UAS Traffic Management

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A growing activity

The rise of the activity

- Operators: ~2500
- Light RPAS: ~4500
- Number of operators growth over the past 6 months: +35%
- Distinct manufacturers, of which 25 supply 68% of the fleet: 349
- Domestic RPAS fleet: <4Kg 86%
- Average daily rate for an aerial photo report: 1245 € HT
- More than 60 training centers

New manufacturers
New UAS – quick turn over
New technologies: UAS, payload, software, big data treatment...
New applications
New projects

... Creating jobs

- Advertising and Media 50%
- Surveillance and security 15%
- Structure and building monitoring 20%
- Mines, quarries 5%
- Agriculture 5%
- Others 5%
Users requirements:
• Easy access to airspace
• Separation with other traffic when drone flight is accepted
• Safety are security taken into account
• Specific equipment acceptable if a good level of safety is achieved

Constraints
Non urban areas:
• No interference with civil or military flights flying in UTM airspace
• No interference with other drones flying in UTM airspace

Urban areas:
• No interference with civil or military flights flying in UTM airspace
• No interference with other drones flying in UTM airspace
• No fly over people, except those involved in drone operation, unless RPAS has demonstrated a safety level comparable with aviation (certified RPAS category).
The current context in France

The regulation, updated in Dec 2015

- Technical requirements on UAV depending on the scenario
- Prior coordination required in populated areas
- Prior authorization required in controlled airspace or restricted areas
- Away from aerodromes
- Derogating scenarios subject to a case by case risk based analysis
- A handbook is available online
Runways of less than 1 200 meters

Runway of 1 200 meters or more, or with instrument approach

The current context in France
The airspace regulation, near airports
The current context in France

Pilot training

A specific theoretical certificate (TBD)

For every professional remote pilot
Practical learning objectives defined in the regulation
The operator is responsible of the practical training of the remote pilots (described in the activity manual)
No self training

A license for S4 (BVLOS) remote pilots

The theoretical certificate required
Having, or have had, a manned aviation licence is required (and a 50 hour experience as captain)
A practical test focusing mainly on flight preparation, risk management, unexpected situation management

And the regulation will continue to evolve

To take into account technology and return of experience
The current context in France
New law from October 2016

• Article 1
  - Web registration for all drones from 800 g (or below).
  - Official registration over 25 kg.

• Article 2
  - Remote pilot education, including leisure, from 800 g (or below).
  - Professional remote pilot to follow approved training.
  - License needed for some UAS operations (Risk based approach).

• Article 3
  - Information towards all drones’ users (leaflet).

• Article 4
  - Devices consisting of lights, electronics and sound for all drones above 800 g.
  - Geo limitation systems (max ceiling, max RPS distance, no-drone zones, ...) on-board for all drones above 800 g (or below). Exemption for specific operations.

• Article 5
  - Law enforcement.
Users wish to develop:

- « longhaul » BVLOS operations such as railway network surveillance or power line inspections,
- Parcel delivery services, in scarcely populated areas,
- Urban activity for building inspection...

We are thus trying to tailor an UTM service that will answer to these requirements.
Technical aspects

UTM High level architecture

ATM

FIS

AIS

UTM Services Providers

Pre-flight

Post-flight

Flt Management

Name, Drone, info, phone, operations...

Ident

Surveillance data when needed

Data query

Database registration

UAS

Operator

Operator

Operator

UAS Operator
Technical aspects

Our current airspace information tool

- Easy to use for leisure drones users: [https://www.geoportail.gouv.fr/données/restrictions-pour-drones-de-loisir](https://www.geoportail.gouv.fr/données/restrictions-pour-drones-de-loisir)

- Approved datas from AIS and IGN with airports, airfields, prohibited, dangerous and regulated areas.

- Available since December 2016

- 177 000 users (single connections) during the first 10 days!
Technical aspects

Our current flight notification tool

• For some specific operations:

  Professional Drone Operators
  Flight notification
  DGAC
  Every night, for next day

  Military and State Aviation

• Could be extended to « Prefectures » very soon
Pre-Flight

Module UTM Information n° 1:
  • Infrastructure and other information (done),

Module UTM Information n° 2:
  • Weather information (existing, but to be improved),

Module UTM Information n° 3:
  • Information about Restricted Areas (done, see previous slide),

Module UTM Information n° 4:
  • Flight declaration and « drone flight plan » management (done, will be in operation this summer. Enables coordination with air force and gendarmerie).
Pre-flight

Module UTM FM n° 1:
• Management of flight authorizations,

Module UTM FM n° 2:
• Reservation of areas for drone operations. Coordination with civil and military ANSPs

Flight Management

Module UTM FM n° 3:
• Flight surveillance, flight data recording and security processes,

Module UTM FM n° 4:
• Provision of separations (or traffic information).

Post flight (recording, rex ...)
Due to the very different types of machines used by drone operators, it is probable that more than one technology will be necessary to guarantee that the full spectrum of drone fleet will be able to transmit an accurate position to the UTM operators.

Possible technologies are:
- Mobile telephone chips,
- FLARM,
- ADS-B,
- UAT. This technology has not been widely deployed in Europe but may be a suitable solution to avoid overloading the 1090 MHz channel used by ADS-B.
**UTM Airspace Management**

**Proposition of UTM Airspace classes**

**UTM airspace definition:**
- UTM includes all the airspace below 500 ft AGL, except A to D class airspace. UTM could also include specific areas between 500 AGL and 3000 ft in E, F or G class airspace.

**UTM Airspace classes:**
- Class N (Non managed) : below a height limit AGL called L (say approx. 100 ft), over non urban areas. Only VLOS flights are allowed. Flight declaration not mandatory. Identification may be mandatory, according to the mass of the machine,
- clase U (Urban) below the L limit, urban area. Only VLOS flights are authorized. Declaration and identification are mandatory. Flight will only be conducted after an authorization has been granted by UTM. However the declaration is not mandatory for flights over private land, provided the owner has granted a permission,
- Except for paragliders and parachutists, every aircraft flying in the UTM must be equipped with a suitable equipment that broadcasts its position.
**UTM Airspace classes (continued):**

- **Class DL (DecLared):** above the L limit over non urban areas, where traffic density is low or medium. Flight may be VLOS or not. Declaration and identification are mandatory. Flight will only be conducted after an authorization has been granted by UTM. Separation is provided by the pilots,

- **classe M (Managed):** above the L limit over urban areas, regardless of traffic density and non urban areas where traffic density is high. Flight may be VLOS or not. Declaration and identification are mandatory. Flight will only be conducted after an authorization has been granted by UTM. An assistance to provide separation is granted by the UTM operator.
UTM Airspace Management

Example of UTM Airspace

- UTM Class N (Non Managed)
- UTM Class U (Urban)
- UTM Class M (Managed)
- UTM Class DL (Declared)
- ATM G Class Airspace
- ATM C Class Airspace
- Military TRA

- 500 ft AGL
- L limit (approx 100 ft AGL)
Following basic set of rules could be suggested:

- Rules of the air shall apply between drones and between drones and manned aircraft
- Except for paragliders and parachutists, every aircraft flying in the UTM must be equipped with a suitable equipment that broadcasts its position,
- Paragliders and parachute operations will be carried out in temporary reserved areas, in which drone activity is prohibited,
- A specific e-VMC separation clearance will probably have to be defined.
• How will UTM service provider be financed?
• What will be the relations with ATM?
• What will be the organisational model for UTM service providers?
• …
THANK YOU FOR YOUR ATTENTION, QUESTIONS?
Here is the expected timetable for NASA’s UTM implementation in the USA:

**Build 1 (August 2015)**
- Reservation of airspace volume
- Over unpopulated land or water
- Minimal general aviation traffic in area
- Contingencies handled by UAS pilot
- Enable agriculture, firefighting, infrastructure monitoring

**Build 2 (October 2016)**
- Beyond visual line-of-sight
- Tracking and low density operations
- Sparsely populated areas
- Procedures and “rules-of-the road”
- Longer range applications

**Build 3 (January 2018)**
- Beyond visual line-of-sight
- Over moderately populated land
- Some interaction with manned aircraft
- Tracking, V2V, V2UTM and internet connected
- Public safety, limited package delivery

**Build 4 (March 2019)**
- Beyond visual line-of-sight
- Urban environments, higher density
- Autonomous V2V, internet connected
- Large-scale contingencies mitigation
- News gathering, deliveries, personal use