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The Global Drone Revolution

**Aerial Transport, Investments
and Make in India Opportunities**

November 2023

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Introduction

In August 2021, in a rather pleasantly surprising move, the Government overhauled the rules on drones for the second time in the same year, but this time liberalizing it almost entirely through the Drone Rules, 2021 (“**Drone Rules**”). It is understood that the compelling potential of drones and their use would have been an important driving factor for this unprecedented legislative action. This act has paved the way for a growing Indian drone industry.

An important part of the drone revolution has also been the shift from operations within visual line of sight (“**VLOS**”) to operations beyond visual line of sight (“**BVLOS**”). The earlier regime on drones required the presence of a remote pilot with unaided visual contact with the drone to undertake any flying operations. Such restrictions remain common in various jurisdictions outside India. However, under the Drone Rules, there has been a shift in this approach with greater relaxations being allowed for undertaking BVLOS operations. This is an important development given the obvious limitations that VLOS operations have.

From an economic perspective, the drone industry has massive potential in terms of giving a boost by attracting significant global investments in India. The Unmanned Aircraft System (“**UAS**”) market-size in India is projected to increase to approximately USD 9.3 billion by 2025 at a CAGR of 80%.¹ In fact, the expanding application of drones to various industries is predicted to impact markets globally, and the investment in the sector is bound to grow exponentially. Internationally, various predictions have estimated the drone market to grow from USD 19.2 billion in 2021 to USD 63.1 billion by 2028.² In the fiscal year 2022–23 alone, drone start-ups attracted close to \$49.7 million in investments in India,³ which is a 300% growth from the last three fiscals. In part, this has been enabled by a global trend towards the relaxation of drone operation restrictions earlier which prevented BVLOS operations and carriage of payloads in various countries along with the ‘Make in India’ initiatives.

The paper provides a brief introduction to various concepts relevant to drones and delves into an extensive analysis of the current Indian regime as well as the regime in the US and EU. We have also analysed the on-ground impact that the drone law in India will have. We have also looked at some of the potential concerns that may arise with an increase in the use of drones and legal lacunae. The concluding section provides for a way forward to ensure successful regulations which strive for a balance between drone usage and policy making.

1 Shri Jyotiraditya Scindia highlights various aspects of the growth of the Indian Civil Aviation Industry, available at: <https://www.pib.gov.in/PressReleaseDetailm.aspx?PRID=1908939>, last accessed October 27, 2023.

2 Drones Market Size Verified Research, available at: <https://www.prnewswire.com/news-releases/drones-market-size-worth--63-05-billion-globally-by-2028-at-16-01-cagr-verified-market-research-301530065.html>, last accessed on October 27, 2023.

3 Indian drone industry flies high with 3x growth in investments over 3-years, (March 24, 2023), available at: <https://www.businesstoday.in/latest/corporate/story/indian-drone-industry-flies-high-with-3x-growth-in-investments-over-3-years-374728-2023-03-24>, last accessed on October 27, 2023.

What are ‘Drones’?

The word “drone” refers to an unmanned vehicle capable of operating on land, air, underwater or some combination thereof. However, colloquially, the word has come to refer to only Unmanned Aerial Vehicles (“UAV”) which, as the name suggests, operate solely in air, or a UAS which is the entire system associated with the UAV, and allows a UAV to function.¹ In this paper, the words ‘drone’, ‘UAV’ and ‘UAS’ are used interchangeably. Drones may be remotely piloted by a human, or partially or fully autonomous.

For regulatory purposes, different countries and international organizations have provided varied definitions of drones. In general aviation and airspace-related parlance, a “**Drone**” may refer to *any vehicle that can operate on multiple surfaces and/or in the air without a human being on board to control it*. They vary in size, shape, form, speed, and a host of other attributes. Most jurisdictions categorize and regulate them by weight. A drone could vary from a model aircraft / toy in a store to a large sized aircraft sent to a war zone.

The International Civil Aviation Organization (“**ICAO**”) is the international body charged with the responsibility of codification and regulation of airways. While the ICAO does not define a drone, it identifies drones to be within the ambit of UAS and has coined the term Remotely Piloted Aircraft Systems (“**RPAS**”) for drones that are operated with the aid of a remote pilot. RPAS belong to the wider family of UAS. UAS essentially includes (i) the unmanned aircraft; (ii) the control system(s) on the ground; (iii) the control data link(s); and (iv) other support equipment.² The ICAO Circular on Unmanned Aircraft Systems, 2011 defines an RPAS as “a set of configurable elements consisting of a remotely-piloted aircraft, its associated remote pilot station(s), the required command and control links and any other system elements as may be required, at any point during flight operation.”

1 Available at: https://www.icao.int/meetings/uas/documents/circular%20328_en.pdf, last accessed on October 27, 2023.

2 See Unmanned Aircraft Systems, ICAO, https://www.icao.int/meetings/uas/documents/circular%20328_en.pdf.

Global Developments in Drone Usage

Over the past few years, drones have come to be used in various industries and for varied purposes. From quick deliveries at rush hour to surveying electrical lines, drones are proving to be extremely beneficial in places where humans cannot reach or are unable to perform operations in a timely and efficient manner.¹ Other uses of drones include aerial photography, express shipping or delivery of goods, supplying essentials to remote places, thermal sensor drones for search and rescue operations, geographic mapping, crop monitoring, forecasting, etc. The usage of drones in urban planning, infrastructure development, construction planning, maritime procedures, manufacturing and inventory management, etc., are also notable. We have detailed some of these use cases below:

i. Agri-Tech

With the use of drones, the agricultural sector is able to gather data, automate redundant processes, and improve efficiency. Drones are being developed to aid the cultivation process, including for pollination of flowers, spraying of fertilisers and even for irrigation requirements as they also enable geographic mapping. Further, drones can also be used for crop observation / monitoring along with analyses of the fields / soil which would aid in crop health. Thus, farmers can optimize the use of inputs (fertilizers, seed, water etc) and react suitably which in turn would save / enhance crop yield.

ii. Air Mobility / Drone Taxis

With the crowding of the streets with cars and hours of traffic jams coming in the way of hassle-free commute, numerous companies around the world are exploring the idea of drone taxis or passenger drones that can be summoned like the Olas and Ubers in the world. Where the latter is also in the process of enabling such air mobility through tie-ups with aircraft manufacturers. Some reports suggest that by 2030, electric vertical take-off and landing (eVTOL) aircraft manufacturers, operators and infrastructure providers will have a market value of \$35 billion.²

Airbus, the multinational European aerospace company, is developing two electric Urban Air Mobility (“UAM”) vehicles with the goal to offer short-time and distance flights across congested big cities. There are numerous other companies testing and developing their autonomous vehicles for the purposes of easing mobility and transport worldwide.

iii. Maritime Usage

Drones have found increasing application in the deep sea. Use cases include deep sea exploration, identifying ship defects at sea, inspection and monitoring of sea borders for pollution and illegal activities such as drug trafficking and fishing, search and rescue operations, drone based delivery to ships at sea, etc.³

1 Divya Joshi, Drone technology uses and applications for commercial, industrial and military drones in 2020 and the future, (December 18, 2019), available at: <https://www.businessinsider.in/tech/news/drone-technology-uses-and-applications-for-commercial-industrial-and-military-drones-in-2020-and-the-future/articleshow/72874958.cms>, last accessed on October 27, 2023.

2 Global eVTOL Aircraft Market size, available at: <https://finance.yahoo.com/news/evtol-aircraft-market-size-worth-141500112.html>, last accessed October 27, 2023.

3 4 Ways Drones are Being Used in Maritime and Offshore Services, available at: <https://www.commercialuavnews.com/security/4-ways-drones-maritime-offshore-services>, last accessed October 27, 2023.

Global Developments in Drone Usage

India has also made effective use of autonomous maritime spotter drones during the test flight mission Gaganyaan i.e., India's mission to send astronauts into a lower earth orbit of 400 kilometres in 2040.⁴ The drones were used for locating the splashdown of the TV-D1 crew module and guiding recovery vessels to the precise location.

iv. Military and Defense Services

Given the strategic size of drones, their use in military operations began decades ago. Numerous countries (with the US, UK, China and Israel being some of the first countries)⁵ have already adopted drone technology for military activities. While drones have been in use by the defence forces of these countries for a few years, drones are being designed exclusively for surveillance and defence, as well as for offensive operations and bomb detection.⁶

v. Shipping and Delivery

The commercial usage of drones for shipping and delivery of goods has gained momentum in the recent years as it aids the logistics chain and provides faster and efficient means of transport. The deliveries may range from that of medicines to posts, packages and even pizzas.⁷ While India struggled with the supply-chain disruptions during the pandemic, drones emerged as a new ray of hope in enabling such deliveries to the doorstep and to remote areas. This will not only solve logistical issues but would enable time sensitive and faster deliveries to take place around the world.

vi. Conservation of Wildlife

While drones enable the monitoring of agriculture related activities, they have also come to assist in monitoring the fauna of various regions.⁸ Wildlife monitoring is essential as it can assist in the prevention of poaching and the footage from such drones would assist in studying animal behaviour and patterns. In such a way, Drones are being utilized for geo-mapping and tracking of such animals in their natural habitats without human interference. Drones have also enabled research on ecosystems and the Ocean Alliance is an example of an organization that has used drones (such as the marine SnotBot) to collect samples — specifically, mucus from whales.⁹

vii. Healthcare

Given the necessity of accessing healthcare for individuals all over the world including those situated in remote places, the use of drones for last mile delivery is gaining immense popularity. While medical supplies can be delivered by traditional means, certain circumstances call for quick access to drugs, blood, and medical technology, drones have expedited access to these facilities for remote regions.

4 The Sky's Not the Limit: How Maritime Spotter Drones and the Indian Navy Ushered in a New Era of Space Exploration, available at: <https://www.financialexpress.com/business/defence-the-skys-not-the-limit-how-maritime-spotter-drones-and-the-indian-navy-ushered-in-a-new-era-of-space-exploration-3283152>.

5 Available at: <https://www.newamerica.org/international-security/reports/world-drones/introduction-how-we-became-a-world-of-drones/#:~:text=The%20United%20States%2C%20Israel%2C%20and,producers%20and%20sellers%20of%20drones>, last accessed on October 27, 2023.

6 38 Ways Drones Will Impact Society: From Fighting War To Forecasting Weather, UAVs Change Everything, (January 09, 2020), available at: <https://www.cbinsights.com/research/drone-impact-society-uav>, last accessed on October 27, 2023.

7 Fintan C. Drones for deliveries from Medicines to Post, Packages and Pizza, available at: <https://www.dronezon.com/drones-for-good/drone-parcel-pizza-delivery-service>, last accessed on October 27, 2023.

8 Drones help researchers manage koala populations, available at: <https://builtin.com/drones-robotics/drones-help-researchers-manage-koala-populations>, last accessed on October 27, 2023.

9 Id.

One of the most well-known medical delivery company is Zipline International, which offers delivery drones in rural areas throughout Africa and in numerous other countries at present such as USA North Carolina.¹⁰

viii. Thermal Sensor Drones for Search and Rescue Operations

Drones equipped with a camera and thermal or optical sensors have been used extensively for disaster management and rescue operations. For example, predator drones which were commonly used for military operations, were used to rescue and detect citizens in the aftermath of the hurricane Katrina in the US.¹¹ The use of such drones enables safe navigation and efficiency in rescue operations.

ix. Internet Beams

Companies such as Facebook and Google are developing drones run by solar power which would beam the internet access to remote areas.¹² It is a technology under discussion and may develop in the coming years and is being developed with an aim of bringing more people online or providing them with greater access to internet.

With the evolving application of drone technology to various industries, the technologies allied with drones are also evolving in tandem. For instance, smart drones may contain a variety of built-in safeguards, including smart accurate sensors and self-monitoring technologies that would provide new opportunities in transport, military, logistics, and commercial sectors.¹³

10 Available at: <https://techcrunch.com/2020/05/26/zipline-begins-us-medical-delivery-with-uav-program-honed-in-africa>, last accessed on October 27, 2023.

11 Available at: https://www.researchgate.net/publication/256841448_Drones_to_the_Rescue_Unmanned_Aerial_Search_Missions_Based_on_Thermal_Imaging_and_Reliable_Navigation, last accessed on October 27, 2023.

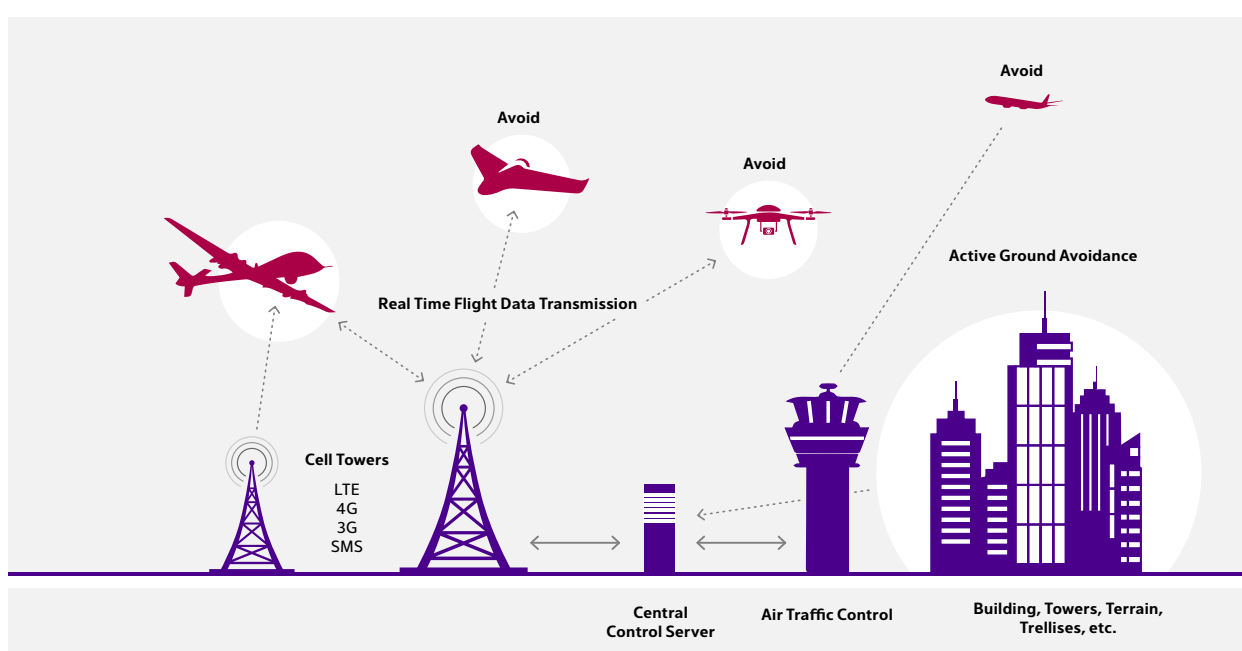
12 Available at: https://techcrunch.com/2019/01/21/facebook-airbus-solar-drones-internet-program/?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAAJgwHVQh6AXxYh2q-GUisSBZ13hFcnuxJodyhN5rQ6Gmg3UUnRPMYjyITu6jwDvFRM5IVKS4vXhDSBziM15uyzEol4GxXKOa-8DIMXlqsohK9Hq7HXkFrKpySt1ewH7Fa0zcZ7IH4KAE2vdlli7aXhgliT9H_rllWnJ67KdSXDg, last accessed on October 27, 2023.

13 Available at: https://csaerospace.cz/data/filecache/c8/str.-42_1.jpg.

Growth of Allied Drone Technologies

Unmanned Aircraft System Traffic Management ('UTM')

UTM is an ecosystem to enable multiple BVLOS operations to be managed in the airspace. It acts as an air traffic service for drones and is in the process of being implemented in India and other countries. The Indian Government published the UTM policy which enables both public and private entities to manage drone traffic.¹⁴ This is a critical development from a safety perspective, especially when the number of drones in the airspace are set to increase.



Source: WeTalkUAV.com

Counter Drone Technology

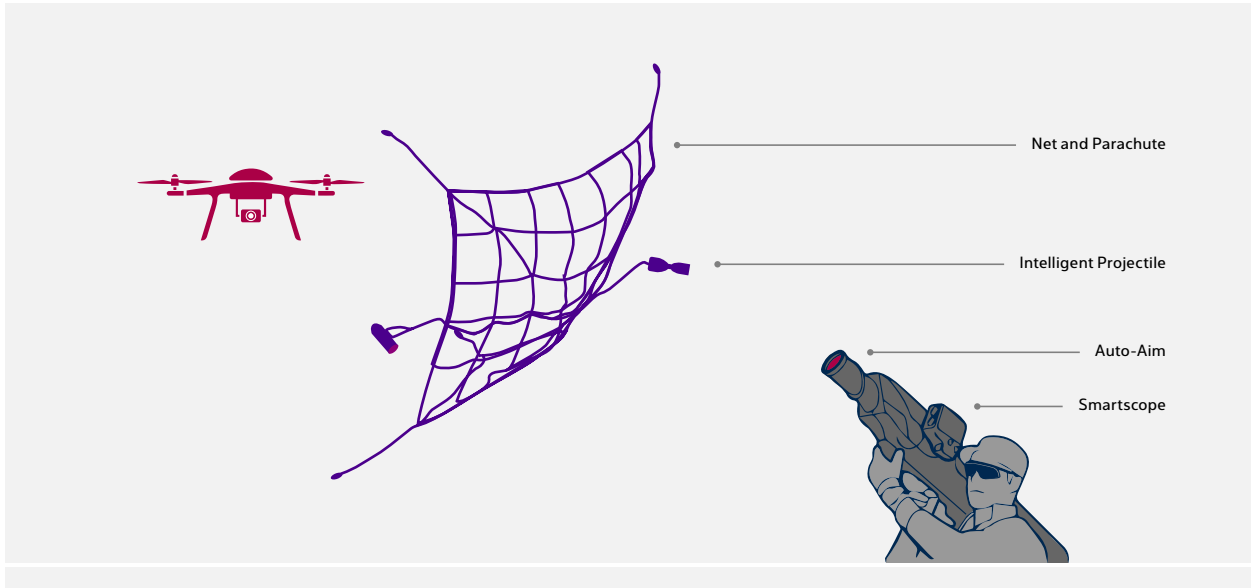
Drones can also be a threat if not used with due caution. In recent times, there have been many cases where drones have risked people's lives and have breached safety and security.¹⁵ This has led to the evolution of counter-drone technology which is being used for tracking and intercepting drones. Mostly drones are spotted using techniques like Radio Frequency (RF) detection, Electro-Optical and Infrared and are then intercepted or neutralised with techniques like RF Jamming, GNSS Jamming, Spoofing, Laser, nets, projectile or Combined Interdiction Elements.

¹⁴ Available at: <https://digitalsky.dgca.gov.in/assets/files/National-UTM-Policy-Framework-2021-24-Oct-2021.pdf>, last accessed on October 27, 2023.

¹⁵ Mayank M., India's Anti-Drone Technology: How to neutralize any future drone attacks, (July 13, 2021), available at: <https://www.indiatimes.com/technology/science-and-future/india-anti-drone-technology-uas-attack-defence-544524.html>, last accessed on October 27, 2023; See also for USA, Department of Defense Counter-Unmanned Aircraft Systems (April 17, 2023), available at: <https://sgp.fas.org/crs/weapons/IF11426.pdf>, last accessed on October 27, 2023.

Global Developments in Drone Usage

Counter drone technology may vary from technology being used for detecting, intercepting and shooting down drones to guns being used to catch drones by use of nets. The latter has been illustrated below:



Source: MedPharmres¹⁶

New Obstacle Avoidance Algorithm

Drones currently on the market with ‘obstacle avoidance’ features are able to navigate around static objects, such as buildings, mountains, and trees without being manually piloted to do so. *Sense and avoid* is a major pattern for obstacle threat avoidance.¹⁷ The main idea revolving the algorithm is transforming the obstacle avoidance problem into path planning and path following, in commercial drones.

Multivehicle Control Through Cloud Computing

The need to manage and control multiple drones within a proximity will be more demanding, as the number of active drones grow. Several tech conglomerates are already promoting the concept of connected drones that can be controlled via a cloud-based infrastructure. Currently, most of the data generated by drones is transferred to cloud systems for users to access and analyse, often not in real-time.

¹⁶ Available at: https://csгаerospace.cz/data/filecache/c8/str.-42_1.jpg.

¹⁷ X. Zhang and H. Duan, “An improved constrained differential evolution algorithm for unmanned aerial vehicle global route planning,” *Applied Soft Computing*, vol. 26, pp. 270–284, 2015.

Global Drone Regulation

Countries around the world have thoroughly deliberated on issues concerning the operation of UAS and have laid down comprehensive legislations to regulate their use. This section briefly discusses some of these regulations.

Global Standards

In 2014, the International Organization for Standardization (“ISO”) created a technical committee on UAS.¹ The scope of the committee’s work includes, but is not limited to, standardization of “classification, design, manufacture, operation (including maintenance) and safety management of UAS operations.”² In 2019, the committee published a document on operational procedures for commercial UAS, detailing international best practices which serve as a recommendatory standard for UAS manufacturers, operators, etc.³

In 2020, the ISO supplemented this document with a list of definitions pertaining to UAS. They also published a document titled Categorization and Classification of Civil Unmanned Aircraft Systems.⁴ This document specifies the requirements for multi-dimensional classification of civil UAS, with the goal of refining, rather than replacing any existing UAS regulatory framework. Similarly, there are various other standards, relating to UAS traffic management, training for personnel, etc., some of which have been published and some of which are under development.⁵

United States of America (US)

According to the Federal Aviation Association (“FAA”) of the United States, as of January 2023, there were over 871,000 drones registered with the FAA, and over 307,000 certified Remote Pilots.⁶ US is a global leader of drone technology operation and legislation, and has been working on developing a regulatory framework for drones for about a decade.

The FAA undertook rulemaking under the authority described in the FAA Modernization and Reform Act of 2012 (Public Law 112–95). In 2023, two Bills were introduced to the US Senate. The first was the American Security Drone Act (“ASDA”), which is primarily aimed at banning federal procurement of certain drones and other UAS from foreign entities, with some exceptions.⁷ The second was the Drone Integration and Zoning Act (“DIZA”), under which the administrator of the FAA will be required to adhere to certain requirements — notably, the requirements pertain to designating areas and routes for civil and commercial UAS, restricting UAS flight over another’s personal property and preserving state authority restrictions.⁸

1 Available at: <https://www.iso.org/committee/5336224.html>, last accessed on October 27, 2023.

2 Id.

3 Available at: <https://www.iso.org/standard/70853.html>, last accessed on October 27, 2023.

4 Available at: <https://www.iso.org/standard/72093.html>, last accessed on October 27, 2023.

5 Available at: <https://www.iso.org/committee/5336224.html>, last accessed on October 27, 2023.

6 Available at: https://www.faa.gov/uas/events/drone_safety_day#:~:text=%E2%80%8BAnnual%20Drone%20Safety%20Day%20is%20Saturday%2C%20April%2029%2C%202023&text=As%20of%20January%2C%20there%20are,have%20fun%20and%20be%20safe, last accessed on October 27, 2023.

7 American Security Drone Act, 2023, available at: <https://www.congress.gov/118/bills/s473/BILLS-118s473rs.pdf>, last accessed October 27, 2023.

8 Available at: <https://www.congress.gov/bill/117th-congress/senate-bill/600?q=%7B%22search%22%3A%5B%22drone%22%5D%7D&r=2&s=1,> last accessed on October 27, 2023.

Global Drone Regulation

The DIZA may provide some relief to juridical questions pertaining to federal and state authority, and some freedom to states to enforce their own regulations. Since 2013, at least 44 states have introduced some form of UAV legislation.⁹ In 2019, California enacted legislation that made it a misdemeanour offense to operate UAS in ways that may violate one's privacy.¹⁰ In 2020, eight states, including Idaho, Minnesota and Massachusetts enacted a total of 11 pieces of legislation aimed at UAV regulation.¹¹ Yet, historically the FAA regulations have superseded state regulations. This was seen in the landmark case of *Singer v. City of Newton*, where the judge confirmed the FAA authority over a state.¹²

Small UAS Regulation (Part 107)

On June 28, 2016, the FAA released the Small Unmanned Aircraft Systems Regulation (Part 107) published under Title 14, Chapter I of the Code of Federal Regulations pertaining to Aeronautics and Space.¹³ The regulation provides guidelines for operational use of small UAS, less than 55 lbs and cover a broad spectrum of commercial and government uses for drones. Part 107 requires that the drones must remain in the Visual Line of Sight (“VLOS”) of the remote pilot in command and operate only in uncontrolled airspace.¹⁴ Further, the part also provides for the operational requirements including licensing requirements, conditions for safe operation, etc., to fly drones in the US airspace for professional or commercial drone services.

VLOS flight operations are covered within the ambit of Part 107.31 of the FAA which requires such flights to be undertaken only within the direct vision of the drone pilot and places certain additional requirements for compliance by such pilots. In order to undertake BVLOS operations, the pilots must obtain a waiver from Part 107.31, although the FAA does not enable a blanket waiver from restrictions to undertake BVLOS operations in US.

Part 107 was hailed as a step forward, however it was also criticized since, among other restrictions, it did not allow flight beyond VLOS or over pedestrians and moving vehicles, and restricted flights to daytime.¹⁵ The Operations Over People Rule, which came into effect on April 21, 2021, provided significant relief on these fronts.¹⁶ This rule allows routine operations over people, moving vehicles and at night under certain circumstances. It is a big step towards integration of UAS into the National Airspace System, since it eliminates the need for waivers under Part 107 for typical operations.

The FAA had also approved automated drone operations without human pilots or BVLOS operation.¹⁷ A special waiver was required from the FAA under the Small UAS Regulations for undertaking such operations. On May 25, 2023, the FAA published a proposed rule to consider expansion of BVLOS operations in certain operating environments with appropriate safety mitigations.¹⁸

9 Available at: <https://www.ncsl.org/research/transportation/current-unmanned-aircraft-state-law-landscape.aspx>, last accessed on October 27, 2023.

10 Id.

11 Available at: <https://www.ncsl.org/research/transportation/current-unmanned-aircraft-state-law-landscape.aspx>, last accessed on October 27, 2023.

12 *Singer v. City of Newton*, 284 F. Supp. 3d 125 (D. Mass. 2017), available at: https://casetext.com/case/singer-v-city-of-newton-1?__cf_chl_jschl_tk__=pmd_0e42d523bd08a316da071af3c827831b2a125fb6-1626771947-0-gqNtZGzNAjicnBszQf6, last accessed on October 27, 2023.

13 Part 107 – Small Unmanned Aircraft Systems, 2016, available at: https://www.ecfr.gov/cgi-bin/text-idx?SID=dc908fb739912b0e6dcb7d7d88cfe6a7&mc=true&node=pt14.2.107&rgn=div5#se14.2.107_11, last accessed on October 27, 2023.

14 Available at: https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=22615, last accessed on October 27, 2023.

15 Part 107 – Small Unmanned Aircraft Systems, 2016.

16 Available at: https://www.faa.gov/uas/commercial_operators/operations_over_people, last accessed on October 27, 2023.

17 Kelsey R., FAA Approves BVLOS Drone Operations without visual observers, (Jan 22, 2021), available at: <https://www.aviationtoday.com/2021/01/22/faa-approves-bvlos-drone-operations-without-visual-observers>, last accessed on October 27, 2023.

18 Available at: <https://www.federalregister.gov/documents/2023/05/25/2023-11024/uas-beyond-visual-line-of-sight-operations>, last accessed on October 27, 2023.

Advanced Commercial Applications

The FAA, recognizing the tremendous potential of UAS, permitted its usage for certain advanced applications, not covered by Part 107.¹⁹ Most notable on the list is the provision for Package Delivery by Drone (Part 135)²⁰ through the UAS BEYOND program. The BEYOND program took effect on October 26, 2020 in partnership with a group of state authorities.²¹ The FAA highlighted three key challenges for the program: (i) BVLOS operations, that would enable package delivery and other survey operations; (ii) leveraging industry operations to better understand the benefits of UAS; and (iii) focusing on community engagement and addressing concerns regarding UAS.²²

The FAA has clearly stated that Part 135 certification is the only path for small UAS to carry the property of another for compensation beyond visual line of sight.²³ Certification is a comprehensive five phase process involving thorough design and performance assessment.²⁴ Four different types of certificates are awarded for operations.²⁵ In April 2019, Wing Aviation (a subsidiary of Alphabet Inc.) became the first to receive a Part 135 Single Pilot Air Carrier Certificate for drone operation.²⁶ The FAA later issued a Standard Part 135 Certificate allowing the wing to operate drone aircraft. Later in 2019, the United Postal Service received similar certification.²⁷ Amazon's Prime Air also received Part 135 certification for its fleet of delivery drones.²⁸

The European Union

Similar to the United States, the EU also provides a detailed set of regulations for drone operations catering to the needs of its member states. The European Aviation Safety Agency (“EASA”), in March 2017, laid down certain regulations focusing on air traffic management and navigation services.²⁹ This regulation classified UAS in different categories according to the maximum take-off mass allowed for UAS distinguishing it between systems with Mass < 5 kg, between 5–25 kg and over 25 kg.³⁰ In the following year, the EASA discussed the regulation of all drones irrespective of the mass.³¹

The EASA released two important documents: “Introduction of Regulatory Framework for the Operation of Unmanned Aircraft” and “Proposed Concept of Operations for Drones.”³² These documents provide feedback for drone operation to EASA members and other stakeholders, such as manufacturers and operators. These documents have since been consolidated and formulated into two EU Regulations.

19 Available at: https://www.faa.gov/uas/advanced_operations, last accessed on October 27, 2023.

20 Available at: https://www.faa.gov/uas/advanced_operations/package_delivery_drone, last accessed on October 27, 2023.

21 Available at: https://www.faa.gov/uas/programs_partnerships/beyond, last accessed on October 27, 2023.

22 Id.

23 Available at: https://www.faa.gov/uas/advanced_operations/package_delivery_drone, last accessed on October 27, 2023.

24 Available at: https://www.faa.gov/licenses_certificates/airline_certification/135_certification/cert_process, last accessed on October 27, 2023.

25 Available at: https://www.faa.gov/licenses_certificates/airline_certification/135_certification/general_info, last accessed on October 27, 2023.

26 Id.

27 Id.

28 Available at: <https://www.cnbc.com/2020/08/31/amazon-prime-now-drone-delivery-fleet-gets-faa-approval.html>, last accessed on October 27, 2023.

29 EASA. European Aviation Safety Agency, 5 May 2017, available at: [https://www.easa.europa.eu/sites/default/files/dfu/NPA%202017-05%20\(A\)_0.pdf](https://www.easa.europa.eu/sites/default/files/dfu/NPA%202017-05%20(A)_0.pdf), last accessed on October 27, 2023.

30 Ahmed A., Astrid L., Markus G., An Exploratory Investigation of UAS Regulations in Europe and the Impact on Effective Use and Economic Potential, (2021), available at: https://publikationsserver.tu-braunschweig.de/receive/dbbs_mods_00069674, last accessed on October 27, 2023.

31 EASA. European Union Aviation Safety Agency. 2018, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R1139&from=EN>, last accessed on October 27, 2023.

32 Available at: <https://www.easa.europa.eu/domains/civil-drones-rpas>, last accessed on October 27, 2023.

Global Drone Regulation

The European commission delegated Regulation (EU) 2019/945,³³ which set out rules for the design and manufacture of drones and the European Commission Implementing Regulation (EU) 2019/947,³⁴ which set out rules for the safe and secure use of drones. Both regulations became fully applicable as of December 31, 2020.³⁵ The regulations dictate that all drone operations, commercial and recreational, are subject to the same conditions across Europe.³⁶ The latter regulation is of particular importance, because it provides a risk-based classification system, as follows:³⁷

- **Open** — These drones do not require an authorisation by an aviation authority for the flight but need to carry out their flight within defined limitations, typically low risk scenarios.
- **Specific** — These drones require an operations authorisation by an aviation authority with specific limitations adapted to the operation, typically moderate risk scenarios.
- **Certified** — These are drones with a higher risk associated with them due to the kind of operation they are used for such as carriage of hazardous goods, operations over assemblies of people and transportation of people. Such drones require certification from the relevant aviation authorities.

To be a compliant drone user, all drone owners must register their drone in the country where they reside or have their main place of business.³⁸ Drones weighing less than 250g, with no camera or personal data detection sensor or even drones having a camera but which are considered to be a toy as per the Directive 2009/48/EC do not require registration.³⁹ The EU regulations distinguish between drone operators (the person registered) and remote pilots (the person who flies the drone).⁴⁰ Remote pilots are required to take the appropriate training for each of the three categories, and all drones must be insured by the operator.⁴¹

In April 2021, the EU issued another noteworthy regulation, (EU) 2021/664.⁴² This regulation is a first of its kind aimed at Unmanned Aircraft Traffic Management.⁴³ This regulation complements other regulations passed, pertaining to more traditional manned aircrafts. Additionally, in July 2021, (EU) 2021/1166 was issued to amend (EU) 2019/947, to postpone the date of application for standard scenarios of BVLOS flight.⁴⁴ From January 26, 2023, EU rules have also established a dedicated airspace for drones named ‘U Space’ i.e., creating conditions for drones to operate safely and carry out more complex and longer distance operations.⁴⁵

33 (EU) 2019/945, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0945>, last accessed on October 27, 2023.

34 (EU) 2019/947, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0947>, last accessed on October 27, 2023.

35 Available at: <https://www.easa.europa.eu/faq/116446>, last accessed on October 27, 2023.

36 Available at: <https://www.easa.europa.eu/newsroom-and-events/events/new-design-verification-process-authorising-drone-operations-specific>, last accessed on October 27, 2023.

37 Available at: <https://www.easa.europa.eu/domains/civil-drones-rpas>, last accessed on October 27, 2023.

38 Available at: <https://www.easa.europa.eu/domains/civil-drones-rpas>, last accessed on October 27, 2023.

39 Available at: <https://www.easa.europa.eu/faq/116454>, last accessed on October 27, 2023.

40 Available at: <https://www.easa.europa.eu/domains/civil-drones-rpas>, last accessed on October 27, 2023.

41 Id.

42 (EU) 2021/644, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R0664>, last accessed on October 27, 2023.

43 Available at: <https://www.easa.europa.eu/document-library/regulations/commission-implementing-regulation-eu-2021664>, last accessed on October 27, 2023.

44 (EU) 2021/1166, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R1166>, last accessed on October 27, 2023.

45 Available at: https://transport.ec.europa.eu/news-events/news/new-eu-rules-dedicated-airspace-drones-enter-force-2023-01-26_en, last accessed on October 27, 2023.

The Drones Rules, 2021 in India

Until late in 2021, drone usage in India faced restrictive laws and directions issued by the Directorate General of Civil Aviation (“**DGCA**”) and the Directorate General of Foreign Trade (“**DGFT**”) who restricted the civil use and import of drones in India, respectively.

However, in August 2021, the Government of India overhauled the civil drone regime in India and notified the Drone Rules, 2021.¹ The Drone Rules supersede the much criticised and highly restrictive Unmanned Aircraft System Rules, 2021 (“**Earlier Rules**”) which were released in March 2021. Through the Drone Rules, the Government significantly liberalised the regime on drones, removing express restrictions on foreign-owned and controlled Indian companies, and simplifying the drone registration and certification process, among other things. The Drone Rules were further amended in February 2022 to *inter alia* replace the requirement of drone pilots having to obtain a remote pilot license with obtaining a remote pilot certificate.² The latest amendment in October 2023 brings additional relaxations by allowing drone pilots to submit other government identity proofs apart from the Indian passport such as voter’s ID card, ration card or driver’s license.³

Key Features of the Drone Rules

Applicability

The Drone Rules defines a “drone” as an “unmanned aircraft system” (“**UAS**”) which has in turn been defined as “*an aircraft that can operate autonomously or can be operated remotely without a pilot on board.*”

The Drone Rules apply to:

- i. UAS registered in India;
- ii. all persons who own or possess, or engage in leasing, operating, transferring or maintaining a UAS in India; and
- iii. UAS which are being operated in or over India for the time being.

Further, the Drone Rules only apply to the civil use of drones and exclude the applicability of the Aircraft Rules, 1937 for drones with an aggregate weight of up to 500 kgs. Drone Rules do not apply to UAS belonging to or used by the naval, military or air forces in India.

1 Available at: <https://qcin.org/ck-docs/1643701822.Drone%20Rules%2025Aug2021.pdf>, last accessed on October 27, 2023.

2 Available at: <https://egazette.gov.in/WriteReadData/2022/233331.pdf>, last accessed on October 27, 2023.

3 Available at: <https://www.civilaviation.gov.in/sites/default/files/2023-10/Drone%20%28Amendment%29%20Rules%2C%202023.pdf>, last accessed October 27, 2023.

Categorization and Classification of UAS

The Drone Rules categorize UAS into aeroplane,⁴ rotorcraft⁵ and hybrid unmanned aircraft system.⁶ These categories are further sub-categorized as the following:

- i. Remotely piloted aircraft system (“RPAS”): This includes a remotely piloted aircraft, its associated remote pilot stations, the required command and control links and any other components as specified in the type design.
- ii. Model RPAS: These are RPAS which have a maximum all-up weight of 25 kgs, which are used for educational, research, design, testing or recreational purpose only and operated within visual line of sight.
- iii. Autonomous UAS: Unlike the Earlier Rules, the Rules do not define autonomous UAS. Hence, the degree of autonomy that would be required for a UAS to be considered as autonomous would need to be evaluated further.

Further, the Drone Rules classify drones as follows:

- i) *Nano*: Less than or equal to 250 g.
- ii) *Micro*: Greater than 250 g and less than or equal to 2 kg.
- iii) *Small*: Greater than 2 kg and less than or equal to 25 kg.
- iv) *Medium*: Greater than 25 kg and less than or equal to 150 kg.
- v) *Large*: Greater than 150 kg.

Authorization Framework

The Drone Rules provide for a largely simplified process for registrations, although certifications involve an extensive process. The two primary requirements under the Drone Rules for a drone are the type certificate (“TC”) and unique identification number (“UIN”).

Type Certificate

A drone is not permitted to be operated in India unless it conforms to a TC or is exempted from the requirement of a TC under the Drone Rules.

The Drone Rules provide that the Government of India may specify the standards for obtaining a TC, based on the recommendations of the Quality Council of India (“QCI”).⁷ The standards may also promote Indian-made technologies and Indian regional navigation satellite system.

4 Aeroplane has been defined under the Drone Rules as “any power-driven heavier than air aircraft machine deriving support for its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight.”

5 Rotorcraft has been defined under the Drone Rules as “a heavier-than-air aircraft supported in flight by the reactions of the air on one or more power driven rotors on substantially vertical axes.”

6 Hybrid unmanned aircraft system has been defined under the Drone Rules as “a heavier-than-air unmanned aircraft capable of vertical take-off and landing which depends principally on power-driven lift devices or engine thrust for the lift during the flight regimes and on non-rotating airfoil for lift during horizontal flight.”

7 The QCI is an autonomous body which was set up by the Government of India jointly with Indian industries and consumers in a public private partnership.

The Drones Rules, 2021 in India

To this effect, the ‘Certification Scheme for Unmanned Aircraft Systems’ (“**Certification Scheme**”) was notified by the Government on January 26, 2022 for obtaining TC for drones.⁸ The Certification Scheme provides the detailed eligibility criteria and process for the type certification of drones, including safety features that are mandatory for drones. The issuing authority for the TC will be the DGCA, or an entity authorised by it, based on the recommendations of the QCI or any authorised testing agency (“**ATA**”). The application is to be made on the digital sky platform (“**Platform**”) which will then be examined by a certification body. Importantly, the Drone Rules provide a specific timeline within which the certification body must submit its recommendations to the DGCA. The DGCA is also required to issue the TC for the specific type of drone within 15 days of receiving the certification body report.

Further, if a “Contracting State”⁹ has granted approval to any type of drone, the DGCA may also issue a TC to such a type of drone, provided that the same has been notified by the Central Government.

Exemptions from Obtaining TC

- i. Nano Drones and Model RPAS have been exempted from the requirement of a TC for their operations.
- ii. In addition, the Drone Rules also exempt the requirement of a TC for the manufacture and import of drones.

Registration of Drones

The Drone Rules further require drones to be registered on the Platform and obtaining a UIN, before they can be operated. Under the application process, once the required details of the individual/organisation and the drones are submitted, the Platform will verify the details and issue a UIN to the applicant. Additionally, the transfer of drones through sale, lease, gift, or otherwise, is also required to be registered with the Platform.

The UIN allotted to a drone must be connected to the “unique serial number” provided by the manufacturer and of the drone’s flight control module and remote pilot station. The Drone Rules prohibit the replacement of the flight control module and remote pilot station without updating the unique serial number there of with the Platform within 7 days of such replacement or before operation of the drone, whichever is earlier.

Insurance

The provisions of the Motor Vehicles Act, 1988 apply *mutatis mutandis* to third party insurance of UAS and on compensations in case of damage to the life and property caused by such UAS.

8 Available at: <https://qcin.org/ck-docs/1643271921.Certification%20Scheme%20for%20Unmanned%20Aircraft%20Systems.%20MoCA%20notification%2026th%20Jan%202022.pdf>.

9 Defined as “any country which is for the time being a party to the Convention on International Civil Aviation concluded at Chicago on 7th December 1944.”

Relaxations on Foreign Companies

The Government has done away with the restrictions at least on foreign-owned and controlled Indian companies (“FOCC”) to conduct drone operations in India. Therefore, for the first time since the sector has become regulated, the drone regime has been liberalised and permits FOCCs to manufacture and operate drones in India, among other things. The liberalisation is likely to bring in foreign investment, in addition to safer and more advanced technology for drones, which would otherwise have to be developed from scratch by domestic entities.

Further, FOCCs appear to have been permitted to own and operate remote pilot training organisations as well, which is another space where the know-how of more technologically advanced countries can be put to use.

Operation of UAS

The Government has notified an interactive map which is accessible on the Platform.¹⁰ The map divides the entire Indian airspace into three zones namely:

- i. **Green:** Includes (a) the airspace up to a vertical distance of 400 ft or 120 m for all zones which have not been categorised as red or yellow; and (b) the airspace up to a vertical distance of 200 ft or 60 m above the area located between a lateral distance of 8 kms and 12 kms from the perimeter of an operational airport.
- ii. **Yellow:** Includes (a) the airspace above 400 ft or 120 m in the designated green zone and (b) the airspace above 200 ft or 60 m in the area located between the lateral distance of 8 km and 12 km from the perimeter of an operational airport
- iii. **Red:** Will include areas notified by the Central Government and may include installations, port limits or areas beyond territorial waters of India.

The Drone Rules do not require any permission to be obtained for drone operations in the green zone, provided that the remote pilot mandatorily self-verifies the Platform for restrictions on the intended area of operations. Operations in the green zone would therefore only require a TC and UIN, which are one-time procedures. On the other hand, operations in the yellow zone and red zone require the permission of the air traffic control authority and Central Government, respectively.

From a safety perspective, the Drone Rules put the onus on the drone operator to ensure that the operations do not, whether directly or indirectly, endanger the safety and security of any person or property. The carriage of dangerous goods (except in compliance with the Aircraft (Carriage of Dangerous Goods) Rules, 2003 and arms, ammunitions, and explosives is prohibited. Further, the remote pilot of a drone which is involved in an accident is required to report the same to the DGCA through the Platform. Interestingly, there is no express requirement for an autonomous drone, which may not even have a remote pilot. Moreover, the definition of “accident” under the Rules does not include any incident involving damage to property. Further, all drones apart from Nano Drones are required to obtain third party insurance before operations in line with the Motor Vehicles Act, 1988 and rules thereunder.

10 Available at: <https://digitalsky.dgca.gov.in/airspace-map/#/app>.

Autonomous and BVLOS Operations

Except in case of Model RPAS, the Drone Rules do not contain any express restrictions on, or permissions required for, beyond visual line of sight (“**BVLOS**”) operations. Given the lack of guidance on BVLOS operations, various industry players might find it challenging to build their future course of action since any subsequent change in regulations can drastically affect R&D operations as well as business plans. Therefore, it is recommended that some guidelines be provided regarding such operations.

Further, apart from the definition of UAS, references to autonomous operations of drones are conspicuously absent from the Rules. Since autonomous drones do not involve a pilot, it is unclear if any license is required for autonomous drone operations. This appears to be a lacuna in the Drone Rules where pilot-operated drones are subject to more security requirements than autonomous drones, which are generally perceived to involve higher risks.

Carriage of Payload

The Earlier Rules only permitted the carriage of goods under a specific license which could be interpreted to mean that drones cannot carry passengers (humans, animals, etc.). Given the lack of specific language in the Drone Rules, the Government appears to have enabled the entry of drone taxis as well. In fact, the Aviation Minister Jyotiraditya Scindia had expressed that drone taxis may soon become a reality under the new drone regime.¹¹ In all likelihood, drone taxis would require a much more stringent process at the stage of the TC itself, nevertheless, the Rules at least enable such operations.

Model RPAS Operations

Model RPAS are limited purpose drones, which can be used only for educational, research, design, testing or recreational purposes. They must not weigh more than 25 kgs and should only be operated within visual line of sight. As mentioned above, no TC is required for Model RPAS, however, a UIN is required for such drones.

Remote Pilots and Training Organisations

Except for operating a Micro Drone for non-commercial purposes, Nano Drones and R&D purposes, all drone operations require the pilot to be a holder of a valid remote pilot certificate (“**RPC**”). Individuals are eligible to apply for an RPC only if:

- i. they are aged between 18–65 years of age;
- ii. have passed grade 10th examinations or equivalent; and
- iii. have completed the training specified by the DGCA from an authorised remote pilot training organisation (“**RPTO**”).

The individual is required to make an application to the DGCA on the Platform for any category, sub-category or class of UAS upon completion of the training within 7 days. The individual will be granted an RPC and once granted, the license will be valid for 10 years and can be renewed for a further period of 10 years thereafter.

¹¹ Available at: <https://www.livemint.com/news/india/taxis-in-the-air-to-be-a-reality-soon-under-new-drone-policy-aviation-minister-11629974892279.html>, last accessed on October 27, 2023.

RPTOs are also required to obtain an authorisation from the DGCA before they impart training for remote pilots. The eligibility criteria for RPTOs to be authorised will be notified separately. The RPTO is required to apply to the DGCA through the Platform for authorisation, and once the authorisation is granted, it will be valid for a period of 10 years.

Research and Development

Under the Drone Rules, any drone manufacturer having a GST identification (among others) number can conduct research, development, and testing (“R&D”) without requiring a TC, UIN, prior permission or even a Remote Pilot Certificate (“RPC”). The Earlier Rules required compliance with all requirements of authorizations prior to commencing R&D operations which acted as an entry barrier to new entrants in the drone regime.

In terms of conducting R&D activities by such eligible entities, the Drone Rules require the R&D operations to be conducted only in green zone and either within the premises of the person conducting the operations or within an open area in a green zone under such person’s control. While the earlier rules envisioned a safety measure to hold such testing operations 50 metres away from uninvolved personnel, the Drone Rules lack this safety measure that may be adopted in the near future. Another notable point is that the R&D operations may include drones of any size, right up to 500 kgs since there has been no limit placed on the type of drones that may be utilized for R&D purposes.

Given that regulatory and compliance requirements often act as entry barriers, the new relaxations will provide a significant boost especially to startups which are exploring opportunities in the drone sector.

Import Ban and Make in India

The Drone Rules provide that import of UAS shall be regulated by the DGFT or any other entity authorised by the Central Government. The import of UAS is “Restricted”¹² and requires prior clearance of the DGCA and an import license from the DGFT.

On February 6, 2022, the Directorate General of Foreign Trade (DGFT), vide notification No. 54/2015–2020 (“**Import Ban**”), prohibited the import of drones in Completely-Built-Up (CBU), Semi-knocked-down (SKD) or Completely-Knocked-down (CKD) form¹³ with limited exemptions such as with for R&D, defence and security purposes.¹⁴ However, import of drone components is permissible and the same is not subject to the said Import Ban.

This Import Ban is part of the overall push towards ‘Make in India’ and while providing an impetus to manufacturers in India, is also aimed at incentivizing foreign manufacturers to set up shop in India. The move is expected to both increase employment opportunities in the Indian drone sector and to a surge in inwards investments. Moreover, even public procurements, which form a major chunk of the demand for drones in India, often provide preference to drones manufactured in India.

¹² DGFT Import Policy, Schedule I, Chapter 88.

¹³ Available at: [https://content.dgft.gov.in/Website/dgftprod/7d5fd1eb-ad39-4c99-b760-014223657469/Eng-Notification%2054%20dated%209%20Feb%202022%20ITC\(HS\)%202022%20_with%20Annexures.pdf](https://content.dgft.gov.in/Website/dgftprod/7d5fd1eb-ad39-4c99-b760-014223657469/Eng-Notification%2054%20dated%209%20Feb%202022%20ITC(HS)%202022%20_with%20Annexures.pdf).

¹⁴ Id.

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As a result, even for such tenders, foreign conglomerates manufacturing in India can get an edge over those who are merely exporting to India. Indian startups are also on the rise — the numbers have almost doubled between 2021 and 2023, with an estimate of 333 drone startups in India currently.¹⁵

On the other hand, the DGFT issued a notification relaxing the norms on the export from India of Drones and UAVs for civilian use. This has been accompanied by a public notice (“**Public Notice**”) issued by the DGFT in light of the notification amending the DGFT’s Handbook of Procedures 2023.

This is a significant development and an important step towards easing export of drones by domestic players, since previously, UAV exports were categorised under Special Chemicals Organisms Material Equipment and Technology (“**SCOMET**”) list under the ITC(HS) classification of export and import of items. With the notification and Public Notice, export of UAVs of certain categories will be subject to the General Authorisation for Export of Drones (“**GAED**”). Hence, drone manufacturers and exporters will not be required to apply for a SCOMET license for every similar export shipment. The GAED would be a one-time license valid for three years.

Safety Concerns

While the Drone Rules are encouraging for various players to explore and build the drones sector, there does appear to be a general lack of framework regarding the operations of a drone from a safety and security perspective. Once a TC and UIN has been obtained, drones may be operated freely in green zones, which, in the absence of further guidance, may include densely populated civilian areas as well. While there is a reporting requirement for drone accidents, there could perhaps be further measures towards prevention of such accidents in the first place.

Moreover, with respect to carriage of payload, it is not that just specifically dangerous goods may endanger life or property during drone operations. At the height that drones operate, even relatively light objects can cause injury and damage if for some reason they get dropped from the drone.

On a similar note, while Model RPAS have been exempted from requiring TC, they may weigh up to 25 kgs, which is a significant size and there is no restriction on the areas (within the green zones) that they may operate. Since ‘recreational purpose’ has also not been clearly defined, this leaves scope for possible abuse of the relaxation granted to Model RPAS. It could be considered whether heavier Model RPAS should require a TC, since the process is one-time. This would likely go a long way in ensuring that before being deployed in common spaces, they undergo a safety check.

R&D operations have also been given an exemption from all certification and registration requirements. Notably, R&D operations may include drones of any size, right up to 500 kgs. From the perspective of the broader drone ecosystem, it would be pragmatic to keep track of the R&D operations, which could be done achieved through a UIN registration requirement of such entities based on the size of the drones they are operating. Further an “open area” in a green zone should also be defined — currently it is unclear if test flights can be conducted over areas which might be “open” but may have a significant number of civilians.

¹⁵ See: https://tracxn.com/d/explore/drones-startups-in-india/_gSDfPZkFoOxgCGVX0gqCXECXtkJ1KA1Nsoz8bS1U0Rs/companies#:~:text=June%2016%2C%202023-,Drones%20Startups%20in%20India,Aeronautics%2C%20Adani%20Defence%20%26%20Aerospace, last accessed on October 27, 2023.

Therefore, the need for further regulations regarding operations of drones, especially the carriage of payload should be further evaluated.

Penalties

The Drone Rules only criminalise the carriage of weapons and explosives and the operation of drones without permission. Moreover, it shall be a valid defence to any proceedings under the Drone Rules if the contravention is proved to have been caused due to factors or circumstances beyond the control of the relevant person or without the knowledge or fault of such person such as stress of weather, or any other unavoidable cause or circumstances. This does not, of course, exempt liability under other laws. For any other contravention of the Drone Rules, a maximum penalty of INR 1 lakh (approx. USD 1200) has been prescribed.

PLI Scheme for Drones

In a press release dated September 15, 2021, the Central Government had launched a Production-linked Incentive (“**PLI**”) scheme for drones and drone components with the aim of making India a global drone hub by 2030. The PLI scheme came as a follow-up to the Drone Rules. Under the scheme, the Government of India’s projected was that the drone industry may see an investment of over INR 5,000 crore or USD 6.8 billion over the next three years, of which INR 30 crore or USD 3.6 million had been disbursed till April 2023.¹⁶

The incentive for a manufacturer of drones and drone components covered under the scheme, shall be as high as 20% of the value addition made by them which is calculated as the annual sales revenue inclusive of GST minus the purchase cost (net of GST) of drone and drone components. This rate is to be kept constant at 20% across all three years for the drone industry unlike PLI rates in other sectors which reduce every year. The coverage of the scheme includes developers of drone related software. The incentive payable to a manufacturer is capped at 25% of annual outlay, allowing a larger number of beneficiaries to avail such incentive.¹⁷ The PLI rate shall be 20% of the value addition made by him, with the minimum being 40% of net sales for drones and drone components.¹⁸

16 Available at: <https://pib.gov.in/PressReleasePage.aspx?PRID=1913565>, last accessed October 27, 2023.

17 Available at: <https://pib.gov.in/PressReleasePage.aspx?PRID=1913565>, last accessed October 27, 2023.

18 Government invites applications from drone industry for production linked incentive, available at: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1804978>, last accessed October 27, 2023.

Related Regulatory Framework

I. Foreign Direct Investment ('FDI')

The erstwhile Department of Industry Policy and Promotion (now Department for Promotion of Industry and Internal Trade (“DPIIT”)) issued a Press Note No. 3 (2014 series), that classified Drones / Unmanned Aerial Vehicles (“UAV”) as a ‘defence aircraft’, hence mandating an industrial license for the manufacture of drones. This applied even if the drones were being manufactured for civil purposes. Hence, Drones were deemed to be dual list items. Although, the DPIIT through Press Note 1 (2019 series) exempted a select category of UAVs (“**Exempted Drones**”), from the meaning of ‘defence aircraft’, a large number of UAVs continue to fall outside the list of Exempted Drones. From an FDI perspective, drones which do not fall within the category of Exempted Drones could be classified as defence items, irrespective of their use, hence investments in such companies may be linked to the FDI conditionality’s of the defence sector. However, unlike the Earlier Rules, there are no express restrictions in the Drone Rules on Indian companies being owned and controlled by foreign companies.

Further, the current FDI policy is also not clear on the status of companies proposing to provide non-scheduled air transport service (delivery services via drones) and whether the same could fall under non-scheduled air transport service (for civil use) where 100% FDI is permitted under the automatic route. Otherwise, FDI in drone manufacturing is permitted up to 100% through the automatic route. However, in case the manufacturing is for defence purposes, conditions pertaining to obtaining of an industrial license, security clearances and foreign investment restrictions would get triggered.

II. Intellectual Property Rights

As more and more advanced drones are invented with unique utilities, it opens up avenues for protection by the grant of patents. For example, companies like Amazon and Walmart have invested in patenting drones for deliveries to customers. In fact, Amazon has now patented delivery vans which are capable of launching drones for last-mile deliveries as well.¹

Under the Indian Patents Act, 1970 (“**Patents Act**”), although there is no express restriction on filing patent applications in relation to drone inventions, specific procedures need to be adhered to if the invention has an impact on defence or national security,² and the grant of such patents may be subject to prior government approvals (including the Indian Ministry of Defence). Currently, it is unclear if patents for civil use drones would also require this additional approval, and this aspect will be required to be evaluated further.

1 See <https://newatlas.com/drones/amazon-patent-fleets-delivery-drone>, last accessed on October 27, 2023.

2 See Chapter VII of the Patents Act.

III. Data Protection and Privacy

With the advent of the *Digital Personal Data Protection Act, 2023* (“**DPDPA**”), India now has a dedicated standalone data protection legislation, although the provisions of the DPDPA as well as its rules have not been enforced. Once enacted, they will replace the *Information Technology (Reasonable security practices and procedures and sensitive personal data or information) Rules, 2011*.

The DPDPA applies to the processing³ of **digital** personal data in India, where the personal data is either (i) collected in digital form; or (ii) collected in a non-digitized format and subsequently digitized.⁴ It also applies to the processing of digital personal data outside the territory of India, if such processing is in connection with any activity related to offering of goods or services to Data Principals within the territory of India.⁵

Personal data has been broadly defined under the Act to include any data about an individual who is identifiable by or in relation to such data.⁶ The DPDPA introduces several compliance requirements for collection and processing of personal data. The compliances are to be implemented by Data Fiduciaries⁷ and Data Processors⁸ while processing the personal data of Data Principals.⁹

Furthermore, once the DPDPA is enforced, the relevant entity operating the drone and processing any personal data that may be collected, will be required to comply with the DPDPA and ancillary rules when notified. These *inter alia* include providing notice to and obtaining consent from the Data Principal, retaining personal data only until the fulfilment of the specified purpose for which such data was collected, implementing technical measures and security safeguards, providing a grievance redressal mechanism for data principals, etc. However, the exact and applicable compliances will vary on a case-to-case basis and would have to be revisited as and when the rules are notified.

IV. Geospatial Data

The Government of India, through the Department of Science and Technology (“**DST**”) in February 2021, had issued “Guidelines for acquiring and producing geospatial data and geospatial data services including Maps” (“**Guidelines**”) ¹⁰ and other products and services offered by government bodies, individuals, and private organisations. Under the Guidelines, the Government had liberalized the collection, use and processing of Geospatial Data. Since one of the major use cases of drones is aerial photography and surveying, the data collected by drones could be categorised as Geospatial Data and be regulated by the Guidelines.

3 Processing is defined under Section 2(x) of the DPDPA as wholly or partly automated operation or set of operations performed on digital personal data, and may include operations such as collection, recording, organisation, structuring, storage, adaptation, alteration, retrieval, use, alignment or combination, indexing, sharing, disclosure by transmission, dissemination or otherwise making available, restriction, erasure or destruction.

4 Section 3(a), DPDPA.

5 Section 3(b), DPDPA.

6 Section 2(t), DPDPA.

7 Section 2(i) of the DPDPA: any person who alone or in conjunction with other persons determines the purpose and means of processing of personal data.

8 Section 2(k) of the DPDPA: means any person who processes personal data on behalf of a Data Fiduciary

9 Section 2(j) of the DPDPA: “Data Principal” means the individual to whom the personal data relates and where such individual is—

- i) a child, includes the parents or lawful guardian of such a child;
- ii) a person with disability, includes her lawful guardian, acting on her behalf.

10 Our detailed analysis of the Guidelines is available at:

<https://www.nishithdesai.com/SectionCategory/33/Technology-Law-Analysis/12/60/TechnologyLawAnalysis/4678/1.html>.

Related Regulatory Framework

While the Guidelines liberalise the laws on Geospatial Data significantly, they also contain certain restrictions thereon. For instance, the Guidelines place certain restrictions on creation, owning and processing of certain geospatial data, most of which are imposed on entities which are not Indian Entities¹¹ (“**Foreign Entities**”). This becomes relevant especially if data collection and processing activities are undertaken by drone companies which are not Indian Entities.

V. Tort Law

While there are no significant case laws as such on drones in India, but the principles of torts such as trespass, nuisance, privacy, harassment, hurt and negligence will play an instrumental role in the development of jurisprudence in this sector. E.g., flying a drone over another individual’s land may amount to trespass and nuisance. However, nuisance requires establishing harm, which may include damage to land, interference with the easement, discomfort or inconvenience. Spying or unauthorized surveillance may also amount to nuisance, particularly when done with a deliberate attempt of causing harassment.

Similarly, injuries caused due to crash of drone or technical defaults to an individual may trigger a claim of hurt and may also involve principles of vicarious liability of the owner or the operator of the drone causing the injury under tort law. It will be interesting to see how courts will apply these principles on the functioning of drones and other new technologies, in due course of time.

VI. Tax Aspects

Developments in technology, internet, cloud computing and IoT have given rise to various tax issues globally. In the Indian context, global enterprises catering to Indian customers have faced difficulties with Indian tax authorities taxing e-commerce and internet-based business models in a manner that conflict with international approaches. There has been significant litigation in this respect, especially in relation to characterization of income and withholding taxes. Another emerging area where such issues are likely to come up, is the usage of drones.

11 Paragraph 7(f) of the Guidelines define an “Indian Entity” as “Any Indian citizen, Government entities, Societies registered under applicable statutes, statutory bodies, Autonomous Institutions of the Government, or any Indian company or Indian LLP owned by resident Indian citizens or any Indian company or Indian LLP controlled by resident Indian citizens (as defined in the Explanation to Rule 23 of the Foreign Exchange Management (Non-Debt Instrument) Rules, 2019).” As a corollary, Foreign Entities would include Indian companies which are not owned and controlled by resident Indian citizens. However, the definition of Indian Entity does not expressly exclude branch offices and liaison offices and this would need to be evaluated further.

Direct Tax Implications

Taxation of income in India is governed by the provisions of the Income Tax Act, 1961 (“**ITA**”). Under the ITA, residents are subject to tax in India on their worldwide income, whereas non-residents are taxed only on income sourced in India. However, non-residents, who are resident of a country with which India has signed a tax treaty, have the option of being taxed as per the tax treaty or the ITA whichever is more beneficial.

The corporate tax rate¹² in India is 30% (on fulfillment of certain conditions, the rate can be reduced to 22% /25% and 15% for manufacturing companies) for resident companies and 40% for non-resident companies (to the extent of income sourced in India). Further, subject to tax treaty relief, withholding tax of 20% (on a gross basis) is applicable in case of royalties and fees for technical services (“**FTS**”) paid to non-residents. In case of failure to withhold, the payer could be liable for the principal tax amount, interest (at 12% per annum) and penalty (up to 100% of the principal tax amount). Further, the payer could face the risk of not being allowed to claim expense deduction (for the royalty / FTS payment) while computing its taxable profits.

The use of drones could lead to risk of permanent establishment (“**PE**”) on account of physical presence in countries. Traditionally, a PE may be constituted if a foreign entity generates income from another country either through a fixed place of business or through employees or dependent agents located in the other country.

However, these rules were formulated in the era of brick and mortar and did not envisage the new and disruptive business models enabled by the onset of the digital economy, propelled by technological advancements, including UAVs. These unique business models have given rise to concerns that multinational enterprises may be able to rely on the existing tax rules to artificially reduce taxable income or shift profits to low-tax jurisdictions in which little or no economic activity is performed. These concerns have prompted countries around the world to come together to revise the international tax framework through the Base Erosion and Profit Shifting Action Plans (“**BEPS Action Plan**”) and the Multilateral Instrument (“**MLI**”).¹³ Among other things, the MLI proposes an expansion of the PE definition, which is hopefully aimed at business models precipitated by the digital economy.¹⁴

Industries and sectors where such drones are likely to be used, specifically for commercial purposes are global in nature. It is possible that the usage of drones by these enterprises in multiple jurisdictions could potentially give rise to PE status in such jurisdictions. In such cases, the manner in which such drones are to be deployed would have a significant bearing on the level of PE risk involved.

Just one example is Amazon, which is reported to be looking at the option of using drones for delivery of goods instead of delivery executives. Owing to the nature of their global operations, their headquarters may be in one jurisdiction, but it may have a presence in other jurisdictions in the form of warehouses, branch offices, liaison offices, go-downs etc. to effectively carry out business activities in each jurisdiction. The likelihood of the existence of a PE increases in such scenarios. Whether the use of drones increases the risk of a PE being constituted in any of such jurisdictions would depend greatly on the manner in which the drones are integrated into Amazon’s business model.

¹² All tax rates mentioned in this paper are exclusive of surcharge and cess.

¹³ The latter is a multilateral treaty designed to simultaneously amend a majority of existing bilateral tax treaties to bring them in line with the proposals set out in the BEPS Action Plans.

¹⁴ This is not to say that foreign companies using business models involving the use of technology (including drones) do not run the risk of having a PE in another country. Rather, once in effect, the BEPS proposals substantially increase that risk.

Related Regulatory Framework**Patent Box Regime**

India has also introduced a new patent box regime. Under the patent box regime, worldwide income derived by an Indian resident from a patent developed and registered in India is taxed on a gross basis at a concessional rate of 10%. The patent box is an attractive proposition for India-based drone developers.

Indirect Tax Implications: Goods and Service Tax

GST, effective in India since July 1, 2017, has comprehensively replaced the erstwhile indirect tax regime. India has a dual GST system with both the Central Government and the State Governments (and Union Territories) levying separate but concurrent taxes on supply of goods and services. The legislative framework of GST primarily comprises the Central Goods and Services Act, 2017 (“**CGST Act**”) and the Integrated GST Act, 2017 (“**IGST Act**”) enacted by the Parliament and State GST Acts (“**SGST Acts**”) enacted by legislature of each state.

Section 7 the CGST Act provides the scope of supply to include *inter-alia* all forms of supply of goods or services or both made or agreed to be made for a consideration by a person in the course or furtherance of business. GST is levied at rates that vary between nil — 28% depending on the rate schedule applicable to the supply in question. To prevent cascading of taxes, a uniform input tax credit system is available in respect of input supplies of goods or services used or intended to be used in the provision of output supplies of goods or services or both. GST is a consumption tax and is typically passed on to the consumer of the good / service as part of the price.

As a general rule, the import of goods or services or both into India qualifies as a taxable interstate supply chargeable to IGST, while the export of goods or services or both from India is treated as a zero-rated supply not chargeable to tax under the GST regime.

Indirect Tax Implications: Customs

In India, customs duty is levied and collected in accordance with the Customs Act, 1962 read with the Customs Tariff Act, 1975 (“**CTA**”). Import of UAS components, which continues to be permissible, is subject to basic customs duty at applicable rates.

Conclusion

Countries worldwide are looking into the regulation of drones in order to keep up with the development in technologies, while also ensuring safety and security of the citizens. Various countries such as the US, Australia, Singapore, South Africa have detailed regulations governing the management, manufacture and operation of drones while numerous others are in the process of deliberation and consultation to lay down comprehensive regulations for this technology. India too has taken a step in this direction by introducing the Drone Rules which enable greater flexibility for drone operations in the country to enable growth and development of numerous industries who seek to adapt drone technology for its services.

No doubt, drones are gaining importance in light of their tremendous potential in application and usage in every field in India and worldwide. In the future, drones could substitute large logistics and be efficient in terms of energy consumption, public safety, air pollution, city noise, air traffic management, road congestion, urban planning, and goods and service consumption patterns in urban areas. Similarly, the use of drones for surveying, disaster management, search and rescue operations, etc. will all be crucial in ensuring that they can be used to save human lives (and even wildlife)¹⁵ and resources.

The Government of India has also emerged as a major buyer of drones, especially in the defence sector but also in the infrastructure and utilities sector. While Indian manufacturers continue to build capacity for providing to the demand in the Indian market, there is considerable unmet demand for drones, which can be fulfilled with the know-how and capabilities of foreign players.

While the laws have opened up the drone sector entirely to both domestic and global players, the work is far from finished. With the increasing number of stakeholders in the sector, new regulatory and security concerns will also arise, which will need to be evaluated by the participants. The development of public trust in drones will require considerable efforts from all stakeholders towards ensuring that drone operations are safe and welcome. Given the liberalised regime, industry players can consider detailed consultations on standards to be adopted and even a self-regulatory mechanism perhaps to ensure that the actions of one or two negligent operators do not lead to an unfavourable opinion of the public regarding drones.

That said, the time is ripe to explore the infinite possibilities that now exist in the Indian drone sector.

¹⁵ Available at: <https://www.reuters.com/technology/doug-rescue-drone-pilot-saves-animals-global-disaster-zones-2021-06-15>, last accessed on October 27, 2023.

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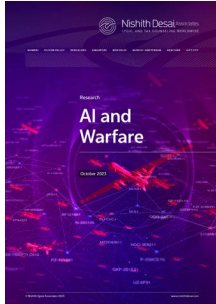
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