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Zipline International Inc

Potential future expansion of Automatic Dependent Surveillance Broadcast (ADS-B) mandate in Australia - Consultation Paper

Content	Zipline response to the consultation on the “potential future expansion of Automatic Dependent Surveillance Broadcast (ADS-B) mandate in Australia”.
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Zipline International Inc - Company Background

Zipline designs, manufactures, and operates Remote Piloted Aircraft Systems (RPAS) that deliver medical supplies, healthcare goods, food, and other consumer products. Zipline is transforming the way goods move so that every human on Earth has access to exactly what they need, when they need it, no matter where they live.

We started by delivering blood to health and hospital systems in Rwanda in 2016 and have grown to operate in eight countries across four continents, including the United States.

As of today, Zipline has flown more than 115 million autonomous miles and made more than 1,700,000 deliveries to customers to date. On average, someone receives a Zipline delivery every 60 seconds and, on a typical day, Zipline flies more than three times the circumference of Earth.

Zipline Responses to the Consultation

Zipline would like to thank the Department for the opportunity to comment on this important consultation on a potential expanded ADS-B mandate in Australia.

Do you support an ADS-B mandate? Why or why not?

Zipline supports mandating ADS-B Out for crewed aviation. Mandating electronic conspicuity (EC) for crewed aircraft (i.e., ADS-B Out on 1090 MHz, with flexibility for approved low-power EC alternatives where appropriate) materially improves safety and situational awareness for pilots, ATC, and automated systems.

Evidence from the United States (US) and Europe demonstrates that widespread ADS-B equipage among crewed aircraft reduces accident rates by more than 50 percent among equipped general aviation (GA) aircraft, improves situational awareness for pilots and controllers, and provides a robust surveillance layer for integration with emerging RPAS. Studies show large, measurable safety gains from cockpit traffic awareness: FAA-sponsored analysis

found GA and air-taxi aircraft equipped with ADS-B In had 53% fewer accidents than unequipped peers. Broader FAA strategy documents also emphasise ADS-B's safety and efficiency benefits.[1]

Zipline supports mandating ADS-B In for BVLOS operations. Mandating ADS-B In (airborne or ground-based relay to the pilot/system) for RPAS operating BVLOS makes sense so RPAS can always yield to crewed aircraft that broadcast their position, aligning with "crewed-aircraft-first" right-of-way concepts emerging internationally.[2]

Zipline strongly opposes mandating ADS-B Out for RPAS operating below 400 feet. Requiring drones to transmit ADS-B Out at scale risks spectrum/receiver saturation and pilot display overload without commensurate safety benefit. Internationally, the FAA's BVLOS NPRM explicitly proposes prohibiting ADS-B Out use by UA in transmit mode because the projected number of drone operations could saturate ADS-B frequencies, reducing the likelihood that other aircraft and ground receivers would be able to properly decode ADS-B messages.[3, 4] The result, both for airborne collision avoidance and ground-based surveillance functions, would be decreased system performance because spectrum saturation would cause receivers to miss ADS-B messages. Instead, the NPRM proposes that RPAS have a detect and avoid (DAA) system that can receive ADS-B position reports from crewed aircraft.[5] Use of Network Remote ID by BVLOS UAS at low altitude provides a scalable, effective means to make UAS conspicuous.

Strategic separation between uncrewed aircraft is best achieved by UTM.

- ASTM F3548-21's safety case[6] shows order-of-magnitude reductions in RPA-RPA midair risk from strategic deconfliction;
- FAA's NPRM cites the same standard and a Johns Hopkins APL assessment in its rationale.
- Large-scale simulations by Airbus UTM/JHU-APL also showed up to ~99% reduction in RPAS midairs with high participation in strategic deconfliction.

In summary, Zipline recommends that Australia adopt the following model:

- ADS-B Out for all crewed aircraft, complemented by approved low-power EC alternatives; and
- ADS-B In (only) based detect and avoid for RPAS operating BVLOS to maintain separation with crewed aircraft; and

[1] https://www.aopa.org/news-and-media/all-news/2019/april/18/study-shows-accidents-less-likely-with-ads-b-in?utm
[2] Ibid.
[3] https://www.mitre.org/sites/default/files/2021-08/16-4497-AIAA-2017-ADS-B.pdf
[4] https://archive.ll.mit.edu/mission/aviation/publications/publication-files/atc-reports/Panken_2012_ATC-390_WW-25379.pdf
[5] https://www.faa.gov/newsroom/BVLOS_NPRM_website_version.pdf
[6] https://store.astm.org/f3548-21.html

- UTM-based strategic deconfliction used for RPA-RPA separation; and
- Network Remote ID for all RPAS to enable real-time conspicuity of RPA for other airspace users.

<u>If so, what airspace and/or aircraft types would you include in it?</u>

All IFR and VFR crewed aircraft should be equipped with ADS-B Out (1090 MHz). Approved portable or low-power EC devices should be accepted for smaller or recreational operators to enable timely compliance, particularly in Class G and F airspace.

For RPAS (BVLOS operations), Zipline strongly recommends the following:

- ADS-B In capability (air or ground-based) should be required for BVLOS operations, particularly those sharing airspace with crewed traffic.
- ADS-B Out should *not* be mandated for any RPAS operating ≤ 400 ft AGL.
- RPA-RPA separation should be achieved through UTM-based strategic deconfliction.

This structure reflects international best practice and aligns with the FAA BVLOS NPRM and implemented standards, including ASTM F3548-21 for strategic deconfliction and ASTM F3411-22a for Network Remote ID.

<u>Can you provide feedback on the potential model (Figure 1 and Figure 2)?</u>

- **<u>Do you consider the model to be sensible and achievable? Why or why not?</u>**

The proposed model is broadly sensible but requires modification to remain performance-based and proportionate.

Zipline supports the following elements:

- Progressive expansion of ADS-B Out equipage for VFR crewed aircraft.
- ADS-B In requirement for RPAS operating BVLOS.
- Recognition of spectrum congestion and display-overload risks.

Zipline strongly recommends the following adjustments:

- Remove any requirement for ADS-B Out on RPAS operating below 400 ft/110 lb, which would be widely regarded as disproportionate and operationally unworkable. Figure 2/Section 6.3 currently contemplates ADS-B Out for “small above 400 ft” and “medium/large regardless of altitude”. This should be pared back to avoid 1090 MHz congestion and cockpit overload, consistent with FAA’s concern and the consultation paper’s own caution.
- Embed UTM strategic deconfliction as the primary mitigation for RPA-RPA conflict, crediting ASTM F3548-21 and referenced analyses.
- Remains performance-based: Keep flexibility for approved portable EC devices for crewed GA to accelerate uptake, in line with the model’s “approved EC device” pathway.

The timeline is achievable if the government maintains rebates/incentives and recognises that ADS-B In for IFR retrofits on large transports are harder; even the consultation notes a cautious 2033 target for ADS-B In fitment depending on viable solutions.

What aspects of the model would you retain, alter, or discard? Why or why not?

Aspect	Recommendation	Rationale
ADS-B Out for VFR crewed aicraft (phased) with approved EC where appropriate	Retain	Proven safety benefit Enhances situational awareness
ADS-B In for RPAS operating BVLOS	Retain	Enables compliance with right-of-way obligations
1090 MHz congestion considerations	Retain	Critical to frequency management to avoid saturation Pilot display overload
ADS-B Out for RPAS ≤ 400 ft/≤ 110 lb	Discard	Creates radio frequency saturation Cockpit overload Minimal safety return with associated risks and negative impacts exceeding the potential benefit
Strategic deconfliction as RPA-RPA mitigator	Strengthen	ASTM F3548-21 shows >97% risk reduction

What impact would the model have on your operations, if applicable?

- **What are the estimated costs that you might incur in complying with this mandate?**
- **What are the potential benefits for your operation?**

The proposed model would have significant implications for operators of medium and large uncrewed aircraft (typically above 25 kg) conducting BVLOS operations in non-segregated airspace.

A performance-based framework that combines ADS-B In, Detect-and-Avoid (DAA), and UTM-based strategic deconfliction would enable these aircraft to operate safely and efficiently alongside crewed traffic without overloading the 1090 MHz spectrum.
DAA systems are specifically designed to support tactical separation between uncrewed and crewed aircraft, providing an airborne safety layer that complements strategic mitigations.

RPA-to-RPA separation, by contrast, should rely on UTM strategic conflict detection and resolution (SCD/R) services and pre-tactical coordination rather than on ADS-B broadcasting.

A model that recognises this division of functions - tactical DAA for RPA-crewed deconfliction and strategic UTM for RPA-RPA separation - minimises unnecessary equipage burdens, prevents spectrum congestion, and allows scalable, repeatable BVLOS operations.

This approach maintains safety equivalence with crewed aviation while keeping operational costs and technical complexity proportionate to risk.

Were the model adopted as government policy, when should all VFR aircraft in all airspace be fitted with approved ADS-B equipment (currently 'beyond 2033')?

A phased implementation culminating beyond 2033 is supported.

Early phases should prioritise aircraft operating in dense or mixed airspace - particularly around controlled aerodromes and within Class C/D airspace - before expanding to the broader VFR fleet.

To encourage compliance:

- Continue and expand the ADS-B rebate program; and
- Recognise approved low-power or portable EC devices as compliant interim solutions.

This phased model will deliver early safety benefits, reduce retrofit burden, and ensure universal equipage is achieved in a practical and equitable timeframe.

Are the proposed weight and height limits for drones, above which an ADS-B OUT mandate would apply, appropriate?

No. Zipline does not support the proposed blanket weight threshold. It is not evidence-based, is inconsistent with international regulatory developments, and would impose disproportionate burdens on many operators without a corresponding safety benefit.

The current 25 kg threshold is a legacy administrative classification, not a safety-driven limit. It originated from early CASA and ICAO weight categories designed for operator certification

rather than for collision-risk or EC applicability. No empirical studies demonstrate a discrete change in mid-air collision risk at 25 kg.

Contemporary research and regulatory reviews (FAA BVLOS NPRM 2025, EASA SORA) show that risk correlates with kinetic energy, altitude, and airspace complexity, not with an arbitrary mass boundary. International counterparts now favour performance- and risk-based approaches, with the FAA using ~ 50 kg (110 lb) as a more practical benchmark. If weight is to be retained as a criterion, it should at minimum be harmonised with leading jurisdictions, such as the FAA's BVLOS NPRM proposal, which limits ADS-B Out requirements to larger aircraft operating above 400 ft.

Accordingly, any future Australian mandate should replace the 25 kg threshold with limits that reflect actual operational risk - such as no ADS-B Out for drones ≤ 50 kg or operating ≤ 400 ft AGL - to maintain alignment with global policy and ensure proportional, evidence-based regulation.

Exceptional cases - such as large RPAS operating at higher altitudes or in proximity to controlled airspace - should be managed through case-by-case operational approval, not universal broadcast mandates.

This targeted approach mitigates congestion risks on the 1090 MHz spectrum, avoids unnecessary equipage and privacy impacts, and aligns with global policy direction that reserves ADS-B Out for crewed aviation. When combined with ADS-B In and UTM-based strategic separation, it provides a robust and scalable safety framework for BVLOS operations in Australia.

Are any of the alternate options outlined at Figure 1 a better way forward? Why or why not?

A phased implementation leading to full coverage beyond 2033 is appropriate and achievable.

The near-term priority should be to equip VFR aircraft operating in higher-density or mixed-use environments - such as near controlled aerodromes, Class C/D airspace, and areas with known BVLOS RPAS activity - before expanding to the remainder of the fleet.

To encourage early adoption, the government should continue and expand the current ADS-B rebate program and recognise approved portable or low-power EC devices as compliant interim solutions. This tiered approach delivers immediate safety benefits while easing financial and logistical burdens on general aviation operators.

By maintaining a clear, achievable path to universal ADS-B equipage by 2033 or shortly thereafter, Australia can ensure safety and interoperability gains are realised progressively and equitably across all segments of crewed aviation.

Noting the Government's ADS-B rebate program, have you fitted ADS-B to your aircraft? Why or why not?

All Zipline drones are fitted with ADSB-In and cooperative DAA but not ADS-B OUT.