

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 17-005

Timely Recovery of Flight Data (TRFD)

1.1 Name of Originator and/or Organization

Boeing / Jessie Turner

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

Group: Global Aeronautical Distress and Safety System (GADSS) Working Group of the Systems Architecture and Interfaces (SAI) Subcommittee

Chairman: Charles Adler, Boeing

2.2 Support for the activity

Airlines: American, Delta, FedEx, Lufthansa, Southwest, TAP, United, UPS

Airframe Manufacturers: Airbus, Boeing, Embraer

Suppliers: ACSS, Honeywell, Rockwell Collins, Teledyne, Thales

Others: Inmarsat

2.3 Commitment for Drafting and Meeting Participation

Airlines: American,

Airframe Manufacturers: Boeing, Airbus

Suppliers: TBD

Others: Inmarsat

2.4 Recommended Coordination with other groups

AEEC: Digital Flight Data Recorder (DFDR) Subcommittee

ICAO: Flight Operations Panel – Flight Recorder Working Group

ICAO: Frequency Management Panel

3.0 Project Scope

3.1 Description

The difficulty in timely recovery of flight data from aircraft crash sites has prompted accident investigation agencies to request ICAO to update Annex 6, Part 1 (Operation of Aircraft – International Commercial Air Transport – Aeroplanes) standards. ICAO has recently updated §6.3 *Flight Recorders* standards to add a new sub-section “6.3.5 Flight recorder data recovery”. This new sub-section 6.3.5 states the following:

6.3.5.1 All aeroplanes of a maximum certificated take-off mass of over 27 000 kg and authorized to carry more than nineteen passengers for which the application for type certification is submitted to a Contracting State on or after 1 January 2021, shall be equipped with a means approved by the State of the Operator, to recover flight recorder data and make it available in a timely manner.

6.3.5.2 In approving the means to make flight recorder data available in a timely manner, the State of the Operator shall take into account the following:

- a) the capabilities of the operator;
- b) overall capability of the aeroplane and its systems as certified by State of Design;
- c) the reliability of the means to recover the appropriate CVR channels and appropriate FDR data; and
- d) specific mitigation measures.

Note.— Guidance on approving the means to make flight recorder data available in a timely manner is contained in the *Manual on Location of Aircraft in Distress and Flight Recorder Data Recovery (Doc 10054)*.

Note: At the time of writing of this APIM, ICAO Doc 10054 has not been published (nor drafted). A draft Doc 10054 is expected by the end of 2017.

The ICAO Annex 6 update also added a definition for an *Automatic deployable flight recorder (ADFR)* – A combination flight recorder installed on the aircraft which is capable of automatically deploying from the aircraft, and includes an APPENDIX 8 which provides a list of requirements that an ADFR must meet.

However, there is no specific ICAO Annex 6 requirement that an ADFR must be installed. Besides ADFRs, timely recovery of flight data could also be provided by Flight Data Streaming from the aircraft.

In order to address a potential Civil Aviation Authority (CAA) mandate for Timely Recovery of Flight Data in the most effective way (accounting for system complexity, cost, schedule, risk, etc.), the aviation industry needs to:

1. Document the end-to-end system requirements that will be levied by ICAO and individual Civil Aviation Authorities (CAAs), including documenting certification and operational requirements, and Acceptable Means of Compliance.
2. Develop candidate architectures (both at the aircraft-level and on-ground systems) that would meet these system-level requirements
3. Choose an architecture(s) in which to develop detailed equipment and aircraft installation requirements, as well as ground system requirements, so that:
 - Equipment suppliers can proceed with development of equipment that can be installed on multiple platforms
 - Airlines and OEMs can plan/proceed with aircraft installation changes.
 - Airlines can make any necessary changes (as required) within their Airline Operations Centers (AOCs)

3.2

Planned usage of the envisioned specification

New aircraft developments planned to use this specification yes no

Specify: To comply with potential TRFD mandates

Modification/retrofit requirement yes no

Specify: Only if required by potential TRFD mandates, or to support owner/operator fleet commonality goals

Needed for airframe manufacturer or airline project yes no

Specify: To comply with potential TRFD mandates

Mandate/regulatory requirement yes no

Potential forthcoming mandates for TRFD.

Is the activity defining/changing an infrastructure standard? yes no

Specify: TBD

When is the ARINC Standard required? Jan. 2021

What is driving this date? Expected TRFD mandates of Jan. 1, 2021 (for new type certification applications).

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

Are Patent(s) involved? yes no

If YES please describe, identify patent holder: Boeing is aware that multiple patents from multiple companies (including Boeing) have been applied for (or obtained) in this area.

3.3

Issues to be worked

Phase 1

Tasks:

1. Document the end-to-end system requirements that are being levied by ICAO and individual Civil Aviation Authorities (CAAs) (both at the aircraft-level and on-ground systems).
2. Document data security and privacy requirements.
3. Develop a System Functional Block Diagram, allocating the requirements (ICAO and CAAs) to each functional block.

Product: ARINC Report (under configuration control)

Duration: ~3 months

Phase 2

Tasks:

1. Develop candidate architectures (both at the aircraft-level and on-ground systems) that would meet these system-level requirements.
2. Choose an architecture (or architectures) in which to develop detailed

equipment and aircraft installation requirements, as well as ground system requirements

Product: ARINC Report (under configuration control)

Duration: ~12 months

Phase 3

Task: Develop detailed equipment, interface, and aircraft installation requirements, as well as ground system requirements, for an architecture (or architectures).

Product: ARINC Characteristic(s) (new or revised)

Duration: ~13 months

There are two potential TRFD architectures that are expected to be evaluated, including (but not limited to) the following:

- Automatic Deployable Flight Recorder (ADFR) - a combination flight recorder (Cockpit Voice Recorder (CVR)/Flight Data Recorder (FDR)) installed on the aircraft which is capable of automatically deploying from the aircraft
- Flight Data Streaming (FDS) – the ability to stream flight data from the airplane while in flight

In order to complete Phase 2, other AEEC subcommittees (e.g. the Digital Flight Data Recorder (DFDR) Subcommittee) may be requested to assist the GADSS Working Group to develop candidate architectures. Also, depending on the chosen architecture(s), Phase 3 may be worked within the SAI subcommittee, or another AEEC subcommittee(s).

4.0 Benefits

4.1 Basic benefits

Operational enhancements? yes no

Dependent on the chosen solution

For equipment standards:

a. Is this a hardware characteristic? TBD yes no

b. Is this a software characteristic? TBD yes no

c. Interchangeable interface definition? yes no

d. Interchangeable function definition? yes no

If not fully interchangeable, please explain: Not applicable

Is this a software interface and protocol standard? yes no

Specify:

Product offered by more than one supplier yes no

Identify: Yes – Multiple suppliers depending on the chosen

architecture(s).

4.2 Specific project benefits (Describe overall project benefits.)

4.2.1 Benefits for Airlines

Airlines are expected to benefit in being able to meet any forthcoming worldwide TRFD mandates in the most effective manner (minimize overall cost, reduced risk, within schedule, etc.).

4.2.2 Benefits for Airframe Manufacturers

Airframe manufacturers will benefit by being able to implement common installation(s)/solution(s) across aircraft models with minimized changes to the aircraft.

4.2.3 Benefits for Avionics Equipment Suppliers

Avionics equipment suppliers will benefit by being able to provide equipment that can be installed on multiple aircraft platforms, across multiple aircraft OEMs.

5.0 Documents to be Produced and Date of Expected Result

ARINC Report, "Timely Recovery of Flight Data (TRFD) System-Level Requirements", in Dec. 2018.

ARINC Report, "Timely Recovery of Flight Data (TRFD) Architectures Study", in Dec. 2019.

ARINC Characteristic(s), "Timely Recovery of Flight Data (TRFD) System", in Sept. 2020.*

* ARINC Characteristic(s) are dependent upon chosen architecture(s) and may be new ARINC characteristic(s), or modification of existing ARINC characteristic(s).

5.1 Meetings and 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
<i>Phase 1: Document the end-to-end system requirements</i>	One 2-day meeting plus teleconferences	2	June 2018*	Dec. 2018
<i>Phase 2: Develop candidate architectures, and select architecture(s)</i>	Three 3-day meetings plus teleconferences	9	Jan. 2019***	Dec. 2019
<i>Phase 3: Develop detailed equipment, interface, and aircraft installation requirements, as well as ground system requirements</i>	Three 3 day meetings plus teleconferences	9	Jan. 2020	Sept 2020**

* The start date of Phase 1 is contingent on completion of ICAO Document(s).

** The completion date of Phase 3 is driven by a Jan. 1, 2021 application for type certification date for new aircraft type designs (ref. ICAO Annex 6, Part I, §6.3.5.1).

*** The start date of Phase 2 is to allow resources/budget to be allocated to the Autonomous Distress Tracking (ADT) development effort which has an earlier potential mandate date.

6.0 Comments

6.1 Expiration Date for the APIM

October 2020