

Re: Issue Paper on Canada's ADS-B Out Implementation

To Whom it May Concern,

Representing over 14,000 pilot and aircraft owner members, Canadian Owners and Pilots Association (COPA) is the largest aviation association in Canada and would like to provide the following input to Transport Canada's recently-announced plan to implement a Canadian Automatic Dependent Surveillance–Broadcast (ADS-B) Out mandate. We are encouraged that Transport Canada has reached out to solicit input from industry and the opportunity to provide feedback. It is hoped that this commitment to meaningful consultation is the start of renewed collaboration between Transport Canada and industry partners nationally and internationally.

COPA shares Transport Canada's belief that modernizing the air traffic surveillance system in Canada is a positive change although COPA also believes there are several elements of the proposed mandate that need further review. These elements require further industry collaboration in order to implement a mutually beneficial system that will serve all parts of the industry into the future.

Equitable and Mutual Costs and Benefits

COPA understands there are some safety benefits brought by access to a nationally available surveillance system, better data for aircraft separation by the Air Navigation Service Provider (ANSP), real time traffic data for suitably equipped aircraft and availability of better data for Search and Rescue are all positive improvements to safety. COPA also understands that there are significant operational benefits, and cost savings opportunities, to the ANSP that are, or can be, realized by implementing this mandate. The ANSP has the opportunity to leverage already paid for technology to expand surveillance and restructure airspace and air traffic operations to realize hundreds of millions of dollars of savings. Whether it is the avoidance of purchasing new secondary surveillance radars (SSR) at approx. \$15 million per site, restructuring airspace and procedures to reduce staffing or reducing costs associated with training controllers to work in differing airspaces there are very significant economic and operational benefits to the ANSP. Conversely, when looked at through the lens of the majority of aircraft operators in Canada any safety benefits, and limited operational benefits, from this implementation appear to be heavily outweighed by the costs imposed on them (possibly as much as \$700 million) to meet the mandate. The burden of costs to operators further appears to be inequitable when the scope of potential savings to the ANSP are understood (Possible saving of approx. \$480 million if obsolete SSR alone are not replaced.) One must ask how Transport Canada, as the Regulator of aviation in Canada, is acting in the best interests of all parties to ensure the fair and equitable sharing of costs and benefits across the industry without allowing undue advantage being given to one party.

Consideration of Safety Benefits

As indicated in the previous paragraph industry does recognize there are some safety benefits realized through the implementation of ADS-B Out in Canada. Throughout discussions it has been advertised that the implementation of space-based ADS-B alone will bring added safety benefits in Canada when evidence from other global ADS-B implementations indicate that this is not a completely accurate statement. Yes, ADS-B Out does bring some safety benefits but one can argue that a space-based

implementation alone does not bring any real improvements to safety except perhaps in areas currently lacking surveillance for Air Traffic Services and for Search and Rescue purposes.

With regard to Search and Rescue the argument is without question, aircraft equipped with ADS-B will have a distinct advantage as aircraft location can be very precisely determined if needing SAR action. The challenge is if an aircraft equips with ADS-B why would it need to also equip with a less accurate 406 ELT. Consideration for exemption to 406 ELT requirements should be given to operators equipped with ADS-B in accordance with any mandate.

When considering benefits to surveillance, one must first consider existing surveillance coverage using Secondary Surveillance Radar (SSR) which has the same separation standards as ADS-B. In fact ADS-B implementation had to prove it met the same standards as SSR in order to be approved for use. This fact suggests there is no additional safety benefit to space-based ADS-B in areas currently covered by SSR. Further it is known that space-based ADS-B suffers from spectrum congestion in high traffic airspace and must be supplemented by either SSR, or ground-based ADS-B, to provide the same service as existing SSR installations. In light of this knowledge, it becomes a question why a mandated space-based approach to surveillance is being imposed when there is a known requirement to continue with some form of ground-based system? Ground-based ADS-B receivers are known to be a fraction of the cost of new, or replacement, radars so it could be argued a combined ADS-B system may be in fact a better operational solution which would minimize costs to operators who do not fly in remote areas.

Moving to areas currently without surveillance, COPA agrees with the assertion that ADS-B Out does bring some benefits to both safety and efficiency in the system. The question becomes at what cost to the user are these benefits realized. As mentioned above, there is a good understanding that, with the implementation of space-based ADS-B, the ANSP realizes significant cost avoidance/savings on infrastructure and has even more potential savings based on possible changes to their operations. On the other hand, Air Operators are faced with significant investments to meet a mandate that provides some improved surveillance and some operational savings from better optimized routings and traffic flow. While bringing surveillance to new areas allows air traffic services to see traffic and provide closer separation standards it does not drastically make an already safe system exponentially safer. Changes to airspace, staffing and additional communication capabilities would also be required in many cases to expand air navigation services. While there have been some air-to-air incidents in recent years, trends do not support that there is any significantly greater safety hazard in most areas not currently under surveillance. Procedural separation may not be as efficient as surveillance based separation but it has done the job effectively for years where traffic levels did not warrant the need for expensive radar systems. It is difficult to understand the urgent need to mandate surveillance now. The safety case is difficult to reconcile when costs to operators are considered.

The next safety question is why ADS-B Out will be mandated while no ADS-B In capabilities are being considered. The FAA implementation of ADS-B provides traffic and weather benefits which will not be available under the currently proposed Canadian system. Focus on Traffic Information In should be considered at a minimum. Under the current proposed mandate ADS-B Out signals will be available to the ANSP for their operations but only aircraft equipped with ADS-B In will see other ADS-B equipped aircraft in their immediate area. This does not improve safety for aircraft not equipped with ADS-B In nor does it provide any additional benefit to ADS-B In equipped aircraft outside of controlled airspace when other aircraft are not ADS-B Out equipped. A brief review of recent air-to-air collisions and near misses shows these incidents in fact happen both inside and outside of controlled airspace. An argument could be made that some sort of low cost on-board traffic detection capability might bring greater safety

benefits by allowing aircrew to see traffic versus a mandate relying on air traffic services to provide separation. US data shows that Traffic-In has had a demonstrated impact on reducing air-to-air incidents by up to 53% and fatal incidents by up to 89% (AOPA Study 2019.)

Going further, if in-flight safety and the reduction of air-to-air incidents is the true goal of Transport Canada there is on-board technology available that supports Electronic Conspicuity (FLARM) which allows aircraft to detect other aircraft and even in some cases unmanned aircraft. These systems are a fraction of the cost of ADS-B equipment and are approved by EASA, UK CAA and several other countries. These systems have radio diversity (ADS-B, Mode C, Mode S, UAT) which allows them to detect and warn of the presence of other aircraft through multiple ways. This empowers aircrew to know the position of other aircraft that might be a threat and allows them to take appropriate action to avoid without the need of Air Traffic Control. In this case each aircrew is now looking for conflicts versus one controller watching multiple targets to ensure there are no conflicts. One must conclude this would be more effective at improving safety versus simply adding more surveillance coverage to an air traffic control system. This FLARM technology could be leveraged to improve safety between aircraft in all operational conditions, surveillance airspace and non-surveillance airspace and at a fraction of the cost of the equipment needed to support the proposed ADS-B mandate.

If the intention of Transport Canada is to significantly improve safety in the system there must be a consideration of how Traffic-In can be part of any solution or mandate.

Equipment Costs and Deadlines

COPA recently held a survey of members to determine the extent of ADS-B equipage in the General Aviation fleet in Canada. Results of the survey indicated that currently 62% of aircraft do not have ADS-B installed. Of the 38% equipped aircraft 66% of those would need to reequip to meet the mandate. This would indicate that a total of 88% of the current General Aviation fleet would need to equip to meet the final proposed mandate. With the current costs for ADS-B installations the total cost outlay for the general aviation fleet is estimated to exceed \$400 M and possibly as high as \$700 M depending on the complexities of the installations.

The survey also indicates approximately 33% of the GA fleet use Class A and/or Class B airspace and of these, 40% do not believe they can be equipped for 2023. In order for these users to equip short term, following 2023, would be estimated to be between \$55 M to \$98 M. This number of users of Class A & B airspace also calls into question the assertion that 90% of aircraft that operate in Class A & B airspace are already equipped for ADS-B. Possibly 90% of large operators in Class A airspace are equipped but it does not appear this is a reality for smaller operators.

97% of respondents indicated they flew in Class C, D or E airspace. 60% of these believed they could be equipped for a 2026 or later deadline. 40% indicated they could not or would not be equipped. Surprisingly, 39% indicated they would consider to not equip and would avoid controlled airspace. This indicates that the mandate has the potential to force almost 40% of current airspace users out of Class C, D and E airspace.

Another potentially serious consequence of non-equipage becomes how would non-compliant aircraft even be seen if they happen to fly in controlled airspace – no ADS-B equals no surveillance target which means no one knows you are there unless there is some other surveillance source. The question of how to enforce compliance in ADS-B airspace, when users are not seen by the system, must be considered.

If there is another surveillance source to ensure compliance then the requirement for mandated equipage comes into question.

Equipment Availability and Installation

COPA has been in discussions with several aircraft and avionic manufacturers and additionally maintenance facilities where equipment changes would be conducted. All of these groups indicate there is a significant shortage of ADS-B equipment within the current aviation supply chain, and a compounding shortage of capacity in maintenance facilities to do the work to upgrade aircraft in the short-term. These realities create a challenge for anyone not currently equipped for the proposed ADS-B mandate to get equipped to meet deadlines. Estimates are delays of 6+ months to procure ADS-B hardware.

These industry groups also highlight a lack of clear technical guidance on what aircraft installations, performance parameters and test parameters meet the requirements of both the mandate and airworthiness. It is understood technical standards changes are in the works but without details it is difficult for industry to prepare.

Concerns have also been raised as to complexity of installations depending of the requirement for antenna diversity or relocation based on aircraft types. For example: Higher performance aircraft currently not TCAS 2 equipped could need significant modification if pressure vessels must be penetrated or other structural modification is needed. It is estimated that 98% of existing ADS-B enabled Mode S transponders on non-TCAS II aircraft should be expected to be non-diversity which means these aircraft would be subject to an avionics upgrade and possible installation of a second antenna.

The final concern from industry is what appears to be a complete lack of information on the impacts to helicopters should they need modifications to meet the mandate.

Regulatory Process

COPA is concerned that TC appears to be implementing the ADS-B mandate without having followed the normal CARAC consultative process. While this current opportunity for comments is a positive step, a change of this magnitude and costs should be considered only after full consultation and cost analysis between TC and all industry partners.

Transport Canada has indicated there is no regulatory change required to implement the mandate for Class A & B airspace but only changes to some standards and definitions currently published. Conversely TC has indicated regulatory change will be required in Class C, D and E airspace which creates a question of what is different between the two cases? Both require, at a minimum, changes to Standards which would require amendment through the CARAC process. These assertions raise several more questions.

1. Recently TC has issued two new posters/documents summarizing the CARAC process, both these posters indicate process will be followed with changes to Standards and that the process will be followed in all cases. This newly published information further confuses how the current proposed mandate is moving ahead when there is clear indication more consultation is required?

2. Changing definitions to fit with existing regulation appears to be an attempt to avoid the regulatory process when the whole intent of the process is to fully assess the impacts to the public and the industry.
3. Complicating the definition argument is the apparent intent to specifically redefine the definition of transponder. As there is no definition of transponder in CARs, a simple dictionary search of the definition of a transponder clearly indicates it is a device which replies to interrogation from another source and provides information in response. Space-based ADS-B simply does not work this way. An ADS-B unit continuously broadcasts an information signal which is received by the satellites. Only a Mode-S transponder associated with ADS-B out equipment responds to interrogation from ground stations. This apparent desire to make a change to a definition clearly understood in the industry makes it appear again that the regulatory process is trying to be avoided.
4. There may be recourse to Treasury Board, or the Standing Joint Committee for the Scrutiny of Regulations, based on the possible economic impact / harm that may be imposed on operators. These impacts do not appear to have been considered in defining the mandate and there is no supporting cost/benefit analysis or Regulatory Impact Analysis Statement (RIAS) supporting the decision to move ahead with changes. A comprehensive and transparent assessment of the economic impact versus the proposed benefits of the mandate would allow industry to be comfortable that their concerns with the regulatory process have been heard and considered.

Impact on US General Aviation

Significant numbers of American based General Aviation operators come to Canada for various reasons. These operators have access to airports, aerodromes and water aerodromes in Canada and can have a significant economic impact on communities.

The Aircraft Owners and Pilot's Association (AOPA) indicates approximately 40% of their membership have flown to Canada on at least one occasion. AOPA estimates approximately 25,000 cross-border flights occur to Canada each year. Most trips are for personal reasons, particularly tourism, where travelers contribute to the economy through the purchase of fuel, visiting stores and restaurants, and staying in accommodations. These activities also create jobs and business development and represent millions of dollars being spent in towns and cities across Canada.

A recent survey by AOPA indicated that up to 49% of regular GA travelers to Canada would cease flying cross-border rather than meet the proposed requirements of ADS-B mandate.

An additional operational, and possible safety, impact to US operators involves the regular movement of aircraft between Alaska and the lower states. Each year a significant number of aircraft transit across Canada to move between Alaska and the remainder of the US. Without a coordinated ADS-B mandate between Canada and the US these operations are faced with restrictions which may either prohibit them from occurring or at a minimum forcing them to operate outside of Canadian controlled airspace. A simple review of options to operate outside of controlled airspace in Western Canada shows potential dangers whether it is operating at low levels through mountainous areas or flying long distances over water. Neither case is forgiving should any flight experience trouble while enroute.

Conclusion and Recommendations

In conclusion, COPA remains in agreement that implementation of ADS-B brings some improvements to air traffic awareness and overall system safety and is a positive step forward for Canada. COPA also believes implementation must be done with cross industry involvement and discussion to ensure that there are mutual benefits across the industry if implemented with consideration to costs and benefits for all operations.

COPA is concerned that the current mandate has not fully assessed the impacts to industry or explored all the possible benefits that could be realized with consideration of the issues highlighted in this submission. The announced mandate relies only on space-based ADS-B to benefit the ANSP, rather than creating a combined system utilizing space-based ADS-B, ground-based ADS-B infrastructure and all possible aircraft equipage. With known spectrum congestion challenges of space-based ADS-B all indications are that some new ground-based ADS-B stations will need to be installed in high traffic areas. Since these ground stations could be installed at a relatively low cost, compared with the costs to operators to equip for space-based ADS-B, it would appear that more analysis would be beneficial and could position Canada as one of the world leaders in system implementation.

COPA recommends the following:

Transport Canada complete an industry wide cost analysis.

Consultations and proposed changes should be conducted in accordance with existing CARAC process to meet any challenge or scrutiny by industry or government oversight. Transport Canada should continue further consultations with industry to identify and discuss areas of concern, along with possible solutions, regarding the general implementation of ADS-B in Canada.

Transport Canada needs to consider possible safety benefits of a combined ADS-B system including optimized and cost effective aircraft equipment requirements that make traffic information available to all users and not only the ANSP.

Projected time-lines should be adjusted to take into account; the currently lead times required to bring products to the market, time for operators to identify, select, and purchase solutions, and installation work to be done.

COPA remains committed to work with Transport Canada to find mutually beneficial opportunities for change that will continue to promote and support the economic health and safety across all of Canada's aviation industry.