CERTIFLIGHT

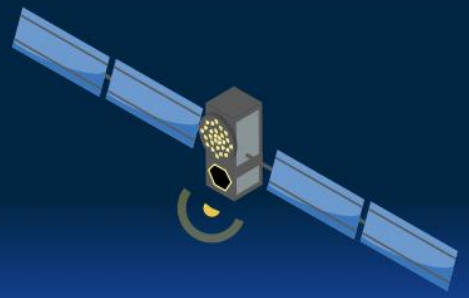
UpVision

Jakub Karas

certiflight

Funded by the European Union
HORIZON-EUSPA-2021-SPACE
Grant num. 101082484

Certiflight uses the Galileo OSNMA feature to certify the flight tracks of drones and ultralight aircraft inside VLL airspace



Call HORIZON-EUSPA-2021-SPACE-02-53
Innovation Action
Grant Agreement n. 101082484
Start: November 2022 End: April 2025
Project Coordinator: Topview s.r.l.
Project Value € 3.077.325
EU contribution € 2.291.602,50





CERTIFLIGHT

Certified E-GNSS remote tracking of drone and aircraft flights



certiflight

Problem statement

The rising number of **UAS** (drones) accessing the airspace and the increased complexity of their operations in **BVLOS** (Beyond Visual Line Of Sight) conditions, led to the introduction of specific rules and procedures for their use (**EU regulatory package 2021/664 U-space**) where UAS is expected to operate alongside ultralight and General Aviation aircrafts.

For this class of aircrafts and UASs, there is no certified component (aeronautical grade) ensuring position information trustable enough as evidential value from a legal perspective.

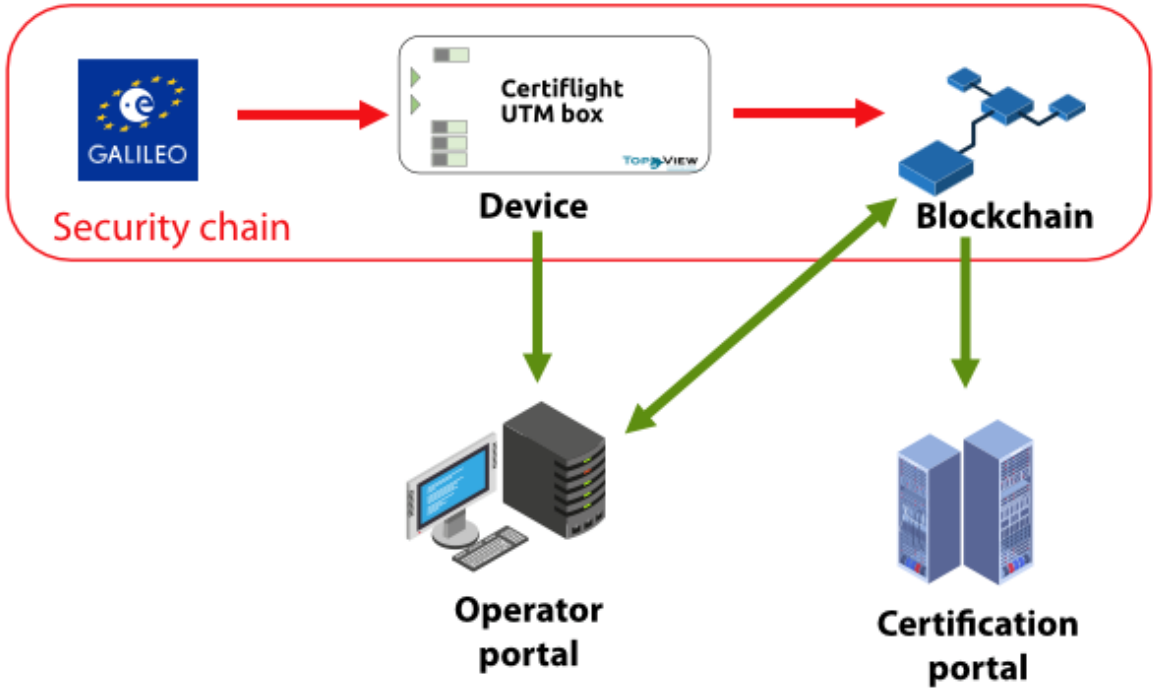
In this scenario, a solution that ensures the **authenticity of the position information** is needed for all the U-space stakeholders, especially for safety-critical and commercially valuable applications.





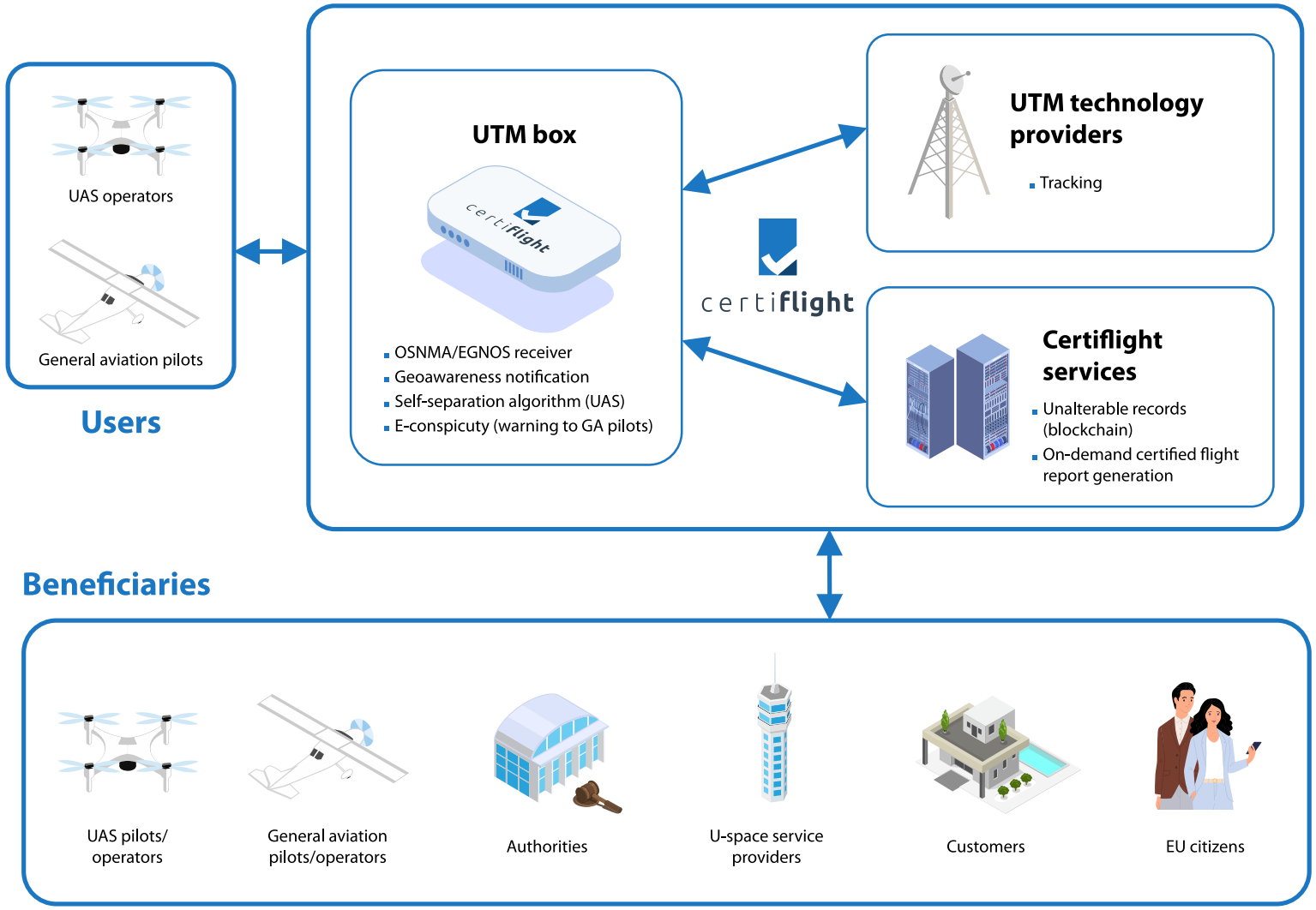
The CERTIFLIGHT Solution

- ✓ The Certiflight platform offers **a digital service for the generation of certified reports of flight tracks** and the flight logs of UAS and GA aircraft
- ✓ The core of the system is a **Digital EGNSS/IoT Device installed on UAS and General Aviation manned aircraft**, equipped with an **OSNMA Galileo/EGNOS enabled receiver**, capable to guarantee the **authenticity** of their position information at the **origin**, without the possibility to be counterfeited or spoofed.
- ✓ Tracking information is encrypted and once transmitted to the Certiflight platform is permanently stored to an **unalterable blockchain private node**.

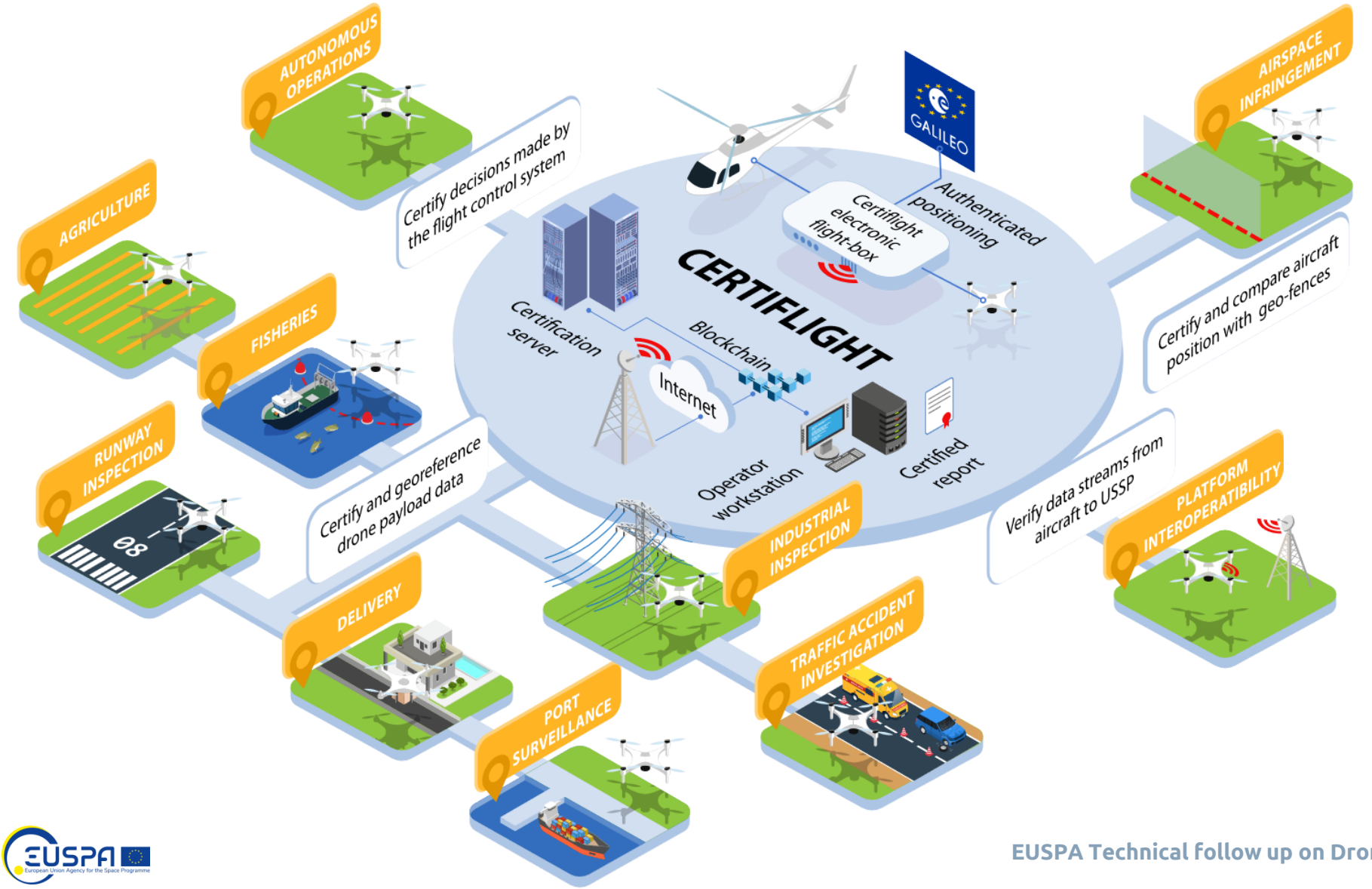


Concept

The CERTIFLIGHT project proposes a **new U-space service** for the legal certification of tracks generated by UASs and aircraft flights, through the introduction of a new **disruptive EGNSS-IoT digital system**.



Certiflight Conops and Use cases



Legal aspects

The intention of the Certiflight is also to exploit technological progress in the sphere of legal services with support of a Board of Lawyers. The solution may help institutions in providing tools capable of pursuing the two key principles of U-space: **automation** and **digitalization** with the help of **EGNSS services**



The CERTIFLIGHT aims to be recognised as a tool for:

- **Determining the parties' liability (legal defence tool).**
- **Activate specific contractual conditions based on UAS flight position information (i.e. Smart Contract)**



Currently this technology is about to be regulated. It can be accepted by both parties of the agreement, as a tool for to the verification and compliance with the negotiation and a way of execution of the contract.

- **EBSI - European Blockchain Service Infrastructure**
- **EBP - European Blockchain Partnership**
- **AGID - Agenzia per l'Italia digitale**

Certiflight Consortium

Granting authority EUSPA

Project coordinator	TOPVIEW LOOKING OVER
Business partners	d-flight, UPVISION, UNIFLY
Research centres and technology partners	DTA Distretto Tecnologico Aerospaziale, TSP, TU Delft, W4W Way4Ward
Consulting partners	Aria United business & funding consultancy, EUROUSC, EUROUSC

European Commission JRC Ispra

EUSPA GSC

ESSP

Supporting organisations

AOPA ITALIA, ASSORPAS, Comune di Bari, DroneR, enav, Fly Rise, Ministerstvo dopravy, Pipistrel Vertical Solutions, Salento Droni

ISO 23629-12/9

EUROCAE WG105 SG3/SG6

Main Results at RP1 (updated at May 2024)

- ✓ Invention of "**Authenticated Tracking**" concept and integration in 3 UTM service providers
- ✓ **Amendment of Standard ISO 23629/9**: Galileo **OSNMA** proposed (and accepted) as suitable implementation of authenticated tracking concept
- ✓ Contribution on Eurocae WG105 SG3 for Authenticated tracking concept (in progress)
- ✓ **Realization of Certiflight prototype platform** implementing Blockchain mechanism for generation of Post flight services (Certified flight report digitally signed)
- ✓ **Realization of Certiflight UTM Box** for drones where GNSS **OSNMA Receiver** is a compulsory part of the prototype
- ✓ Realization of Certiflight UTM Box for aircraft (prototype) with e-conspicuity features
- ✓ Algorithms **APP** and **GSD** with Data certification chain under **patenting process**
- ✓ Channels for marketing open in EU and Third Countries (i.e. Israel) where the product Topview Pollicino™ is already on the market
- ✓ Two demonstration performed in Italy (Bari and Grottaglie Airport – Apulia Region)

ISO DIS 23629-9 amended

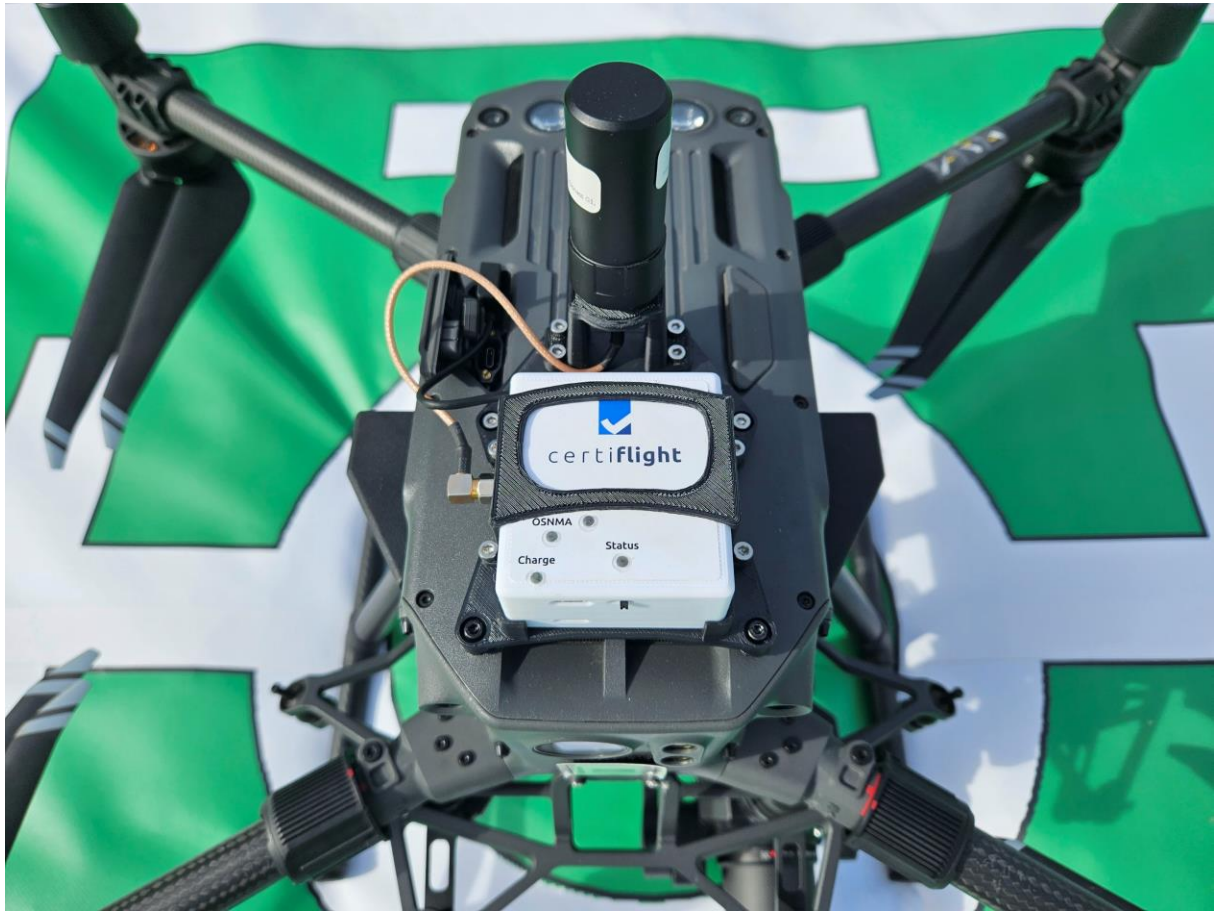
ISO/TC 20/SC 16/WG 4 **N 298**

ISO/TC 20/SC 16/WG 4 "UAS Traffic Management"
Convenorship: JISC
Convenor: Ichikawa Yoshiaki Dr

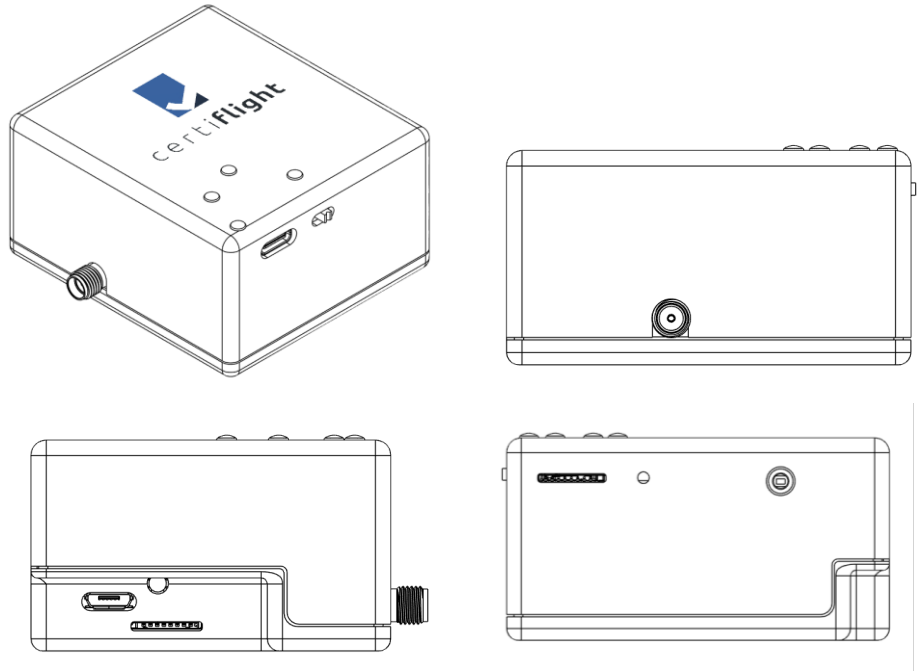
Re-revision of ISO_DIS__23629-9__Collated__Comments 20230708

IT-033		7.1	Table 13	te	Add a footnote related to authenticated tracking service	[1] The "Authenticated tracking service" is an extension of the "Tracking service" included in ISO 23629-12 Annex A Safety-critical UTM services. This service provides a more robust resiliency against GNSS spoofing and meaconing through the authentication of GNSS position, laying the foundation for certification of flight tracking with legal value. A possible implementation proposed by CERTIFLIGHT project relies on the GNSS service OSNMA offered by Galileo in combination with blockchain technology. Such implementation can be used also to address other Operation support services listed in ISO	Accepted We add the authenticated tracking service with footnote in Table 13.
IT-034		7.1	Table 13	te	Add a row in UTM services column between Tracking service and Real-time GIS, inserting "Authenticated tracking service". The "Authenticated tracking service" is an extension of the "Tracking service" included in ISO 23629-12 Annex A Safety-critical UTM services. This service provides a more robust resiliency against GNSS spoofing and meaconing through the authentication of GNSS position, laying the foundation for certification of flight tracking with legal value.	Authenticated Tracking Service proposed by CERTIFLIGHT project[1] – Unmanned Air traffic information	Accepted We add the row.

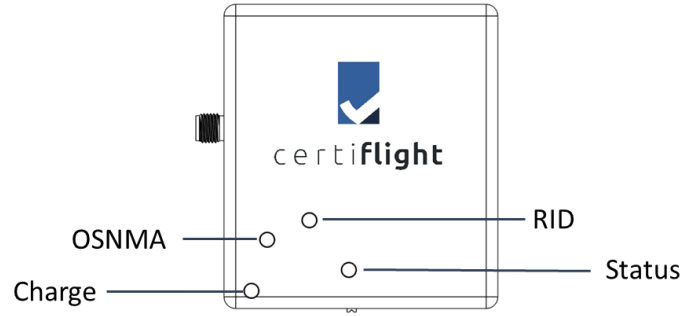
UTM Box Prototype



CERTIFLIGHT UTM Box installed on a DJI M300 RTK drone



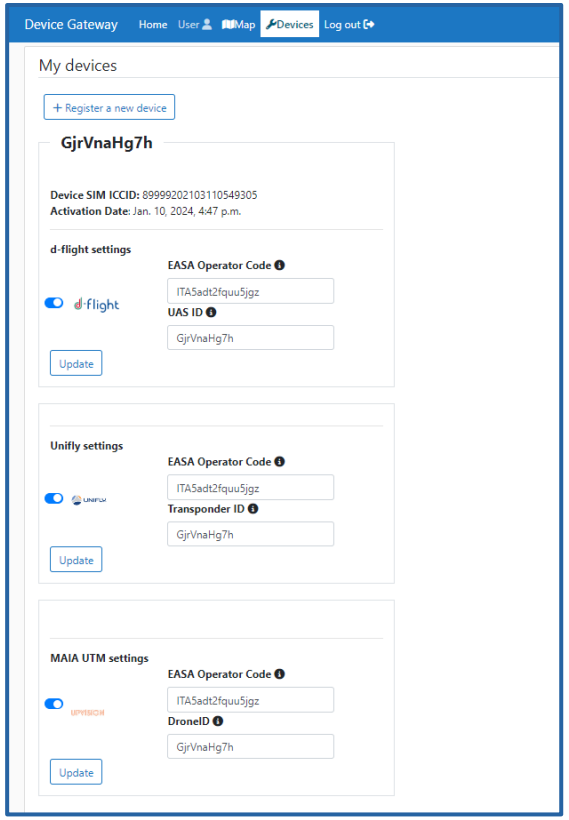
front, top and side view

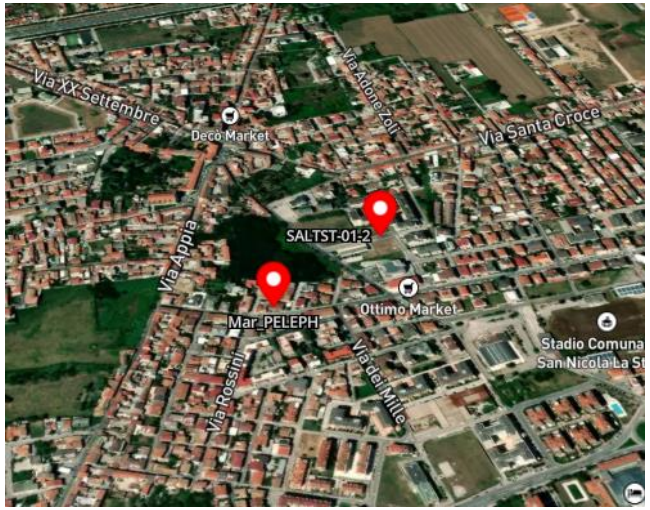


LED indicators

Map section

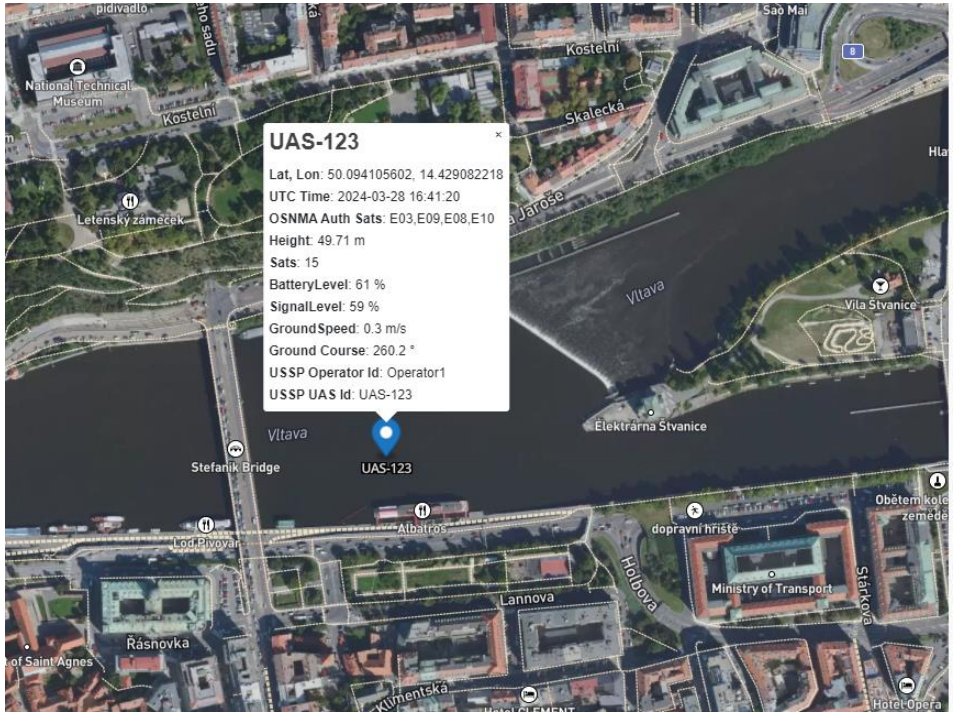
In the map section, user can view the location of active devices and the information transmitted to the USSPs



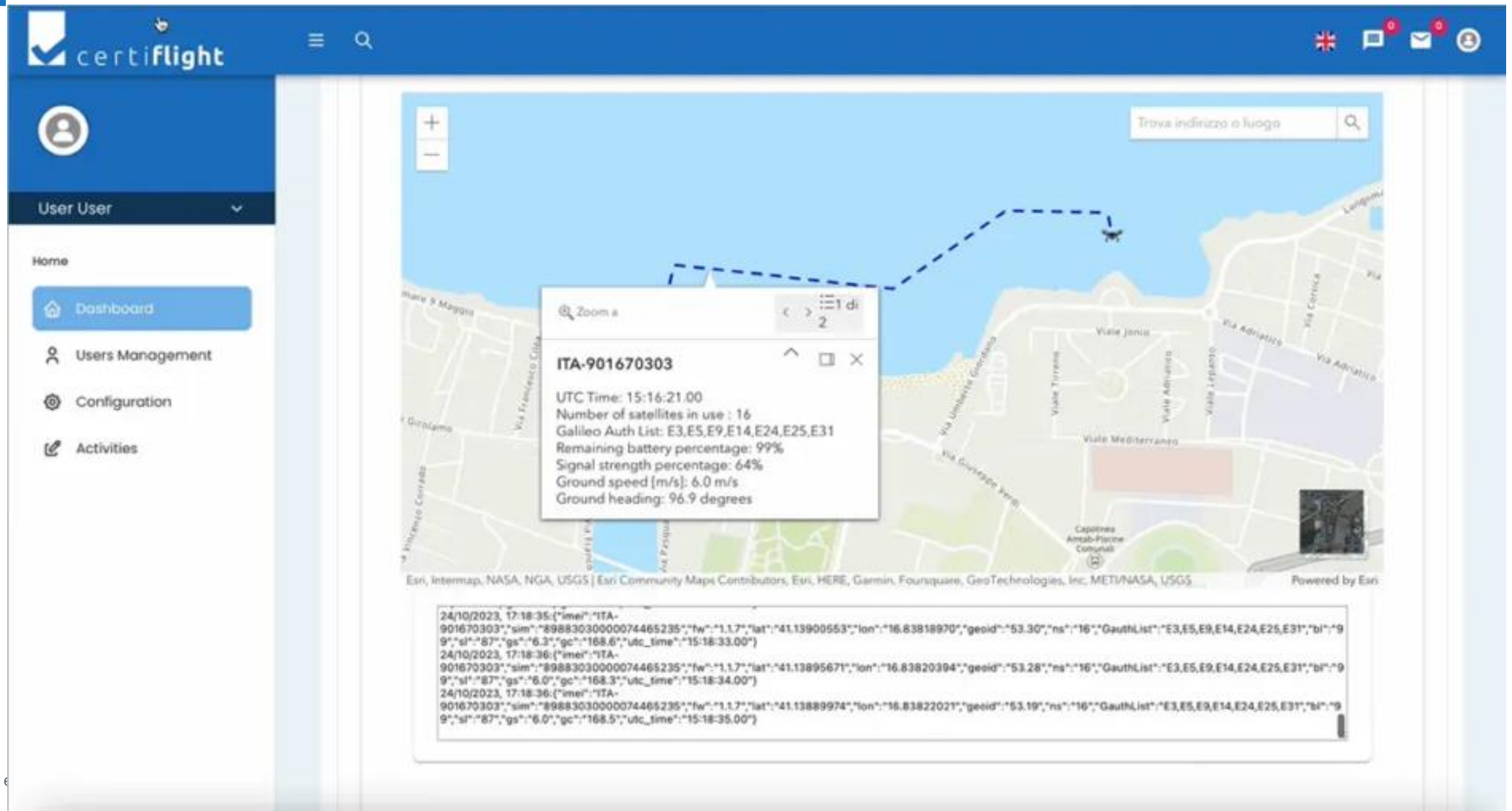


Non authenticated position

Authenticated position



Certiflight platform prototype



CERTIFLIGHT UTM services

- **In-flight services**

These are security-related services based on real-time data processing.

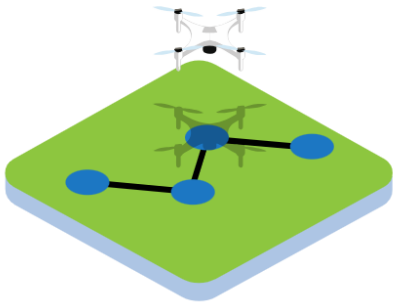
- **Post-flight Services**

The post-flight services are provided in the form of dedicated reports resulting from the processing and analysis of data gathered during the flight.

The data processed leads to the generation of two kinds of flight reports:

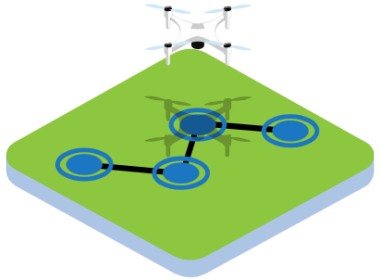
- **Basic report:** Based only on in-flight services data that are transmitted by the Certiflight UTM Box (only) in real time to Certiflight platform. This data includes authenticated positioning, time, UAS attitude, navigation parameters and ancillary telemetry data. The basic report offered by Certiflight platform is available right after the flight and it is generated using only the data transmitted by the UTM Box.
- **Full Report:** Provides additional information generated from the data logged on the UTM Box. In fact, some data including attitude data, GNSS Observables and UAS payload data, cannot be transmitted in real time, due to the narrow band digital channel used for data transmission, therefore such data will be stored onboard the UTM Box. To generate the full report, the user must download the UTM Box data to Certiflight portal with an authenticated mechanism.

CERTIFLIGHT UTM in-flight services



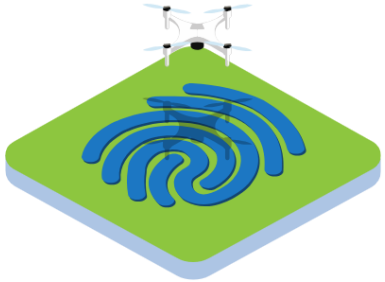
Service 1
Tracking service

The **tracking service** plays a crucial role for U-space, as it allows U-space service providers to display, monitor and predict the movements of unmanned aerial systems (UAS) in the airspace. Helps to improve safety and avoid potential conflicts between aircrafts. It is essential that services such as monitoring, tactical conflict prediction and traffic information have access to tracks rather than observations to ensure accurate and effective airspace management.



Service 2
Authenticated Tracking Service

The **authenticated tracking service** is intended as an extension of the tracking service included in ISO 23629- 12 Annex A Safety-critical UTM services. This service aims to increase the robustness and the resiliency against GNSS spoofing and meaconing through the authentication of GNSS position exploiting new GNSS authentication features. The authenticated tracking is a real time service that USSPs can exploit to inject authenticated tracking data in their systems. The implementation proposed by Certiflight project relies on the GNSS service OSNMA offered by Galileo in combination with blockchain technology.



Service 3
Remote Identification Service

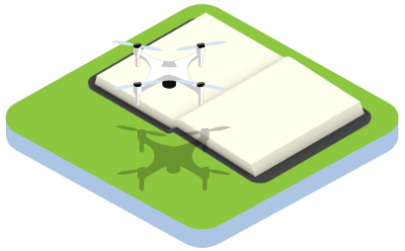
Remote identification is a service which allows governmental and civil identification of UAS for safety, security, and compliance purposes. The objective is to increase UAS remote pilot accountability by removing anonymity while preserving operational privacy for remote pilots, businesses, and their customers.

CERTIFLIGHT UTM post-flight services



Service 4
Legal Recording Service

Legal Recording Service is intended to assist in the investigation of claims and incidents. The service must guarantee the recording of all information transmitted in the U space and allows a complete view of the state of the system, always.



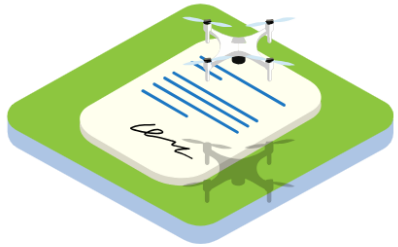
Service 5
Digital Logbook Service

The **Digital Logbook Service** extracts information from Legal Recording to produce relevant reports for users of the service. It allows drone operators and pilots to see information summaries of the flights: start and end times, locations, aircraft id, distance, track, etc.



Service 6
Accident and Incident Report Service

The **Accident and Incident Reporting Service** allows reporting of accidents and incidents. The service is intended to also represent a single storage point for reports, throughout their life cycle and for this reason, given the nature of the information it contains, it must be secure and allow access only to people authorized to process data.



Service 7
Smart Contract Management Service

Smart contracts are simple agreements *if/when/where...then...*statements that are written into code on a blockchain structure. From the operational point of view, the **Smart Contract Management Service** can be used to control the four key steps of these particular agreements: Conclusion of the contract, Blockchain validation, UAS as oracle, and Execution.

Thank you for your attention!

certiflight

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