TELSTRA CORPORATION LIMITED

Submission to the Department of Infrastructure, Transport, Regional Development and Communications

Emerging Aviation Technologies

Public submission

2 December 2020

Contents

Executive Summary

Telstra welcomes the opportunity to comment on the emerging aviation technologies issues paper (the Issues Paper). Safe integration of drones and other emerging aviation technologies into the national airspace is important for the future prosperity of Australia and we commend the Department of Infrastructure, Transport, Regional Development and Communications (the Department) on taking the first step towards development of a national policy in this area.

We welcome and support most of the core principles and the overall proposed approach to policy development as outlined in the discussion paper[1] but do have some specific suggestions as explained below:

UTM

We see Unmanned Traffic Management (UTM) as a critical enabler of this emerging aviation sector and we support the proposed policy approach for an Integrated Airspace System (IAS). We consider network connectivity will be an important enabler in the Internet of Things (IoT) and believe that mobile networks have competencies that meet key requirements of the drone ecosystem, such as registration, control, security and law enforcement.

We have been collaborating with our partners to develop the Low-Altitude Airspace Management (LAAM) platform. This platform utilises key network infrastructure and capabilities, including our extensive national wireless coverage (IoT, 4G & 5G networks), to enable a safe and secure ecosystem for management of equitable low-altitude airspace, in Australia.

Counter-drone measures

We believe drone jammers have significant limits in their ability to address malicious use of drones and also pose a risk of interference to mobile telecommunications network, as well as the aviation sector which is critically reliant on dedicated frequency ranges for communications. Our view is that a comprehensive UTM is a key foundation to being able to distinguish between legitimate drone use and that which may be malicious.

Noise

We support the proposed approach of determining localised ground-based noise limits. In terms of noise regulation of drones and eVTOLs, we recommend the use of private sector "accredited persons" to certify compliance. In addition, we see a critical role for IoT sensors to monitor ground-based noise levels cheaply and effectively, in conjunction with knowledge of where the drones and eVTOLs are, by way of the UTM.

Technology Trials

Telstra invests substantially in technology trials and participates wherever possible. We support the idea of 'sandbox' spaces for conducting trials and look forward to collaborating with the government, industry and other stakeholders in the near future.

BVLOS flights

We believe that BVLOS is the key to unlocking many of the potential benefits associated with drones. While a UTM system will be critical to this endeavour, rolling out an effective and safe system that integrates a wide range of service will take some years.[2] We recommend that a national policy should therefore consider additional opportunities to facilitate low-risk BVLOS flying in the near-term. This would encourage innovation in parallel with the development of a UTM system.

1 Issues Paper, p.6-7
2 National Aviation Policy Issues Paper, pg 14.

1 The role of the Telco in Emerging Aviation Technologies

Globally it has become recognised that mobile networks offer a cost-effective solution to aerial connectivity in the lower altitudes. We know that use of mobile networks is already widespread amongst general aviation informally. Police and ambulance helicopters are known to use mobile broadband for access to street directories. These vehicles go so far as to have LTE modems installed in them. Fixed wing aircraft pilots have enthusiastically adopted electronic flight book software running on connected tablets. In addition to receiving over the air updates to aviation technical documents, these connected devices are also connecting inflight and providing situational awareness to other connected users[3]. Passenger manifest and other flight data are often synchronised to arriving or departing aircraft using LTE connectivity.

The telecommunications industry is evaluating its infrastructure, standards and overall role in enhancing mobile networks to support the drone industry with cellular connectivity. Telstra is a member of the GSMA (a global association of mobile network operators and mobile ecosystem stakeholders) working group which is making plans for mobile networks to support drone operations. Telstra is also an associate member in the Third Generation Partnership Project (3GPP), a telecommunications industry standards development organisation that develops the technical standards for mobile devices and networks, including those for identification, authentication and authorisation. The 3GPP Radio Access Network Technical Specification Group is currently considering new features which can support connectivity to drones operating at low altitudes[4]. Telstra is actively contributing to the work of this group.

2 Airspace Integration

We agree with the position that integration of emerging aviation technologies into Australia's airspace will require re-thinking how airspace and aviation is managed. We see Unmanned Traffic Management (UTM) as a critical enabler of this emerging Aviation sector and support the proposed policy approach that will see a partnership between the Australian government and the industry in development of a UTM system that will facilitate "fair and competitive access to airspace"[5].

The Issues Paper correctly notes that while implementation of UTM will initially be modest and focused on drone operations in the uncontrolled airspace, "over time, UTM could expand to cater for other manned, unmanned and autonomous platforms, and may help facilitate the integration of these aircraft into controlled airspace and existing ATM systems"[6]. We agree with this view and further note that for true airspace integration to be a reality UTM must accommodate the needs of all airspace users both in the controlled and uncontrolled airspace (including for example, parachutists, hang gliders, ultralights, gyrocopters, balloonists, blimps etc.) so that they are aware of each other's operations and separation requirements. The use of LTE for UTM C2 would allow these air space users to participate by perhaps something as simple as an app on a phone or tablet.

We support the notion of Australia's UTM including a centralised Government platform – a flight information management system (FIMS). We note FIMS is being led by Airservices Australia and a request for information phase has already been completed to which we contributed.

3 See for example: https://tx.ozrunways.com/
4 The study concerns enhanced LTE support for Aerial Vehicles.
5 Issues paper; p19.
6 Issues Paper; p.19.

Telstra has done significant work in network-based communication, navigation and surveillance (CNS) technologies to support UTM, and in our view, these technologies are worthy of consideration. We provide further details in section 3.

3 Telstra's role in enabling a safe and secure Low Altitude Airspace Management (LAAM)

Telstra Labs has been collaborating with our partners to visualise a safe and secure ecosystem for management of equitable low-altitude airspace, in Australia. We aim to enable equitable sharing of airspace between manned aviation and unmanned aerial vehicles, ensuring effective, mission-critical connectivity to enable effective traffic management and control for drones in the lower airspace.

Telstra will use the solution to develop a platform for enabling a multitude of mission-critical services, vital in supporting successful drone operations. The platform provides a link between cellular networks and aviation systems, such as air traffic management (ATM), UTM and FIMS.

Telstra recognises the role that Telcos can serve via their mobile network, ranging from IoT (drone registration, activation and identification), through to 5G (super low latency remote command and control and hi-res video carriage). We have been running a number of drone-related technology assessments and trials with various industry customers, within Law Enforcement, Humanitarian Aid, Post Disaster, First Responders and City Councils, over the past 12 months.

The aim is to provide suggestive models to airspace regulators and operators, such as Civil Aviation Safety Authority and Air Services Australia, to demonstrate that a mobile carrier like Telstra has the potential to perform a critical role in managing drones, keeping the airspace safe between drones and other general aviation. This will unlock greater uptake of beyond-visual-line-of-sight flying, which will trigger additional commercial opportunities for drones across several industries. Its key requirements will be underpinned and accelerated using mobile networks' (4G/5G) wide coverage, rather than short range wireless solutions.

Telstra believes that its network and data technologies will play a strategic role in supporting the safe and widespread operation of UAV, and enabling robust Communications, Navigation and Surveillance (CNS). Our aim is to play a part in supporting beyond visual line of sight (BVLOS) and automation to enable a safe and flourishing UAV industry in Australia enabling customers to benefit from this technology.

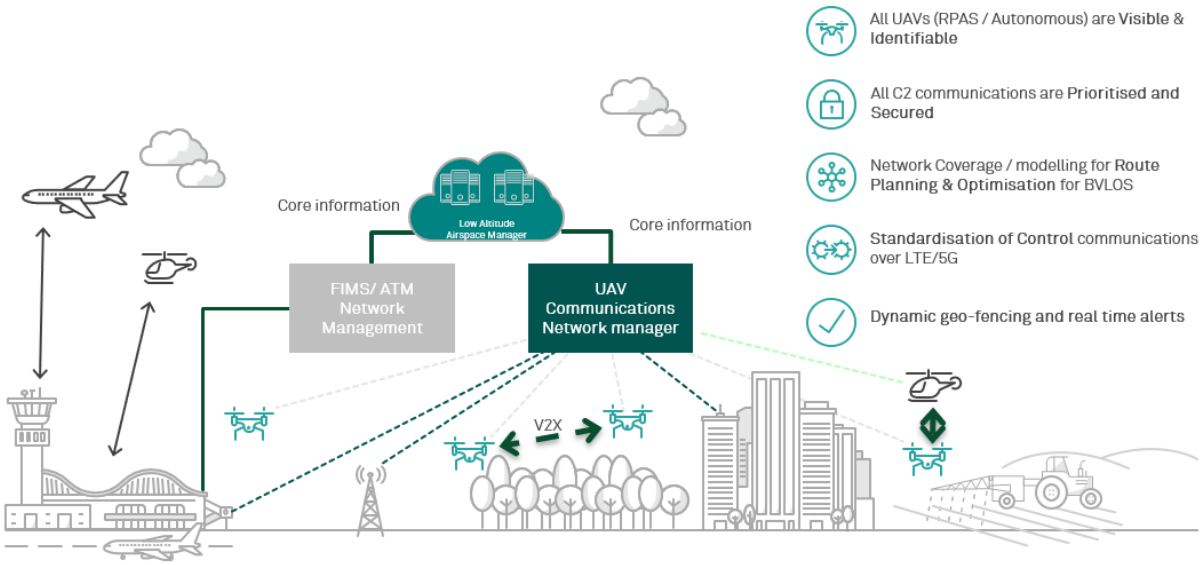
With the ever-increasing growth of UAV use-cases, both recreational and commercial, the Low-Altitude Airspace Management (LAAM) platform developed by Telstra utilises key network infrastructure and capabilities, including our extensive national wireless coverage (IoT, 4G & 5G networks), cyber security, multi-cloud, data hub and artificial/machine learning platforms. Our priorities are focused around keeping drones safe and securely connected and identifiable, especially when they are flying BVLOS.

We've been exploring the potential of our 4G and 5G mobile technology, and our extensive long-range IoT networks, to enable monitoring of all kinds of aviation in low-altitude airspace. We see a future where a drone operator might be able to simply plan and prepare a flight through an app on their phone dynamically. Regulatory authorities would have the ability to dynamically open and close airspace using temporary flight restrictions if necessary.

Key Focus Areas for Telstra are:

- Working with government and regulatory authorities to assist regulatory enablement through technology.

- Investigating how we can leverage our network and IoT capabilities, and customer reach to enable effective UAV registration and identification.
- Looking at ways to create efficiencies in UAV communication and navigation using secured LTE / 5G and data technologies.
- Socialising UAV technology through public support of effective UAV applications.
- Currently providing networks for aviation, emergency services and the military.



4 Safety

As noted in the Issues Paper, registration of drones is being introduced progressively which will assist management of safety and security concerns[7]. We anticipate remote electronic identification is likely to follow.

Electronic identification could be potentially provided either by localised transmission of the identification code or through mobile network connectivity. While requiring drones to locally broadcast their identification code would be a better mechanism for registration than the simple physical registration, its benefits would be limited to registration alone and a globally harmonised standard would need to be developed. We believe mobile network connectivity is a better solution because, as well as enabling secure registration and identification, it also creates the opportunity for drone devices to be tracked and managed from a centralised management system, and is based on a set of global standards that are proven, reliable and scalable.

Within mobile networks, the mobile device can be uniquely identified by the International Mobile Equipment Identity (IMEI) number and the subscriber is identified using the Subscriber Identity Module (SIM) and associated unique International Mobile Subscriber Identity (IMSI). Both identifiers are secure forms of identification that could be applied to drones. The device's IMEI could be used for drone registration and the IMSI could be used to create a secure register of drone owners.

Additionally, we believe, the use of mobile networks for registration will lead to a significantly lower cost and faster implementation of a drone identification solution. This is because the drone industry

[7] Issues Paper, p.27

can leverage and take advantage of the existing investment in mobile network technologies and processes, including the economies of global scale associated with this infrastructure. Any alternative wireless network platform would take a long time to design and deploy globally. It would also require substantial new investment without the same economies of scale.

Some of the specific benefits of using mobile networks for drone registration and identification include:

- Ease of limiting the operation of unregistered drones i.e. drones that are not registered via an active SIM card could be required to operate in some limited mode, for example, limited to a 30m range from the operator.
- Leveraging the established process to confirm identity when a customer acquires a new mobile service, including the requirement for a 100 point identification check at the point of sale.
- Ease of transferring drone from one party to another; i.e. party A removes SIM card and transfers ownership of drone to party B, party B will be responsible for obtaining a new SIM card.
- Enabling a future centralised Unmanned Traffic Management (UTM) system that could completely revolutionise the commercial operations of drones by supporting Beyond Visual Line of Sight (BVLOS) flight, autonomous operation and the ability for one pilot to manage more than one craft, simultaneously. By providing a reliable and ubiquitous communications platform for exchange of information, mobile networks could allow drones to be contextually aware of other manned and unmanned craft so they can co-exist in common airspace in near real-time.
- Assisting national security and law enforcement agencies to identify and monitor drones that may be of interest (for example those conducting unlawful activities), by enabling the near real-time recording of drone flight information in a UTM.
- Allowing the dynamic application of geo-fencing by providing for near real-time updates to the geo-fencing data for each drone. This is discussed in more detail below in Section 3 Geo-fencing.
- Greater reliability. Compared to alternative wireless solutions that operate in open access radiofrequency spectrum, mobile networks offer a more reliable communications environment for drones. This is because there is a much greater risk of interference between wireless devices that share open access spectrum, which limits the quality of service that can be offered. Mobile networks are not subject to this type of interference risk as they use spectrum which is exclusively licensed to them and not shared with other users.

In the case of Telstra, the reliability of mobile network connectivity for mission critical applications can also be enhanced through the use of the Telstra LANES® Enterprise[8] and Telstra LANES® Emergency[9] service offerings. Telstra's standard mobile broadband service is designed to provide a high level of performance and security, and the Telstra LANES® Enterprise and Telstra LANES® Emergency services take this even further by prioritising the network traffic associated with these services.

Using mobile networks to register and identify drones will require Original Equipment Manufacturers (OEMs) to deliver drones with cellular modems embedded and implement the required logic in firmware to restrict drone operations when not fitted with an activated SIM card. The accelerating growth of industrial IoT technology, including the development of new categories of Long Term Evolution (LTE) mobile devices suited to low volume data transmissions such as those needed for command and control

[8] See https://www.telstra.com.au/business-enterprise/industries/mining-and-resources/telstra-lanes
[9] See https://www.telstra.com.au/business-enterprise/industries/public-safety/lanes-emergency

(C&C) and location data, means that the cost of LTE modules and on-going network access charges will also decline over time. It is our belief that, given the other benefits of mobile network-connected drones, that over time drone manufacturers will start to offer cellular enabled drones.

5 Counter-drone measures

We agree with the concerns noted in the Issues Paper regarding the potential risks posed by counter-drone technology which relies on jamming of the radiofrequency spectrum being used to control a drone which has been identified as a threat[10]. Our concern is with the risk of interference with our mobile telecommunications network, but we also recognise that there may be just as much risk to the aviation sector which is critically reliant on dedicated frequency ranges for communications. Jammers which are tuneable by an operator to different frequencies (as opposed to being restricted to jamming those class-licensed bands on which recreational drones currently rely) pose significantly increased risk.

In our submissions to the Australian Communications and Media Authority on the exemption instruments made to date under the Radiocommunications Act, to enable law enforcement officers to deploy counter-drone technology, we have emphasised that such jamming devices have significant limits in their ability to address malicious use of drones[11]. Further, we are concerned about the risk of proliferation of such counter-drone devices in Australia due to the risk they pose if they fall into the wrong hands. We agree with the position in the Issues Paper that there should be a robust, long-term approach to counter-drone strategy. Our view is that a comprehensive UTM is a key foundation to being able to distinguish between legitimate drone use and that which may be malicious. We believe that a comprehensive UTM will also be more effective in enabling surgical neutralisation of drones considered to be malicious, as compared to counter-drone jamming devices. We look forward to making a constructive contribution in this important area.

6 Noise

We support the proposed approach of determining localised ground-based noise limits, which we agree is a more flexible and effective way to manage drone noise issues than setting emission levels for the drone. We note a similar paradigm is used by the Australian Communications and Media Authority in the management of emission levels in spectrum licensing, and one aspect of that regulatory approach is the use of private sector “accredited persons” to certify compliance. This removes the burden from the regulator and enables the licensee to optimally use its spectrum. These are well-established regulatory concepts which we think could be very effective for noise regulation of drones and eVTOLs.

Moreover, we see a critical role for IoT sensors to monitor ground-based noise levels cheaply and effectively, in concert with a UTM. In a future context where drones and eVTOLs are ubiquitous, public confidence will be bolstered by a robust monitoring and compliance regime. An IoT sensor network coupled with the UTM would enable immediate and automated compliance with noise restrictions without requiring human involvement. Such a form of dynamic monitoring would address the high variability of noise travel depending on weather conditions and the pre-existing noise floor in a particular location. It would be possible to build public confidence by diminishing the number of instances where a drone intrudes upon a person’s seclusion, as the Paper describes it, through using the intelligent noise sensor network in conjunction with knowledge of where the drones and eVTOLs are, by way of the UTM.

[10] Issues Paper; p.32

[11] Telstra submission to the ACMA on “Radiocommunications exemptions for law enforcement use of drone jamming devices”, July 2020: https://www.acma.gov.au/consultations/2020-05/arrangements-jamming-devices-and-radiocommunications-device-exemptions-consultation-152020

7 Infrastructure

For low altitude airspace to be managed, infrastructure to support its requirements needs to at least exist and be part of a managed solution. The information element of a FIMS needs to take into consideration how the flow of information occurs, i.e. between what set of interfaces and network elements. Even if FIMS is not the precise location for the management of low altitude network elements in the future of UTM, these elements will need to be considered in order to facilitate the usage of networked UAS and UAS Service Suppliers (USS) by FIMS.

Given that networking and the CNS is within the integrated airspace system proposed, a network service is essential. It could be both a centralised government and an industry provided service.

In the future of UTM, networked UAS' with C2 communications will be essential in unlocking BVLOS flight.

Telstra has been exploring data-as-a-service models, installing sensors on towers and testing the value of collected data to various stakeholders. For the low altitude airspace, it is this type of data that could be added and tweaked for a FIMS platform as a primary and localised source of data for drones in flight. It has the potential to support both operator and administrator decision making, as well as internal system logic.

This infrastructure presence across towns, cities and rural communities also allows Telstra the opportunity to be involved in many solutions for the future. Physical Telstra cell towers and exchanges are able to play a part in this. By their nature these Telstra facilities are located in population and industry centres, ideally placed to support the needs of this emerging aviation sector.

Currently there are no established regulations or planning guidelines for establishing an Urban Air Mobility (UAM) vertiport or an equivalent drone facility. Precedents exist for helipads but the requirements are very different.

Connectivity for the facility, vehicles, ground crew, pilots and passengers all need to be considered as does power for charging, access control and physical security, noise abatement, safety as well as a range of as yet undiscovered concerns.

A pilot site trial could be an excellent opportunity to collaborate on the requirements for such facilities.

8 Technology Trials

Telstra invests substantially in technology trials and participates wherever possible. As mentioned in section 3, we have been running a number of drone-related technology assessments and trials with various industry customers, within Law Enforcement, Humanitarian Aid, Post Disaster, First Responders and City Councils, over the past 12 months.

Trials bring the industry together and foster collaboration in a timely manner. In addition to advancing innovation, these events also serve to educate and inform the public, demystifying the technology, allaying fears and leading to greater social acceptance. We support the proposal that controlled, appropriate 'sandbox' spaces for conducting trials need to be developed by governments in collaboration with industry and local communities to facilitate flight-testing of new technology, and look forward to contributing to these trials in the future.

9 International approaches and BVLOS flights

We support the Issues Paper's stated aim for a national policy approach to capitalise on Australia's willingness to be an early adopter of new technology and to attract greater investment, jobs and economic growth.[12] A handful of early adopter international jurisdictions are already paving the way by rolling out their own UTM systems and seeking a more flexible approach to drone regulation. The Issues Paper references UTM systems being pursued by the United States, the European Union and Switzerland.[13] In August 2019, NASA completed its five-year program of planned UTM demonstrations, and is now working with the Federal Aviation Administration to further research objectives and map out the development of a UTM system. The EU and Switzerland programs have followed in the last few years and are gathering momentum.

As noted earlier, we believe that BVLOS is the key to unlocking many of the potential benefits associated with drones. While a UTM system will be critical to this endeavour, rolling out an effective and safe system that integrates a wide range of service will take some years.[14] A national policy should therefore consider additional opportunities to facilitate low-risk BVLOS flying in the near-term. This would encourage innovation in parallel with the development of a UTM system. We note that CASA has already moved towards accommodating some forms of Extended Visual Line of Sight (EVLOS) flying via the *Part 101 (Unmanned Aircraft and Rockets) Manual of Standards 2019* which provides a framework in Chapter 5 under which CASA will consider approving such operations. Progress in this area will help Australia keep step with other jurisdictions, such as the EU which introduced a standard scenario for prescribed rural BVLOS flying in 2020.[15]

Aside from facilitating BVLOS operations, there are other opportunities to introduce flexibility into Australian drone regulation, to encourage take-up and innovation. For example, New Zealand draws no distinction between recreational and commercial use of drones – the same regulatory conditions apply to drones regardless of the purpose of their use.

12 National Aviation Policy Issues Paper, pg 4.
13 National Aviation Policy Issues Paper, pg 15 and footnote 21.
14 National Aviation Policy Issues Paper, pg 14.
15 European Union Aviation Safety Agency (2019) Opinion 05/2019 . Available at: https://www.easa.europa.eu/sites/default/files/dfu/Opinion%20No%2005-2019.pdf [accessed 28 October 2020]; The amendments proposed by EASA were formally adopted by the European Commission on 12 May 2020: Commission Implementing Regulation (EU) 2020/639 of 12 May 2020 amending Implementing Regulation (EU) 2019/947 as regards standard scenarios for operations executed in or beyond the visual line of sight. The standard scenario permits drone operators to send a declaration to the respective authority instead of applying and waiting for an authorisation.