How to build interoperable UTM systems?

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Global UTM Association

Why Interoperable UTM

- Region based bespoke UTMs will be very expensive
  - Development
  - Certification of UTM, Drones, apps, …
- Portability of drones and software between markets
- We learn how to do UTM safely, together and in the open

- Interoperability requires standards and certification
- Legislators are looking to industry to develop the standards

Why Industry

- The drone sector is moving much more rapidly than “traditional” aviation
- Regulators are under pressure from politicians who are keen to unlock the economic benefits of drones
- Using technology that is unfamiliar to the regulators
  - Consumer technology
  - Cloud
  - Public Internet

Why GUTMA

- International Organisation
- Representation from *all* parts of the drone ecosystem
  - UTM providers
  - Drone manufactures
  - ANSPs
  - App developers
  - Regulators
- GUTMA contains
  - Subject matter experts to develop the standards
  - Members to contribute to and implement them

New standards, built on experience

- Pick the right technology
- UTM is going to run over the public internet
  - ASTRIX and other traditional binary protocols aren’t going to be much use
- UTM is going to be cloud based
  - Try hiring XML and SOAP developers that are under 40 years of age!
- UTM services are going to be accessed by a large ecosystem of clients
  - Lets build them in a format that can be easily consumed

Industry needs to work with the regulator

- The regulator can’t do this on their own
- Industry can’t do it on our own
- Need a mixture of new thinking grounded by regulatory experience

Charter

The Data Exchange Group strives to define technology protocols that facilitate the exchange of data across UTM systems in support of safe, compliant, and efficient unmanned business operations.

The Data Exchange Group advocates for a “grass-roots” industry-led definition rather than a tops-down regulator-driven approach.

The protocols are open sourced and free for use for all UTM systems regardless of GUTMA membership.

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Andres Van Swalm	Unifly	Massimo Antonini	IDS Corporation
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Current Projects

Flight Declaration Protocol - published April 2017

Defines a pre-flight data exchange format to identify possible airspace conflicts among participating entities.

Flight Logging - proposed

Defines a standard set of telemetry data for a given flight.

Real-time flight Logging - candidate

Defines a protocol to capture near real-time flight data to enable in-flight airspace conflict avoidance.

GeoFencing / GeoCaging - candidate

Defines a protocol to deliver airspace and hazard data to a drone or client application.

Flight Declaration Protocol

The Situation Today

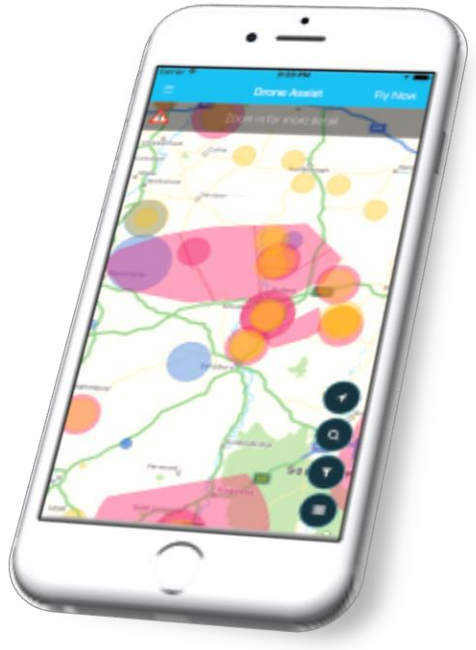
- Drone operators use apps / tools to declare where they are flying / planning to fly to their UTM provider
- The UTM provider then warns other operators of this flight.

The Challenge

- Currently UTM providers “airspace areas” overlap in many countries
- Flights declared with one UTM provider are not visible to users of another

The Solution

- UTM providers need to share flight declarations



The Solution

UTM providers share flight declarations by:

- Using a server to server notification based protocol

Key Protocol Principles:

- Designed for Visual Line of Sight and Beyond Visual Line of Sight
- Designed with security & privacy in mind
- Is licence under open source (Apache v2.0)
- Based on standards for internet cloud based systems
  - JSON over HTTPS and GeoJSON

Notification Based

Proprietary protocol

UTM Provider A

UTM Provider B

UTM Provider C

Flight Declaration Protocol

UTM Provider D

Flight Declaration Protocol

ACTIONS
Clone
Compare
Fork

NAVIGATION
Overview
Source
Commits
Branches
Pull requests 2
Pipelines NEW
Downloads

Source

UAV/Operator Flight Declaration Exchange Protocol

A protocol designed to facilitate the secure exchange of flight situation data between UTM Providers, while allowing each UTM Provider to retain ownership of their customer data.

ATTRIBUTION NOTICE

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1 Background

UTM Exchange

UTM Provider A

Message For conflicting flight

Flight Declaration

UTM Exchange

Detection that flight is in conflict with one of Provider C's flights

Message for conflicting flight

UTM Provider B

UTM Provider C

UTM Provider D

Europe's U-Space Vision

- Geo Fencing
  - Capability Level 0: Static Airspace data, current to AIRAC cycle, 100m accuracy
  - Capability Level 1: Static Airspace, NOTAMS, 100m accuracy, 99.5% uptime, 5 second max response time
  - Capability Level 2: Certified Static Airspace, NOTAMS, 10m accuracy, < 5min latency, 99.999% uptime, 1 second response time
- Each level requires a Data Exchange standard or new version of an existing standard
- Each level requires *appropriate* certification