SAMPLE

THE MARKET FOR UAV TRAFFIC MANAGEMENT SERVICES 2020-2024

BY PHILIP BUTTERWORTH-HAYES AND TIM MAHON

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Market overview

The first six months of 2020 has seen the global UAS traffic management (UTM) market fragment, overturning business plans, market assumptions and business strategies. Two events have caused this fragmentation. The first is publication of the FAA's UTM business model based on the successful Low Altitude Authorization and Notification Capability (LAANC) programme, in which UTM services will be only partly funded from services charges to operators – commercial and other technical services will have to provide the bulk of UTM service supplier (USS) revenue. The second has been a clarification of the potential technical UTM capabilities of mobile network operators (MNOs),

From the GUTMA/GSMA 2020 "Connected Skies" series of webinars it is clear that MNOs will not only be able to provide connectivity but integrate UTM services such as geofencing and alerts, dynamic ground-risk determination, virtual "human-eye" piloting, drone tracking and positioning, real-time data analytics, weather condition reporting and forecasting, post-flight data analysis and reports, airspace access authorisations and cloud services into an inter-connected eco-system. For MNOs, their networks will be to support drone operator (command and control/payload download) services in parallel to UTM services.

This changes the landscape of the UTM market. Where will this leave USS companies?

At first sight, in a very difficult position. There is still clear top-line revenue to be had from working with air navigation service providers (ANSPs) by providing strategic UTM architectures, especially at a national level, and around 2030 there will be a major influx of new business from towns, cities and regions requiring bespoke UTM systems for urban/advanced air mobility concepts. Providing an interface between the UTM and ATM systems is another key role USSs can play. But the prospect of slogging it out with multiple, super-competitive, technically-advanced USS companies in the tactical UTM market is unappealing unless they can develop a range of USPs which will allow them to dominate a sector. No wonder that over the last six months many have begun to re-examine their business models, providing other drone related services such as pizza delivery and construction site operations integration.

With 5G, MNOs have a technical capability and financial reserves that make partnership agreements with USS companies highly complex – and have very different views on who will be providing what in the future UTM eco-system (see table one).

In the long term USS company business plans will be driven to a large part - in the USA and Europe at least – by the rules of engagement for UTM services currently being drawn up by the Federal Aviation Administration (FAA) and the European Aviation Safety Agency (EASA). These are currently being drafted by both organisations, with the final iterations likely to be broadly amended from the draft versions following inputs from industry and – in EASA's case – States.

Table one: 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	**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 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 **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	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 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*	

But there are several challenges before MNOs can adapt their services to the demands of the aviation market. The main one is to convince regulators that MNO service levels in areas such as coverage, latency and back-up procedures are sufficiently robust for UTM operations. Early research[1] suggests that 4G will be

[1] https://www.unmannedairspace.info/uncategorized/mobile-phone-network-multi-link-drone-tracking-performance-compared/

"Drones need cellular networks for full-service autonomous operations and UTM" – GUTMA Connected Skies webinar

https://www.unmannedairspace.info/uncategorized/intermittent-cellular-communications-can-still-support-complex-drone-operations-gutma-connected-skies-webinar/

https://www.unmannedairspace.info/uncategorized/relmatech-validates-remote-id-and-tracking-technology-via-5g-networks/

Section two: A growing demand for services

2.1 Overview of high-level forecasts for commercial drone operator services, by sector, value, geography and platform numbers

Professional aerospace market forecast companies are still showing wide variations in the predications for the civil UAS market over the next few years.

Table two: Recent drone industry forecast growth rates

Forecaster	Years	Market	Growth rate
FAA	2020-2040	Commercial UAS fleet	100% 2024/2020
Frost & Sullivan	2019-2023	Global commercial UAS fleet	CAGR 4.3%
DRONEII	2020-2024	Global drone fleet	CAGR 13.0%
Gartner	2019/2020	Global commercial UAS fleet	CAGR 50%
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%
Teal	2019-2028	Global drone industry	CAGR 12%
Finbold.com	2018/2019	Venture capital funding in drone enterprises	CAGR 67%

In March 2020 the FAA released its Aerospace Forecast 2020-2040. The FAA forecasts that the commercial UAS fleet by 2024 will likely (base scenario) be more than twice as large as the current number of commercial UAS. As the present base (the cumulative total) increases, the FAA anticipates the growth rate of the sector will slow down over time. Nevertheless, the sector will be much larger than what was understood only a few years ago. Given the accelerated registration over the last year, the FAA now projects the commercial sUAS sector will have around 828,000 aircraft in 2024, the end of the 5-year period.

The agency recorded more than 108,000 registrations by commercial operators in 2019, or about 10,000 every month. The pace of registration is slowing down in comparison to 2018, but still relatively high. By the end of 2019, there were more than 385,000 commercial UAS registered since the registration for part 107 or commercial sUAS opened in April 2016. According to the forecast, the FAA anticipates that the growth rate in this sector will remain high over the next few years. This is primarily driven by the clarity that part 107 has provided to the industry, for example proposed new rule changes for operations over people and at night without waivers and remote identification.

3.1 Australasia

By June 2020 the following drone safety apps had been approved by Australia's Civil Aviation Safety Authority (CASA):

- AirMap by AirMap Inc
- Air Mobility Platform by AiRXOS (GE Aviation)
- ok2fly by Avsoft
- OpenSky by Wing Aviation LLC
- Can I fly there? by CASA

In April CASA announced the government has agreed to defer mandatory drone registration and accreditation until 30 September 2020. Drone registration for commercial operators and excluded category operators was scheduled to commence on 1 April 2020 in line with legislation that was passed in July 2019. The requirements will require all drones, regardless of type or weight to be registered regardless of their type or weight. Each drone being flown at work will need to be registered, which will need to be renewed every 12 months.

CASA also announced a suite of measures to alleviate pressure on Australian RPA operators while ensuring the ongoing safety of aviation. The agency said: "COVID-19 is expected to continue to disrupt business and operations for some time, so we are putting in place further measures to assist the RPAS industry." Measures include extending RPA operator certificates for 6 months and delaying new requirements relating to training and record keeping.

Recreational drone registration and accreditation is still expected to commence in 2022.

In April 2019 CASA introduced technical requirements for Remotely Piloted Aircraft (RPA). The new rules are contained in the Part 101 (Unmanned Aircraft and Rockets) Manual of Standards (MOS) 2019. Primarily they effect commercial and professional RPA pilots and operators.

Meanwhile, Thales and Telstra, an Australian mobile network provider, have agreed to partner on low altitude airspace management systems for manned and unmanned vehicles, such as helicopters, drones and autonomous flying taxis.

"The ambition is to create a robust digital communications network infrastructure using Telstra's expertise, to underpin the navigation and surveillance ecosystem needed to safely manage low altitude airspace," according to a company press release. "Thales and Telstra's prototype air traffic control platform, called Low Altitude Airspace Management (LAAM) is capable of integrating manned and unmanned traffic, and will include automated drone flight approvals and dynamic airspace management. This collaboration will foster the development and growth of new products, services and innovations. The two companies are currently working on a prototype system.

Telstra is working with Uber to build a future urban aviation transport system in the city of Melbourne, reportedly providing Uber with population density services, among others.

In March 2020 Australia's Institute for Drone Technology announced it was working on the development of a LAAMS in partnership with counter drone specialists Department 13 (D13). D13 provides situational awareness capabilities airspace management platforms by detecting, identifying, attributing, and locating drones within the airspace to ensure safe flights. The institute provides drone consultancy, training and pilot license accreditation.

Paul New, Executive Director of The Institute for Drone Technology, told *Commercial UAV News:* "With LAAMS, you can record and track everything within one system," explained New. "You're pre-qualified, you're trained, you're managing and monitoring your drone operations, and with LAAMS you can detect, track, and identify what is in your local airspace and determine whether it is a threat. By taking off some of the capability that counter-drone systems have, mainly interdiction, we found that sweet spot regarding airspace management. Airspace management is not just about governance, compliance, and protection, and it's potentially about revenue opportunities – it's about knowing more about your space."

In October 2017 Google parent company Alphabet's Wing began trialling merchant deliveries in Australia. Following the launch in April 2019 of the first Australian commercial drone delivery service, Wing announced plans on 31 July 2019 to expand operations into one of the fastest growing communities in Australia, the Queensland city of Logan. CASA Corporate Communications Manager, Peter Gibson said that for each new location a drone delivery operator wants to service they need to apply to CASA for approvals. In the case of Wing, who already have approvals for Canberra, he said it will not be a new approval but a variation to the existing one.

In **New Zealand** the national air navigation service provider Airways New Zealand has set up a commercial company AirShare to manage UTM operations throughout the country.

The UTM system has been fully integrated into the country's ATM system since 2015. More recently, AirShare entered into an agreement with Dubai's Exponent to provide a new generation of UTM technology and has expanded its service to include visual line of sight (VLOS) flight authorisations and tracking in both controlled (around airports) and uncontrolled (everywhere else) airspace. Drone operators can plan and log flights with AirShare anywhere in New Zealand to determine where they can legally fly, apply and receive flight approvals, and get awareness about other airspace users. This includes information on landowner approvals – in New Zealand, drone operators may often need to understand the approvals process for flying drones beneath 400ft over some areas of the country where local authorities, national parks, conservation organisations and others have authority for low level airspace.

The company has developed Android and iOS mobile apps to access the UTM system, on a free basis – though the company plans to introduce charges for some

of its services from 2020. The UTM system is integrated with the Leidos ATM system, enabling approved flights into controlled airspace to be incorporated into the ATCs dashboard as an electronic flight strip.

In February 2020 AirShare released an updated version of the AirShare app which is available for download to help drone users to fly safely in New Zealand. AirShare 2.0 is designed for easier flight planning and provides quick access to airspace and landowner advisories. Other features include wind and weather information, live location broadcast to other drone users in the vicinity, and historical flight data. According to the company, only 30 minutes notice is required to receive automatic provisional authorisations in most of controlled airspace. This includes areas more than 4km from the controlled aerodrome for flights up to 400 ft, and up to 200ft in areas within 4km of an aerodrome if you are not operating on an aircraft approach path or an area where air traffic is commonly routed.

Users can log onto AirShare to see where they can fly, file a flight plan and more easily gain approvals. The app provides proximity and surveillance data that creates better situational awareness. Automated text alerts are sent for boundary infringements. AirShare is one of the building blocks that will support safe UAV management for New Zealand. Airways is also looking to systems that will ensure aerodrome safety and a trial of drone detection technologies at Auckland Airport is ongoing.

Meanwhile in February 2020 the New Zealand Government announced it had signed a memorandum of understanding with urban air mobility company Wisk (https://www.urbanairmobilitynews.com/air-taxis/boeing-and-kittyhawk-launch-wisk-company-to-develop-the-cora-air-taxi/) to support a transport trial of the company's Cora air taxi in Canterbury, according to Research, Science and Innovation Minister Megan Woods. This is reported to be the world's first autonomous air taxi/airspace integration trial. The specific details regarding the trial parameters, timeframes, and the proposed routes are currently being developed in collaboration with local partners.

In October 2018 UNICEF reported that the **Vanuatu** Government awarded two international drone companies, Swoop Aero and Wingcopter, with commercial contracts to trial the use of drones to bring lifesaving vaccines to children living in remote rural islands.

Two contracts were awarded to Swoop Aero Pty Ltd of Melbourne, which will cover vaccine delivery to health facilities on Epi and the Shepherd Islands as well as Erromango Island. Wingcopter Holding GmbH & Co. KG of Darmstadt, Germany, was awarded the third contract to deliver vaccines to facilities on Pentecost Island.

The first phase of the drone trials took place during the week of 3-7 December 2018 when these two drone companies tested the viability of delivering vaccines to inaccessible areas.

Table ten: UTM service providers and commercial contracts with ANSPs, civil aviation authorities

Date	UTM service supplier	Client	Country	Contract details
April 2016	Exponent	Dubai Civil Aviation Administration	Dubai	Public launch of the Exponent Portal software which allows DCAA officials and other local authorities to track the location, speed and height of drones.
2017				
July	Unifly	DFS	Germany	UTM deployment with mobile app in July 2017
August	AirMap	Kansas Department of Transportation (KDOT)	USA	The AirMap UTM platform is deployed in Kansas where drones will be mobilised for disaster recovery, search-and-rescue, agriculture, construction, package delivery, and more.
August/September	AirMap	States of Texas and Florida	USA	Temporary UTM set up in wake of hurricanes Harvey and Irma
September	Kongsberg Geospatial	Public Services and Procurement Canada (PSPC)	Canada	A contract to produce an Emergency Operations Airspace Management System (EOAMS) for evaluation by

				Canadian government agencies for safely managing drones at emergency and disaster scenes.
October	Skyward	Federal Aviation Administration	USA	Approval to give commercial drone operators instant access to controlled airspace with the Low Altitude Authorisation and Notification Capability (LAANC)
October	Unifly	Danish Transport, Construction and Housing Authority	Denmark	Launch of "Droneluftrum" app centred on interactive map based on Unifly software
November	AirMap	Federal Aviation Administration	USA	Approval to give commercial drone operators instant access to controlled airspace with the Low Altitude Authorisation and Notification Capability (LAANC)
December	AirMap	Airways New Zealand	New Zealand	Drone operators use AirMap's iOS and Android apps to request airspace approvals required by New Zealand's Civil Aviation Authority at Christchurch, Queenstown, and Wanaka airports, and on public lands in the Christchurch City, Selwyn, and Queenstown Lakes District Council,

				including parks and reserves.
December	Rakuten AirMap	Chiba City	Japan	Chiba City is the first city in Japan to deploy the Airspace Management Dashboard from Rakuten AirMap.
December	Unifly	Austrocontrol	Austria	UTM deployment with mobile app
2018				
March	Unifly	Belgocontrol and the Belgian Civil Aviation Authority	Belgium	Launch of droneguide.be, a digital platform based on Unifly software.
March	Wing	Federal Aviation Administration	USA	Approval to give commercial drone operators instant access to controlled airspace with the Low Altitude Authorisation and Notification Capability (LAANC)
March	Rockwell Collins	Federal Aviation Administration	USA	Approval to give commercial drone operators instant access to controlled airspace with the Low Altitude Authorisation and Notification Capability (LAANC)
March	Deutsche Telecom	DFS	Germany	The UTM system is based on the DFS multi-sensor tracker Phoenix, which was developed by DFS and is in use to

				display radar data for air traffic control.
March	AirMap, SITAONAIR, senseFly and PX4	Skyguide	Switzerland	The contract is to develop and deploy a national drone traffic management system for Switzerland.
March	Altitude Angel	NATS	UK	A strategic partnership to develop unmanned traffic management solutions that can be integrated and interact with conventional air traffic control.
March	DroneRadar consortium	Polish Air Navigation Services Agency and Polish Civil Aviation Authority	Poland	The consortium comprises DroneRadar JSW Innowacje, dlapilota.pl Sp. z o.o., Creotech Instruments S.A, FlyTech UAV Sp. z o.o., Aerobits and WIZIPISI. The consortium cooperates closely with the PANSA to create a nationwide UTM system
May	Unifly	UNICEF	Malawi	Unifly has set up the first UTM in Africa, supporting UNICEF's humanitarian drone corridor in Malawi.
May	Leonardo	ENAV	Italy	Leonardo will lead the industrial team that includes subsidiary Telespazio

				and IDS – Ingegneria Dei Sistemi.
July	Avetics, Garuda Robotics, Nova Systems, Wilhelmsen with OneSky	CAAS	Singapore	
August	AirMap	ANS-CR	Czech Republic	ANS CR is deploying AirMap UTM to manage authorisations for drone flights in the controlled airspace around Václav Havel Airport Prague.
December	AirMap	DGAC	Mexico	The General Directorate of Civil Aeronautics (DGAC) and Mexico City are working with AirMap to facilitate drone-pilot access information on flight rules and restricted areas.

2019				
January	Exponent	AirShare	New Zealand	
June	Airspace Drone	DCA	Monaco	
August	Airspace Drone	DGAC	Haiti	

7.3 Surveillance, tracking and identification

The FAA is planning to have remote ID service for drones operational in 2021, following the award in early May of an FAA contract to eight "cohort" companies to assist the FAA in developing technology requirements for the service (https://www.unmannedairspace.info/latest-news-and-information/us-confirms-eight-companies-to-frame-requirements-for-future-remote-id-technology/).

Remote ID will enable Unmanned Aircraft Systems (UAS) to provide identification and location information while operating in the nation's airspace. Unmanned Airspace first released the names of the companies following memorandums issued by the FAA in January.

The FAA selected the following companies to develop technology requirements for future Remote ID UAS Service Suppliers (USS): Airbus, AirMap, Amazon, Intel, One Sky, Skyward, T-Mobile, and Wing. These companies were selected through a Request for Information a process in December 2018. This initial group will support the FAA in developing technology requirements for other companies to develop applications needed for Remote ID. The applications will provide drone identification and location information to safety and security authorities while in flight.

The technology is being developed simultaneously with the proposed Remote ID rule. Application requirements will be announced when the final rule is published. The FAA will then begin accepting applications for entities to become Remote ID suppliers. The FAA will provide updates when other entities can apply to become qualified Remote ID USS on FAA.gov.

"The FAA will be able to advance the safe integration of drones into our nation's airspace from these technology companies' knowledge and expertise on remote identification," said US Transportation Secretary Elaine L Chao

In January 2019 NASA published its *UAS Service Supplier Network Performance Results and Analysis from Flight Testing Multiple USS Providers in NASA's TCL4 Demonstration* report which has measured the results of UAS service supplier (USS) performance in three areas: unauthorized data access, latency within the USS network and high density operations.

The first Measure of Performance (MOP) "Successful response rate by USSs to unauthorized data exchanges" established a minimum success bar of 90%. "On a per-USS view, five of the seven USSs met the minimum success criterion," said the report. "Aggregating all test results for all flight days across all USSs, the result was a 89.70% pass rate, failing to achieve the overall minimum success criteria."

In the "USS latency within USS Network" MOP, which calculates the average latency of USS exchanges, broken down by various categories the UTM project established a minimum success criteria of an average latency of < 1000ms and a target success of < 400ms for various data exchanges. According to the report: "Over the full set of messages, this MOP was met, with an overall average latency of 189.4 ms. When broken down by essage type, the minimum success criteria were met for all but the Negotiation message type. Variability was high amongst most message types (over 2

7.10 Global satellite navigation systems

Until recently, GNSS services in support of sUAS navigation were regarded as too expensive, with low levels of latency, requiring large, heavy on-board avionics. However, recent developments in the addition of new GNSS capabilities and the miniaturisation of airborne systems have changed the equation.

The drone market is set to outstrip any other GNSS user base in aviation and open up new business opportunities for application developers, according to a December 2019 White Paper on European Global Navigation Satellite Systems (EGNSS) for drone operations published in mid-December by the European GNSS Agency (GSA). In light of the upswing on the drone market, European drone service revenues are expected to nearly double from EUR 32 million in 2018 to approximately EUR 60 million by 2020 and are eventually forecast to reach EUR 150 million by 2023, according to the GSA report.

GNSS is a necessary asset for the safe and reliable navigation of drones, and GNSS receivers are implemented on almost all new commercial drones as standard. With increasing demand for BVLOS operations GNSS, possibly with various augmentations, is the most obvious choice of technology for navigation, although it is not the only one. Offering additional accuracy, Galileo is already present in more than 30% of the receivers used for drone applications, and many of them also implement EGNOS corrections to increase accuracy. The GSA White Paper provides an overview of the added value of EGNOS and Galileo for current and emerging operations, as well as for future U-Space services.

The paper provides a market perspective of GNSS for drones, together with a summary of applications powered by EGNSS and the results of testing campaigns that show the benefits of EGNSS vs GPS in different operational contexts. With Galileo satellites in addition to GPS, drones can use signals from more satellites for position determination which improves their accuracy and also increases the availability of received signals. This is particularly important in urban canyons.

In March 2020 the European Commission announced it had selected a GMV-led consortium to lead the Solution for E-GNSS U Space Service (SUGUS) project. SUGUS is an 18-month EUR485,000 EU research and development project involving consortium members: Everis Aerospace, Defense and Security, VVA Brussels, ESSP, FADA-CATEC and Unifly. SUGUS will help to develop services geared towards the effective integration of drones in the airspace. A series of trials will be held to show the benefits of E-GNSS for drone operators as well as its approval by aviation authorities.

SUGUS will demonstrate the benefits for drone operations of the measures implemented at service-provision level and the new EGNSS API (Application Programming Interface) to be implemented in the project. These benefits included the mitigation of operating risks, improvement of preparation processes and clearance of the operator's mission. Such measures as expected to ease future urban aerial mobility (UAM) operations, such as aero taxis or parcel delivery.

As the first step in this endeavor, SUGUS will carry out a review of the results of previous E-GNSS projects while also pinpointing the needs of drone operators and