ARINC Project Initiation/Modification (APIM)

Name of Proposed Project 23-xxx

ARINC 834A Supplement 1 to include interface, protocols, and security for Electronic Flight Bag (EFB) applications to send data to the Flight Management System (FMS).

Software specification only yes ☑ no ☐

1.1 Name of Originator and /or Organization

GE Aviation Systems on Behalf of the EFB Subcommittee

Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

EFB Subcommittee

2.2 Support for the Activity (as verified)

Airlines: Air France-KLM, American, Austrian, Delta, FedEx, Lufthansa, Southwest, United, UPS

Airframe Manufacturers: Airbus, Boeing

Suppliers: Astronics AES, Astronautics Corporation, Collins Aerospace, GE Aviation Systems, Lextech, Lufthansa Systems, NAVBLUE, Teledyne

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: Delta, Lufthansa, Southwest

Airframe Manufacturers: Airbus, Boeing

Suppliers: Astronics AES, Astronautics Corporation, Collins Aerospace, GE Aviation Systems, Lextech, Lufthansa Systems, NAVBLUE, Teledyne

2.4 Recommended Coordination with other Groups

The EFB Subcommittee will coordinate with other subcommittees as needed.

The following specifications and activities might be relevant to this topic:

- ARINC Specification 679: Aircraft Server, Communications, and Interface Standard
- ARINC Characteristic 702A: Advanced Flight Management Computer System
- ARINC Characteristic 759: Aircraft Interface Device (AID)

Project Scope (why and when standard is needed)

3.1 Description

There is an increasing desire to enable an EFB application to send data directly to the FMS instead of having the flight crew enter data manually. This data can range from flight plans to performance data where manual entry can be cumbersome and prone to errors.

Most FMS' can already receive essentially all data that can be entered manually by the flight crew via Airline Operational Center (AOC)/ACARS data link. This is

defined in ARINC 702A ATTACHMENT 7 (FMC/DATALINK INTERFACE). This interface can be somewhat “obscure” to non-data link experts and it should not be up to an EFB application developer to learn it. There are also subtle differences between different FMS implementations.

The purpose of this project is to develop Supplement 1 to ARINC 834A that defines a simple Application Programming Interface (API) to be implemented in an AID. The EFB application developer will then only have to learn that interface.

This project will only provide an API for an initial sub-set of the most commonly used data/parameters that can be entered into the FMS until the need for more parameters/messages has been established.

There will also be guidance for AID manufacturers to map the API to an Airline Operational Center (AOC)/ACARS message that most FMS’ can already process. The guidance will only go as far as providing examples purely based on ARINC 702A ATTACHMENT 7. Differences between FMS’ will have to be addressed by the implementer.

It is not the purpose of this project to define how the AOC/ACARS message will be delivered to the FMS. This could be via the CMU but also by other means.

3.2

This project will only address data/messages and not cybersecurity needs. It is paramount that the implementer and system integrator appreciate that the FMS is a critical system in the Aircraft Control Domain (ACD) and will thus have to be protected when exposed to external entities. The intended functionality described here could enable a significant increase in cybersecurity through using modern communications and encryption. Currently data is sent to the FMS via ACARS (typically via Flight Plan uplink before flight). Depending on the ACARS MU (e.g.: CMU/ATSU) used, this data cannot be digitally signed and can be encrypted weakly or not at all.

Using an EFB, this data can be received from ground encrypted and signed with state-of-the art technologies. The EFB can then send this data to the A834A server via an encrypted and authenticated interface before it is forwarded to the FMS. Therefore, it would be possible to have encrypted data transfer up to the ACD border as well as encrypted and signed data transfer at least up to the pilot interface (the EFB) where data can be manually evaluated. Furthermore, on the EFB uplink, additional metadata can be added to the signed data such as the Operational Flight Plan (OFP) number, to which a flight plan uplink should be linked, which is an additional parameter for verification by the flight crew. Some airlines already transfer encrypted and signed data via ACARS using the EFB. With this proposal it would be possible to uplink FMS data encrypted and signed over ACARS and without any modification to the existing ACARS hardware needed. Planned usage of the ARINC Standard:

New aircraft developments planned to use this specification	yes ☒ no ☐
Modification/retrofit requirement	yes ☒ no ☐
Needed for airframe manufacturer or airline project	yes ☐ no ☒
Mandate/regulatory requirement	yes ☐ no ☒
Is the activity defining/changing an infrastructure standard?	yes ☐ no ☒

Are 18 months (min) available for standardization work? yes ☒ no ☐

Are Patent(s) involved? yes ☐ no ☒

3.3 Issues to be Worked

- Develop a simple API that abstracts the complexity of interfacing with the FMS away from EFB application developers.
- Help AID developers understand how to translate this simple API into data the FMS understands. This will focus on the defined sub-set of FMS functionalities to interface with. The challenge is where FMS' differ in their implementation from the already-defined data path into an FMS per ARINC 702A ATTACHMENT 7.
- Consider safety and (cyber) security aspects.

3.4 Security Scope

Is Cyber Security Impacted (if YES, check box(es) below) yes ☒ no ☐

Aircraft Control Domain yes ☒ no ☐

Airline Information Services Domain yes ☒ no ☐

PAX Information and Entertainment Systems yes ☐ no ☒

RTCA DO-326A

RTCA DO-356A

It is paramount to address all potential security concerns.

Benefits

4.1 Basic Benefits

The main benefit from this work is to leverage modern technology provided through tablet EFBs when interfacing with an FMS.

Operation enhancements yes ☒ no ☐

For equipment standards:

a) Is this a hardware characteristic? yes ☐ no ☒

b) Is this a software Characteristic: yes ☒ no ☐

c) Interchangeable interface definition? yes ☒ no ☐

d) Interchangeable function definition? yes ☒ no ☐

If not fully interchangeable, please explain: _____

Is this a software interface and protocol standard? yes ☒ no ☐

Product offered by more than one supplier yes ☒ no ☐

The purpose of this proposed project is to provide a common interface to the FMS while also reducing complexity through a simplified API.

4.2 Specific Project Benefits

The ability to send data from an EFB to the FMS will reduce crew workload and reduce entry errors, as well as enabling an increase in cyber security.

4.2.1 Benefits for Airlines

This update will make it easier for airlines to develop EFB applications that communicate with the FMS even when being used on different airframes. The EFB applications will have less complexity as the translation layer of data to specific FMS' will be handled by an AID.

4.2.2 Benefits for Airframe Manufacturers

There is also benefit to airframe manufacturers in that they will be able provide the same common interface to the FMS for their own connectivity solutions.

4.2.3 Benefits for Avionics Equipment Suppliers

They can offer a standardized interface to the FMS which allows airlines to use simpler EFB applications that can communicate with the FMS on different airframes.

Documents to be Produced and Date of Expected Result

Supplement 1 to ARINC 834A by June 2026.

5.1 Meetings an Expected Document Completion

The following table identifies the number of meetings and proposed meeting days needed to produce the documents described above.

Activity	Mtgs	Mtg-Days (Total)	Expected Start Date	Expected Completion Date
Supplement 1 to ARINC 834A	*Monthly 2-hour virtual meetings*	*Semi-annual 3-day virtual meetings, with additional TBD*	*6/2023*	*6/2026*

Comments

None

6.1 Expiration Date for the APIM

December 2026

Completed forms should be submitted to Sam Buckwalter
(sam.buckwalter@sae-itc.org)
AEEC Executive Secretary & Program Director