

A white drone is shown in flight against a clear blue sky. Below the drone, a network of white lines and dots is overlaid on a blurred cityscape. The word 'SAMPLE' is written in large, bold, yellow capital letters across the middle of the image.

SAMPLE

**THE MARKET
FOR UAV TRAFFIC
MANAGEMENT
SERVICES
2021-2025**

**BY PHILIP BUTTERWORTH-HAYES
AND TIM MAHON**

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The Market for UAV Traffic Management Services – 2021-2025

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Contents – V3.03

Executive summary	4
1. Market overview	6
2. A growing demand for services	8
2.1 Overview of high-level forecasts for commercial drone operator services by sector, value, geography and platform numbers	8
3. A country-by-country and regional guide to programmes creating the procedures and protocols required for UTM	17
Introduction	17
3.1 Africa	18
3.2 Australasia	23
3.3 Europe	27
3.4 Far East	66
3.5 Latin America and the Caribbean	80
3.6 Middle East	83
3.7 North America	87
4. Financing UTM	106
4.1 Different approaches to financing UTM systems	106
5. Market forecasts for growth in the global UTM market – by value, geographic demand and sector	118
5.1 How UTM services are currently being implemented worldwide	118
5.2 Business opportunities for UTM service providers	122
5.3 Business opportunities for mobile network operators	134
5.4 Air navigation service providers and UTM business opportunities	141
5.5 UTM market forecasts by value, geographic demand and sector	144
6. The Urban Air/Advanced Air Mobility UTM market	146
6.1 Introduction to the UAM market	146
6.2 Governmental and inter-governmental urban air transport research and collaborative programmes	164
6.3 Commercial company research programmes	168
7. Current and emerging technologies	170
7.1 Drone registration	172
7.2 Geo-fencing	175
7.3 Surveillance, tracking and identification	181
7.4 Sense-and-avoid	190
7.5 Communications	199
7.6 Block chain	208
7.7 Parachute systems	212
7.8 Integrated counter-UAS systems	214
7.9 High altitude operations	221

7.10 Global navigation satellite systems	222
8. The role of regulators, certification and standards agencies – likely scenarios for developing the regulatory framework for UTM	224
8.1 GUTMA	224
8.2 The International Civil Aviation Organization (ICAO)	226
8.3 European agencies	231
8.4 National regulatory bodies, drone councils and JARUS	238
8.5 Standards organisations	243
8.6 The International Air Transport Association (IATA)	259
8.7 Industry trade associations	260
9. UTM – Different approaches to defining the concept	264
9.1 The elements that make up a UTM system	264
9.2 The US vision: NASA's UTM	269
9.3 The European Union vision – U-space	275
9.4 China's UOMS concept	287
9.5 Japan's Aerial Industrial Revolution	289
9.6 Nanjing Technical University's UTM concept	291
9.7 ONERA's Low Level RPAS Traffic Management system (LLRTM)	292
9.8 Technology provider and other UTM concepts	293
9.9 A6 Alliance	296
Appendices	
Appendix one: July 2019 EASA draft U-space regulations	299
Appendix two: An index of UTM service providers	309
Appendix three: Drones Amsterdam Declaration	327
Appendix four: FAA UPP lead participants	329
Appendix five: EASA's timetable for introducing BVLOS rules, main principles	337

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Market overview

The UTM market is set for lift-off in two years' time, when all the standards, regulations and business cases for automated BVLOS (BVLOS) commercial drone operations will be finally in place. Unfortunately, that sentence could have been written in the first *Unmanned Airspace* UTM market survey, published in 2018.

However, there are four reasons for supposing January 2023 will be the real lift-off time for the industry.

First, regulators should have in place by then the main rules to provide compliance clarity for BVLOS operations supported by UTM systems which can track and identify drones, if only for security purposes. Some pioneering States have already implemented such systems. In an historic first in December 2020, UTM company ANRA Technologies launched a remote identification service called SmartSkies DroneID in partnership with the Swiss Federal Office of Civil Aviation (FOCA) and Swiss U-Space Implementation (SUSI) to remotely identify drones in Switzerland.

Second, the roles and responsibilities of UTM stakeholders are now becoming much clearer, especially in Europe which is the world's largest UTM geographic market. In September 2020 the European Commission proposed an upgrade of the Single European Sky (SES) regulatory framework in a staff working document which outlined its strategy for 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 air traffic management 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 should have separate accounts.

"If U-space services are provided under market conditions, then a single point of truth needs to be established on data to enable the dynamic reconfiguration of airspace intended for unmanned aircraft. For this, rules on common information services are necessary. This issue needs to be considered in the context of the ongoing work in the EASA Committee on the U-space regulation."

This will also give mobile network operators (MNOs) a stronger-than-originally anticipated bargaining chip in the USP/connectivity company partnership as the technical and economic criteria demanded by the FAA and European Commission for establishing this service is likely to be rigorous and beyond the scope of many UTM service providers, especially when the added potential benefits of 5G are taken into consideration. Many MNOs will be able to provide UTM services (at 4G service delivery) at marginal costs because their main drone-based revenue streams are likely to come from value added 5G services such as payload data streaming.

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

The small UAS market, based on a forecast-of-forecast, is predicted to grow at an average of 27.7% compound annual growth rate over the next few years – but this study suggests growth rates are likely to be much smaller, perhaps slightly over 7% in 2021 over 2020 (see section 5.5).

Professional aerospace market forecast companies are still showing wide variations in the predications for the civil UAS market over the next few years – the highest is Finbold's 67% CAGR and the lowest is Frost & Sullivan's 4.3% CAGR. However, most of these forecasts do not take into account the impact of the Covid-19 pandemic. While this has accelerated the demand for medical delivery services it has also slowed the expansion of other sectors, such as construction monitoring and environmental protection, as has been evidenced in the October 2020 findings of the AW-Drones analysis of near-term professional drone services in Europe (*Survey on European UAS Operations and Operation Risk Assessment Methods Conclusions* https://rps-info.com/global-uas-ops_interim-survey-results_201113/download/) which concluded that:

"It is anticipated that the percentage of drone flight operations taking place in the 10 principal current Market Sectors will decrease from 86% to 79%, which indicates that there is more activity in the other Market Sectors. 'Aerial Photography, Audio Visual Production, Advertising' has exchanged first position with 'Construction & Real Estate'. 'Mining & Exploration' has replaced 'Cinema & TV Industry' in the tenth position. The activity volume in the following Market Sectors is anticipated to change as indicated:

• Maintenance	Stable
• Construction & Real Estate -	-26%
• Agriculture, Fishery, Fish Farming, Forestry	+26%
• Security & Law Enforcement	Stable
• Research & Science	+9%
• Public Services & Safety	Stable
• Flight Training & Instruction	+12%
• Environmental Protect. & Wildlife Conservation	-17%"

Recent (2020) high-level drone industry forecast growth rates show no impact of Covid-19 on the commercial drone market – surely an error.

In March 2020 the US FAA (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.

Section three -A country-by-country and regional guide to programmes creating the procedures and protocols required for UTM

In August 2019 the **Democratic Republic of Congo** (DRC) Civil Aviation Authority approved the country's first drone port site in Mbandaka to enable a series of test flights to demonstrate how drones can support the vaccine supply chain for hard-to-reach communities. A partnership between DRC Ministry of Health, Swoop Aero, Gavi the Vaccine Alliance, and Village Reach carried out test flights between Mbandaka and the Widjifake health centre in Équateur Province in the north west of the country in July.

In September 2020 **Ethiopia** became the latest African nation to enact drone legislation, now allowing for the legal production, importation and operation of unmanned aerial systems in the country, according to a report by *Drones.R.Africa*. The Ethiopian Civil Aviation Authority, in collaboration with Information Network Security Agency (INSA) introduced the country's drone bill into legislation, which will, according to reports from Ethiopia, "govern the import, operation and production of drones." The director general ECAA, Wossenyeleh Hunegnaw was quoted in the local media explaining how drone owners in the country should get them registered. "We will register them and those who qualify will be licensed. The licensed operators will be given instructions on where they can operate their drones," Hunegnaw said, adding that registration starts in September.

The Ethiopian Ministry of Science and Technology previously invested four million Birr (USD144,990) for a pilot project to start medical deliveries by drone. The domestically-developed drone, carrying cargo weighing five kilograms and flying at 5,000m altitude, was assembled with components from China and an engine from the USA and can fly up to 120km an hour. According to press reports the drones will deliver medical supplies while running in autopilot mode from dispatch centres to be located in Addis Ababa, Meqelle, Hawasa, Jima, Dire Dewa and Bahir Dar, and will operate in an area that covers a 150km radius from each dispatch centre, according to the report by *Fortune*.

In April 2020 **Kenya's** parliament approved the Civil Aviation (Unmanned Aircraft Systems) Regulations, 2019 Act according to a report published by *techweez*. The Kenya Civil Aviation Authority (KCAA) drew up revised proposals to the bill earlier this year which were presented to parliament in February. According to *techweez*; "Kenyans can now buy and operate drones without fear or breaking the law." It lists the following registration and licensing considerations:

"You are eligible to own a drone if you are a Kenyan citizen of 18 years and above. Applicants should also have a company registered in Kenya. National or county governments are also eligible for ownership. Owners are not allowed to transfer the ownership of drones without approval from the Kenya Civil Aviation Authority (KCAA). Only the national government is allowed to run drones with military specs. Users can also apply for a temporary permit lasting up to 30 days, and can only be renewed once."

KCAA authorisation is required in order to import or export drones.

The *techweez* report continues: "People or companies intending to use drones for commercial applications must apply for a Remote Aircraft Operators Certificate (ROC) from KCAA. According to the regulations, 'the issuance of an ROC by the Authority is dependent upon the UAS operator demonstrating an adequate organization, method of control and supervision of flight operations, training program as well as ground handling and maintenance arrangements consistent with the nature and extent of the operations specified and commensurate with the size, structure, and complexity of the organization.'

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4.0 Financing UTM

4.1 Different approaches to financing UTM systems

The December 2019 Notice of Proposed Rulemaking (NPRM) from the FAA setting out potential charging mechanisms for UTM service suppliers for remote drone ID services has underlined the principle that tactical UTM service providers will have to rely on “added extras” rather than “core services” covered by user fees for much of the future revenue sources.

The FAA assumes each entity operating a UAS would be required to subscribe to a Remote ID USS at an average rate of USD2.50 per month or US\$30 per year. If these costs were applied to the current fleet of drones this would have generated USD241.72 million – or around USD28.34 million a year. Given that the FAA expects there to be nine UTM service suppliers (USS) qualified as FAA partners in the first year of operations this suggests subscription costs will be able to finance only a small portion of the remote ID service being offered by USSs.

The number of new and renewed Remote ID USS subscriptions is approximately USD3.1 million for part 107 operators and USD5.7 million for recreational flyers. The potential commercial operator market in the USA is around 116,000 entities (<https://www.reuters.com/article/us-usa-drones/u-s-agency-requires-drones-to-list-id-number-on-exterior-idUSKCN1Q12O9>) who will provide the main clientele for UTM services. According to December 2019 FAA figures there are 1,509,617 drones registered in the USA, 420,340 commercial drones registered, 1,085,392 recreational drones registered and 160,748 remote pilots certified. While USS companies will already have established relationships with this community how will they define their own unique selling points over their competitors?

As the FAA will not provide payment for the development or operation of Remote ID USS products or services it anticipates that “the Remote ID USS would recoup the costs of providing services either through the sale of subscriptions for remote identification services, online advertising, or “value added” services that can be purchased from the service provider.” But which added value services and would these be produced by the USS or in partnerships?

Unless they have already done so, UTM service providers will need to build scalable strategic partnerships with internet service providers and mobile phone companies in ways that everyone can make money

The proposed rule would require persons operating UAS with remote identification to transmit the remote identification message elements to a Remote ID USS over the internet. For most USS this is not a technical problem. But it becomes a business issue as the FAA appears to require UTM to be based on increasing numbers of scalable, certified telecommunications services (“The FAA anticipates that in the future, third parties may develop mobile phone applications for law enforcement use...the FAA anticipates that some UAS manufacturers will also be Remote ID USS. In those cases, the Remote ID USS may choose to only connect to UAS made by the same manufacturer. This model is similar to how mobile telephone networks sell devices that can only be used on their networks. The FAA requests comment on whether manufacturers should be permitted to produce UAS that are only compatible with a particular Remote ID USS).

This insistence by regulatory authorities that UTM services be provided at minimal cost has also featured in recent European Union legislation. In September 2020 the European Commission proposed an upgrade of the Single European Sky (SES) regulatory framework which comes on the heels of the European Green Deal. As part of the proposals, the

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5. Market forecasts for growth in the global UTM market – by value, geographic demand and sectors

5.2 Business opportunities for UTM service providers

At the heart of the UTM industry lies the UTM service provider industry (see appendix two). These companies broadly fall into four types:

- Technology-focused network builders – organisations focused on writing software networking a wide range of stakeholders into the UTM network, whichever form it takes;
- UTM system managers – organisations who want to run drone traffic management services on behalf of national and local governments, on their own or in partnership with ANSPs;
- UTM system builders, managers, operators – organisations such as MNOs who want to provide the entire UTM infrastructure, using mobile telephone communications, for example, to develop a complete network, and provide their networks for C2 and video streaming services alongside UTM.
- Drone service operators – organisations who want to provide an entire, bespoke drone operational system (“drone-in-the-box”) and for whom the UTM system is merely one component in their drone operation eco-system.

Among the first group, technology-focused network builders are companies such as Unifly. This is a particularly robust business model because it is almost UTM-management-structure agnostic while the success of the other business service models will depend on how national regulators structure the UTM service delivery concept.

AirMap is an example of the second group, forging increasing numbers of partnerships with ANSPs and US states to provide early UTM services. Its flight planning service is integrated in systems developed by DJI, Intel, senseFly 3DR, and Aeryon Labs. Terra Drone, on the other hand, is a group-three company, not just developing management services but developing partnerships with cellular network providers to develop the infrastructure and management. Amazon would be an example of a group-four company.

The market for these companies is extremely complex – but essentially there are two types of commercial arrangements between UTM service suppliers and national ANSPs/civil aviation authorities under consideration: national strategic partnerships when access to airspace for drone operators is managed under a shared ANSP/USS partnership and more localised UTM markets – such as urban airspace arrangements where USS companies are working with an MNO to deliver UTM services.

These are two separate markets requiring different but complementary skills sets.

Under the first strategic arrangements ANSPs use the airspace flight planning tools developed by USS companies to evolve national programmes to evolve a lower airspace UTM tool which may or may not be integrated within the national ATM network but will eventually be used to track general aviation movements in lower airspace. UTM here will evolve into “unified air traffic management” airspace, using digital tools to manage airspace one metre above the ground to low earth orbit.

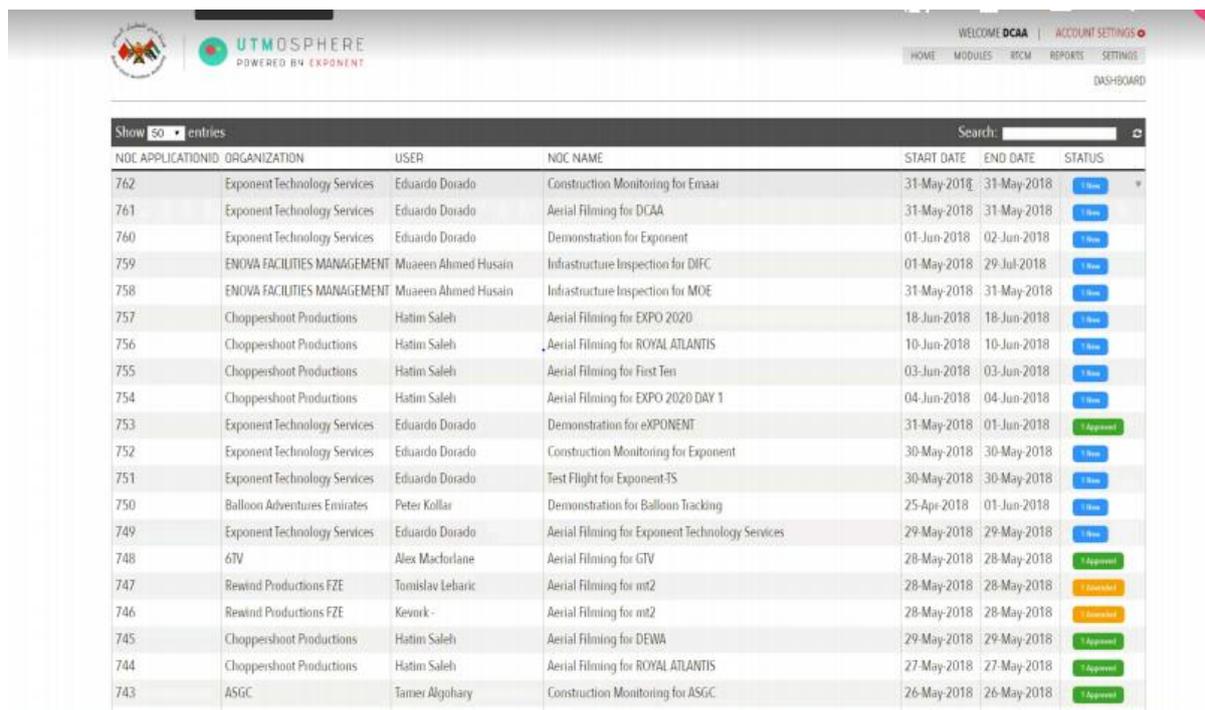
UTM service providers and commercial contracts with ANSPs, civil aviation and military authorities

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
June	Airspace Drone	DCA	Monaco	
August	Airspace Drone	DGAC	Haiti	

7.1 Drone registration

Drone registration, along with geo-fencing and identification/tracking, is one of the key pillars of the first generation of UTM systems and many/most countries wishing to develop commercial drone activities now require drones above a certain weight to be registered with their national aviation safety regulator. EASA in March 2020 set out its requirements for drone registration in EU countries (<https://www.unmannedairspace.info/news-first/easa-publishes-easy-access-rules-for-uas-including-u-space-interactions-and-drone-registration-details/>)

The first operational drone registration programme has been set up in Dubai.



The screenshot shows the UTMOSPHERE dashboard, a web-based drone registration system. The interface includes a header with the DCAA logo, the UTMOSPHERE logo (powered by EXPONENT), and navigation links for HOME, MODULES, BPCM, REPORTS, SETTINGS, and ACCOUNT SETTINGS. Below the header is a search bar and a 'Show 50 entries' dropdown. The main content is a table listing drone applications with columns for NOC APPLICATION ID, ORGANIZATION, USER, NOC NAME, START DATE, END DATE, and STATUS. The table contains 20 rows of data, each with a 'View' button and a 'Status' button (e.g., 'Approved', 'Rejected', 'In Progress').

NOC APPLICATION ID	ORGANIZATION	USER	NOC NAME	START DATE	END DATE	STATUS
762	Exponent Technology Services	Eduardo Dorado	Construction Monitoring for Emsaar	31-May-2018	31-May-2018	View
761	Exponent Technology Services	Eduardo Dorado	Aerial Filming for DCAA	31-May-2018	31-May-2018	View
760	Exponent Technology Services	Eduardo Dorado	Demonstration for Exponent	01-Jun-2018	02-Jun-2018	View
759	ENOVA FACILITIES MANAGEMENT	Muaeen Ahmed Husain	Infrastructure Inspection for DMFC	01-May-2018	29-Jul-2018	View
758	ENOVA FACILITIES MANAGEMENT	Muaeen Ahmed Husain	Infrastructure Inspection for MOE	31-May-2018	31-May-2018	View
757	Choppershoot Productions	Hatim Saleh	Aerial Filming for EXPO 2020	18-Jun-2018	18-Jun-2018	View
756	Choppershoot Productions	Hatim Saleh	Aerial Filming for ROYAL ATLANTIS	10-Jun-2018	10-Jun-2018	View
755	Choppershoot Productions	Hatim Saleh	Aerial Filming for First Ten	03-Jun-2018	03-Jun-2018	View
754	Choppershoot Productions	Hatim Saleh	Aerial Filming for EXPO 2020 DAY 1	04-Jun-2018	04-Jun-2018	View
753	Exponent Technology Services	Eduardo Dorado	Demonstration for eXONENT	31-May-2018	01-Jun-2018	Approved
752	Exponent Technology Services	Eduardo Dorado	Construction Monitoring for Exponent	30-May-2018	30-May-2018	View
751	Exponent Technology Services	Eduardo Dorado	Test Flight for Exponent-TS	30-May-2018	30-May-2018	View
750	Balloon Adventures Emirates	Peter Kollar	Demonstration for Balloon Tracking	25-Apr-2018	01-Jun-2018	View
749	Exponent Technology Services	Eduardo Dorado	Aerial Filming for Exponent Technology Services	29-May-2018	29-May-2018	View
748	6TV	Alex Macforlane	Aerial Filming for GTV	28-May-2018	28-May-2018	Approved
747	Rewind Productions FZE	Tomislav Lebaric	Aerial Filming for mt2	28-May-2018	28-May-2018	Rejected
746	Rewind Productions FZE	Kevin	Aerial Filming for mt2	28-May-2018	28-May-2018	Rejected
745	Choppershoot Productions	Hatim Saleh	Aerial Filming for DEWA	29-May-2018	29-May-2018	Approved
744	Choppershoot Productions	Hatim Saleh	Aerial Filming for ROYAL ATLANTIS	27-May-2018	27-May-2018	Approved
743	ASGC	Tamer Aljohary	Construction Monitoring for ASGC	26-May-2018	26-May-2018	Approved

Pilot and drone registration was set up in 2016 and flight authorisation began in 2017. A representative of the Dubai Civil Aviation Authority, speaking at the 2018 GUTMA annual conference, highlighted some of the complexities involved in setting up such a directory. These include monitoring the trading and transfer of drones between operators, allowing tourists to fly their own drones (after appropriate security vetting and skills assessments) and sharing this data with other states as other United Arab Emirates States had yet to develop their own directories. Dubai has 4,600 registered operators – all of whom had received training.

GUTMA's Hrishikesh Ballal has been leading a working group into this and concluded civil aviation authorities (CAAs) had three options in deciding how to develop such a registry – maintain their own registry, buy technology from a vendor or delegate the whole job to a third party. But without global consensus CAAs have different views on – and are at different stages in – developing directories which will have to be globally compatible.

- The European strategy aims at establishing a single RPAS market to reap the societal benefits of this innovative technology and at dealing with citizens' concerns through public debate and protective action wherever needed. It should also set the conditions for creating a strong and competitive manufacturing and services industry able to compete in the global market;