Whitepaper

Why aircraft data downloading wirelessly is good

Introduction

Safety of an aircraft is always a high priority for an airline or operator. Monitoring of the aircraft safety data can be a tedious, costly, and labor-intensive process, which needs constant monitoring, analysis, and expertise.

The major Challenges faced by Airlines, Corporate and Business jet Owners to accomplish this are:

- To have access to **flight data** within minutes of landing.
- Need for lightweight, reliable, and secure, immediate transfer of data.
- Need for continuous and fully automated recovery of **aircraft data**.
- To have full operational control over its **data distribution** and analytics to ensure the best possible outcomes.
- Airline's requirement for **quick access to data** and standardization of their fleet under one platform.

Solutions present in the Aviation Industry

The aviation community is under constant pressure to achieve safety improvements.

The present solutions for analyzing flight data are Flight Data Monitoring (FDM) or Flight Operations Quality Assurance (FOQA). These are often part of a larger the Safety Management Systems (SMS) at a given operator. Specialized hardware helps to capture specific parameters from the aircraft Recorders and then transfer manually or wirelessly the key preselected data for further analysis and insights. Flight Data Analysis is the process of analyzing recorded flight data to improve the safety of flight operations.

Today Operators share the need and requirement for quick access to data and standardization of their fleet under one platform as important for FDM success.

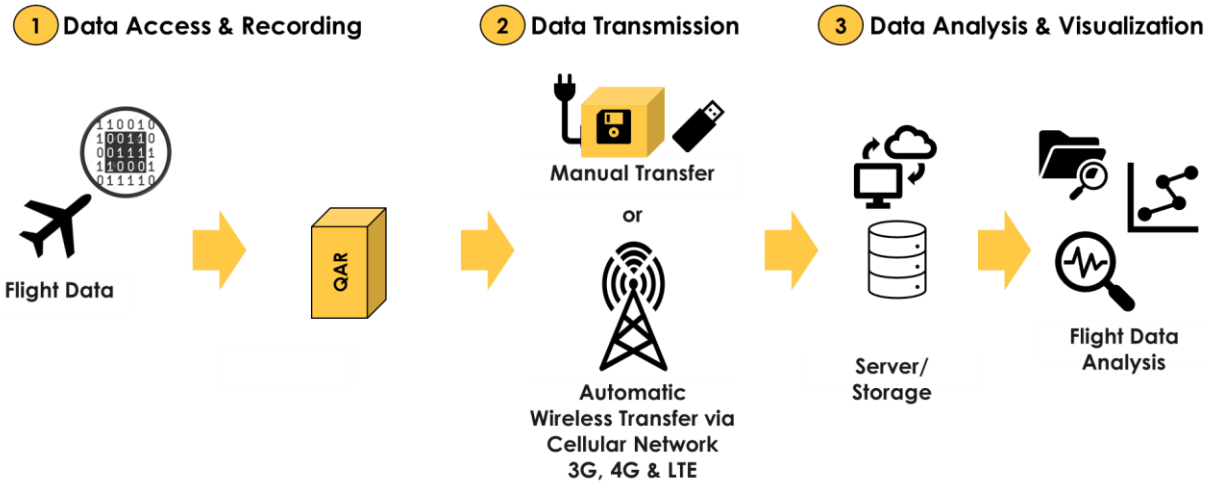

Figure 1 - Aircraft flight data monitoring (FDM) system

A Quick Access Recorder (QAR) or related hardware collects and stores the aircraft operational data. The data is then transferred from aircraft to designated servers either manually or wirelessly. However, it's not all about the hardware, it's using the data that helps to give insights through analysis to airline operation teams. Getting **all** the data, in a timely manner, can drive additional use cases, resulting in better decisions faster.

Wireless versus manual Data Download options

All QAR have a manual download option available. Dedicated personnel must regularly go to the aircraft to manually remove the recording media or access QAR ports. If connecting to a port, a cable is attached to download the required data and bring to a specific computer to transfer the data in the files for further flight data analysis (FDA).

The wireless option is very simple, secure, and useful for transferring the data to the servers within minutes after landing the aircraft.

Wireless delivery enables automated data transfer to and from the aircraft through existing cellular or Wi-Fi networks enabling FOQA/FDM programs. While it is straightforward that this increases the timeliness of the availability of the data, it has also been shown to significantly increase the percentage of flights that are successfully provided to the FDA systems.

Traditional FDA does not rely on receiving data from every flight immediately. These programs monitor events, and the trends of events over time. However, the industry continues to find new use cases to improve safety and efficiency as the data delivery improves. Following are examples of a few use cases that take advantage of the wireless delivery. This is important for all operators, regardless of size or aircraft type.

Use Cases

Flight Crew

- Many airlines are implementing pilot debrief tools.
- Insights are available quickly after every flight resulting in immediate feedback and higher reinforcement for flight crews.

Maintenance Crew

- Mechanics can focus on their primary jobs, fixing aircraft versus manual downloading data and using "sneaker net" to upload to the FDM system
- Faster Data transfer for FDM/FOQA software analysis
- AOG and other alerts accessible through their FDM software
- Data for AOG maintenance, e.g., hard landings, flap overspeeds, etc.

Benefits include improved aircraft maintenance operations resulting in cost-saving, such as reductions in gate delays, maintenance interruptions and cancellations, deferral rates, component removals, logbook errors and compliance issues, and lost revenue due to the maintenance impact on passenger loyalty. The wireless QAR will help operators to streamline their processes, reduce workload for their maintenance and engineering teams, while increasing the amount of usable data available.

Comparison of Manual vs Wireless data transfer Process

#	Manual Data Transfer	Wireless Data Transfer
1	Breakdown of process – 70% data capture rates	99.8% of data capture – Highly Reliable capture rates & Secure transmission
2	Labor intensive –dedicated personnel needed	Automatic and no dedicated personnel needed
3	Data is not available quickly – Delay can be expected	Data is available quickly within minutes of landing (<15Mins)
4	No immediate insights from FDM/FOQA Analytics. Manual transfer to ground station delays analysis and insights.	Immediate insights from FDM/FOQA Analytics – Flight crew through Pilot debriefs Maintenance crew is benefitted from Insights on AOG or alerts.
5	Local dedicated personnel needed – Limited access to data	Automatic and 24/7/365 available through global Cellular Service Provider – Anytime and anywhere

Conclusion

Wireless technology is on its way to becoming standard to transmit QAR data without the need for manual handling. This will lower the cost of data recovery and increase the timeliness and availability of the data. WIRELESS ADVANTAGE is the key outcome as your flight data is always within reach, and you can make quick money-saving decisions on maintenance and operations. It also avoids the cost of media handling, data can be sent from anywhere in the world to your Headquarters, OEM, and/or FOQA providers facility simultaneously without lifting a finger, all through wireless solutions. The data transmitted from your aircraft can be used with your FDM solution to get Information accessible including flight data, platform analysis, statistical reports, and 4D replay of all flights for any aircraft in your fleet. FDM is an efficient input to SMS for flight operations. The safety value is priceless with automatic data downloading and insights developed through FDM and Analysis.

Abbreviations

1. AID - Aircraft Interface Device
2. DFDAU - Digital Flight Data Acquisition Unit
3. FDAU - Flight Data Acquisition Unit
4. FDA or FDAP - Flight Data Analysis (Program)
5. FDIMU - Flight Data Interface Management Unit
6. FDM - Flight Data Monitoring
7. FDMP - Flight Data Monitoring program
8. FDR - Flight Data Recorder
9. FOQA - Flight Operations Quality Assurance
10. PCMC - Personal Computer Memory Card
11. QAR - Quick Access Recorder

How can Avionica help you to solve your flight data recording challenges?

There are still plenty of QAR options available that do not have wireless options or are heavy and the total cost of ownership is high.

The Avionica suite of products is the aviation industry's smallest and lightest wireless and most robust flight data solution and provides secure and reliable data transfer in seconds. Avionica's modular flight data management solution includes two flight data recorder options and three unique installation options to best fit your Flight Data Management needs. Our extensive STC's cover hundreds of aircraft types. Not sure which one you need? Our aircraft engineering experts will help choose the perfect installation for your operations. Explore our Seamless Solutions for customized solutions and services.

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