AEEC

Together "We Set the Standard."

To Aviation Industry

Date October 16, 2019

From P. J. Prisaznuk
AEEC Executive Secretary
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Reference 19-110/AXX-226 lth

Subject **AEEC Work Program for 2019-2020**
AEEC Mid-Term Session
October 10-11, 2019 – Renton, Washington

Summary The AEEC Executive Committee approved 12 additional project proposals at the AEEC Mid-Term Session in Renton:

APIM Number	AEEC Sub-Committee	APIM Description
19-004	CSS	ARINC Project Paper 8xx: Cabin Secure Media Independent Messaging
19-007	ISS	ARINC Project Paper 768A: Second Generation Integrated Surveillance System (2G ISS)
19-008	WXR	ARINC Project Paper 7xx: Airborne Weather Radar
19-009	ISS and XPDR	ATC Transponder/ADS-B Out Functions 1) ARINC 718A-5 – Mark 4 ATC Transponder (ATCRBS/MODE S) 2) ARINC 768-3 – Integrated Surveillance System (ISS) TCAS/ACAS-X/ADS-B In Functions 1) ARINC 735B-3 – Traffic Computer TCAS and ADS-B Functionality 2) ARINC 768-3 – Integrated Surveillance System (ISS)
19-010	CDS	Update ARINC Specification 661: Cockpit Display Interfaces, Part 1 and Part 2
19-011	SDL	Supplement 1 to ARINC Report 645: Common Terminology and Functions for Software Distribution and Loading (Add Security Guidance)
19-012	APEX	Update ARINC Specification 653: Avionics Application Software Standard Interface, Part 0, Part 3A, Part 3B

19-014	SDL	Supplement 1 to ARINC Specification 641: Logical Software Part Packaging for Transport
17-012A	CSS	Third Generation Cabin Network (3GCN) – PLUS New ARINC Project Papers 808A and 809A
17-014A	EFB	EFB Aircraft Data Interface – Supplement 8 to ARINC 834 and new ARINC Project Paper 834A
16-015A	SDL	ARINC Project Paper 851: Ground System Definition for e-Enabled Aircraft
16-008A	DLK	Datalink Users Forum – 3-year Extension of Activity

The statement of work for each of these projects is attached to this document in the form of an APIM (ARINC Proposal to Initiate/Modify an ARINC Standard). As of the date of this letter, 17 AEEC Project Papers and 35 Supplements to existing ARINC Standards are presently in work.

Summary The purpose of this letter is twofold:

1. Actions of the Airlines Electronic Engineering Committee (AEEC) are hereby announced.
2. ARINC Industry Activities invites its Members, Corporate Sponsors, and all interested parties to participate in ARINC Standards development activities.

For additional information on the AEEC work program, contact the AEEC Executive Secretary or visit the AEEC website: *www.aviation-ia.com/aeec*.

cc AEEC Executive Committee, APEX, CDS, CSS, DLUF, EFB, ISS, SAI, SDL, XPDR

Attachment 1

Attachment 1

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project — APIM 19-004

New ARINC Project Paper xxx: Cabin Secure Media Independent Messaging

1.1 Name of Originator and/or Organization

Safran Aerospace

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

Cabin Systems Subcommittee (CSS)
Dale Freeman Delta Air Lines

2.2 Support for the activity (as verified)

Airlines: Delta, Etihad

Airframe Manufacturers: Boeing, Airbus

Suppliers: Safran Passenger Systems, Panasonic, Thales, Crane, Lufthansa Technik, Astronics, Zodiac Seats UK, KID Systeme, Recaro, BAE Systems, Diehl

Others:

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: Delta, Etihad

Airframe Manufacturers: Boeing, Airbus

Suppliers: Safran Passenger Systems, Panasonic, Thales, Crane, Lufthansa Technik, KID Systeme, Astronics, Recaro, BAE Systems, Diehl

Others:

2.4 Recommended Coordination with other groups

Network Infrastructure and Security (NIS) Subcommittee

EFB Subcommittee

SAI Subcommittee

3.0 Project Scope (why and when standard is needed)

3.1 Description

Refer to attached White Paper

3.2 Planned usage of the envisioned specification

Note: New airplane programs must be confirmed by manufacturer prior to completing this section.

New aircraft developments planned to use this specification yes ☐
no ☒
Airbus: (aircraft & date)
Boeing: (aircraft & date)
Other: (manufacturer, aircraft & date)

Modification/retrofit requirement yes ☒
no ☐
Specify: (aircraft & date)

Needed for airframe manufacturer or airline project yes ☐
no ☒ Specify: (aircraft & date)

Mandate/regulatory requirement yes ☐
no ☒
Program and date: (program & date)

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

When is the ARINC standard required? ______(ASAP) ___________

What is driving this date? Many existing integrations between different vendors of IFE & IFC

Are 18 months (min) available for standardization work? yes ☒
no ☐
If NO, please specify solution: ___________________

Are Patent(s) involved? yes ☐
no ☒
If YES please describe, identify patent holder: ___________________

3.3 Issues to be worked

Define

- M2M messaging infrastructure services necessary to communicate with networked components based on selected IoT services and protocols (REST, CoAP or MQTT, DTLS, CBOR, etc.);
- Rules for URI mapping of device attributes and services for access by applications executing on other networked devices;
- Machine readable schema (e.g., JSON Hyper-schema) that will be used by suppliers and integrators to describe device interfaces, device interaction and path to source data;
- Common device attributes and services necessary to enable network integration, security, installation and management;
- Aircraft systems semantic ontology used to document device interfaces;
- Semantic ontological repository to allow open access for supplier contributions, configuration managed to support application developers and integrators;
- Subsystem and system verification testing approach based on declared component functionality and integrator defined components and information paths;

- Limited exposure of some component attributes and services and the manner in which they are made available for access by non-avionics data analytic maintenance applications.

4.0 Benefits

4.1 Basic benefits

Operational 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 ☐

Specify: _________________

Product offered by more than one supplier yes ☒ no ☐

Identify: (company name)

Panasonic Avionics Corporation
Thales InFlyt Experience

Safran Aerospace

Crane

Astronics

Recaro

4.2 Specific project benefits (Describe overall project benefits.)

4.2.1 Benefits for Airlines

Common messaging infrastructure across aircraft wired and wireless networks allows simplified system integration for aircraft functional expansion including new sensors, new applications and shared information across dissimilar networks to achieve improved operations and maintenance.

4.2.2 Benefits for Airframe Manufacturers

Similar to airline benefits

4.2.3 Benefits for Avionics Equipment Suppliers

Similar to airline benefits

5.0 Documents to be Produced and Date of Expected Result

ARINC 8xx new document, +18 months

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
Develop ARINC Project Paper xxx	4	4 (using 1 of 3 SC meeting days)	Oct 2019	May 2021

This effort is part of the larger Cabin Systems Subcommittee effort. The draft document will be discussed in periodic web conferences as needed.

6.0 Comments

N/A

6.1 Expiration Date for the APIM

October 2021

Completed forms should be submitted to Paul Prisaznuk, AEEC Executive Secretary and Program Director (pjp@sae-itc.org).

APIM 19-004

Cabin Secure Media Independent Messaging

Introduction

A typical aircraft hosts many networked systems from different suppliers. In most cases, these systems operate independently and, with limited exceptions, are unable to benefit from equipment commonality, integrated maintenance or centralized management.

New cabin system designs are beginning to integrate cabin functions in aid of overarching functions like data collection and off-load for predictive maintenance and the creation of expanded crew awareness such as display of cabin status including TTL safety checks on portable crew devices.

Expanded cabin functionality and cabin systems integration are expected to touch galleys, lavatories, passenger service units, entertainment services, window controls, lighting and many other systems.

Integration of systems from different suppliers is only possible if communications interfaces and protocols are standardized. Similarly, suppliers require common standards to affordably produce new devices that can communicate with and be easily integrated into a variety of cabin systems.

Wireless system intra-communications is rapidly becoming the preferred system architectural approach to achieve reduced weight, reduced cost and ease of system reconfiguration/expansion.

Onboard networks vary widely in their needs for power, throughput, distance, location, number of clients, etc. From a wireless communications perspective, one size does not necessarily fit all: different aircraft interconnect systems come with different technical problems and benefit from different network architectures and communications mediums, whether wired or wireless.

Ethernet, Bluetooth, WAIC, RFID, Wi-Fi, ZigBee –each technology has unique attributes that make it the most efficient and/or cost-effective solution for a specific onboard task.

A common inter-application communications infrastructure is required to enable onboard sensors, clients and applications to communicate and share information across a variety of task-optimized communications mediums.

Messaging

Application-to-application communications across dissimilar networks is common in the IP-world and has been further pushed forward in the commercial electronics industry through the development of communications standards for the Internet of Things (IoT), which includes a larger variety of different client platforms and network technologies.

Machine-to-Machine (M2M) communications between applications and IoT devices occur at the presentation and application layer of the OSI stack, thereby abstracting network-specific physical interfaces and protocols. Standards for M2M messaging on the IoT offer a well-defined framework that can be used for aircraft cross-system communications.

The IoT does not depend on fixed addresses or device-specific functions. Rather, IoT applications rely on a “discovery” process. When a new device is discovered on the network, an application can refer to a common Resource Repository to determine device capabilities and determine how to access the attributes and services of the new device. The discovery process allows new devices and new applications to be introduced to networks at will and it works because IoT devices and applications use a common language to describe their capabilities and interfaces. When a new IoT device is attached to a home network its capabilities can be automatically discovered so its features and services can be incorporated by existing applications. While useful and clever in the home market, device discoverability is not necessarily a positive attribute in network environments with strict configuration management rules.

Aircraft networks employ fixed configurations, established by system integrators. Introducing IoT-type devices and communications into an aircraft environment will require certain standard adaptations to ensure adherence to aircraft certification and configuration management processes.

The overall utility of M2M communications for integration of new aircraft functionality will depend on standard definitions for device attributes and services that can be mapped by system integrators to manage the application interaction necessary to create new functionality.

The definition of a standardized M2M messaging interface for each avionics component enables the development and certification of new aircraft applications which can be introduced without impacting existing certifications.

Device Interface Definition Format

Traditional avionics suppliers provide an Interface Control Document (ICD) for each aircraft equipment that defines precisely how its attributes and services are accessed. An aircraft system integrator then utilizes equipment ICDs to define the system interconnections to distribute data from sources to destinations. This process works because RTCA/EUROCAE MOPS and ARINC documents exist which specify common interfaces between suppliers. It is also a fixed process that is slow and difficult to change. New sensor and wireless communications technologies are being developed at a rate that existing processes for equipment standardization can no longer support.

Interface definitions for IoT devices are written in a human-readable form. The most popular formats for interface definition are eXtended Markup Language (XML) or JavaScript Object Notation (JSON) schema. The interface definition for a given IoT device fully describes the accessible features of the device. An IoT device’s interface schema is the functional equivalent of an aircraft equipment ICD. The structure of the device schema is usable by applications as an extension of the device address to access specific device attributes and services.

An IoT device’s interface definition is described by the supplier in an importable schema. This same schema concept is used to describe the interface definitions of a subsystem. A system integrator defines new aircraft functions by linking function-specific applications to the imported attributes and services of member devices.

Core Device Features

System integrators depend on a common set of attributes and services from each network device to allow that each device to be incorporated and managed in a common manner. The following core services will enable system integrators to build network solutions from compliant avionics components:

- Authentication/authorization
- Remote (Wireless) Data load
- Configuration Management, including access controls
- Security/Cryptographic Key/Certificate Management

- Maintenance Services (BITE, etc.)
- Maintenance Logging and Reporting
- Security Logging and Reporting

Device Addressing

Aircraft network addressing must accommodate both wired and wireless devices in fixed or mobile operation. In any case, networks will no longer be dependent on fixed hardware adapter physical addresses (e.g. Ethernet). Instead, access to IoT devices will be based on web addressing using Uniform Resource Identifiers (URI). Access to individual device attributes and services will be accomplished by extending a device URI with the name of the attribute or service as defined in the semantic ontology. For example:

Each property or service in the device schema has a reference URI which consists of the device name with a concatenated name of the property or service.

e.g., "readingLight/on"

An integrator embedding a predefined device into passenger seat would import the device's JSON schema and create an instance of the device schema. The URI to access a property or service of a device instance would be built by concatenating the name of the current container object ("seat") with the partial URI from the embedded object to form a unique description.

e.g., "seat/readingLight/on"

Continuing with the seat example, one or more instantiations of the seat object can be embedded into a seat group. Each instance of seat is given a unique name. The URI to access any addressable element of an object in the seat group is built by concatenating the seat group name "seatGroup" with the name of an object instance e.g., "seat1" with the name of the device followed by the name of the property or service.

e.g., "seatGroup/seat1/readingLight/on"

This same process occurs as the cabin integrator embeds instances of seatGroup into a Row schema and instances of Row into a cabin schema.

e.g., "Row/MiddleSeatGroup/seat1/readingLight/on"

becomes

"LH748Cabin/Row33/MiddleSeatGroup/seat1/readingLight/on"

The only remaining step for the system integrator is to concatenate the link type and authority address with any URI address chain to derive a fully formed address to a parameter on the network.

e.g.,
"coap://192.168.1.1/LH748Cabin/Row33/MiddleSeatGroup/seat1/readingLight/on"

The above integration process can be highly automated and can be fully verified at every subsystem step to significantly simplify the total aircraft-level integration effort.
Each subsystem can limit how many of its internal attributes and services are accessible by only exposing some attributes and services in its schema that will be imported for integration on other systems.
The nested subsystems in the above example also illustrate how subsystem testing can be accomplished within the IoT metaphor. Every subsystem (e.g., seat) is independently testable since the subsystem schema fully defines the attributes and services available for communications with other systems.

Semantic Ontology

IoT applications are able to establish communications with new IoT devices on the network because they share a common descriptive language for defining device capabilities, attributes and methods and a common M2M messaging service for communicating between devices. A Semantic Ontology is the common dictionary for a collection of IoT devices.
Semantic ontologies tend to differ from one industry to another and are typically built from modular device ontologies such as the Semantic Sensor Network Ontology on the World Wide Web. Industry-specific semantic ontologies are hosted on W3.org so as to be universally accessible by device developers and system integrators. The medical and automotive industries have semantic ontologies on W3.org. No semantic ontology exists for the aviation industry on W3.org today.
A semantic ontology for the aviation industry must be built based on a common base object that defines all of the standard attributes and services which every other aviation device will inherit. Avionics suppliers define new device interfaces based on the terminology used in the semantic ontology. The semantic ontology will expand as new and unique device capabilities are incorporated into the ontology by equipment suppliers.

RTCA DO-356A Security Compliance

RTCA SC-236 Wireless Avionics Intra-Communications (WAIC) is currently defining equipment and network requirements for wireless avionics communications devices operating in the 4.2-4.4 GHz band. SC-236 performed an analysis based on DO-356A/ED-203A security guidelines which identified vulnerabilities associated with authentication, data load and configuration of wireless equipment on aircraft. SMIM requirements will address these vulnerabilities to ensure networks that use SMIM are capable of DO-356A/ED-203A compliance when using either wired or wireless media types.

Key Tasks

The ARINC Specification must specify:

- M2M messaging infrastructure services necessary to communicate with networked components based on selected IoT services and protocols (REST, CoAP or MQTT, DTLS, CBOR, etc.);
- Rules for URI mapping of device attributes and services for access by applications executing on other networked devices;

- Machine readable schema (e.g., JSON Hyper-schema) that will be used by suppliers and integrators to describe device interfaces, device interaction and path to source data;
- Common device attributes and services necessary to enable network integration, security, installation and management;
- Aircraft systems semantic ontology used to document device interfaces;
- Semantic ontological repository to allow open access for supplier contributions, configuration managed to support application developers and integrators;
- Subsystem and system verification testing approach based on declared component functionality and integrator defined components and information paths;
- Limited exposure of some component attributes and services and the manner in which they are made available for access by non-avionics data analytic maintenance applications.

While the above list of tasks may initially appear daunting for the development of a new ARINC Specification, this activity can pull extensively from existing IoT standards and emulate semantic ontology models developed for the medical and automotive industries to reduce the total project effort.

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Attachment 2

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 19-007

ARINC Project Paper 768A: Second Generation Integrated Surveillance System (ISS)

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

Systems Architecture and Interfaces (SAI) Subcommittee

SAI Chairmen: Reinhard Andreae and Rich Stillwell

Surveillance Working Group Chairman: Jessie Turner

2.2 Support for the activity

Airlines: American, Delta, FedEx, TAP Portugal, UPS

Airframe Manufacturers: Airbus, Boeing

Suppliers: ACSS, Collins Aerospace (TBC), Gables, Garmin, Honeywell

Others:

2.3 Commitment for Drafting and Meeting Participation

Airlines:

Airframe Manufacturers: Airbus, Boeing

Suppliers: ACSS, Garmin, Honeywell

Others:

2.4 Recommended Coordination with other groups

None

3.0 Project Scope

3.1 Description

This project proposes to create a generational [2nd Generation (2G)] update (ARINC 768A) to the existing ARINC 768 “Integrated Surveillance System (ISS)” characteristic which would support new aircraft designs. It is expected that the ARINC 768A – 2G ISS would result in a >50% reduction in size and weight as compared to currently fielded ARINC 768 ISS Processor Units and a >60% savings in volume and weight (at the aircraft-level). Overall equipment acquisition costs are expected to be reduced and overall reliability is expected to increase.

The Integrated Surveillance System (ISS) represents the integration of standalone aircraft surveillance systems and has resulted in the reduction of the cost, as well as the size, weight, and power (SWaP) requirements, for the suite of the following surveillance functions:

- Air Traffic Control (ATC)/Mode S Transponder
- Automatic Dependent Surveillance – Broadcast Out (ADS-B Out)
- ADS-B In
- Airborne Collision Avoidance System (ACAS-X)
- Terrain Awareness and Warning System (TAWS) with Reactive Wind Shear (RWS)

The initial version of ARINC Characteristic 768: Integrated Surveillance System was developed in 2002-2004, and was first published in October 2005. This characteristic has been successfully used by both Airbus (A380 and A350) and Boeing (787 and 777-8/-9).

In the ~15 years since the first development of the ISS, there have been significant technology advancements in processors and Radio Frequency (RF) components/designs which are expected to result in further reductions in cost and SWaP requirements. Also, with future aircraft designs having a network-based interface design (in lieu of point-to-point ARINC 429/discrete wiring), the equipment can be designed to specifically support network-based interfaces without carrying the overhead of legacy ARINC 429/discrete interfaces. In addition, lessons learned from industry implementations of the ARINC 768 standard can be incorporated into an updated ARINC 768A industry standard.

The Distance Measuring Equipment (DME) function, which currently resides in a standalone ARINC 709 DME Interrogator (along with a dedicated DME antenna), operates in the same L-Band frequency range as the ATC Transponder, TCAS, and ADS-B. The DME function can be included within the 2G ISSPU (and bottom ATC antenna connection) resulting in additional, significant cost and SWaP savings at the aircraft-level.

Lastly, the new ARINC 768A standard should also support a bottom mounted omni-directional antenna (in lieu of a directional antenna). This would provide installation and weight savings, since the omni-directional antenna is smaller/lighter and only requires a single coaxial cable (versus 4 coaxial cables required for a directional antenna).

3.2 Planned usage of the envisioned specification

New aircraft developments planned to use this specification yes ☒ no ☐

Specify: Boeing - new air transport aircraft

Airbus - new air transport aircraft

Modification/retrofit requirement yes ☐ no ☒

Specify:

Needed for airframe manufacturer or airline project yes ☒ no ☐

Specify: Next new Boeing air transport aircraft

Mandate/regulatory requirement yes ☐ no ☒

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

Specify:

When is the ARINC Standard required? May 2021

What is driving this date? Target design date

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

Are Patent(s) involved? yes ☐ no ☒

If YES please describe, identify patent holder:

3.3 Issues to be worked

It is expected that the following specific items will be addressed as part of the ARINC 768A standard development (and others as they arise):

1) Standardize ISS Processor Unit form, fit, function, and interfaces with reduced SWaP compared to ARINC 768 and determine need to define multiple configurations (for example, with or without TAWS.)

2) Add the Distance Measuring Equipment (DME) function

3) Specify an architecture with a bottom omni-directional antenna connection in lieu of a bottom directional antenna.

4) Specify the ISS connector size, keying, and pinouts to support:
   a) ARINC 664 network-based connections (e.g., fiber)
   b) One directional antenna (4 coaxes) and one omni antenna (1 coax)
   c) Minimize ARINC 429 interfaces

4.0 Benefits

4.1 Basic benefits

Operational 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: Not applicable

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

Specify:

Product offered by more than one supplier yes ☒ no ☐

Identify: ACSS, Collins Aerospace, Honeywell

4.2 Specific project benefits (Describe overall project benefits.)

4.2.1 Benefits for Airlines

- Expected reduced equipment and operating cost (< weight and volume)
- Equipment supplier choices
- Higher reliability (no separate hardware for dual DME installation, and more reliable omni antennas)

4.2.2 Benefits for Airframe Manufacturers

- Common installation(s)/solution(s), less variability
- Equipment volume reduction (reduction in equipment racks, or allows other avionics equipment to be installed without additional equipment racks)

4.2.3 Benefits for Avionics Equipment Suppliers

- 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 Characteristic 768A, "Second Generation Integrated Surveillance System (2G ISS)", May 2021.

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
ARINC 768A – 2G ISS	4 (plus teleconferences)	12	October 2019	March 2021

6.0 Comments

6.1 Expiration Date for the APIM

October 2021

Attachment 3

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 19-008

New ARINC Project Paper 7XX: Airborne Weather Radar System and Aircraft Installation Standards

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

Systems Architecture and Interfaces (SAI) Subcommittee

SAI Chairmen: Reinhard Andreae and Rich Stillwell

Surveillance Working Group Chairman: Mohammed Ahmed, Boeing

2.2 Support for the activity

Airlines: American, Delta, FedEx, TAP Portugal, United, UPS

Airframe Manufacturers: Airbus, Boeing

Suppliers: Collins, Garmin, Honeywell, Gables

Others:

2.3 Commitment for Drafting and Meeting Participation

Airlines:

Airframe Manufacturers: Airbus, Boeing

Suppliers: Collins, Garmin, Honeywell

Others:

2.4 Recommended Coordination with other groups

None

3.0 Project Scope

3.1 Description

This project calls for a new Weather Radar ARINC Project Paper 7XX to support new, ARINC 664 network-based, aircraft designs.

ARINC Characteristic 708A “Airborne Weather Radar with Forward Looking Windshear Detection Capability” was last updated with Supplement 3 in 1999. The ARINC 708A-3 architecture has the WXR antenna and antenna drive under the nose radome, and interconnected, via a waveguide, to a Receiver/ Transmitter (that contains the RF front-end and processing) installed in a tray inside the pressure vessel.

In the last 10 years, suppliers have designed and fielded newer WXR system installations that are not compliant with ARINC 708A (or any other standard). In these WXR installations, the RF front end is installed within a Receiver/Transmitter Module (RTM) under the nose radome and is interconnected with a standalone ARINC 600 rack-mounted WXR processor in the EE bay. Also, no separate waveguide installation is required for these newer WXR installations. [Note: This type of newer WXR architecture (with an RTM under the nose radome) is documented in the ARINC 768 Integrated Surveillance System (ISS) characteristic, but ARINC 768 has an ISS Processor Unit in lieu of a standalone WXR Processor in the EE bay].

Although these newer WXR installations provide cost and Size, Weight, and Power (SWaP) benefits over-and-above the ARINC 708A WXR installations, these newer, standalone WXR installations do not follow an industry standard and are not interchangeable between suppliers. Consequently, if one supplier's WXR system needs to be swapped-out to install another supplier's WXR system, extensive aircraft changes are required to be made (e.g. the WXR Processor's ship-side connector, RTM ship-side connector, and wiring between the WXR Processor and RTM need to be changed). This has a significant impact if an airframer or airline wants to switch between WXR equipment suppliers.

For future network-based aircraft, the WXR system installation needs to be standardized so that these extensive aircraft changes are not required. Note that this standard would allow interchangeability at the WXR system level. For example, it is not expected that one supplier's WXR RTM be compatible with another supplier's WXR Processor. The working group should consider an interface definition for accommodating the receipt and transmission of raw weather data.

3.2 Planned usage of the envisioned specification

New aircraft developments planned to use this specification — yes ☒ no ☐

Specify: Next new Boeing air transport aircraft

Next new Airbus air transport aircraft

Modification/retrofit requirement — yes ☐ no ☒

Specify:

Needed for airframe manufacturer or airline project — yes ☒ no ☐

Specify: Next new Boeing air transport aircraft

Mandate/regulatory requirement — yes ☐ no ☒

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

Specify:

When is the ARINC Standard required? May 2021

What is driving this date? Target design date

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

Are Patent(s) involved? — yes ☐ no ☒

If YES please describe, identify patent holder:

3.3 Issues to be worked

It is expected that the following specific items will be addressed as part of the WXR standard development (and others as they arise):

1) Standardize WXR processor form, fit, function, and interfaces with reduced SWaP compared to ARINC 708A

2) Specify the WXR Processor connector size, keying, and pinouts to support:
   a) ARINC 664 network-based connections (e.g., fiber, and others if required)
   b) Connections to the RTM (see item 4 below)

3) Specify RTM interfaces (not form factor or installation)

4) Specify a single Weather Radar Antenna Unit (WRAU) connector that supports connections to the WXR Processor.

5) Single or dual WXR System installations are supported (e.g. single or dual antenna drives). Installation of a single RTM into a dual drive (with provisions for the second RTM) shall be supported.

4.0 Benefits

4.1 Basic benefits

Operational 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: Not applicable

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

Specify:

Product offered by more than one supplier yes ☒ no ☐

Identify: Collins Aerospace, Honeywell

4.2 Specific project benefits (Describe overall project benefits.)

4.2.1 Benefits for Airlines

- Supplier system interchangeability

4.2.2 Benefits for Airframe Manufacturers

- Common installation(s)/solution(s), less variability
- Supplier system interchangeability

4.2.3 Benefits for Avionics Equipment Suppliers

- 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 Characteristic 7XX, Airborne Weather Radar System and Aircraft Installation Standards, May 2021.

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
ARINC 7XX - WXR	4 (plus teleconferences)	12	October 2019	March 2021

6.0 Comments

6.1 Expiration Date for the APIM

October 2021

Completed forms should be submitted to the AEEC Executive Secretary & Program Director, Paul Prisaznuk (pjp@sae-itc.org).

Attachment 4

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 19-009

Updates to ATC Transponder, Traffic Computer, and ISS Characteristics
(ARINC 718A, ARINC 735B, ARINC 768)

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

Systems Architecture and Interfaces (SAI) Subcommittee
SAI Chairmen: Reinhard Andreae and Rich Stillwell
Surveillance Working Group Chairman: Mohammed Ahmed, Boeing

2.2 Support for the activity

Airlines: American, Delta, FedEx, TAP Portugal, UPS
Airframe Manufacturers: Airbus, Boeing
Suppliers: ACSS, Collins (TBC), Garmin, Honeywell
Others:

2.3 Commitment for Drafting and Meeting Participation

Airlines:
Airframe Manufacturers: Airbus, Boeing
Suppliers: ACSS, Garmin, Honeywell
Others:

2.4 Recommended Coordination with other groups

None

3.0 Project Scope

3.1 Description

ATC Transponder/ADS-B Out Functions

This project proposes to update the following ARINC Characteristics based on changes being incorporated into RTCA DO-181F - ATCRBS/Mode S Minimum Operational Performance Standards (MOPS) and RTCA DO-260C - 1090 MHz ADS-B Out MOPS [both ECD Dec. 2019]:

- Prepare Supplement 5 to ARINC 718A: MARK 4 ATC TRANSPONDER (ATCRBS/MODE S)
- Prepare Supplement 3 to ARINC 768: INTEGRATED SURVEILLANCE SYSTEM (ISS)

TCAS/ACAS-X/ADS-B In Functions

This project also proposes to update the following ARINC Characteristics based on newly released RTCA DO-385 - Airborne Collision Avoidance System – X MOPS (dated Oct. 2, 2018) and changes being incorporated into RTCA DO-361A - Advanced Flight deck based Interval Management (FIM) MOPS and RTCA DO-260C - 1090 MHz ADS-B Out MOPS [both ECD Dec. 2019]:

- Prepare Supplement 3 to ARINC 735B: TRAFFIC COMPUTER, TCAS AND ADS-B FUNCTIONALITY
- Prepare Supplement 3 to ARINC 768: INTEGRATED SURVEILLANCE SYSTEM (ISS)

3.2 Planned usage of the envisioned specification

New aircraft developments planned to use this specification — yes ☐ no ☒

Specify:

Modification/retrofit requirement — yes ☒ no ☐

Specify: ADS-B In & ACAS-X changes

Needed for airframe manufacturer or airline project — yes ☒ no ☐

Specify: Supports future ADS-B In/ACAS-X projects

Mandate/regulatory requirement — yes ☐ no ☒

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

Specify:

When is the ARINC Standard required? May 2021

What is driving this date? Target design date

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

Are Patent(s) involved? — yes ☐ no ☒

If YES please describe, identify patent holder:

3.3 Issues to be worked

ATC Transponder/ADS-B Out Functions
Update ARINC 718A and ARINC 768 to reflect changes necessary due to changes to the ATC/Mode S Transponder MOPS (RTCA DO-181F) and the 1090MHz ADS-B Out MOPS (RTCA DO-260C).

TCAS/ACAS-X/ADS-B In Functions
Update ARINC 735B and ARINC 768 to reflect changes necessary due to the new ACAS-X MOPS (RTCA DO-385) and changes being incorporated into the Advanced FIM MOPS (RTCA DO-361A).

Potential changes include (but are not limited to): descriptions of functions supported, input/output pin definitions, and ARINC 429 label/bit definitions.

4.0 Benefits

4.1 Basic benefits

Operational enhancements? ADS-B In — 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: Not applicable

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

Specify:

Product offered by more than one supplier — yes ☒ no ☐

Identify: ACSS, Collins Aerospace, Honeywell

4.2 Specific project benefits (Describe overall project benefits.)

4.2.1 Benefits for Airlines

- Supports future ADS-B In/Collision Avoidance capabilities
- Equipment supplier choices with common interfaces

4.2.2 Benefits for Airframe Manufacturers

- Supports future ADS-B In/Collision Avoidance capabilities
- Common installation(s)/solution(s), less variability

4.2.3 Benefits for Avionics Equipment Suppliers

- Supports future ADS-B In/Collision Avoidance capabilities
- 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

- Supplement 5 to ARINC 718A: MARK 4 ATC TRANSPONDER (ATCRBS/MODE S), May 2021
- Supplement 3 to ARINC 735B: TRAFFIC COMPUTER - TCAS AND ADS-B FUNCTIONALITY, May 2021
- Supplement 3 to ARINC 768: INTEGRATED SURVEILLANCE SYSTEM (ISS), May 2021

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
Supplement 5 to ARINC 718A XPDR	4 (plus teleconferences)	12	Oct 2019	Mar 2021
Supplement 3 to ARINC 735B ADS-B				
Supplement 3 to ARINC 768 ISS				

6.0 Comments

6.1 Expiration Date for the APIM

October 2021

Attachment 5

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 19-010

This APIM proposes development of two documents as follows:

Supplement 8 to ARINC Specification 661 Part 1: *Cockpit Display System Interfaces to User Systems - Avionics Interfaces, Basic Symbology, and Behavior*

ARINC Project Paper 661 Part 2: *Cockpit Display System Interfaces to User Systems - User Interface Markup Language (UIML) for Graphical User Interfaces*.

1.1 Name of Originator and/or Organization

Cockpit Display Systems (CDS) Subcommittee

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

Cockpit Display Systems (CDS) Subcommittee

Co-Chairman: Brian Gilbert, The Boeing Company

Co-Chairman: Sofyan Su, Airbus

2.2 Support for the activity (as verified)

Organizations: Airbus, Boeing, Dassault Aviation, Ansys, TP Group plc, GE Aviation, Garmin, Honeywell, Presagis, Collins Aerospace, Thales AVS, Elbit Systems, US Army, Safran Aerosystems.

2.3 Commitment for Drafting and Meeting Participation (as verified)

Organizations: Airbus, Boeing, Dassault Aviation, Ansys, TP Group plc, GE Aviation, Garmin, Honeywell, Presagis, Collins Aerospace, Thales AVS, US Army, Safran Aerosystems.

2.4 Recommended Coordination with other groups

The following AEEC Subcommittee activities are relevant to this topic:

- SAI Subcommittee

3.0 Project Scope (why and when standard is needed)

3.1 Description

Develop and maintain ARINC 661 flight deck display interface standards for new airplane development programs and for retrofit programs, including Airbus A380, A350, A400M, Boeing B787, B737 MAX, B777X, KC-46A, NMA, COMAC C919, Regional Aircraft, General Aviation (GA) and rotorcraft. Ensure growth for CNS/ATM applications that provide advanced operational concepts that will increase aviation safety, capacity, and efficiency.

ARINC 661 defines the basic building blocks through which a Graphical User Interface (GUI) to display systems can be developed. ARINC 661 is being expanded to meet OEM requirements for new airplane programs. ARINC 661 will enable flight crews to interact with the CDS using a cursor control device or touchscreen technology.

ARINC Specification 661 Part 1 will be updated through the preparation of Supplement 8 topics identified in Section 3.3, the material needed to describe Part 1 and Part 2, and the relation between the two parts.

ARINC Project Paper 661 Part 2 will define the User Interface Markup Language which will allow developers to specify the interface and the look and behavior of any graphical user interface, in particular ARINC 661 building blocks.

3.2 Planned usage of the envisioned specification

New aircraft developments planned to use this specification yes ☒ no ☐

Airbus: A380, A350, A400M

Boeing: B787, B737 MAX, B777X, KC-46A, NMA

Other: COMAC C919, Regional Aircraft, General Aviation (GA) and rotorcraft

Modification/retrofit requirement yes ☐ no ☒

Specify: N/A

Needed for airframe manufacturer or airline project yes ☐ no ☒

Specify: N/A

Mandate/regulatory requirement yes ☐ no ☒

Specify: N/A

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

Specify: ARINC 661

When is the ARINC standard required?

- Supplement 8 to ARINC 661 Part 1 is expected by April 2020.
- ARINC Project Paper 661 Part 2 is expected by April 2020.

What is driving this date?

Submission to General Session in May 2020.

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

If NO please specify solution:

Both projects are nearing completion.

Are Patent(s) involved? yes ☐ no ☒

If YES please describe, identify patent holder: ________________

3.3 Issues to be worked

Start with ARINC 661-7 Part 1 Gray Cover and update the document to include:

- Metadata definition (full XML schema)
- Map3D widgets
- Update to PictureBlock for picture atlasing
- Column widget
- Scroll extensions
- StyleSetParameter extension
- Updates to Animation Widgets
- Other new widgets and extensions as warranted
- Harmonization with Part 2

ARINC Project Paper 661 Part 2 will include the following:

- Metadata definition (full XML schema)
- Popup primitive
- Focus Management
- Graphical Bounding box
- Styling
- Basic Scripting Definition
- Glossary

4.0 Benefits

4.1 Basic benefits

Operational 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 ☐

Specify: Aircraft installation interface may use any suitable protocol for data delivery, including ARINC 664 Ethernet.

Product offered by more than one supplier yes ☒ no ☐

Identify: Aircraft manufacturers, CDS application developers

4.2 Specific project benefits (Describe overall project benefits.)

4.2.1 Benefits for Airlines

Supplement 8 to ARINC Specification 661 Part 1 will define a common CDS interface data formats, graphical user interface (GUI). The idea is to support the widest possibilities of airplane types, for both forward fit and retrofit using common data interface. This document will enable benefits to be realized at lower costs to the airlines and with less risk to the suppliers.

ARINC Project Paper 661 Part 2 will define a language (UIML) that can be used by any airframe manufacturer on any kind of aircraft to specify graphical user interface look and behavior. This document will enable benefits to be realized at lower costs to the airlines and with less risk to the suppliers.

4.2.2 Benefits for Airframe Manufacturers

This standard will provide several benefits to Airframe manufacturers:

- The airframe manufacturers can define a common CDS interface for all aircraft implementations.
- Flexibility to add new CDS capabilities by adding to existing platforms.
- The airframe manufacturers can use a common language, from CDS mockups and prototyping, to maintenance and training, graphical user interfaces.
- Reduce the cost of development and management of the graphical user interface specification.
- Ability to specify modern user interface (data fusion, multi-touch, animation, 3D, Post WIMP interface).

4.2.3 Benefits for Avionics Equipment Suppliers

This standard will provide several benefits to Avionics Suppliers:

- Reduces CDS cost of development compared to non-standard platforms
- Allows for an open marketplace for manufacturers to supply interoperable equipment.

5.0 Documents to be Produced and Date of Expected Result

Supplement 8 to ARINC Specification 661 Part 1: *Cockpit Display System Interfaces to User Systems: Avionics Interfaces, Basic Symbology, and Behavior*. A mature document is expected in April 2020.

ARINC Project Paper 661 Part 2: *Cockpit Display System Interfaces to User Systems: User Interface Markup Language (UIML) for Graphical User Interfaces*. A mature document is expected in April 2020.

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
Supplement 8 to ARINC Specification 661 Part 1	2	10* (two 5-day mtgs)	06/2019	04/2020
ARINC Project Paper 661 Part 2				

* Note: Table shows in-person meetings. Additional web conferences will be held each month, one web conference for each document in work.

6.0 Comments

This activity is an extension of AEEC's Cockpit Display Systems (CDS) Subcommittee activity previously authorized by APIM 08-004.

6.1 Expiration Date for the APIM

April 2020

Completed forms should be submitted to Paul Prisaznuk, AEEC Executive Secretary and Program Director (pjp@sae-itc.org).

Attachment 6

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project — APIM 19-011

Software Loader Security Guidance in Supplement 1 to ARINC Report 645: Common Terminology and Functions for Software Distribution and Loading

1.1 Name of Originator and/or Organization

Todd Gould, The Boeing Company

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

AEEC Software Distribution and Loading Subcommittee
Ted Patmore, Delta Air Lines (Chairman)

2.2 Support for the activity (as verified)

Airlines: American, Delta, Lufthansa

Airframe Manufacturers: Airbus, Boeing

Suppliers: Garmin, MBS, Safran, TechSat,

Note: Need confirmation: (Collins), (Honeywell), (Thales), (Teledyne), (Swiss Aviation Software)

Others: ICAO Aviation Trust Framework, AIA SW and Distribution Security Working Group**, RTCA, EUROCAE**

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: Delta,

Airframe Manufacturers: Boeing,

Suppliers: Garmin TechSat, Safran,

Others:

2.4 Recommended Coordination with other groups

(List other AEEC subcommittees or other groups.)

3.0 Project Scope (why and when standard is needed)

This project will have a high priority given that cyber security regulations and standards are being considered from work within ICAO, IATA, RTCA & EUROCAE, ARAC and ASISP. In this scope of work, these organizations are look to ARINC to define security process guidance to be implemented within aircraft software loading devices. This includes all types of civil aircraft types that use software loading devices, some of which are often referenced as dataloaders within the aerospace industry.

Civil aircraft cyber security is currently on the forefront of concerns within airline organizations and aircraft manufacturers. Work within standards organizations, as those previously indicated above, is in progress at an international scope. All aspects of cyber security threats, active measures, and security management are being considered and defined.

Data distribution and loading security, the process of securing software from the software provider to the aircraft flight systems, is the essential key vulnerability in the safety and security of all aircraft the use flight control software.

AIA software and distribution security working group has recommended that ARINC develop a security standard for all dataloaders, loader devices, portable dataloaders, STC airborne dataloaders, and shop loading devices.

3.1 Description

A variety of software loaders and load tools (PDLs and **STC** ADLs) are used to directly load aircraft systems onboard aircraft and load aircraft LRUs in supplier, OEM, and operator shops. The software load tools generally conform to ARINC 615, ARINC 665, and ARINC 615A standards. In general, most of these loaders do not implement ARINC 835 software security specification. Also, there is no common guidance on how the loaders operating system and media ports should be hardened against cyber threats. There is no common security process guidance for how the loaders should be managed or how the process of getting software to the loaders should be managed to be resilient against Cyber threats.

This standard would address the following to ensure a complete security solution is established for software loaders to be considered compliant:

1. Require use of adequate digital authentication mechanism to ensure aircraft software is not tampered with prior to any SW loading. ARINC 835 provides one example of a detailed description of industry implemented processes which can be used as a reference. However, compliance with ARINC 835 will not be required.
2. **Create or reference loader** device hardening requirements.
3. Create or reference processes for ensuring loader devices are developed to guard against cyber threats.
4. Create or reference processes for ensuring loader devices are well managed against cyber threats through all phases of the life cycle. For example, ensuring that the loading devices implement robust security measures to prevent corruption from untrusted networks; that loader device software is up to date, that loader devices are physically secured.
5. Create process recommendations for media handling and software transfer to the **loader devices** to ensure cyber resiliency.
6. PDLs and STC ADLs are specific examples of loading devices.

3.2 Planned usage of the envisioned specification

Note: New airplane programs must be confirmed by manufacturer prior to completing this section.

New aircraft developments planned to use this specification yes ☐ no ☒

Airbus: (aircraft & date)

Boeing: (aircraft & date)

Other: (manufacturer, aircraft & date)

Modification/retrofit requirement yes ☒ no ☐

Specify: This standard should be applied to all aircraft which use PDLs or **STC** ADLs.

Needed for airframe manufacturer or airline project yes ☐ no ☐

Specify: (aircraft & date)

Mandate/regulatory requirement yes ☒ no ☒

Program and date: It is expected that this standard would be used for operators to comply with AC 43-216. It is expected that regulators may require use of this standard in future rulings.

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

Specify (e.g., ARINC 429)

When is the ARINC standard required? __ASAP__________

What is driving this date? __AC 43-216 and AIA SW security use case

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

If NO please specify solution: __________________

Are Patent(s) involved? yes ☐ no ☒

If YES please describe, identify patent holder:

3.3 Issues to be worked

1. Device hardening requirements and potential impact to existing loaders
2. Regulatory involvement to ensure solution meets in work security rulings

4.0 Benefits

4.1 Basic benefits

Operational 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 ☒

Specify:

Product offered by more than one supplier yes ☒ no ☐

Identify: All existing PDL and STC ADL suppliers are expected to be compatible with update security requirements

4.2 Specific project benefits (Describe overall project benefits.)

Provides the end of an end-to-end software tamper protection solution where the airplane OEMs do not provide a built-in secure loader.

4.2.1 Benefits for Airlines

Provides a more end-to-end solution that is less reliant on a variety of storage, network, and handling processes. Provides a good means to comply with AC 43-216.

4.2.2 Benefits for Airframe Manufacturers

Better assurance that all aircraft have better software tamper protection.

4.2.3 Benefits for Avionics Equipment Suppliers

Provides a security check right before loading into equipment.

5.0 Documents to be Produced and Date of Expected Result

Supplement 1 to ARINC Report 645 adding Software Loader Security Guidance

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
Supp 1 to ARINC Report 645	*6*	*12*	*Oct 2019*	*May 2021*

6.0 Comments

The SDL Subcommittee has other APIMs in-work. Work on all projects are done in parallel.

The SDL has monthly web conferences to discuss and modify their assigned projects.

6.1 Expiration Date for the APIM

April 2022

Completed forms should be submitted to Paul Prisaznuk, AEEC Executive Secretary and Program Director (pjp@sae-itc.org).

Attachment 7

Attachment 7

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 19-012

ARINC Specification 653: *Avionics Application Software Standard Interface, Part 0, Overview Of ARINC 653, and Avionics Application Software Standard Interface, Part 3A and 3B, Conformity Test Specifications for Multi-Core Processor Operating Systems*

1.1 Name of Originator and/or Organization

APEX Software Subcommittee

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

APEX Software Subcommittee

Pierre Gabrilot, Airbus and Gordon Putsche, Boeing

2.2 Support for the activity (as verified)

Airlines: TBD

Airframe Manufacturers: Airbus, Boeing

Suppliers: Collins Aerospace, Garmin, Honeywell, Thales, GE Aviation, Green Hills Software, Wind River Systems, DDC-I, Verocel, GMV, Sysgo, Lynx Software, Universal Avionics, Mannarino

Others: TUBITAK

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: TBD

Airframe Manufacturers: Airbus, Boeing

Suppliers: Collins Aerospace, Garmin, Honeywell, Thales, GE Aviation, Green Hills Software, Wind River Systems, DDC-I, Verocel, GMV, Sysgo, Lynx Software, Universal Avionics, Mannarino

Others: TUBITAK

2.4 Recommended Coordination with other groups

SAI Subcommittee, Future Airborne Capability Environment (FACE)

3.0 Project Scope (why and when standard is needed)

3.1 Description

Maintain an application software interface definition for avionics real-time computing systems performing the most flight-critical applications on the airplane.

This APIM will:

1. For Part 0: Make corrections to the Glossary and include information from the new Supplements to Parts 3A and 3B.
2. Add multicore processor conformity test specifications in Parts 3A & 3B.

3.2 Planned usage of the envisioned specification

Develop and maintain ARINC 653 software interface standards for new airplane development programs and for retrofit programs, including the Boeing 777X.

ARINC 653 (APEX) defines an interface between APplication software and EXecutive software. ARINC 653 is being expanded to meet OEM requirements and avionics supplier requirements for new airplanes and to support in-service software updates.

New aircraft developments planned to use this specification yes ☒ no ☐

Airbus: New potential programs

Boeing: Future new models, 2021 and on

Other: (manufacturer, aircraft & date)

Modification/retrofit requirement yes ☐ no ☒

Specify: Multiple Airbus & Boeing programs

Needed for airframe manufacturer or airline project yes ☒ no ☐

Specify: (aircraft & date)

Mandate/regulatory requirement yes ☐ no ☒

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

Specify ARINC 653

When is the ARINC standard required? October 2021

What is driving this date? Implementation of multi-core solutions by several avionics suppliers.

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

If NO, please specify solution: ___________________

Are Patent(s) involved? yes ☐ no ☒

If YES please describe, identify patent holder: ___________________

3.3 Issues to be worked

- Prepare Supplement 3 to ARINC Specification 653, Part 0, Overview Of ARINC 653
- Review multicore services in ARINC 653 Parts 1 & 2 and prepare the necessary conformity test specifications
- Prepare Supplement 2 to ARINC Specification 653, Part 3A, Conformity Test Specification for ARINC 653 Required Services (Part 1, Supplement 5 2019 version)
- Prepare Supplement 1 to ARINC Specification 653, Part 3B, Conformity Test Specification for ARINC 653 Extended Services (Part 2, Supplement 4 2019 version).

4.0 Benefits

4.1 Basic benefits

Operational 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 ☐

Specify:______________

Product offered by more than one supplier yes ☒ no ☐

Identify: Wind River, Green Hills, DDC-I, Thales, Honeywell, GE Aviation, Lynx Software, Sysgo.

4.2 Specific project benefits (Describe overall project benefits.)

4.2.1 Benefits for Airlines

This standard will provide several benefits to the airlines:

- Enables airlines to consider operational upgrades to specific software to support new ATC capabilities, e.g., CNS/ATM.
- Reduction of avionics weight and volume by using IMA architecture
- The benefit of multi-core is twofold:
  1) more computing throughput as new functions require.
  2) Reduction of the number of modules for the same computing throughput.

4.2.2 Benefits for Airframe Manufacturers

This standard will provide several benefits to airframe manufacturers:

- The airframe manufacturers can specify a common interface for all aircraft implementations.
- Provides flexibility to add new capabilities by adding to existing platforms or plugging in appropriate components.
- Enables use of competitive O/S products that are commercially available (COTS).
- Increased maturity in products as a result of using well-defined interfaces, and reusability
- With multi-core, the OEM has the option of using hi-performance avionics based on the latest edition of the ARINC 653 standard.

4.2.3 Benefits for Avionics Equipment Suppliers

This standard will provide several benefits to avionics suppliers:

- Enables concurrent design of application software programs
- Maintaining the open door for software re-use
- Reduces time-to-market
- As an indirect benefit, the avionics manufacturer stays competitive once standardized multi-core is mastered.

5.0 Documents to be Produced and Date of Expected Result

ARINC 653 Part 0, Supplement 3	September 2020
ARINC 653 Part 3A, Supplement 2	September 2020
ARINC 653 Part 3B, Supplement 1	April 2021

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
Parts 0, 3A & 3B	2	6	Oct 2019	April 2021

NOTE: Web conferences will be scheduled as needed. It is anticipated that at least one every quarter will be held.

6.0 Comments

6.1 Expiration Date for the APIM

October 2021

Completed forms should be submitted to Paul Prisaznuk, AEEC Executive Secretary and Program Director (pjp@sae-itc.org).

Attachment 8

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 19-014

Prepare Supplement 1 to ARINC Specification 641: Logical Software Part Packaging for Transport

1.1 Name of Originator and/or Organization

Olivier BASTIEN, Airbus Civil Aircraft

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

AEEC Software Distribution and Loading (SDL) Subcommittee

Ted Patmore, Delta Air Lines

2.2 Support for the activity (as verified)

Airlines: American, Delta, Lufthansa,

Airframe Manufacturers: Airbus, Boeing

Suppliers: Honeywell, TechSAT, Safran, Teledyne

Others: TBD

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: TBD

Airframe Manufacturers: Airbus

Suppliers: TBD

Others: TBD

2.4 Recommended Coordination with other groups

TBD

3.0 Project Scope (why and when standard is needed)

Legacy ARINC 615 software standard has been specified taking in consideration the certification of Field Loadable Software (FLS) distributed via physical media devices, which are most of the time part of the certified aircraft definition and requiring being kept onboard as per regulation requirement.

FLS physical media distribution is now becoming obsolete, and e-distribution of digitalized FLS progressively becomes the standard.

However, removing regulation requirement for storing FLS medias onboard the aircraft is challenging. It requires, not only, to ensure that any alternate FLS e-delivery process of these existing certified FLS medias being performed in a digitally secured way, from its originator to their final destinations, but also not to affect certification of existing legacy FLS medias, whose format and content are most of the time linked to ARINC 615 media sets organization.

This method needs to be included within ARINC 641. It will be used for A320 and A330/A340 aircraft to allow the removal of software media that has been required to be carried on the aircraft and kept updated. This method is compatible with the method used for the A350/A380 field loadable software delivery, and is already approved. Therefore, this approved process specific to these aircraft types should be included within ARINC 641 to cover all use cases.

3.1 Description

This additional method specific to Airbus aircraft needs to be added to ARINC Specification 641 so that it will contain an array of complete solutions for aircraft software packaging.

This standard would propose a method allowing:

- Simple conversion of existing certified ARINC 615 FLS media sets in a digitally secured FLS, for compatibility with existing ARINC 665 & ARINC 835 standard involved in the FLS e-distribution processes.
- Simple re-generation of ARINC 615 media sets from a digitally secured FLS, for backward compatibility with existing in-service floppy based loaders.

3.2 Planned usage of the envisioned specification

Note: New airplane programs must be confirmed by manufacturer prior to completing this section.

New aircraft developments planned to use this specification yes ☐ no ☒

Airbus: A320 & A330 families,

Boeing:

Other:

Modification/retrofit requirement yes ☒ no ☐

Specify: A320 & A330 families

Needed for airframe manufacturer or airline project yes ☒ no ☐

Specify: allows e-distribution of existing ARINC 615 multiple media sets, in a secured digital ways

Mandate/regulatory requirement yes ☐ no ☒

Program and date:

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

Specify: allows e-distribution of existing ARINC 615 multiple media sets, in a secured digital ways.

When is the ARINC Standard required? Q1-2020

What is driving this date?

APIM review by SAI, APIM Consideration, APIM Approval, Drafting Work, Circulation for Adoption consideration

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

If NO please specify solution: ___________________

Are Patent(s) involved? yes ☐ no ☒

If YES please describe, identify patent holder: ___________________

3.3 Issues to be worked

Legacy ARINC 615 software standard has been specified taking in consideration the certification of Field Loadable Software (FLS) distributed via physical media devices. Today, FLS physical media distribution becomes obsolete, and e-distribution of digitalized FLS progressively becomes the standard.

However, digitalization of existing FLS physical medias is not obvious, and becoming challenging due to:

- The need to ensure integrity of e-distributed software vs. genuine certified physical media set content.
- The need to secure replicability of the e-distributed software vs. individual certified physical media sets aircraft attached.
- The need to ensure compatibility with well-known ARINC 665 (FLS format) & ARINC 835 (FLS digital signature)

On top of that, ARINC 615 software drives additional challenges, especially when they are based on a media sets made of multiple media members, due to:

- The presence of a commonly file named having different content on each media member of the media sets (e.g. CONFIG.LDR)
- The need to keep traceability of multiple floppy organization after e-distribution for backward compatibility with existing floppy based loader.

4.0 Benefits

4.1 Basic benefits

Operational 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 ☐

Specify: ____________________

Product offered by more than one supplier yes ☒ no ☐

Identify: (company name)

4.2 Specific project benefits (Describe overall project benefits.)

4.2.1 Benefits for Airlines

Allows electronic reception and distribution of existing ARINC 615 multiple media set Field Loadable Software (FLS) in a secured digitally signed way, compatible with existing ARINC 665 & ARINC 835 standards.

Streamlines Airline process, by:

- Suppressing Media devices from certified aircraft definition.

- Suppressing floppy media management for FLS distribution between Airline engineering and line maintenance
- Introducing state of the art of FLS Data Security, allowing multiple FLS copy from centralized airline software storage.

It also provides Airlines opportunity to align legacy aircraft FLS management and distribution on brand new aircraft FLS e-distribution processes.

Avoid the use physical media such as floppies/CD. Enhances robustness and avoids obsolescence issues.

Ensures backward compatibility with legacy floppy based aircraft loaders, if needed, by allowing re-generation of floppy media sets from an e-distributed FLS parts.

4.2.2 Benefits for Airframe Manufacturers

Allows electronic distribution of existing ARINC 615 multiple media set Field Loadable Software (FLS) in a secured digitally signed way, compatible with existing ARINC 665 & ARINC 835 standards.

Streamlines Airframer processes by:

- Suppressing Media devices from aircraft definition.
- Suppressing logistic flow of numerous floppy media distribution between Suppliers and Airframer Final assembly line for each MSN.
- Introducing state of the art of FLS Data Security, allowing multiple FLS copy from centralized Airframer software storage

4.2.3 Benefits for Avionics Equipment Suppliers

Allows electronic distribution of existing ARINC 615 multiple media set Field Loadable Software (FLS) in a secured digitally signed way, compatible with existing ARINC 665 & ARINC 835 standards.

Streamlines Supplier processes by:

- Suppressing logistic flow of numerous floppy media distribution between Suppliers and Airframer, or Airlines.
- Introducing state of the art of FLS Data Security, allowing multiple FLS copy from centralized supplier software storage

Ensures integrity of e-distributed FLS with regards to original certified media content, allowing re-using certified software PNR identifier and MoC, instead of Media PNR identifier.

5.0 Documents to be Produced and Date of Expected Result

Standard describing how to convert multiple ARINC 615 Media members FLS, in digitalized ARINC 665 FLS.

Optionally, this standard could describe the method to re-generate ARINC 615 media sets from digitalized FLS PNR.

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
Supplement 1 to ARINC 641	*3*	*3*	*Jan 2020*	*May 2021*

* This project worked in conjunction with other SDL projects (i.e., 3 meetings per year total, etc.).

6.0 Comments

none

6.1 Expiration Date for the APIM

October 2021

Completed forms should be submitted to the AEEC Executive Secretary.

Attachment 9

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 17-012A

Prepare two ARINC Standards as follows:

ARINC Project Paper 808A (3GCN Cabin) and **ARINC Project Paper 809A** (3GCN Seats) to define a 3GCN **Plus** architecture capable of supporting multiple aircraft types with fiber optic **and high-speed copper technology. New aircraft programs and IFES requires documentation for industry references.**

Name of Originator and/or Organization

Jecelin Peterson, Boeing

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

Cabin System Subcommittee (CSS)

Dale Freeman, Delta Air Lines

2.2 Support for the activity (as verified)

Airlines: Delta

Airframe Manufacturers: Boeing, Airbus

Suppliers: Thales, Panasonic, **Safran**

Others:

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: Delta

Airframe Manufacturers: Boeing, Airbus

Equipment Suppliers: Thales, Panasonic, **Safran**

Others:

2.4 Recommended Coordination with other groups

FOS, NIS

3.0 Project Scope (why and when standard is needed)

ARINC 808 and ARINC 809 were developed as the 3GCN standard architecture for the IFE industry. Network technology is evolving and the development of 10 Gbps fiber interfaces provides a growth path for the 3GCN architecture that will support future IFE features such as 4K UHD video to be incorporated to create a 3GCN **Plus** architecture.

New aircraft developments and IFES architectures require documenting for industry review.

3.1 Description

The ARINC 808 and ARINC 809 defined 3GCN architecture will be revised to incorporate a 10 Gbps fiber backbone routed between the head-end IFE equipment and the Area Distribution Boxes that form the cabin network distribution system.

3.2 Planned usage of the envisioned specification

New aircraft developments planned to use this specification — yes ☒ no ☐

Specify: 777X, Existing Airbus aircraft

Modification/retrofit requirement — yes ☒ no ☐

Specify: 777, 747-8

Needed for airframe manufacturer or airline project — yes ☐ no ☒

Specify:

Mandate/regulatory requirement — yes ☐ no ☒

Program and date: None

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

Specify: ARINC 808**A** and ARINC 809**A,** 3GCN **Plus**

When is the ARINC Standard required? ~~2019~~**-2021**

What is driving this date? Certification of the B777X

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

If NO, please specify solution: Not applicable

Are Patent(s) involved? — yes ☐ no ☒

If YES please describe, identify patent holder: Not applicable

3.3 Issues to be worked

- Incorporation of 10 Gbps fiber (existing scope)
- New outline drawings (LRUs and new connectors)
- New architecture drawings of networks and components
- Pinout tables to be updated
- Validating connector callouts
- Material specific to increased network speeds
  - i.e., 2.5GBASET or higher

4.0 Benefits

4.1 Basic benefits

Operational 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 ☐

Identify:

4.2 Specific project benefits (Describe overall project benefits.)

The purpose of the project is to **prepare ARINC Project Paper 808A** and **ARINC Project Paper 809A** to incorporate performance enhancements to the 3GCN architecture creating a 3GCN **Plus** architecture that is applicable to multiple aircraft models.

.

4.2.1 Benefits for Airlines

Airlines will benefit from a revised standardized 3GCN **Plus** architecture that provides an IFES growth platform that supports new features such as 4K UHD video distribution.

4.2.2 Benefits for Airframe Manufacturers

Standardized products from a variety of suppliers applicable to multiple airplane platforms.

4.2.3 Benefits for Avionics Equipment Suppliers

Revision of an existing architecture that incorporates new and existing technology and improves system performance.

5.0 Documents to be Produced and Date of Expected Result

Prepare two new documents:

ARINC Project Paper 808A and ARINC Project Paper 809A

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
*~~Supplement 3 to~~ ARINC Project Paper 808**A***	*~~8~~ **18***	*~~24~~ **54***	*Oct 2017*	*~~10/2019~~ **Apr 2022***
*~~Supplement 4 to~~ ARINC Project Paper 809**A***				

* Meetings reflect ongoing CSS activities responsible for multiple ARINC Standards.

6.0 Comments

Revision A to this APIM adds 30 months to schedule.

6.1 Expiration Date for the APIM

January ~~2020~~ **2023**

Completed forms should be submitted to the AEEC Executive Secretary.

Attachment 10

Attachment 10

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 17-014A

Prepare two ARINC Standards as follows:

- **Supplement 8 to ARINC Specification 834: Aircraft Data Interface Function (ADIF) to include Aviation Data Broadcast Protocol (ADBP) improvements, support for Media Independent Aircraft Messaging (MIAM) protocol, and data security enhancements.**
- **New ARINC Project Paper 834A: Aircraft Data Interface Functional Enhancements to define single standard using Internet Protocols (IP) to improve EFB interface functions.** This interface is intended to reside within the EFB device.

Software specification only yes ☑ no ☐

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group

Electronic Flight Bag (EFB) Subcommittee.

2.2 Support for the activity (as verified)

Organizations: Alaska Airlines, American Airlines, El Al, FedEx, Lufthansa Airlines, Qantas, Southwest Airlines, United Airlines, Airbus, Boeing, Astronautics, Astronics Ballard Technology, Avionica, CMC Electronics, Gulfstream Aerospace, Lextech, Lufthansa Systems, Rockwell Collins, Sabre, SITA, Teledyne, Ultramain, UTC Aerospace Systems, Viasat, Thales, Jeppesen [others, TBI]

2.3 Commitment for Resources (directly from participant)

Organizations: American Airlines, FedEx, Lufthansa, Southwest, Airbus, Boeing, Astronics Ballard Technology, Astronautics, Avionica, CMC Electronics, Gulfstream Aerospace, Rockwell Collins, Sabre, SITA, Teledyne, UTC Aerospace Systems [others, TBI]

2.4 Recommended Coordination with other groups

The EFB Subcommittee will coordinate other subcommittees as needed.

The following activities might be relevant to this topic:

- ARINC Specification 429: *Digital Information Transfer System (DITS)*
- ARINC Characteristic 717: *Flight Data Acquisition and Recording System*
- ARINC Specification 619: *ACARS Protocols for Avionic End Systems*
- ARINC Characteristic 759: *Aircraft Interface Device (AID)*
- ARINC Specification 840: *Electronic Flight Bag (EFB) Application Control Interface (ACI) Standard*
- **ARINC Specification 841: *Media Independent Aircraft Messaging (MIAM)***

3.0 Project Scope

3.1 Description

The goal of **ARINC Project Paper 834A** is to eliminate the need for end-system application developers to write separate data interfaces for different AIDs (as is currently the case), depicted in Figure 1, and to also not be required to provide conversion from raw input data (e.g., ARINC 429 labels) to engineering units.

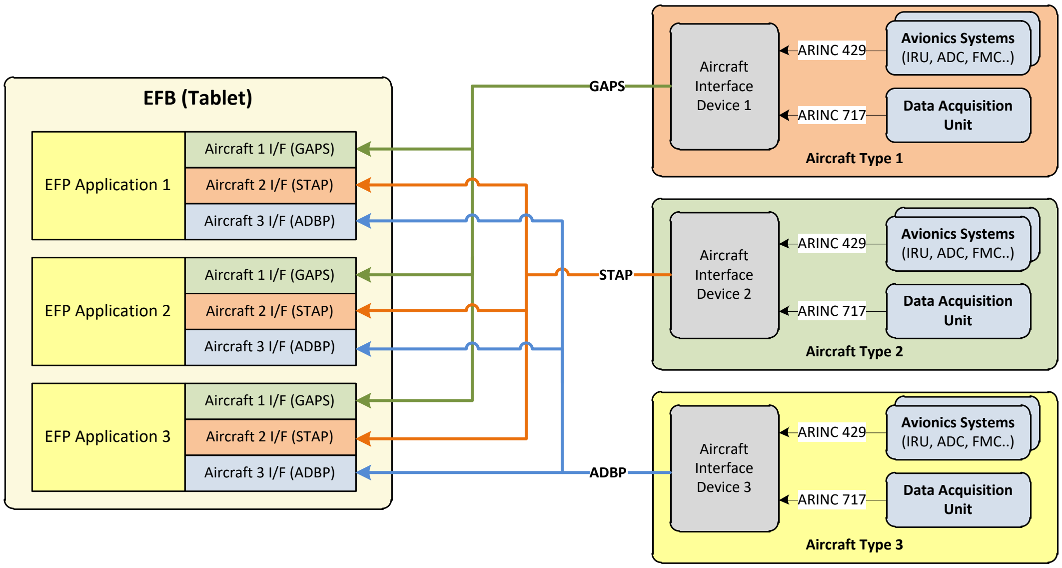

Figure 1: Too many interfaces between existing EFB applications and aircraft systems.

The primary intent of this APIM is to resolve of this problem of three standardized protocols for Aircraft Data Interface Function (GAPS, STAP, and ADBP defined in ARINC 834). This requires evaluation of possible solution approaches to identify the optimal suitable solution for airline operators.

ARINC Specification 834 will be updated to Supplement 8 and will include security improvements, MIAM protocols, and ADBP enhancements to simplify its continued use in existing deployments.

The EFB Subcommittee has identified the need for an entirely new ARINC Standard, to be developed as ARINC Project Paper 834A. This standard will encompass the latest IP technologies and focus on a single protocol to eliminate the duplication of applications required to function among the three protocols described above in the existing ARINC Specification 834.

3.2 Specific project benefits (Describe overall project benefits.)

A key consideration during the proposed work is to arrive at a cost-effective solution which does not result in unwanted duplication of existing standards.

Planned usage of the envisioned specification

New aircraft developments planned to use this specification yes ☐ no ☒

New avionics equipment for major retrofit programs yes ☐ no ☒

Mandate/regulatory requirement yes ☐ no ☒

Program and date: (program & date) Not Applicable

Modification/retrofit requirement yes ☐ no ☒

Specify: Not Applicable

Airframer and/or airline projects to use this specification yes ☒ no ☐

Once established, it is expected to be used by airframer and/or airline projects using avionics data parameters.

Is the infrastructure standard for the aircraft defined? yes ☒ no ☐

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

If NO please specify solution: _________________

Are Patent(s) involved? yes ☐ no ☒

If YES please describe, identify patent holder: _________________

3.3 Issues to be worked

EFB application suppliers are confronted with the need to develop multiple interfaces for connectivity to various AID solutions. This problem is due to three different protocol choices presently defined in ARINC 834, and data that may be presented in engineering units, ARINC 429 units or ARINC 717 units requiring the application to perform conversions. This represents an additional burden on application developers in terms of development and software maintenance, and higher costs for airlines, particularly mixed fleet operators.

ARINC Specification 834 will be upgraded to Supplement 8 with additional capabilities to support legacy implementations.

ARINC Project Paper 834A will define a single protocol intended to achieve true interoperability between the EFB and aircraft systems.

4.0 Benefits

4.1 Basic benefits

ARINC Project Paper 834A will define a single EFB end-system application aircraft data interface to be developed and maintained by application developers, which will reduce development time and software maintenance overhead, lower costs for airline operators, and represent a significant step towards achieving interoperability.

Operational enhancements (reduction in DOC?) yes ☒ no ☐

Form, Fit, Function, (FFF) standard (HW and/or SW):

(a) ARINC 600 form (only HW) yes ☐ no ☒

(b) Interchangeable fit (plug, mount, SW loading interface, etc.) yes ☐ no ☒

(c) Interchangeable function yes ☒ no ☐

If not fully interchangeable, please explain:

(d) API standard only, since H/W will not be addressed yes ☒ no ☐

(e) Product offered by more than one supplier yes ☒ no ☐

The purpose of this proposed project is to establish an open standard that can be implemented by any supplier.

4.2 Specific project benefits

- Minimize the overall cost of implementing EFB applications by defining a single API that is simple to implement.
- Enable the use of software applications developed by third parties.

4.2.1 Benefits for Airlines

ARINC Project Paper 834A will provide several benefits to Airlines:

- Airlines would benefit from lower integration cost, time, and risk.
- Better and more consistent integration of applications leads to better user acceptance.

4.2.2 Benefits for Airframe Manufacturers

- Provide guidance to implement EFB to aircraft systems interface.

4.2.3 Benefits for EFB Equipment and Application Suppliers

- Facilitate communication from EFB and aircraft systems

5.0 Documents to be Produced and Date of Expected Result

New ARINC Project Paper 834A and Supplement 8 to ARINC Specification 834: Aircraft Data Interface Function (ADIF) by October 2020.

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. This activity will be undertaken by the EFB Subcommittee. Monthly teleconferences will be held between face to face meetings to maintain progress.

Activity	Mtgs	Mtg-Days (Total)	Expected Start Date	Expected Completion Date
Supplement 8 to ARINC Specification 834	~~6~~8	~~2~~3x1 (w/EFBUF) ~~4~~5x3 (EFB SC) ~~14~~18 total days	July 2018	~~April~~ Oct 2020
Develop new ARINC Project Paper 834A				Oct 2020

Please note the number of meetings, the number of meeting days, and the frequency of web conferences to be supported by the ARINC IA staff.

6.0 Comments

None.

6.1 Expiration Date for the APIM

~~May~~ Dec 2020

Completed forms should be submitted to the AEEC Executive Secretary.

Attachment 11

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project — APIM 16-015A

Ground System Definition for e-Enabled Aircraft

1.1 Name of Originator and/or Organization

Maurice Ingle, American Airlines

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

Software Distribution and Loading (SDL) Subcommittee

Chairman: Ted Patmore, Delta Air Lines

2.2 Support for the activity (as verified)

Airlines: American Airlines, Cathay Pacific, Delta Air Lines, El Al Israel Airlines, Lufthansa, Qatar Airways, Southwest, TAP Portugal, United Airlines, UPS, Virgin America, WestJet

Airframe Manufacturers: Airbus, Boeing

Suppliers: Collins, Esterline, Honeywell, Teledyne

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: American Airlines, Delta Air Lines, Lufthansa

Airframe Manufacturers:

Suppliers: Teledyne

Others:

2.4 Recommended Coordination with other groups

RTCA SC-216, EASA WG-72, NIS and SAI Subcommittees

3.0 Project Scope (why and when standard is needed)

3.1 Description

e-Enabled aircraft and their e-Operations Ground Systems are proprietary, and only operational with aircraft built by that respective airframer. Airlines that operate aircraft from more than one airframer are faced with building and maintaining more than one entire ground system.

The project has a grand objective, potentially involving almost all facets of airborne software management. Given unlimited power, time, resources, and business approval the project would simply provide airlines a single Software management system. This system would span from LSAP receiving, storage, distribution, PKI, installation, and verification, to include configuration reporting. It would cover all airframes, all fleets, and all systems.

The reality of the industry does not allow for such a simple system to be available today for airlines.

This APIM proposes a phased approach to achieving an acceptable outcome for all stakeholders. Initially, industry will draft a document defining an API to allow access between an airline's ground software management tools to any aircraft manufacturer's airplane software distribution mechanisms. This is represented in the Figure 1 as API-1. This phase provides value to the airlines by simplifying a portion of their ground infrastructure requirements

It was originally envisioned that API-2 (see Figure 1) would later be developed to standardize the Air to Ground Module (AGM) communication to the aircraft.

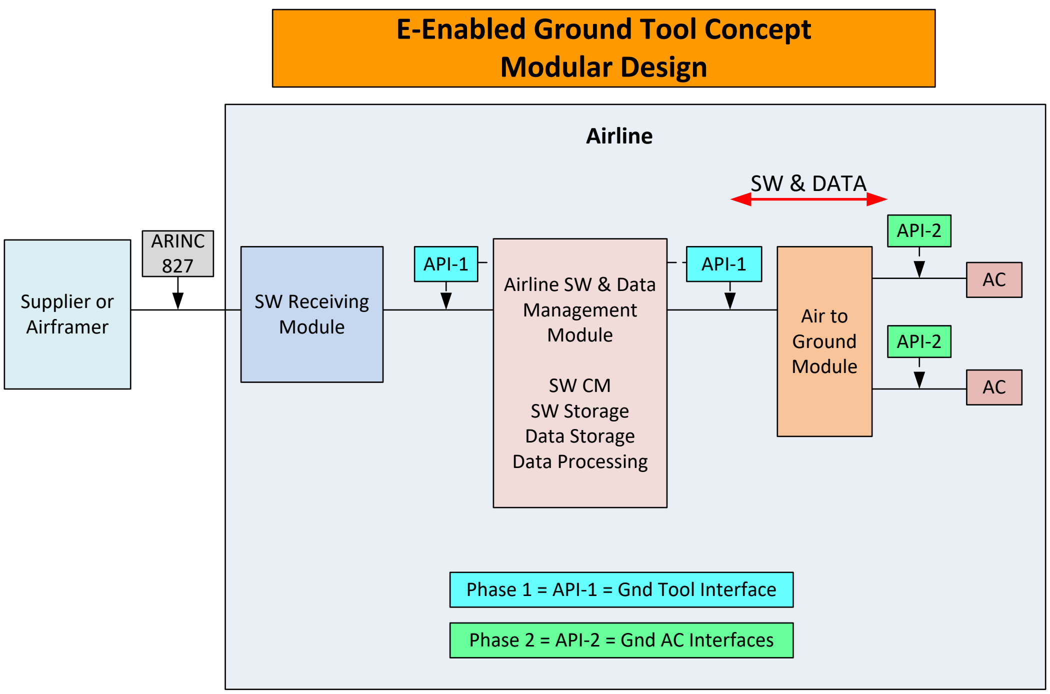

Figure 1 – Old Concept - Modular e-Enabled Ground Support System

However, there has been significant reluctance from the major aircraft manufacturers in sharing the AGM to aircraft interface information with outside parties. Among other reasons for their position, they consider this information to be proprietary and essential to maintaining aircraft security. Additionally, standardizing the AGM affects TC aircraft components and restricts future development to keep up with the latest technology.

The SDL Subcommittee began working on an alternate approach to the resolve the issue that the AGM module functional details need to remain proprietary.

As shown in Figure 2, the goal now (APIM 16-015A) is to standardize the interface between the Operator Ground Module (OGM) and Air to Ground Module (AGM).

Here, the OGM to AGM communication would be standardized. This means that the aircraft interface functionality would remain hidden, and the AGM would be designed, by the aircraft manufacturer, to conform to the standard set of API-1c functions and messages defined in this standard. Each aircraft manufacturer will produce an Air Ground Module (AGM) function that will communicate to their aircraft using their proprietary method, and communicate with the OGM using the ARINC Specification 851 defined standard method. The AGM will operate in a standardized hosting environment defined in this standard.

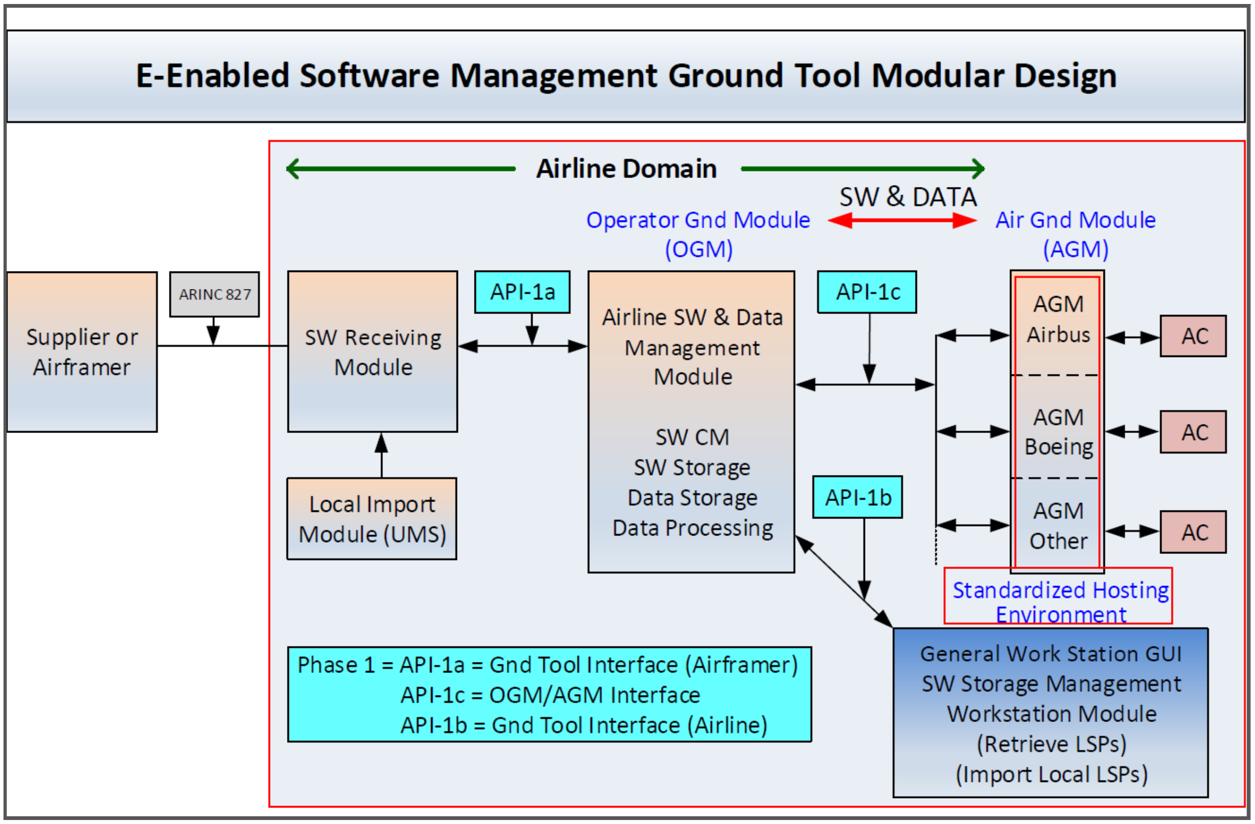

Figure 2 – New Concept - Modular e-Enabled Ground Support System

The OGM will interface to the AGM through API-1c. This will require that all AGM are designed or modified to interface to the OGM standard that will be defined in this standard. This will avoid the need to develop the API-2 (phase 2) of the original APIM proposal.

For aircraft planned in the future, the overall single, unified software management system could be more easily implemented to accept an airline's fleet of disparate aircraft software from any manufacturer. This would greatly simplify the airlines' processes into the next 100 years of powered flight.

Through all phases, there are a few details that would significantly assist the airlines in managing their processes.

- The desired method of software distribution is media-less.
- The desired method of software staging on aircraft is wirelessly.

- A mechanism for a hosted system should be available. Some airlines do not want or do not have the capability to host and maintain the Information Technology (IT) infrastructure required to support software intensive aircraft.
- Downloading data from the aircraft is also a function related to eEnabled ground system transport and storage, whether wireless, media based or wired for the following data:
- Aircraft system reports
- Flight Ops Quality Assurance data
- Security log data
- FLS configuration data

3.2 Planned usage of the envisioned specification

Note: New airplane programs must be confirmed by manufacturer prior to completing this section.

New aircraft developments planned to use this specification yes ☐no ☐

Airbus: (aircraft & date)

Boeing: (aircraft & date)

Other: (manufacturer, aircraft & date)

Modification/retrofit requirement yes ☒ no ☐

Specify: **Ground System,** Desired

Needed for airframe manufacturer or airline project yes ☒ no ☐

Specify: Desired

Mandate/regulatory requirement yes ☐ no ☒

Program and date: (program & date)

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

Specify (e.g., ARINC 429)

When is the ARINC standard required? March **2021**~~2019~~

What is driving this date? Time necessary to define, prepare and alter systems

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

If NO please specify solution: ___________________

Are Patent(s) involved? yes ☐ no ☒

If YES please describe, identify patent holder: ___________________

3.3 Issues to be worked

The ground system applications must support the following:

- A secure means of validating that FLS has been provided from a trusted source and the FLS integrity has not been compromised.
- The ability to digitally sign the FLS with the airline or operator digital signature (as required).
- Storage of the FLS.

- Distribution of the FLS wirelessly to aircraft and/or via ground systems like proxy servers, USB sticks or maintenance laptops.
- PKI infrastructure as required by the ground and aircraft systems.
- A repository for aircraft data.

4.0 Benefits

4.1 Basic benefits

Operational 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 ☐

Specify: All of the above is as it relates to ground systems and interface with aircraft

Product offered by more than one supplier yes ☒ no ☐

Identify: Boeing and Airbus

4.2 Specific project benefits (Describe overall project benefits.)

4.2.1 Benefits for Airlines

Large initial acquisition and build, and ongoing maintenance cost savings for airlines that operate or plan to operate any aircraft manufacturer's "eEnabled" aircraft will be realized from commercial product and licensing costs, hosting fees, IT infrastructure costs, and Engineering, IT, and IT Security resources.

Also, operators desire to have one process to perform eEnabled FLS management. This will minimize problems due to human factors caused by the complexity of using multiple systems for one type of task.

Regulatory requirements will also be simplified with the standardization of ground applications, infrastructure and processes.

4.2.2 Benefits for Airframe Manufacturers

Simplification with one industry standard

4.2.3 Benefits for Avionics Equipment Suppliers

(Describe any benefits unique to the equipment supplier's point of view.)

5.0 Documents to be Produced and Date of Expected Result

Identify Project Papers expected to be completed per the table in the following section.

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
*ARINC Project Paper **851**: **Aircraft Software Ground Tool Definition**~~ARINC Project Paper 8XX: Part 1, API-1~~*	*9~~5~~*	*27~~15~~*	*Jan 2017*	*Mar **2021**~~2019~~*
~~ARINC Project Paper 8XX: Part 2, API-2~~				
Web meetings	*6/year*		*Feb 2017*	*Mar **2021***

Please note the number of meetings, the number of meeting days, and the frequency of web conferences to be supported by the ARINC IA Staff.

6.0 Comments

Airbus, Boeing, and all other aircraft manufacturers will have to support this standardization if it is to be accomplished. IT and IT Security involvement will be instrumental.

6.1 Expiration Date for the APIM

April 2022

Completed forms should be submitted to the AEEC Executive Secretary.

Attachment 12

Attachment 12

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project — APIM 16-008A

Data Link Users Forum (DLUF)

1.1 Name of Originator and/or Organization

Victor Nagowski, DLUF Secretary

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

This APIM calls for the continuation of the DLUF activity for three years.

Co-Chairmen:

Brian Gleason, Southwest Airlines **and Steinarr Bragason, IcelandAir**

2.2 Support for the activity (as verified)

Airlines: Air Canada, Air France, Alaska, American, ANA, Delta, DLH, FedEx, Hawaiian, **IcelandAir**, JAL, KLM, SAS, Southwest, TAP, United, UPS, and others

Airframe Manufacturers: Airbus, Boeing, Gulfstream

Suppliers: Cobham, AVICOM, Airtel ATN, Gables Engineering, GE Aviation, Honeywell, Inmarsat, Harris, SATCOM Direct, SITA, Collins Aerospace, ALTYS Technologies, Hewlett Packard, Spectralux, Iridium, SITA OnAir, Avionica, L2 Consulting, Teledyne Controls, Panasonic Avionics, Thales, and others.

Others: FAA, JRANSA, UK NATS, Nav Canada, IATA, Eurocontrol, MITRE, NWS, and others.

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: **IcelandAir,** Southwest, United and others

Airframe Manufacturers: Airbus and Boeing

Suppliers: Airtel ATN, AVICOM, GE Aviation, Harris, Honeywell, Inmarsat, Iridium, Collins Aerospace and SITA.

Others: FAA, UK NATS, Nav Canada, IATA, and Eurocontrol.

2.4 Recommended Coordination with other groups

- SAI
- DLK Systems Subcommittee
- AOC
- AGCS
- IPS
- KSAT

3.0 Project Scope (why and when standard is needed)

3.1 Description

The goal of the DLUF is to assist aircraft operators improve the system performance and maximize the operational and economic benefits of air/ground data link communication services through the exchange of technical and operational information. The DLUF is a coordinating activity among airlines and cargo carriers, aircraft manufacturers, avionics manufacturers, civil aviation authorities (CAA), Air Navigation Service Providers (ANSP), and data link service providers (DSP) on technical issues of mutual interest leading to the identification and resolution of common problems. The DLUF also provides an opportunity for coordination among airlines, civil aviation authorities, and Air Traffic Service (ATS) providers on the direction, equipment requirements and schedule of new ATS data link programs.

3.2 Planned usage of the envisioned specification

Not applicable

3.3 Issues to be worked

An objective of the DLK Users Forum is to establish and maintain interoperability between airborne users and ground communication service providers while ensuring the efficient use of the limited frequency spectrum allocated for use by the air transport industry.

The DLUF will evaluate a rational progression from the legacy air-ground communications systems to more capable air-ground communication systems as they are identified to support Aeronautical Operational Control (AOC) and ATS applications. The DLUF affords airspace users (i.e., airlines, air cargo carriers and other operators) and ATS service providers an opportunity to coordinate datalink applications. This coordination can be in the form of exchanging operational experience, harmonization of procedures, identification of problems or opportunities that enhance system performance. The DLUF will establish and promote consistency among the services offered by ATS providers.

4.0 Benefits

4.1 Basic benefits

4.2 Specific project benefits (Describe overall project benefits.)

The DLK Users Forum provides benefits to the aviation community by:

- Identifying and resolving operational issues
- Improving system reliability while reducing costs
- Identifying system enhancements and future air-ground communication systems

- Promoting interoperability among various AOC and ATS service providers
- Coordinating ATS applications and procedures for worldwide operations

4.2.1 Benefits for Airlines

- Enable airlines to influence datalink product evolution to suit their operational needs, leading to greater commonality across fleets
- Provide a venue for airlines to have input in forming regulations that govern data link usage
- Common processes and applications for data link usage worldwide
- Prepare for mandates from civil authorities
- Cost reduction in airline data link programs

4.2.2 Benefits for Airframe Manufacturers

- Airframe manufacturers will benefit from being able to offer new aircraft models with data link provisions that meet the broadest needs of their customers, and satisfies CAA mandates
- Airframe manufacturers can rely on equipment suppliers and choose not to develop products themselves

4.2.3 Benefits for Avionics Equipment Suppliers

- Avionics suppliers will benefit from being able to offer new data link provisions that meet the broadest needs of their customers
- Open market opportunities for data link suppliers to provide desired equipment.
- Will simplify supplier effort to equip different aircraft types
- Easier to certify and to get operational approval due to commonality and familiarity

4.2.4 Benefits for Data Link Service Providers

Open market opportunities for data link service providers to provide airline desired data link applications and introduce new services.

5.0 Documents to be Produced and Date of Expected Result

Reports will be provided for each meeting.

5.1 Meetings and Expected Document Completion

The DLK Users Forum meets twice per year for 2.5 days. One meeting is scheduled in the United States in the February timeframe, the other is scheduled in Europe in the September timeframe. The DLUF holds a two-day meeting, followed by a one half day airline only meeting to review the results of the last meeting and identify topics for future meetings.

If necessary, the DLUF will schedule a workshop in conjunction with a DLUF meeting on a specific subject matter. The intent is to help educate the airlines on a specific product, an air/ground protocol improvement, new service provision, etc.

Activity	Mtgs	Mtg- Days (Total)	Expected Start Date	Expected Completion Date
AEEC Datalink Users Forum	6	18 (6x3)	Oct 2019	Dec 2022

6.0 Comments

6.1 Expiration Date for the APIM

December 2022~~19~~

Completed forms should be submitted to the AEEC Executive Secretary & Program Director, Paul Prisaznuk (pjp@sae-itc.org).