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COMMITTEE A

Agenda Item 5: Emerging issues

5.2: Operations below 1000 feet

5.3: Remotely piloted aircraft system (RPAS)

REMOTELY PILOTED AIRCRAFT SYSTEM TRAFFIC MANAGEMENT IN CANADA

(Presented by Canada)

EXECUTIVE SUMMARY

This paper presents some of the key considerations that Canada is facing in developing an approach to the integration of remotely piloted aircraft systems (RPAS) into Canada's national airspace. Many of the questions Canada is contemplating are the same ones other administrations are facing, however there are some circumstances in Canada that may be unique and will impact Canada's path forward on remotely piloted aircraft systems traffic management. This paper also describes some of the principles that will guide Canada in the development of an approach to the integration of RPAS into Canadian airspace.

1. INTRODUCTION

1.1 The growing popularity of remotely piloted aircraft systems (RPAS) for civilian applications, both commercial and recreational, along with the different flight patterns and airspace use of these aircraft, is challenging administrations and air navigation service providers to examine their current means of managing air traffic, and how they can be adapted or complemented to meaningfully include remotely piloted traffic.

1.2 The global economic potential of remotely piloted aircraft systems is anticipated to be substantial – Goldman Sachs estimates there is a USD100 billion economic opportunity in this sector between now and 2020¹. Realizing this economic potential will, however, depend upon an effective means of managing the increased level of RPAS traffic while maintaining or enhancing aviation safety.

¹ Goldman Sachs. *Drones Reporting for Work*. Available at <https://www.goldmansachs.com/our-thinking/technology-driving-innovation/drones/>

2. DISCUSSION

2.1 Canada is examining many of the same questions as other administrations when it comes to traffic management for RPAS of all sizes. Canada's existing air traffic management system – delivered primarily by NAVCANADA, a not-for profit independent service provider – has served Canada well and is well respected globally.

2.2 The existing airspace classification system was designed for conventional aviation, which for the most part uses low altitude airspace a minority of the time (e.g., take-off and landing, aerial works) and in a limited number of places (at aerodromes). RPAS, on the other hand, are often exclusively operating at low altitudes and may be flying patterns that are distinct from conventional aviation's emphasis on the most efficient route from point A to point B (for example, scanning a field for the purpose of precision agriculture requires a series of passes from one end of the field to the other).

2.3 Administrations are taking various approaches to address this challenge. Canada has undertaken work to develop procedures specific to its major airports to allow for routine low altitude flights within controlled airspace without prior permission from air traffic control, where there is a demonstrated low risk of conflict (e.g., away from approach paths and/or where there are already obstacles such as buildings).

2.4 In developing an approach to the future of airspace management, Canada is taking into consideration its unique domestic circumstances and the challenges and opportunities that these circumstances pose. Important features of the Canadian airspace include:

- *Independent air navigation services provider (ANSP):* Canada's primary civilian air navigation service provider, NAVCANADA, is fully independent of the regulator, Transport Canada. This model has served Canada well for more than two decades, and the two organizations work together in close collaboration on questions of airspace management. NAVCANADA and Transport Canada are together looking at the potential impact of remotely piloted aircraft traffic in Canada and how to best address the challenges and capitalize on opportunities.
- *Large uncontrolled airspace:* Canada is the second largest country in the terms of land area, and more than a third of Canadian territory is north of the 60th parallel. The vast majority of the Canadian population lives in a relatively small geographical area close to its southern border and the country's major airports are also largely located in the very southern parts of the country. This leaves Canada with a very large volume of uncontrolled airspace (Class G) across the country.
- *Severe and varied climates:* Canadian temperatures may range from -50 to +40 degrees Celsius, depending on location and season. Reliability of RPAS and any traffic management solutions in cold weather is a primary concern. In particular, Canada needs to consider that RPAS may be flying in icing conditions, and that snow and other severe winter weather may impact detect-and-avoid capabilities.
- *One international land border:* Canada shares a long land border with the United States. Efforts to coordinate work on RPAS are carried out through the Canada-United States Regulatory Cooperation Council. However, given Canada's geography, there is currently a lot of room to fly (particularly for visual line of sight operations) without needing to approach or cross international borders. This contrasts

with Europe, where there are many more international borders in a smaller geographical area.

- *Non-national connectivity*: Canada does not have universal and reliable access to telecommunications services – what the Canadian Radio-television and Telecommunications Commission (CRTC) has referred to as the “digital gap”. In particular, “First Nations communities generally continue to experience a deep digital divide in contrast to other communities in Canada (CRTC Submission to the Government of Canada’s Innovation Agenda)”². While the CRTC and others continue to make advances in availability and affordability of basic telecommunications services, gaps will remain in the short- and medium-term.

2.5 Airspace management solutions for RPAS make use of existing telecommunications networks to provide services. Canada is considering how to approach airspace management solutions in an environment that does not yet support these services across the country.

2.6 Canada is undertaking discussions with its domestic industry and NAVCANADA to develop a path forward for remotely piloted aircraft systems traffic management. In the short term, the following principles will guide Canada’s decisions:

- *Safety*: The safety of the aviation sector must at least be maintained with the integration of RPAS. There is the potential that some of the traffic management solutions for RPAS could even contribute to an overall increase in safety from the aviation sector, as conventional aviation may look to make use of some of the technologies becoming available.
- *Identification as a pre-condition for operation*: Canada supports the concept that anonymity is unacceptable for all but the very smallest RPAS (micro drones less than 250g). Administrations need to have a means to understand the number and type of aircraft operating in their airspace, and have a means of establishing communication with the pilots, for example, in the event that the air navigation service provider needs to immediately communicate with pilots in the area to provide direction in response to an urgent or changing situation.

2.7 Registration will be fundamental to these efforts but registration systems must be developed that keep in mind the diversity of the remotely piloted aircraft sector, in terms of size (aircraft much smaller than conventional aviation to the much larger aircraft that start to look a lot more like conventional aircraft) and application (hobbyists to professional commercial use). To encourage compliance and maximize the effectiveness of any registration system, it must not be unnecessarily onerous on the pilot to apply and receive the certificate. Canada is developing a digital platform that will be able to issue Certificates of Registration with unique registration numbers instantly.

2.8 Remote pilots present a particular challenge for compliance verification (i.e., is the aircraft allowed to fly there?) and enforcement actions. Registration serves to link the aircraft to the pilot, but it may not be possible to verify this on the ground. The possibility of remote identification is becoming a reality, but the technology continues to evolve. Canadian regulations currently do not require the ability for remote identification/e-identification, but may do so in the future if a predictable supply of proven technologies becomes available. A performance-based approach to any remote identification

² <https://crtc.gc.ca/eng/publications/reports/rp161221/rp161221.htm>

requirements is preferred rather than mandating a particular piece of equipment. In this dynamic and evolving sector, Canada is best served by regulating outcomes rather than specific technologies.

- *Reliability, Redundancy, and Universality*: Any remotely piloted aircraft traffic management system must be available at all times, be capable of functioning in all Canadian weather conditions, and must have redundant systems in place in the event of failure. A Canadian system will require consideration of how to provide services in areas of limited or unreliable connectivity to a telecommunications network and at a reasonable cost.
- *Adaptability*: RPAS technology is evolving rapidly and growth in the number and type of use cases can be expected to continue. This includes increasing levels of automation. Traffic management solutions for RPAS must be able to adapt and scale to keep pace with this change. The way forward for remotely piloted aircraft systems traffic management in Canada will necessarily require a multi-step approach to fulfil this principle. This need has also been recognized in the European approach to U-Space.
- *Collaboration*: Effective traffic management solutions for RPAS will be informed by ongoing discussions with key stakeholders and other administrations. This approach will help Canada learn from the progress others have made and stay abreast of the latest from the drone industry.

2.9 Canada continues to work to improve its understanding of the capabilities of existing technologies. As a first step towards enabling routine beyond visual line-of-sight (BVLOS) RPAS operations, Canada is working with the RPAS industry and NAVCANADA to conduct proof-of-concept trials. The BVLOS trials, conducted with Canada Post Corporation, Canadian UAVs, Drone Delivery Canada, and ING Robotic Aviation, are focused on oil and gas sector infrastructure inspections and delivery use cases in Canada's remote and rural regions, including Indigenous and First Nation communities. The results of the trials will be made public to help inform both Canada and industry's respective approaches to BVLOS and airspace.

3. CONCLUSION

3.1 Ultimately, Canada envisions a future where all types of air traffic are fully integrated into the airspace, and managed in a coherent and coordinated manner. Technological advances, in automation in particular, will continue to blur the lines between conventional aviation and RPAS. While these segments of aviation may be treated separately today, decisions made must reflect progress toward the end goal of full integration and overall evolution of the aviation sector.

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