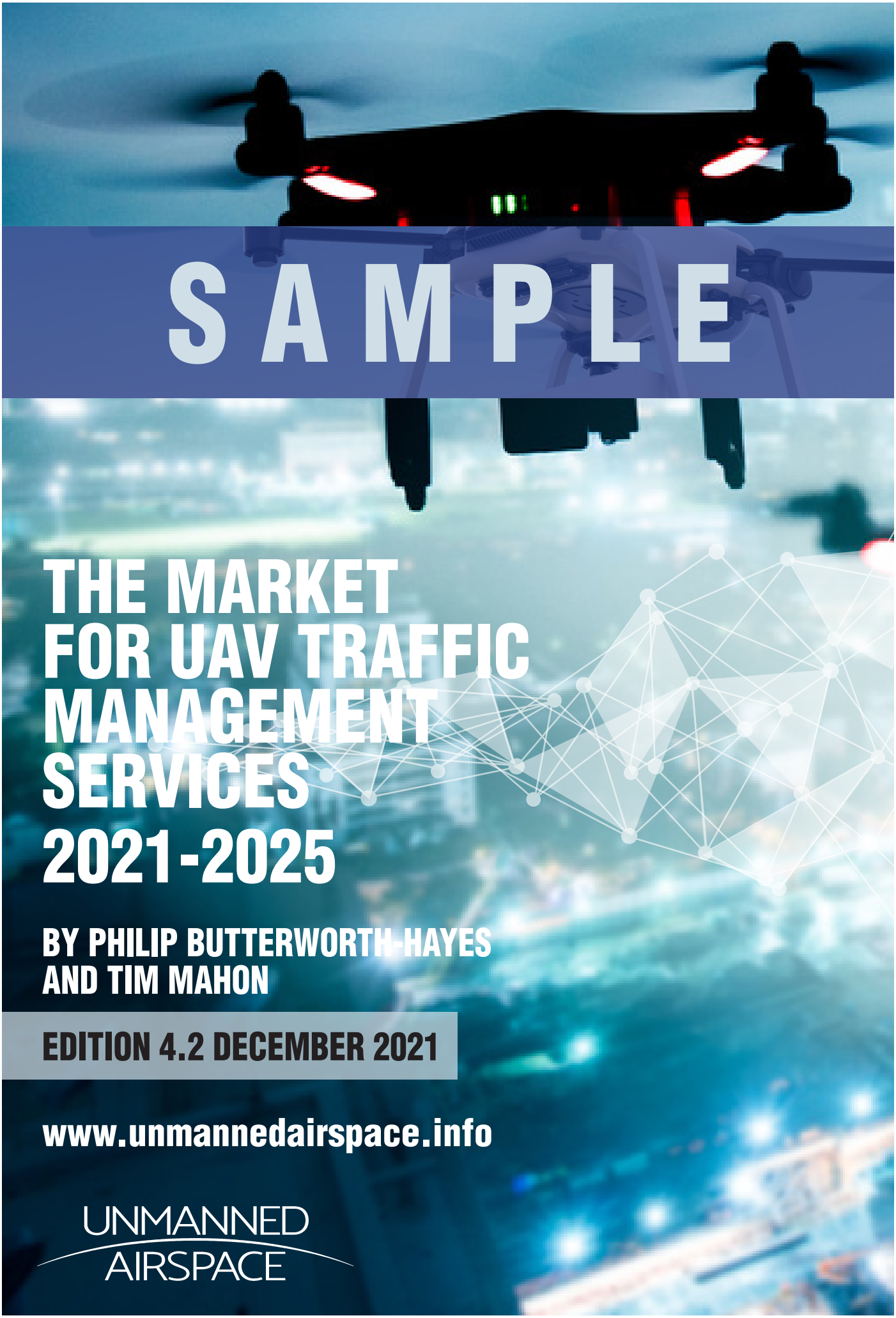

THE MARKET FOR UAV TRAFFIC MANAGEMENT SERVICES 2021-2025

BY PHILIP BUTTERWORTH-HAYES AND TIM MAHON

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Market overview

The second half of 2021 has been marked by slow but steady progress in the development of UTM regulations and technology maturity research (see below) but more spectacular growth in the emergence of urban air mobility (UAM) UTM development (see section 6.1) with the deployment of the world's first commercial prototype UAM UTM system in Antwerp port.

The UK has emerged as the most dynamic urban UTM market with no less than 12 urban airspace integration projects under way, with Spain close behind.

Only one national UTM programme was awarded in the second half of 2021, in Spain, with other commercial contracts based on city or regional drone eco-system management organisations, rather than central governments.

Table one: Commercial UTM contracts awards in the second half of 2021

July	Droniq/DFS	Port of Hamburg	Germany	
August	Indra, with Airbus and Unifly	ENAIRE	Spain	
September	Aeroscript	Sakhalin Region Development Corporation	Russia	
September	FuVex. UPNA, Naitec, Naturgy and Sistemas de Navarra, Civil Protection and Emergency teams.	General Directorate of the Interior	Spain	A regional UTM and management project to coordinate drone flights, manned aircraft operations and ground-based first responder missions has been launched In Navarra, Spain.
September	Altitude Angel	Drone Center Sweden	Sweden	The Swedish Transport Administration has selected Altitude Angel to supply its GuardianUTM Enterprise platform at Sweden's 2,400km² Drone Center in Västervik on Sweden's south-east coast.
October	Altitude Angel	Dublin Airport	Ireland	
November	Universitat Politecnicia de Valencia	Valencia regional authority	Spain	

The FAA and NASA in the USA and the European Union and EASA in Europe are accelerating their urban UTM research efforts to ensure technologies, regulations and standards will be in place for the commercial market entry of eVTOL operations in the next two to three years. Other national authorities are taking contrasting views to UAM UTM research. In contrast to the UK's rather scattergun approach of multiple programmes researching niche areas of the urban airspace integration sector France is zeroing in one key programme, the Pointoise

Section two: A growing demand for services

2.1 The market for commercial drones

Industry forecasters are continuing to offer widely different views of the scale and predicted growth rate of the commercial UAV sector. The small UAS market, based on the latest forecast-of-forecasts, is predicted to grow at an average of 25.8% compound annual growth rate over the next few years, slightly down on the 27.7% average recorded in the July 2021 report. However, perhaps more importantly from the UTM market viewpoint, BVLOS market for drones will grow at a rate of 71.1% CAGR globally, according to Drone Industry Insights.

Table four: Drone industry forecasts

Forecaster	Years	Market	Growth rate
ABI Research	2020-2030	Small UAS	CAGR 25%
FAA	2020-2040	Commercial UAS fleet	CAGR 20%
Frost & Sullivan	2019-2023	Global commercial UAS fleet	CAGR 4.3%
DRONEII	2021-2026	Global drone fleet	CAGR 9.4%
Gartner	2019/2020	Global commercial UAS fleet	CAGR 50%
Grand View	2021-2028	Commercial drones	CAGR 57.5%
Fortune Business Insights	2020-2026	Global sUAS fleet	CAGR 15.92%
International Data Corporation (IDC)	2020-2025	Global drone industry (including software)	CAGR 33.3%
Market and Markets	2021-2026	Global UAV market	CAGR 16.4%
Teal	2019-2028	Global drone industry	CAGR 15.6%
Technavio	2021-2025	Commercial drones	CAGR 36.73%

In August 2021 **Drone Industry Insights** forecasts a growth of 9.4% Compound Annual Growth Rate (CAGR) for a global drone market that it currently estimates to be worth USD26.3 billion in 2021. This means that drones are on their way to become a USD41.4 billion industry by 2026.

According to the Drone Market Report, the drone applications in the energy industry are on path to earn just under USD5.9 billion throughout the globe. Other industries such as construction and agriculture are not far behind, and some industries related to warehousing and insurance will grow at a more rapid pace in the next 5 years.

Drone services, such as mapping and inspections among dozens of others, represent roughly 78% of global drone-related revenue and are the main driving force in the market. Some of these also experienced a positive impact from the pandemic by assisting with the remote delivery of coronavirus test kits and vaccines that allowed people to keep a safe distance and avoid infection. Moreover, drone hardware is forecasted to experience strong growth as well, despite the fact that this report excludes passenger drones that have made headlines throughout 2021 through companies like Joby, Archer and Lilium.

Regionally, Asia and North America are currently the strongest markets, led by China and the United States respectively. However, developing countries in South America and Asia will experience the fastest growth above 11% CAGR.

Later in the year the company published its BVLOS Operations Report 2021, predicting the BVLOS market for drones will grow at a rate of 71.1% CAGR globally. The report finds the market for rural BVLOS operations is and will remain larger than the urban market, though the

2.2 The UAM market

(see also section 6.2).

Table four: urban air mobility industry forecasts

Forecaster	Years	Market	Value	Growth rate
BIS Research	2023-2035	UAM		CAGR 27.3%
Marketsandmarkets	2020-2030	UAM	USD9.1 billion (2030)	CAGR 13.5%
Mordor Intelligence	2021-2035	UAM	US17.2 billion (2035)	CAGR 17.81%
Horizon Aircraft	2050	eVTOLs	USD90 billion	
IDTechEx	2041	eVTOLs	USD14.7 billion	

The first challenge in forecasting this market is one of definitions. While many eVTOL manufacturers prefer to see this sector as a new sub-market to the legacy aviation passenger transport market – using many standards and regulations applicable to the rotor-craft industry – the authors of this report believe UAM should be considered more widely than passenger and large cargo carrying transports. It should encompass small UAS on missions including transport of packages but also involved in other urban aerial activities such as inspection, surveillance and first responder operations.

However, for the sake of simplicity, this section focuses on eVTOL and eVTOL infrastructure. According to an April 2021 white paper from **Osinto and Lufthansa Innovation** hub (https://tnmt.com/wp-content/uploads/2021/04/2021_Mapping-the-AAM-ecosystem_LIH_Osinto.pdf) the air taxi segment is already complex despite its nascent stage. "There is significant integration with both the aviation (ANA, Blade, Japan Airlines) and aerospace industries (Airbus, Boeing, Toray). We also witness significant integration with the automotive industry (Daimler, Geely, GM, Hyundai, Stellantis, Xpeng). Capital is being attracted from a very diverse range of sources: from angel investors (Larry Page) and startup accelerators (EIC Accelerator, Plug and Play) to corporates (Deutsche Bahn, Intel, Tencent, Toyota) and venture capital funds (Atomico, Levitate Capital, Zhen Fund). Corporate capital has come from industries as diverse as construction, defense, energy, finance, information technology, and transport."

While it is understandable at this stage of development over 95% of UAM capital investment is aimed at platforms, eVTOL (and urban drone) infrastructure development requirements will be substantial.

In March 2021 the Demand and Capacity Optimisation for U-space programme (DACUS project) published its Concept of Operations for "Demand and Capacity Balancing" (DCB) for drones within an urban environment. As part of its studies, the DACUS consortium has estimated how many take-off and landing areas (TOLAs) might be needed in Europe over the next ten to 15 years for drones and passenger carrying vehicles. "As a test case we applied the calculation to the population that is living in the metropolitan area of Toulouse (about 1.2 million people). In total a number of roughly 350 – 450 stationary TOLAs can be expected there." This suggests that an average of one TOLA for each 3,000 residents in European urban areas, based on the Toulouse case, might be needed by 2036.

In October 2021, Dublin Airport. **Ireland**, selected Altitude Angel's airspace management solution GuardianUTM Enterprise platform to provide the Irish Aviation Authority Air Navigation Service Provider (ANSP) with a combined view of the airspace in the vicinity of its FRZ (flight restricted zone), enabling ATS to enhance and provide UTM Services for drone companies and drone operators, using Altitude Angel's digital authorisation and flight management technology.

Ireland's Minister of State for Training, Skills, Innovation, Research and Development, John Halligan TD in March 2018 announced funding from Science Foundation Ireland (SFI) of EUR 1.8 million – with a further EUR 4.5 million investment from industry (cash and in-kind) to Dr Tim McCarthy, Maynooth University Department of Computer Science and National Centre for Geocomputation, for a new drone technology initiative known as U-Flyte. U-Flyte is an SFI Strategic Research Partnership award based at Maynooth University that involves collaboration with partners across the aviation industry, and includes input from Airbus, Irelandia Aviation, Intel and 15 other relevant companies and agencies with an active interest in the development and deployment of drone technology.

The first flights involving manned and unmanned aircraft sharing the same airspace took place at Waterford Airport, Ireland in September. On 14 September, a Cessna 172 was flown in proximity to a drone operating near the control tower, with both aircraft under visible control of the tower controllers.

"This is the first stage in a progressive implementation of demonstrators," said Dr Tim McCarthy, "with the end goal of developing a practical, responsible example of a U-space UTM system. We are looking at how an integrated UTM/ATM system could work, first from the point of view of the manned aircraft pilot, starting with putting simple physical illumination lights on the drone and then gradually introducing primary radar, ADS-B and then automated detect and avoid systems."

In this initial trial the controller, the Cessna pilot and the research team co-located with the drone operator were in three-way radio contact. The drone and the Cessna flew pre-determined routes above the airfield, with the drone flying initially within 50m to 100m from the tower and at around 170ft altitude, to stay within sight of the tower.

The drone was also equipped with an ADS-B 1090 transmitter which was monitored on the ground and in the Cessna aircraft. A traffic alert was signalled in the cockpit every time the Cessna turned towards the drone.

Meanwhile, the Irish Post Office An Post has started its first autonomous mail drone delivery flights. The first delivery was made on 5 July 2018, when a joint operation between An Post and SkyTango (https://skytango.com/) saw a parcel-carrying drone cross 5km of sea between Roonagh Pier in County Mayo and Clare Island in 11 minutes, an An Post spokesman told *Unmanned Airspace*. This was An Post's first autonomous over-water drone flight and was a test flight for other postal delivery operations throughout the country.

In March 2019, Maynooth University and Intel Ireland signed a Memorandum of Understanding (MoU) to establish a strategic partnership for research and innovation, and to nurture future talent.

In **Italy** D-Flight is the company created by ENAV in November 2018 to develop the U-space platform for the provision of UTM services - capital is held 60% by ENAV and 40% by an industrial team led by Leonardo in partnership with Telespazio and IDS-Ingegneria Dei Sistemi.

ENAV, through D-Flight, aims to make the traditional air traffic coexist with the needs of the new type of traffic, allowing the use of drones for an increasing number of services also of public utility, ensuring the highest levels of safety.

According to ENAV

"Following the signing of the agreement with the ENAC regulator ENAV undertook to develop and implement a specific ATM system for UAVs and to define the methods of

Commission has published a staff working document which outlines its strategy for air navigation service providers (ANSPs) being able to provide both UTM services and UTM technology services, such as the provision of Common Information Services (CIS).

According to the working paper:" ….It is therefore necessary to establish requirements on the pricing, and related oversight, of the Common Information Services (CIS) that are needed to enable safe ATM of the unmanned traffic (i.e. drones), as well as on the pricing of and access to data necessary for such services. Those requirements should be similar to those relating to air traffic data services, namely that air navigation service providers must make data available at marginal cost. In addition, if an ANSP wishes to become a CIS provider, and in the interest of transparency and to avoid discrimination and cross-subsidisation, it

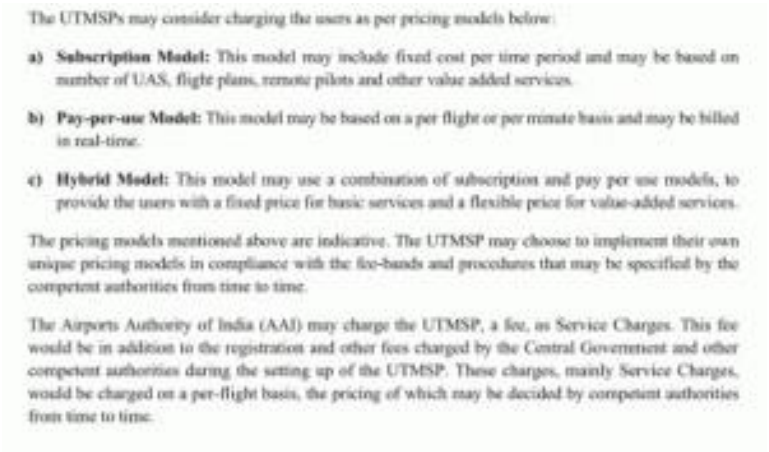
Other regulators are taking a more holistic view of charging for UTM services.

In October 2021 India's Ministry of Civil Aviation published an important high-level UTM roadmap in which stakeholder roles are defined and the next steps for UTM implementation have been published.

The government wants to develop a hybrid approach to UTM deployment, allowing competition between UTM service suppliers where possible but also considering the opportunity for single UTM services in niche areas of the market, such as delivery of goods and services by drone in remote rural areas.

The document includes a "next step" road map, including calls for participation in trials and the onboarding of UTM service providers. The document contains some interesting views on how UTM service providers can be recompensed for their services, suggesting several different finance models may be acceptable.

Figure 12: India's Ministry of Civil Aviation proposals for UTM service charging



The UTMSPs may consider charging the users as per pricing models below:

a) **Subscription Model:** This model may include fixed cost per time period and may be based on number of UAS, flight plans, remote pilots and other value added services.

b) **Pay-per-use Model:** This model may be based on a per flight or per minute basis and may be billed in real-time.

c) **Hybrid Model:** This model may use a combination of subscription and pay per use models, to provide the users with a fixed price for basic services and a flexible price for value-added services.

The pricing models mentioned above are indicative. The UTMSP may choose to implement their own unique pricing models in compliance with the fee-bands and procedures that may be specified by the competent authorities from time to time.

The Airports Authority of India (AAI) may charge the UTMSP, a fee, as Service Charges. This fee would be in addition to the registration and other fees charged by the Central Government and other competent authorities during the setting up of the UTMSP. These charges, mainly Service Charges, would be charged on a per-flight basis, the pricing of which may be decided by competent authorities from time to time.

There is a process of consolidation of independent UTM service suppliers under way, with the lack of a clear revenue stream from drone operational support as a main reason for this. It will be 2024 before automated BVLOS flight operations will be taking place with enough regulatory to provide independent service suppliers with a viable income. DroneUp's December 2021 takeover of AirMap points one way to the future. DroneUp is offering drone eco-system developers such as cities and ports an airspace monitoring tool and a communications system to talk directly to operators at no charge. If eco-system managers want to use the tool for more complex operations, or contract maintenance and upgrades to DroneUp, then those will be billable services. "If they want to go to higher levels and introduce classified operations or certain data metrics for customised reporting for regulators,

Table 16: Potential UTM roles for ANSPs, USSPs, CAAs, MNOs and others

Who provides what services in a U-space eco system – how USS see the future	Who provides what services in a U-space eco system – how MNOs see the future
U1 e-Registration - CAA Electronic chip – MNO/ANSP/USSP Drone operator online registration - CAA Drone online registration - CAA Registration enforcement - CAA Registration Authority -CAA e-Identification – MNO/ANSP/USSP Drone Identification - MNO/ANSP/USSP e-identification enforcement – CAA/ANSP Identification Authority - CAA Pre-tactical geo-fencing – USSP/ANSP Geo-limitation database – CAA/USSP/ANSP Drone operator authentication and authorisation – CAA/ANSP	**U1** e-Registration - CAA Electronic chip – MNO Drone operator online registration - CAA Drone online registration - CAA Registration enforcement - CAA Registration Authority -CAA e-Identification – MNO Drone Identification - MNO e-identification enforcement – CAA/ANSP Identification Authority - CAA Pre-tactical geo-fencing – MNO Geo-limitation database – ANSP/MNO Drone operator authentication and authorisation – CAA/ANSP
U2 Tactical geo-fencing – USSP/ANSP/MNO? Live airspace data feed – USSP/ANSP/MNO? Area infringement notification – USSP/ANSP/MNO? Flight planning management – USSP/ANSP Automated FPL validation – USSP/ANSP Operations digital authorisation – USSP/ANSP Digital NOTAM – USSP/ANSP/SDSP Weather information – USSP/SDSP Low-altitude wind forecast – USSP/SDSP Actual low-altitude wind info - SDSP Weather info collection - USSP Weather hazard alerts – SDSP/USSP Tracking – MNO/USSP Radio Positioning infrastructure – MNO/USSP Real-time tracking -MNO/USSP Tracking data recording - USSP Monitoring -USSP Air situation monitoring - USSP Flight non-conformance detection - USSP Area infringement detection - USSP Traffic info multicast- USSP Alert/Report line - USSP Drone aeronautical information management - USSP/SDSP/ANSP UTM-relevant static aeronautical data - USSP/SDSP/ANSP UTM-relevant dynamic aeronautical data- USSP/SDSP/ANSP Procedural interface with ATC -USSP/ANSP ATC/UAS coordination procedures – USSP/ANSP Flight notification procedures -USSP Emergency and contingency procedures – USSP/ANSP Emergency management -USSP/ANSP Emergency alert line – USSP/ANSP Emergency assistance information -USSP/ANSP Strategic de-confliction - USSP Strategic de-confliction - USSP	**U2** Tactical geo-fencing – MNO Live airspace data feed – USSP/ANSP/MNO Area infringement notification – USSP/ANSP/MNO Flight planning management – USSP/ANSP/MNO Automated FPL validation – USSP/MNO Operations digital authorisation – USSP/MNO Digital NOTAM – USSP/ANSP/SDSP/MNO Weather information – SDSP/MNO Low-altitude wind forecast – SDSP/MNO Actual low-altitude wind info – SDSP/MNO Weather info collection – USSP/MNO Weather hazard alerts – SDSP/USSP/MNO Tracking – MNO/USSP Radio Positioning infrastructure – MNO/USSP Real-time tracking -MNO/USSP Tracking data recording – USSP/MNO Monitoring -USSP/MNO Air situation monitoring – USSP/MNO Flight non-conformance detection – USSP/other Area infringement detection – USSP/other Traffic info multicast- USSP/MNO Alert/Report line – USSP/MNO Drone aeronautical information management - USSP/SDSP/ANSP/MNO UTM-relevant static aeronautical data - USSP/SDSP/ANSP UTM-relevant dynamic aeronautical data- USSP/SDSP/ANSP/MNO Procedural interface with ATC -USSP/ANSP/MNO ATC/UAS coordination procedures – USSP/ANSP/MNO Flight notification procedures -USSP Emergency and contingency procedures – USSP/ANSP/MNO Emergency management -USSP/ANSP/MNO Emergency alert line – USSP/ANSP/MNO Emergency assistance information - USSP/ANSP/MNO Strategic de-confliction – USSP/MNO

U3 Dynamic geo-fencing - USSP Dynamic geo-fencing – ANSP/USSP Collaborative Interface with ATC – ANSP/USSP Global air situation monitoring - USSP ATC alert notification -USSP/ANSP Tactical de-confliction -DO/USSP Dynamic capacity management - USSP Airspace capacity monitoring - USSP UAS traffic complexity assessment USSP/ANSP Demand/capacity imbalance detection – USSP/ANSP UTM measures implementation – USSP/ANSP	Strategic de-confliction – USSP/MNO **U3** Dynamic geo-fencing – USSP/MNO Dynamic geo-fencing – USSP/MNO Collaborative Interface with ATC – ANSP/USSP/MNO Global air situation monitoring – USSP/MNO ATC alert notification -USSP/ANSP/MNO Tactical de-confliction -DO/USSP/MNO Dynamic capacity management – USSP/MNO Airspace capacity monitoring – USSP/MNO UAS traffic complexity assessment USSP/ANSP/MNO Demand/capacity imbalance detection – USSP/ANSP/MNO UTM measures implementation – USSP/ANSP
Notes: Based on the SESAR U-space service level definitions *Key:* *CAA – civil aviation authority DO – drone operator MNO – mobile network operator* *ANSP – air navigation service provider SDSP – Supplemental data service provider USSP - UTM/U-Space service provider ND - Not decided*	

The following reports from individual MNOs and associated companies - from the GUTMA/GSMA Connected Skies series of webinars and other sources – outline UTM and aviation connectivity plans of individual MNOs.

Wing

Intermittent communications based on mobile network operator (MNO) cellular networks can support highly automated UAS delivery operations, according to Reinaldo Negron, head of UTM at Wing, speaking at the first "Connected Skies," webinar on 18 March, organised by the Global UTM Association (GUTMA).

"There are many questions about what level of performance you need but for us the performance of cellular depends on the concept of operations, the automation of the aircraft and the role the pilot plays in managing all these; we have shown that intermittent communications can support our types of operations," said Negron. Wing is operating package delivery services in Christiansburg (Virginia, USA), Helsinki (Finland) and Melbourne (Australia).

"When we started, we planned to operate via 4G and LTE… when we moved to remote and rural we found that 3G was sufficient for the telemetry and monitoring processes that we have. As you look at a highly automated operation you can use a wide range of cellular to support that and 3G can work for us. Our model of being able to connect with multiple mobile network operators (MNOs) has been great and we have been able to repeat this in Europe, Australia and the USA. It's not easy to get onboarded with an MNO – it involves integration and flight testing – but it is an achievable and repeatable process at a point where we can scale today for operations."

KPN

"We focus on business first and technology second," said Sander Barake, Innovation Lead at Dutch MNO KPN. KPN has been involved with the Dutch Drone Delta, working with partners to build a drone eco system in the Netherlands. "Connectivity is a real good basis for us but

Table 21: A list of UK-based UAM UTM research programmes

Programme sponsor	Programme name	Description	Consortium members
CAA	UK Air Mobility Consortium	The UK Air Mobility Consortium has announced it has started work on a concept of operations for integrating air taxis and electric vertical take-off and landing vehicles (eVTOLs) into the UK's airspace. The consortium, which is led by Eve, the first company to graduate from EmbraerX, will be working with the UK Civil Aviation Authority as part of its Future Air Mobility Regulatory Sandbox. According to a consortium press release: "The project will examine how eVTOLs may operate in transporting passengers and cargo over urban and regional areas." Initially working alongside local authorities, the consortium will explore how eVTOLs can transport passengers from London City Airport (LCY) to Heathrow Airport (LHR), with stops in between, says the press statement. Data from simulations will help policymakers develop community-friendly rules, mitigate community noise impacts, and draft airspace procedures for future flight tests. "Today, flights between London City Airport and Heathrow Airport are limited, and the routes are designed specifically for helicopters.	In addition to Eve, the consortium includes international companies that span the aviation industry, including Heathrow Airport, London City Airport, NATS, Skyports, Atech, Volocopter and Vertical Aerospace
CAA	London City – London Heathrow airspace link	A consortium of UAM and aviation companies has commenced work on a concept of operations for integrating air taxis and electric vertical take-off and landing vehicles (eVTOLs) into the UK's airspace. According to a Skyports press release, the project will examine how eVTOLs may operate in transporting passengers and cargo over urban and regional areas. Initially working alongside local authorities, the consortium will explore how eVTOLs can transport passengers from London City Airport (LCY) to Heathrow Airport (LHR), with stops in between. Data from simulations will help policymakers develop community-friendly rules, mitigate community noise impacts, and draft airspace procedures for future flight tests. According to a LInkedIn post by NATS, the air navigation service provider will develop new traffic management and airspace design concepts to enable the UAM industry to scale safely and improve mobility for communities across the UK. The results will not only provide a draft framework for future flight tests, but also highlight regulatory challenges that will help the CAA to shape future regulations. "Today, flights between London City Airport and Heathrow Airport are limited, and the routes are designed specifically for helicopters. By	The consortium is led by Eve Air Mobility, the first company to graduate from EmbraerX, will be working with the UK Civil Aviation Authority as part of its Future Air Mobility Regulatory Sandbox.

		collaborating with the UK Civil Aviation Authority, we aim to demonstrate to the public why regulatory support is required to build eVTOL-specific routes," said David Rottblatt, Vice President of Business Development and leader of the Urban Air Traffic Management project for Eve. "This unprecedented consortium, consisting of some of aviation's foremost thought leaders, will work towards preparing London, and eventually the UK, to be a viable and successful market for passenger and cargo flights using eVTOLs."	
Drone Major Group	Phoenix 1	Liverpool City Region Combined Authority (LCRCA) plans to open a 'Test and Development Area' in partnership with Drone Major Group, a drone consultancy company, with the involvement several regional partners. Phoenix I aims to deliver commercially viable, scalable and environmentally sustainable drone services across all environments and sectors including surface, underwater, air and space. A roadmap has been created which identifies key themes and outlines a pathway to develop operational drone capabilities in the fields of urban logistics, the environment, security, maritime logistics, port & maritime, and the wider community. The project currently comprises 10 initiatives addressing these sectors across the UK, based around a common operational model and data analysis. The programme aims to stimulate Liverpool City Region's inward investment opportunities, while enhancing the region's global recognition as a hub for technological innovation. The UK government granted Liverpool City Freeport status in March 2021. Digital infrastructure and knowledge resources in the Liverpool City Region include the University of Liverpool's Centre for Autonomous Systems Technology (CAST), Liverpool Institute for Sustainable Coasts and Oceans (LISCO) and Virtual Engineering Centre (VEC), and the drone research group at Liverpool John Moores University.	Project participants include Peel Ports Group, LogisticsUK, SP Energy Networks, Manufacturing Technology Centre (MTC) Liverpool John Lennon Airport, the University of Liverpool and Liverpool John Moores University.
Future Flight	Future Flight 3	In September 2021 Innovate UK launched Future Flight 3, a UKP65 million funding competition focusing on creating ambitious, real-world demonstrations for a new aviation system. The competition is split into two strands: one to demonstrate the electric, autonomous air vehicles and one to develop systems to support their deployment.	

7.8 Integrated counter-UAS systems

In March 2021 the FAA selected five host airports to evaluate technologies and systems that could detect and mitigate potential safety risks posed by unmanned aircraft. The effort is part of the agency's Airport Unmanned Aircraft Systems Detection and Mitigation Research programme, says an agency press release.

The FAA selected the following airports:

- Atlantic City International Airport in Atlantic City, New Jersey
- Syracuse Hancock International Airport in Syracuse, New York
- Rickenbacker International Airport in Columbus, Ohio
- Huntsville International Airport in Huntsville, Alabama
- Seattle-Tacoma International Airport in Seattle, Washington

These airports meet FAA requirements for diverse testing environments and represent airport operating conditions found across the United States.

The research will lead to the implementation of new technologies that will make airports safer for passengers and manned aircraft. Researchers plan to test and evaluate at least 10 technologies or systems at these airports. Testing will begin later this year and continue through 2023. It will create standards for future unmanned aircraft detection and mitigation technologies at airports around the country.

The FAA Reauthorization Act of 2018 requires the agency to ensure that technologies used to detect or mitigate potential risks posed by unmanned aircraft do not interfere with safe airport operations. The FAA does not support the use of counter-UAS systems by any entities other than federal departments with explicit statutory authority to use this technology, including requirements for extensive coordination with the FAA to ensure safety risks are mitigated.

Meanwhile in July 2021 the European Commission launched the JEY-CUAS – "Joint European sYstem for Countering " programme, involving 14 countries and 38 entities to pave the way for the development of a joint European Counter UASs capability.

The value of the programme is EUR 15,003,473 with the EU providing a maximum contribution of EUR 13,500,000.00.

According to the Commission:

"JEY-CUAS will advance technologies at system and sub-system level to develop a new generation C-UAS system based on a modular and flexible plug'n'play architecture to address the emerging challenge of micro and mini drones increasingly used for defence purposes. The solution will contribute to an improvement of the situational awareness and reaction engagement to overcome the growing resilience of UASs to first generation C-UAS systems keep up with new LSS (Low, Small, Slow) aerial threats and reduce the minimum reaction time. Related PESCO project: Counter Unmanned Aerial System (C-UAS).

Developing a suitable action plan to integrate unmanned air vehicles in common occurrence reporting procedures and describing the roles and responsibilities of the actors, and best practices on how to respond to unauthorised drones in the surroundings of an aerodrome are included in the September 2020 edition of the European Union's Aviation Safety Agency's (EASA) Counter-UAS Action Plan.