless services. These restrictions are more common in ITU region 1 (ie. Europe, the Middle East and Africa).









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