



Universal Virtual Flight Data Recorder



Global Aeronautic Distress and Safety System as a Service

The key to improving operational safety is having an understanding of the root cause and contributing factors of each accident so that any reoccurrence can be prevented. Crash-protected flight recorders (Black Boxes) have therefore played a pivotal role in making aviation as safe as it is today.

Recovering flight recorders aircraft involved in incidents or accidents can take a long time and considerable effort, and the recovery of useful data is not guaranteed. Where the flight ends away from an airfield, especially in remote, mountainous, or oceanic areas, finding the location where the flight ended can be a challenge. Getting there is often further hampered by weather, vegetation, terrain, political tensions, or the depth of an ocean.

Recognising growing pressure in the wake of several high-profile accidents over the past 20 years, the International Civil Aviation Organisation (ICAO) has led the creation of standards and recommended practices for a Global Aeronautic Distress and Safety System (GADSS). GADSS includes provisions and related performance requirements for Global Aircraft Tracking (GAT), Autonomous Distress Tracking (ADT), the Timely Recovery of Flight Data (TRFD), autonomous and manual triggering of a distress alert as well as post-flight localisation and rescue support.

CGI is leading a consortium in the development of the Universal Virtual Flight Data Recorder (UVFDR), offering GADSS as a service.

A significant increase in the data communication bandwidth available from a growing number of mobile satellite service networks has brought the price of satellite data connectivity down significantly, allowing a growing fleet of aircraft to be equipped with high-speed connectivity for their passengers and crew. With the volume of critical flight data being very small compared to the data volume required by most other users, even the continuous transmission of flight data for monitoring (FDM) and flight operations quality assurance (FOQA) becomes economically feasible and desirable. The benefits to the operator increasingly outweigh the costs incurred by the service.

The UVFDR service replicates the function of a traditional crash-protected flight recorder in a virtual, cloud-based environment by storing the data transmitted by an airborne aircraft in an assured, authenticated and provenance-controlled system. This way, the UVFDR service will be able to provide all functions needed to enable GADSS compliance for suitably equipped aircraft. In case of an emergency, incident or accident, access to that data is available almost immediately.

Easy and cost-effective integration with existing FDM and FOQA services.

The UVFDR is designed for use on any aircraft equipped to send engineering telemetry and operational data to the ground while in flight, irrespective of the type of equipment through which the data is sent. Providers of such services, like our industry partner SatAuth, can add the UVFDR service to their portfolio of customer-focused solutions. CGI can offer the service globally through existing aviation data service providers and can remain impartial to investigations. The UVFDR therefore addresses flight data storage and alerting requirements outlined in EASA's recently published Quick Recovery Flight Recorder Data (QR-FRD) study.

In addition to airliners and other large transport aircraft, the UVFDR service can also be tailored for use with any data transmission hardware and service available to smaller aircraft whilst in flight, where the carriage of a fixed recorder is not mandated. This includes business aviation, general aviation and charter operations. The UVFDR can increase the level of safety especially for fleets routinely operating across sparsely populated areas, such as for the provision of supplies and medical services to remote communities.

With future Advanced Air Mobility aircraft designed to provide widespread commercial passenger services, regulators and accident investigation authorities have expressed an expectation that the safety levels of commercial jet passenger transport aircraft will be reached. The flight recording solutions necessary to support this will inevitably need to record data transmitted over the network infrastructure in use for uncrewed traffic management (UTM) and for the command and control of uncrewed aerial vehicles (UAV). The UVFDR, by its very nature, can deliver this functionality, offering valuable insights into the operational safety of these new vehicles before accidents occur.

Built on CGI TrustedFabric, the UVFDR provides a secure, authenticated, and impartial trusted truth that can be validated globally.

CGI TrustedFabric is a proprietary blockchain solution for the secure storage of highly sensitive data hosted on the cloud. The UVFDR is scalable, and a future commercial service can be made available globally. The technology also offers the potential to support additional services, such as improved technical support for aircraft in flight, and integrated flight recordings for remotely piloted and advanced air mobility (RPAS and AAM) vehicles together with their remote pilot stations and traffic management systems. The UVFDR technology therefore offers the potential to provide airspace data integration solutions for future air navigation services.

CGI is working together with industry partners SatAuth, Code Magus Ltd, Cranfield University, and Amazon Web Services (AWS), along with other stakeholders, towards a global UVFDR service. The development and operational demonstration are supported by the UK Space Agency and the European Space Agency through the ARTES – Space Systems for Safety and Security (4S) programme.



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We are an IT Systems Integrator working to advise, build and operate bespoke, technically complex, mission-critical information systems. Bringing innovation to our clients using proven and emerging technologies, agile delivery processes and our expertise across space, defence, intelligence, aerospace and maritime, all underpinned by our end-to-end cyber capability.

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