Drones for Good

Transport Canada’s Approach to Drones in Transport Logistics

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Monday, November 4, 2019
Background: Introduction to RPAS

• Remotely Piloted Aircraft Systems (RPAS/drones) are a growing subsector in civil aviation and aerospace in Canada and worldwide.

• In 2017 Transport Canada (TC) established a dedicated multidisciplinary Task Force to address the emergence of drones.

• In 18 months, the RPAS Task Force has lead a diverse range of activities:

- New Rules
  Part IX Rules for Visual Line-of-Sight Operations (VLOS)

- Pilot Projects
  Beyond Visual Line-of-Sight (BVLOS) Operations

- Research and Development
  With the National Research Council and federal partners

- International Engagement
  Harmonizing approaches and informing strategies
Context: VLOS and Beyond

### Current Operations and Platforms

**Visual Line-of-Sight**
- VLOS operations are conducted when the RPAS can be seen by the pilot or a visual observer.
- Most regulators worldwide, including TC Civil Aviation, limit RPAS operations to VLOS.

### Near-Term Innovation

**Beyond Visual Line-of-Sight**
- BVLOS is when the RPAS cannot be seen by the pilot or visual observer and detect and avoid is done through technology and/or procedures.
- BVLOS greatly increases the economic value of an RPAS operation by introducing greater efficiencies, range, and speed:

### Future Market Disruptors

**Current Operations and Platforms**
- DJI Phantom
  - Consumer / “Prosumer”
- Aeryon Skyranger
  - Public Safety
- 700g eBee Sensefly
  - Precision Agriculture

**Near-Term Innovation**
- Griffon SeaHunter
  - Environmental Monitoring
- ING Robotic Responder
  - Infrastructure Inspections
- Drone Delivery Canada
  - Drone Delivery

**Next-Generation Technology**
- Aerospace manufacturers and new entrants are proposing game-changing designs and operations.
- Proposed applications include long-range cargo delivery, Urban Air Mobility (air taxis), and delivering telecommunications services.

- Intel Volocopter
  - Passenger Transportation
- Airbus Zephyr S
  - High Altitude Operations
- Uber Air Taxi / Bell Helicopter
  - Passenger Transportation
- Google
  - High Altitude Operations
The Global Context

**Switzerland**
- Swiss Port has partnered with Matternet on drone delivery in three cities since 2017.
- Delivery service flies lab samples between hospitals, labs, and clinics, reducing times to within 30 minutes.
- 3000 successful deliveries.

**United States**
- Google's Project Wing and UPS are now authorized air carriers for drone delivery flights under Part 135.
- FAA authorizes a limited amount of BVLOS operations, with only a few organizations operating for utility and rail surveys, and precision agriculture.
- Ongoing rulemaking for remote identification to track RPAS in airspace, deploying a low altitude aircraft notification system.

**Australia**
- Project Wing is approved by the CASA for drone delivery in Canberra, with restrictions (i.e. daytime ops only).
- Variety of goods being delivered – including food/drink, coffee and chocolate.
- Ongoing efforts to seek community feedback on issues and opportunities for drone delivery.

**Rwanda**
- Zipline performing BVLOS drug deliveries between remote communities.
- One flight can deliver up to 3 units of blood (1.8 kg payload) from an 80 kilometer service radius from each (two) distribution centre.
- 60% of the Rwandan blood supply outside of Kigali is now delivered by an RPAS.
- Variety of goods being delivered – including food/drink, coffee and chocolate.
- Ongoing rulemaking for remote identification to track RPAS in airspace, deploying a low altitude aircraft notification system.
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**Multilateral Forums: International Standards Development**

- International Civil Aviation Organization: Developing Standards and Recommended Practices for certified platforms operating internationally within controlled airspace under instrument flight rules.
- ASTM International: Committees on RPAS design, quality acceptance, and safety monitoring, as well as autonomy and RPAS traffic management.
- Joint Authority for Rulemaking of Unmanned Systems: Seven working groups on technical safety topics, including airworthiness and detect and avoid. Publication of the Specific Operations Risk Assessment model adopted by TC.
Canadian Context for Drones

**Geographic Characteristics**
- Isolated Areas of Wilderness
- Uncontrolled Airspace
- Remote & Rural Communities
- Diverse Weather and Topography
- Low Population Densities

**Influencing Economic Factors**
- Service and Resource based Economy
- Developed Trade Networks and Commercial Partnerships
- Strong Aerospace Sector
- Geographic Clusters of Use-Cases and Capabilities

**Use-Case Opportunities**
- Wildlife Monitoring
- Linear Surveys
- Drone Delivery
- Wildfire Operations
- Search and Rescue

**State of the RPAS Sector:**
- Over 1000 companies employing 22,000 Canadians
- 44% of companies are 0-5 years old
- 70% based in Alberta, B.C. and Ontario
BVLOS Strategy

- The department is pursuing a three-phased BVLOS strategy, beginning with activities to stimulate innovation and allow operations.

**Technology:** Conducive Environment for Innovative Ideas

- Test Ranges
- Pilot Projects

**Interim Measures:** Allowing Routine Operations

- Creating Venues for operations in controlled conditions and in dedicated airspace
- Validating procedures in real world conditions

**Routine BVLOS Operations**

- Policies to accommodate unique Canadian use-cases in isolated areas, northern airspace, and uncontrolled airspace
- BVLOS operations are allowed in northern and isolated areas and uncontrolled airspace with scaled requirements based on operational complexity.

**Regulation:** Evidence-based Rulemaking

- Engaging Industry through preliminary consultations to inform regulations
- Accelerating rulemaking to provide predictability for operators
Drones in Delivery and Logistics

RPAS are positioned to be market disruptors in the delivery of goods, with a $13.0 billion (USD) market potential (PricewaterhouseCoopers 2016)

Market confidence is lacking: most operators and manufacturers are testing new concepts and prototypes, but perceive low near-term growth potential.

Opportunities with Canada’s geography and low population density, but this can also complicate logistics.

Additional work to be done by Transport Canada and industry to build market confidence, and strategically address outstanding technological and regulatory issues…
Addressing Technology Challenges

Are current fuel systems and energy sources (gas hybrid, electric battery) adaptable to air taxi and cargo drones?

How will we certify autonomous systems for drones?

How will air traffic management systems accommodate additional drone traffic?

How do different aircraft and aircraft engines react in an air-air collision with a drone?

Do drone pilots respond differently than pilots in traditional aviation in the same conditions?

How do sense and avoid platforms perform in different airspace categories and to different users (general aviation, commercial, birds)?

Can drone platforms operate safely in the North and in harsh winter conditions (icing, snow, wind)?
Addressing Regulatory Challenges

Is the public ready to accept drone delivery or riding an air taxi?

Do we have the right skillsets to become a regulator of the future?

Are our provincial, territorial, and municipal partners ready (and willing) to deal with additional airspace users?

Are our privacy laws sufficient to deal with the collection of data by drones?

Is public policy adequately responding to industry trends and market interests?

Do we have the right regulatory instruments to manage risk without stifling innovation?

Do we have to think different about how we regulate and legislate air traffic services?

How do we safely accommodate a growing and diverse number of new airspace users?

How will Air Service provisions apply under the Canada Transportation Act?

Dialogue
- Conducting Public Opinion Research
- Provincial, Territorial, Municipal Engagement
- Monitoring Industry Trends

Evidence
- Risk Assessments with Industry
- Engaging International Partners
- Applying Operational lessons to Rulemaking

Partnerships
- Interdepartmental information sharing
- Delegating enforcement powers to law enforcement authorities
Moving Forward

- Draft regulations to allow lower risk BVLOS operations in 2020.
- Seek out opportunities for dialogue and engagement with the logistics and transport sector.
- Advance research and development with industry and federal partners.
- Consider additional trials for air traffic management in various environments to inform policy and regulatory frameworks.
- Ensure Canada’s regulatory framework remains flexible to enable innovation and allow for future delivery operations.