LEONARDO ELECTRONICS

UTM
UNMANNED
TRAFFIC MANAGEMENT

The range of civil applications of Unmanned Aerial Vehicles (UAV) is rapidly growing. Main application areas are territorial security, infrastructure monitoring, remote sensing, aerial photography, environmental and natural disasters monitoring, search and rescue operations, video recordings.

Most drone operations are currently performed outside the controlled airspace, where no air traffic or management services are provided. This uncontrolled airspace is the Very Low Level (VLL) volume spanning up to 500 feet (120 metres) above ground. The VLL airspace is shared with other users such as General Aviation, helicopters, gliders, balloons, and micro-lights. Drones operation in this airspace could endanger safety, security, and privacy of citizens. The Leonardo UTM system allows various actors to interact in a controlled ecosystem.

Different services can be created based on drones and their ability to carry on air missions independently. Possible applications include numerous sectors and areas of action such as public order management, urban security, logistics, agriculture, monitoring of weather conditions, media/entertainment (aerial photographs, coverage of large events, etc.), monitoring of infrastructures and networks (gas and oil pipelines, railways, etc.), survey and control of large and complex territories (borders, flooded areas, etc.).

LEONARDO UTM SOLUTION

Leoanrdo UTM system provides low-altitude air traffic management services for remotely piloted aircraft and all other types of aircraft that fall into the Unmanned Aerial Vehicles (UAV) category. Portion of airspace falling below 150 m are considered as the key element for safely operating drones, in all kind of scenarios and missions.
The U-space platform developed by Leonardo allows safe handling of registered unmanned aircraft –certified, authenticated and identified across civil airspace. Monitoring and flight planning, managing of emergencies, recording of flight data, layered geo-referenced information including AIS, applicable rules of flight, and published no-fly zones are provided.

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Leonardo U-space platform is web-based and remotely accessible by stakeholders through standard Web Browsers. Leonardo U-space platform is also designed as "Platform of Services", capable to integrate additional SW solutions such as payload cloud data storage.

WEB AND MOBILE UTM PLATFORM

Leonardo UTM system is based on SOA (Service Oriented Architecture) principles and, specifically, on a modern micro-service architecture integrated with third-party modules by means of Application Programming Interfaces (APIs). The system is designed for deployment and execution on (public or private) Cloud Infrastructures adopting latest technologies like Docker and Kubernetes. Those are accessible via web browser and mobile applications. The system also integrates Business Intelligence capable to perform analytics and obtain reports on data stored in the system.

Thanks to the modular architecture of the D-flight platform is possible to transfer services from monolithic architectures to European Aviation Safety Agency (EASA) architectures. The SOA based architecture, allows the creation of a distributed U-Space into which CISP (Common Information Service Platform) and USP (U-Space Service Platform) can be differentiated and distributed.

KEY TECHNOLOGICAL DRIVERS

· Strategic de-confliction providing de-confliction assistance to a drone operator at strategic level (for instanc a submitted flight plan is compared to other acquired plans and a de-confliction algorithm proposes time and/or route way-outs)
· Dedicated Tracking API allowing ease integration to an UTM box or a UTM/GCS-mounted transponder subsystem
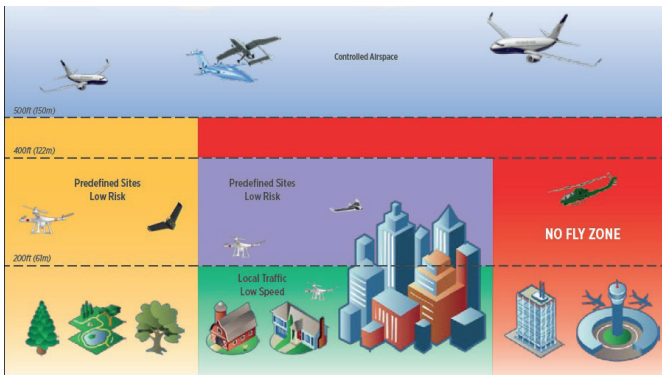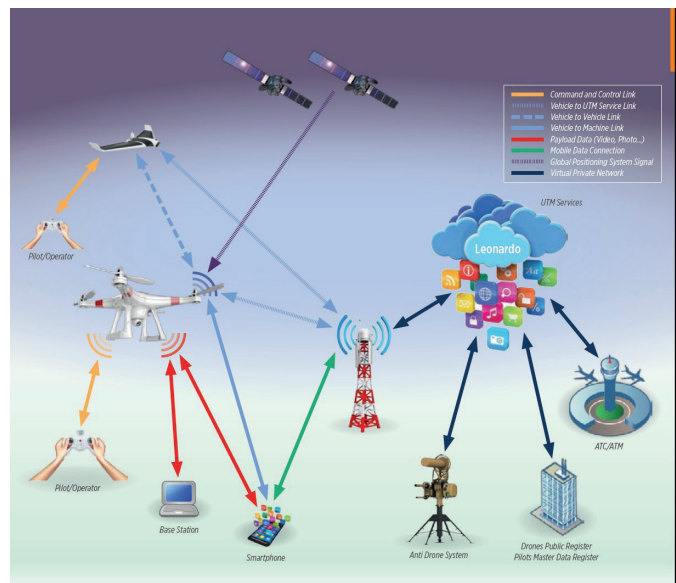
· Conformance monitoring service generating warnings in case of potential unsafe events and potential violation of known constraints
· Automatic warnings and alerts dispatched to operators via mobile app or web client
· Tactical deconfliction service monitoring UAS vs UAS and UAS vs manned aircraft separations

TECHNICAL FEATURES

The following table shows the categories of drones and relevant dynamical and performance parameters. Threat performance parameters are those considered within the monitored infringement zones.

Categories	Weight [kg]	Type	Payload [kg]	Cov.rage [km]	Speed [km/h]	Endur. [h]	Alti.de [m]	RCS [dBm²]
NANO	<0,5	FW, RW	<0,1	<1,5	0,8	<0,5	<100	-30
MICRO	<2	FW, RW	<1	<10	0,1	<1,5	<1500	-20/-25
MINI L.HT	<10	FW, RW	<5	<25	0,15	<3	<3000	-10
MINI H.VY	<25	FW, RW	<12	<50	0,18	<5	<4000	-6
SMALL	<150	FW, RW	<50	<50	0,3	<12	<6000	0

Threat	Reference size [cm^3]	Weight [Kg]	Max speed [Km/h]	Typical altitude [m]	Minimum RCS [dBm²]
Class I - micro	25 x 25 x 30	< 2 kg	80	100	-20 (objective -30)

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