Integrating UAS Into Your Airspace:
The System-of-Systems Approach to UAS Integration


29 September 2021
Thales Snapshot

83,000 employees

68 Countries

Sales in 2019

19 billion $

A balanced revenue structure

50% Defense

50% Civil

1.4 billion $

Self-funded R&D* 2019

* Does not include R&D funded externally

AIR TRAFFIC MANAGEMENT MARKET
GLOBAL REACH, LOCAL EXPERTISE

Sensing & data gathering

Data transmission & storage

Data processing & decision making

Digital Identity and Security

Defence and Security

Aerospace

Space

Ground Transportation

We help customers master decisive moments by providing the right information at the right moment
Thales possesses the technology, experience, and leadership to define a path toward sustainable UAS integration.
BVLOS is the greatest economic value driver for commercial UAS.

<table>
<thead>
<tr>
<th>Example</th>
<th>VLOS</th>
<th>&gt;</th>
<th>BVLOS</th>
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</thead>
<tbody>
<tr>
<td><strong>Capability</strong></td>
<td>LAANC automates the application &amp; approval process for airspace authorizations.</td>
<td></td>
<td>A statewide UAS network incorporates physical and virtual infrastructure that connects UAS to the airspace management system.</td>
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<tr>
<td><strong>Enabling Tech</strong></td>
<td>E-registration, Mission Planning Application, UAS AIM, Airspace &amp; Mission Rules Engine, APIs</td>
<td></td>
<td>C2 communication &amp; surveillance; Remote ID, Traffic display; ATM integration; etc.</td>
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<tr>
<td><strong>Result</strong></td>
<td>Today, LAANC supports ~50K monthly VLOS flights in CTRs.</td>
<td></td>
<td>With Vantis, North Dakota will scale BVLOS statewide by 2023.</td>
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</tbody>
</table>
BVLOS connects communities, reduces emissions, and improves the daily lives of citizens.

**Certified UAS**
- Attract UAS Manufacturers and UAS businesses
- FAA Certified Airframes
- UAS for Government Use

**VANTIS UAS Network**
- Leverage public investment
- Infrastructure to support "Drone-ports"
- Regional Operations Center for UAS Operations

**Training / Education**
- Reimagine future workforce
- Training for UAS services jobs
- University programs
- STEM in K-12 education

**UAS Operator Services**
- UAS Operators using UAS network services
- UAS to support public use cases
- Logistics services

**Electrification**
- "Drone-ports" across the State
- New fuel sources
- Logistics hubs to increase access for rural citizens

**Increased Industrial Productivity**

**Connected Communities**
UTM is the collaborative system that provides airspace stakeholders with the necessary services to integrate advanced UAS operations into the airspace.

**Case study:** BVLOS inspection in North Dakota thanks to Thales UTM system.

**UAS Services**
- Weather,
- Geographical,
- AIM,
- Authorization,
- Surveillance,
- datalink...

**UAS Software Infrastructures**
- TopSky-UAS Airsp Mgr
- TopSky Tracker,
- Remote ID, Health Monitoring

**UAS Physical infrastructures**
- Radar,
- Com,
- MNOC,
- Backhaul network

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The diagram illustrates the various components of the UTM system, including pre-flight, in-flight, and post-flight processes. Each section highlights different aspects such as weather, geographical data, authorization, surveillance, and datalink capabilities. The integration of these services is crucial for the safe and efficient operation of UAS in the airspace.

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The diagram also includes images of various UAS-related equipment, such as radars and remote ID systems, emphasizing the technical infrastructure that supports UAS operations.
Getting to BVLOS: Anatomy of a statewide UAS network

THE VANTIS NETWORK

REMOTE INFRASTRUCTURE
- Surveillance sensors
- Command and control radios

BACKHAUL DATA NETWORK
- High reliability, low latency
- Scalable

UNMANNED AIRCRAFT SYSTEM (UAS)
- Ground control station
- Aircraft

MISSION & NETWORK
- Data correlation and validation
- Maintenance monitoring
- System testing

SE/SI Enablers

BVLOS ConOps, Safety Case and Supporting Policy & Procedures
System Architecture & Tooling (Security, CM, etc.)
Technologies (Non-cooperative Surveillance, C2 Links, Cloud Technologies, Communications Networks, etc.)
Industry Partners & Regulators (UND, Thales, FAA, FCC)

Current scope = supports individual BVLOS flights separated in time & space
Getting to BVLOS: North Dakota's approach

North Dakota is building a UAS network (Vantis) to support BVLOS operations.

- **Phase 1**: BVLOS System Development & Implementation Plan Initial Deployment **for Western North Dakota**
- **Phase 2**: BVLOS System Technical Engineering and Business Modeling for a Statewide System
- **Phase 3**: Develop, Implement, and Operate a BVLOS System Initial Capability ("Key Site") Deployment for Western ND

Vantis is expanding statewide.

- **Phase 4**: Vantis Operations and Maintenance (O&M)
- **Phase 5**: Statewide expansion

Thales is the SE/SI of choice for Vantis.

- Thales selected as long-term Vantis partner
- Thales pro-actively supports legislative lobbying, business case development and customer needs.
- Thales is active on many UAS integration projects in the US (TX, NY and USAF) and internationally (FR, UK, SG and AU).
Our “System of Systems” delivers an integrated, efficient, and secure end-to-end airspace management capability.

- **UAS Airspace Management**
  - flexible, scalable airspace management for drones

- **Air Traffic Management**
  - integration of drone operations into traditional controlled airspace/systems

- **Sensor Networks**
  - market-leading sensors + C2 capability to protect airports & critical areas

- **Applications**
  - mission & fleet management to plan, prepare, assure and deliver, safe missions

- **Connectivity**
  - secure connectivity solutions for drones from a world-leader in digital identity and IoT

- **Risk Management**
  - high integrity, geo-fencing capability based upon flight avionics heritage
Thales acts as a Systems Integrator, bringing together a safe, secure, and seamless solution that incorporates best-in-class partner technologies.
PHASED IMPLEMENTATION: Getting to BVLOS is a long-term project that requires significant investment and a shared vision for a fully integrated UTM/ATM capability delivering seamless airspace operations. Thales has defined a phase implementation approach to ensure the success of our partnership.

ORIENTATION
Understand national and local regulations, data sources, work flows, procurement processes, and other elements needed for successful implementation.

PILOT PROJECT
Establish basic UAS mission planning and approvals within a limited scope to validate/test value and ensure regulatory compliance.

NATIONAL ROLLOUT
Integrate lessons learned and feedback from the pilot project into system for national deployment. Deploy industrial cloud for large scale operation under service-level agreement.

ENHANCEMENT
Monitor, learn, and improve the system to meet field experience and evolving national & local regulations. Move from strategic / static capability to real-time dynamic operations.

SEAMLESS AIRSPACE
Extend UAS integration platform to integrate with ATM and other external systems to create seamless airspace operations.