Submission 96 – Richard Sutherland

Submission on Remote Identification (Remote ID) for - Discussion Paper Public Consultation - July 2023

Introduction

My comments are from the point of view of a recreational model aircraft hobbyist. Model aircraft are by far the lowest risk sector of aviation. Radio control models have been operated in Australia for more than 70 years, and there has never been a fatality. Contrast this to manned aviation, where we see around 35 fatalities and 5000 serious incidents each and every year. When it comes to aviation safety regulation, some priorities are clearly more pressing than others.

Any suggestion that RID be required for all model aircraft represents unjustified regulatory overreach. The Department of Infrastructure, and the Civil Aviation Safety Authority (CASA) should instead focus on the real issues in manned aviation, the ~35 fatalities that occur under their watch each and every year.

Representation

I note that this Discussion Paper was prepared in consultation with the Aviation Industry Working Group (AIWG). The number of non club based recreational 'drone' flyers make them by far, the largest direct stakeholder group, and yet they have no representation on the AIWG. This is unreasonable and has contributed to very poor policy decisions in the past (E.g. CASA's 'drone' registration scheme). Note: The MAAA and AMAS do not represent unaffiliated aeromodellers.

In August 2022, following consultation on PP 2207US, CASA acknowledged its poor engagement with unaffiliated aeromodellers: "*Five respondents stated that CASA must consult more with model aircraft and sport and recreation flyers to identify opportunities for improved collaboration and consultation. CASA notes that model aircraft associations were represented in the formal technical working group consultation meetings conducted in July 2021 but will endeavour to engage with unaffiliated aero modellers beyond public consultation mechanisms.*" This Discussion Paper clearly demonstrates that the above statement was just more 'lip service'.

On a prorata basis, unaffiliated aeromodellers should hold more than 50% of the seats on the AIWG. Instead, the AIWG is stacked with vested interests (representing minority stakeholders), who advise on policy which may well benefit the vested interests, while having serious adverse impacts on the voiceless majority stakeholder (unaffiliated aeromodellers). This is fundamentally unjust.

It is also telling that the AIWG seems oblivious to the FATAL FLAWS of RID which have been identified by hobbyists, and that are discussed below in this submission.

The Discussion Paper

The Discussion Paper starts in the Introduction by stating the need to "*identify drone operators and hold them accountable for their actions.*" Really? What are these "actions" that are so serious to warrant this major regulatory intervention? Evidence please. How many people have been seriously injured, or killed? What are the total third party property losses valued at?

Much of the wording in the Discussion Paper suggests that the Department of Infrastructure has already decided on implementing RID with comments like "*Remote ID technology is an essential step towards this*" and "*We are seeking your views on key policy considerations for successful adoption of Remote ID in Australia.*" and "*As the industry continues to evolve, we will need to consider an iterative review mechanism to ensure Remote ID provisions remain fit-for-purpose*."

Section 7 is the only part that suggests 'no action' could be an option. It is disappointing when it appears a decision has already been made prior to consultation, although this would be consistent with CASA's 'lip service' consultation in the past.

The Australian Government Guide to Policy Impact Analysis (GPIA) provides guidance for agencies on preparing new policy. While the full PIA is yet to be developed, it is concerning that the most basic parts have not been adequately addressed:

1. ***What is the problem you are trying to solve and what data is available?***
   The Impact Analysis framework requires you to explain the problem – and the data and evidence needed to describe and solve it – simply and clearly. A crisply defined problem offers better scope to target approaches that will actually solve it. An upfront discussion about available data and any gaps will ensure the evidentiary base is sufficient to support a decision.

The Discussion Paper fails dismally to "*clearly identify and define the problem*". The Discussion Paper does not identify "*why it is a problem*" and does not "*offer any evidence about the magnitude of the problem*"

It reads more like an ineffective solution looking for an imagined problem. Section 5 of the Discussion Paper states a potential benefit is "*Gathering of data which will form an evidence-base to support future regulatory and policy Development*". CASA has estimated there are 2.8 million recreational 'drones' in Australia, with the cheapest RID module at A$234 (see Appendix A), this works out to A$655 million. So, imposing a regulation to gather data, (which costs users over half a billion dollars), to inform whether regulation is necessary? Really? This could make a great episode for Utopia.

The GPIA states "*When you begin your analysis, think about the broad nature of the problem you face. There are a relatively small number of situations that justify direct government intervention in the form of regulation*." The Department of Infrastructure, Transport, Regional Development, Communications and the Arts needs to objectively consider this statement.

2. ***What are the objectives, why is government intervention needed to achieve them, and how will success be measured?***
   Each Impact Analysis must be clear about the objectives that will be achieved in solving the problem and the metrics for success. This will form the basis for selecting the best option and for future evaluation. The analysis must demonstrate the issue is a genuine priority, the government's job, serious enough to justify government intervention, and that intervention would likely be successful in addressing the problem.

The Discussion Paper fails to "*Clearly identify what objectives, goals or targets you are aiming for*". Just vague hypotheticals, imagined issues, exaggerated benefits and the fantasy that criminals and terrorists will comply with any RID requirement.

A supposed benefit listed is "*Increased situational awareness to prevent mid-air collisions with " traditional aircraft and other aircraft.* This is a clear case of exaggeration, the high latency, inaccuracy, short range and unreliability of RID means it is not going to increase situational awareness or prevent mid air collisions.

The Discussion Paper fails to "*outline what factors will make this policy change a success and include measurable targets*". Social media comments on the US situation suggest there is little chance of the policy change being a success, and any 'measurable target' is unlikely to be met.

Overseas experience

In the USA, the FAA has set an implementation date for RID of 16 September 2023. As such, social media is currently flooded with videos, blogs, and chat groups discussing how poorly thought through, ineffective and dangerous, the FAA's implementation of RID will be.

The FAA states that RID will stop bad actors, but the FAA's implementation of RID will do the opposite. There are numerous comments on social media warning of how easy RID makes it for bad actors to cause chaos by planting RID modules on airport taxis, throwing them over fences or attaching them to a helium party balloon and releasing it upwind of a sensitive site. Apparently a RID signal can be easily spoofed by a simple App on any smartphone.

It seems extraordinary that so many members of the public are able to identify such FATAL FLAWS in the FAA's RID scheme, yet the FAA is oblivious. Although, it was the FAA who was responsible for the botched Boeing 737 Max 8 certification disaster that cost 346 lives - not an agency that CASA should be keen to emulate. I also note that comments on social media make it clear that the FAA's consultation on RID was disingenuous, and completely ignored the concerns of hobbyists. It reminds me of CASA's consultation on 'drone' registration.

It is also clear from social media, that the majority of US pilots consider the FAA RID rule to be unfair, expensive, unnecessary, ineffective and may also put them in personal danger. For these reasons, many have stated that they have no intention of complying.

Comment on the questions asked in Section 8 of the Discussion Paper

A blanket mandate for RID lacks an evident and intelligent justification, and does not meet the legal standard of reasonableness.

RID should only be required for operators flying in controlled airspace with an RPA weighing more than an amount determined through a comprehensive and transparent Quantitative Risk Assessment.

However, since it has been clearly demonstrated in the past that CASA has no expertise in Quantitative Risk Assessment, I would suggest a weight of 5 kilograms based on empirical observations. Appendix B demonstrates why 250g is a totally unsuitable threshold for RID or indeed any regulatory intervention.

Question 1 Who should have access to Remote ID data and to what information?

Only a central Federal Agency should have access to all data (including personal identifiers). Other Agencies should only have access to generic data with no personal information. Agencies wanting personal identification data should have to apply for a Court issued Warrant.

Question 2 Should there be a data collection standard?

Is this a serious question? How about letting operators transmit any data they see fit, in any format, encrypted or not, at any time interval and on any RF frequency? That would fit nicely with the current cluster of convoluted, inconsistent and contradictory CASA regulations.

Question 3 What is the best method of providing Remote ID data to relevant stakeholders?

Generic data could be provided to authorised State and Federal Agencies through an online request. Data that includes personal identification should only be provided in response to a Court issued Warrant. This is the only method that ensures privacy and prevents misuse.

Question 4 What types of drone operators should be required to carry Remote ID equipment to operate drones? What should be exempt and why?

RID should only be required for operators flying aircraft weighing more than 5 kilograms and operating in controlled airspace.

The impracticality of retrofitting broadcast RID modules to model aircraft (both fixed wing and multirotor) less than 1000 grams is discussed in Appendix A. The total farce of the FAA's 250 gram threshold for RID is discussed in Appendix B. From these discussions, and given the very low risk presented by model aircraft, at a minimum, the following MUST BE EXEMPT from any RID requirement:

model aircraft that weigh less than 1000 grams (due to impracticality and low risk),
model aircraft that are gliders (due to impracticality and low risk), and
model aircraft flown at a club field (due to known and approved location, and low risk).

Question 5 How can Remote ID privacy issues be managed?

The data should not be available to the public. I note the FAA's implementation will allow members of the public to view data (including pilot location) through a Smartphone App. This has serious implications for the personal safety of pilots. Many pilots in the USA are so concerned that they have stated that they will not comply, or that they will 'open carry' firearms (in States that allow it) to reduce the potential for muggings.

Question 6 Is Remote ID (BRID, NRID or both) an appropriate solution for Australia? Are different types of Remote ID more fit-for-purpose in different contexts or applications? Are there other types (or variations of types) of Remote ID that should be considered?

The simple reality is that Network RID is not viable in Australia due to coverage issues. For recreational users, the high costs of Network RID hardware plus the ongoing costs from telco providers, would make it impractical and a totally unreasonable impost.

The Discussion Paper also greatly exaggerates the benefit of Broadcast RID, and downplays the problems. Page 13 of the Discussion Paper states "*The information being broadcast can only be controlled by limiting who has access to a compatible receiver and depends on the availability of a network of BRID receiver infrastructure, with its associated costs*."

This is complete nonsense, anyone with a smartphone can receive WiFi and Bluetooth signals, "compatible receiver". The low range of broadcast RID, and the number and thus already has a

of aggregate receivers that would be required to give any sort of coverage, make it impractical,

and would result in a very poor cost/benefit ratio. The security/disruption problems enabled by Broadcast RID (see Q8) also greatly outweigh any perceived accountability benefits.

Question 7 What factors should Remote ID mandates be based on, e.g. location, airspace related, other?

Any mandate should be based on a comprehensive and transparent Quantitative Risk Assessment. In the absence of such, it should only be required for 'drones' weighing more than 5 kilograms that are operating in controlled airspace.

The impracticality of retrofitting broadcast RID modules to model aircraft (both fixed wing and multirotor) is discussed in Appendix A. The farcical origins of the FAA's 250 threshold for RID are Discussed in Appendix B. From these discussions, and given the very low risk from model aircraft, at a minimum, any requirement for RID MUST EXCLUDE:

model aircraft that weigh less than 1000 grams,
model aircraft that are gliders, and
model aircraft flown at a club field.

Question 8 What technical requirements, standards and governance arrangements should be considered in the introduction of Remote ID to position for integration with adjacent systems, including the development of the UTM ecosystem?

To suggest that Broadcast RID is going to integrate with "adjacent systems, including the development of the UTM ecosystem" in any useful way is fantasy.

Comments like (p16): "*It is anticipated that Remote ID will only be used for drone-to-drone separation*" demonstrate a failure to understand the high latency, inaccuracy, short range and unreliability of RID.

Major consideration must be given to the FATAL FLAW of RID - how easy major disruption and chaos could be caused at sensitive sites either inadvertently, or intentionally by bad actors. The potential problems with RID far outway the exaggerated benefits imagined in the Discussion Paper:

What happens when someone forgets to turn off their RID module and drives home past an Airport or other sensitive site?
Many hobbyists spend several hours each week, performing maintenance, upgrading firmware, and adjusting flight control parameters. What happens if these hobbyists live close to an Airport or other sensitive site?
What happens when criminals use the RID signal to locate pilots and/or their properties in order to target pilots and steal their drones/property?
What happens when an activist attaches a RID module to an airport taxi, or a helium party balloon and releases it upwind of Sydney Airport?

Question 9 What features does Remote ID require to ensure tamper resistance and to mitigate security issues (including cyber risks)?

If someone wants to tamper with a RID device, they will easily find a way. Believing otherwise is simply wishful thinking. Apparently any smartphone with a simple App can spoof a Broadcast RID signal, making it easy for bad actors to use the RID ecosystem to cause disruption and chaos.

Question 10 What impacts could mandatory equipage have on drone operators?

CASA has estimated there are 2.8 million recreational 'drones' in Australia, with the cheapest RID module of A$234 (see Appendix A), this works out to A$655 million. Mandating RID for all 'drones' including model aircraft under 1000 grams, would, if it could be enforced, largely destroy the hobby.

This would prevent children from participating in a safe and fulfilling hobby that fosters an interest in and learning of STEM subjects, and eventually results in a more technically competent workforce.

However, as in the USA, the reality is that many would just ignore such an unfair, expensive, unnecessary, ineffective and privacy infringing mandate, that would be so difficult to enforce.

Mandatory RID equipage would also make it easy for bad actors to cause major disruption and chaos at sensitive sites like Airports, with little risk of getting caught.

Question 11 Should mandatory equipage be rolled out to all drone operators, or phased through types of operators and/or operations?

Any mandate should be for aircraft weighing more than 5 kilograms and operated in controlled airspace only.

It would be prudent to delay any RID regulations in Australia until there is an independent review of the RID roll out in the USA. From the flood of social media comments, it seems likely that any objective review of the FAA's policy will show very limited uptake, little (if any) real benefit, identify significant risks, and conclude that the policy is a total failure.

Question 12 Are there existing standards that should be considered/adopted to facilitate Remote ID uptake in Australia?

Over recent years, CASA's proposed drone registration scheme (and annual tax) has exposed hobbyists to CASA's toxic culture. Poorly thought through, knee jerk regulations, arrogantly pushed through with no evidence base, has made hobbyists acutely aware of CASA's lack of competence when it comes to risk identification, assessment and management of model aircraft. CASA's disinformation, outright lies, and its discriminatory approach to enforcement have left hobbyists with a very poor view of the regulator.

To facilitate uptake by hobbyists of any new regulations, it will be necessary to rehabilitate the reputational damage that CASA has inflicted on itself, something that will be extremely difficult.

Question 13 Who should we be engaging with, particularly outside of the aviation industry (e.g. telecommunications providers)?

Consulting anyone with even the most basic understanding of RF, would be a good start in order to correct your exaggerated beliefs in what Broadcast RID can actually do.

APPENDIX A

Practicality of retrofittingRID Modules to Model Aircraft

While most of the currently available broadcast RID modules are much more expensive, the most affordable RID modules currently available to retrofit to home built model aircraft are:

A) DroneTag Beacon

Cost: Beacon €199
Antenna € 30
Postage €35
G S T € 2 6
Total €290 **A$468**

Size: 37x26x16
Weight: 16g (without antenna)

B) Drone Beacon Db120 **C)**

Cost: Beacon €129
Postage €35
GST €16
Total €180 **A$290**

Size 48x38x28
Weight: 25g

D) DroneTag BS

Cost: Beacon €89
Antennas €8
Postage €35
GST €13
Total €145 **A$234**

Size: 16x13x5
Weight: 3g (without battery or antennas)

Note: RID modules A and B allow the possibility of moving the modules between aircraft, offering the potential for a hobbyist to purchase one RID module which is swapped between aircraft. However, due to its lack of protective casing and the limited cycle antenna connectors, RID module □ does not lend itself to swapping between aircraft.

Practicality in model aircraft with a weight greater than 1000 grams?

Both fixed wing and multirotor models in this weight category generally have sufficient space and weight capacity to allow any of the RID modules listed above to be used. However, the module cost is significant, and it is unreasonable to impose such a cost on hobbyists.

Note: high performance model gliders are an exception here, they are designed for minimum drag, with minimal cross section, and internal space for RID modules may not be available.

Practicality in small model aircraft (Parkflyer types) with weight up to 1000 grams?

These small aircraft typically cost between A$75 to A$200 with about half the cost being the model kit and half being the motor and control electronics.

Available space and weight constraints in these small model aircraft make the larger RID modules A and B technically impractical.

For models that weigh less than **500 grams**, the limited space and weight constraints are such that none of the available modules are technically practical.

For models that weigh between **500 and 1000 grams**, RID module □ is a technically viable option, but since RID module □ does not lend itself to swapping, a separate RID module would be required for each aircraft. The module would also need to be wired into the aircrafts electronic system to provide power, and thus would be transmitting whenever the aircraft was powered, even for maintenance, firmware updates, and preflight checks etc.

Many hobbyists have 20 or more models and requiring a A$234 RID module to be added to each model is unjustified and totally UNREASONABLE.

Note: While RID module □ could be used in models between 500 and 1000 grams, weight distribution constraints would necessitate placing this module close to the radio control (RC) receiver. Since the RC receiver operates in the 2.4Ghz spectrum, an adjacent RID module (which is a transmitter also operating the 2.4Ghz spectrum) will significantly increase the RF noise that the RC receiver must contend with. This would degrade the quality of the control link, and could cause a loss of control.

APPENDIX B

The LAUGHABLE non-science behind CASA's 250 gram SAFETY threshold for 'DRONES'

CASA has specified a 'drone' safety threshold of 250g for registration and flight within 5.5km of an Airport. However, many aeromodellers know (based on decades of experience and observations) that 250g is much lower than could be reasonably justified on safety grounds. So, have you ever wondered why CASA has set such a low threshold of 250g?

Was it the result of a comprehensive Quantitative Risk Assessment? No
Was it from the detailed analysis of empirical data from decades of recreational model aircraft operations internationally? No

Inappropriate criteria

Amazingly, it harks back to Lieutenant General Heinrich Wilhelm Rhone of the Prussian Army in 1896. Now, while there weren't many 'drones' around in 1896, Rhone suggested that a bullet needed 80 joules of kinetic energy (KE) "*to remove a human from the battlefield ...* " This criteria was deemed useful in training infantrymen in the effective range of their rifles.

Surprisingly, Rhone's work was not based on rigorous testing or detailed calculations, but simply on empirical observations, stories-sort-of-like: 'old Sergeant Otto reckons at Waterloo he clocked a French Grenadier at 220m with his musket'. Rhone's criteria was subsequently adopted by the US military in the 1930s, whereas the British favoured a momentum based approach. Rhone's criteria was contested and debated over many decades since, but it continued to be used for body penetrating ordinance by some agencies.

When applied to blunt force trauma (non penetrating), Rhone's criteria was found to be even more wanting. A paper "Common Risk Criteria for National Ranges: Inert Debris, April 2000", found that explosive debris (metal, concrete, bricks etc) needed 203.4 joules of KE to have a 90% probability of causing a fatality, 103 joules of KE to have a 50% probability, and 51.5 joules to have a 10% probability.

Examples of common items with 80 joules of KE

As an example of Rhone's criteria, a 15g bullet would need to be travelling at 370 km/hr to have 80 joules of KE. What other common objects have 80 joules of KE:?

a 52g tennis ball served at 189 km/hr. This is about the average first serve speed of an ATP player. The fastest serve in tennis was clocked at 263 km/hr;
a 163g cricket ball going 113 km/hr. This is slower than the average speed of a swing or seam bowler at 128 km/hr and well below an express bowler at 160 km/hr;
a 480g AFL footy kicked at 66 km/hr. The average football speed over a 20m kick is around 108 km/hr;
a 600g basketball thrown at 59 km/hr; or even
a 90 kg AFL player sauntering along for a soft tackle at 4.8 km/hr.

All of the above sports balls are intentionally thrown, hit, kicked or bowled directly at people, clearly demonstrating the fallacy of using 80 joules as a threshold for regulation of sports balls or indeed model aircraft.When determining lethality, the KE that can be transferred from the projectile to the victim is important. While a chunk of concrete may impart 100% of its KE, a

quadcopter would impart much less, probably around 60 to 70%, and a balsa or foam model aircraft would be lucky to impart 20%. Therefore blast debris criteria is not applicable to 'drones'.

The FAA chooses its criteria

So when the FAA decided to use KE for 'drone' criteria, did they undertake frangible impact testing to determine realistic values of KE transfer? No. Did the FAA simply adopt the conservative 90% probability of fatality from inert debris of 203 joules of KE? No. With an ineptitude that beggars belief, the FAA decided to apply Rhone's old 80 joule criteria, albeit with an interpolated 30% probability of fatality, for a hit to the head.

The FAA then calculated the mass a 'drone' falling from 120m needs in order to achieve 80 joules of KE. The FAA's calculation gave a result of ~250g.

Now, besides mass, there are other important variables in the terminal velocity formula - cross sectional area, and the coefficient of drag (Cd). The FAA used a cross section of 0.02m^2 (which is in the ballpark for a 250g 3" quadcopter), but chose a slippery Cd of only 0.3! Now, given the Cd for a sphere, cube, and a skydiver are 0.47, 1.05, and 1.0-1.4 respectively, (and a skydiver doesn't clutch a large propeller in each hand and foot), 0.3 is incredibly low for a falling 'drone'. It's hard to fathom how the FAA arrived at the value of 0.3, perhaps they tasked the calculation to the janitor or the work experience kid?

It is extremely troubling when agencies like the FAA, whose **primary** purpose is **safety,** can base policy on such a ludicrous approach, flawed criteria, and incorrect parameters. But then again, the FAA was the agency responsible for the botched Boeing 737 Max 8 certification debacle which cost 346 lives.

A realistic value of Cd

So, if we use a much more realistic, but still conservative Cd of 1.0, the mass a falling 'drone' needs to achieve 80 joules of KE is 450g. Now, 450g would equate to a 4" quadcopter with a larger cross sectional area than a 3" quadcopter, and thus would fall slower, reducing its KE.

If we solve the equations of KE and terminal velocity to give the FAA's 80 joules when dropped from 120m, we end up with a typical 5" quadcopter with a cross section of 0.06m^2, and a mass of 775g. Interestingly, 800g is the mass adopted by the French CAA for registration, showing their superior judgement in estimating Cd and cross section when compared to the FAA.

For the FAA's chosen 80 joule criteria, the threshold should be 775g not 250g

Note: if the FAA had adopted the conservative explosive debris criteria of 203 joules with 90% probability of fatality, the threshold would be around **2300g**, or an order of magnitude greater than the FAA's 250g.

Level of Risk?

In 2015, the FAA also calculated the level of risk (using the 80 joule criteria) to be ~$5x10^{-8}$. This is about three orders of magnitude safer than general aviation, which has a level of risk of ~$5x10^{-5}$, and two orders of magnitude safer than the level of risk generally considered acceptable in society, of one in a million.

A level of risk so low, should have been a wake up call to the FAA, that the 80 joule criteria was too conservative, and not fit for purpose. Regulatory intervention should only ever be imposed when the level of risk is likely to exceed one in a million.

The FAA's Registration Task Force

In late 2015, the FAA convened a Registration Task Force to provide advise on its criteria. The Task Force had very limited time (3 days of meeting) and there were very divergent views amongst members on what the criteria and threshold should be, and on why the FAA was regulating at such a low level of risk, but with the limited time, the Task Force accepted that 250g be used as the basis for registration. The Task Force stated "*It should also be noted that the 250 gram weight threshold was agreed to for registration purposes only and was not a validation of the underlying assumptions for any purpose other than the registration requirement.*"

CASA chooses its criteria

Of course, CASA just gullibly copied the FAA's 250g threshold, and thus also Rhone's 80 joule criteria. Sadly, CASA must have done this without even basic due diligence which would have identified the flaws in the FAA's approach. Incredibly, CASA also ignored the Tasks Forces warning, and extended the 250g threshold to flight within 5.5km of an Airport. Presumably, CASA believes that people who live, work and play within 5.5km of an Airport deserve more protection from falling 'drones'?

The way forward

Clearly, aviation regulators need to stop basing policy on nonsense, and undertake a comprehensive and transparent Quantitative Risk Assessment, in genuine consultation with hobbyists, in order to set appropriate safety criteria for 'drones' and model aircraft.