AEEC

Together "We Set the Standard."

To Aviation Industry

Date November 2, 2022

From ARINC Industry Activities

Reference 22-080/AXX-243 lth

Subject **AEEC Work Program 2022-2023**
AEEC Mid-Term Session
October 20, 2022

Summary The AEEC Executive Committee approved seven project proposals during the AEEC Mid-Term Session:

APIM Number	AEEC Sub-Committee	APIM Description
16-006B	KSAT	**Supplement 2 to ARINC Characteristic 791:** Mark I Aviation KU-Band and KA-Band Satellite Communication System PART 2 Electrical Interfaces and Functional Equipment Description and **ARINC Project Paper 791 Part 3**
19-001A	KSAT	**Supplement 2 to ARINC Characteristic 792:** Second-Generation Ku-Band and Ka-Band Satellite Communication System
19-004B	CSS	**ARINC Project Paper 8xx:** Cabin Secure Media Independent Messaging
20-001A	KSAT	**ARINC Project Paper 792A:** Multi-Modem Ku/Ka Satcom System with Fiber Optic Interfaces
22-005	AGCS	**Supplement 2 to ARINC Characteristic 771:** *Low-Earth Orbiting Aviation Satellite Communication Systems*
22-006	AGCS	**Supplement 3 to ARINC Characteristic 771:** Low-Earth Orbiting Aviation Satellite Communication Systems and **Supplement 9 to ARINC Characteristic 781:** Mark 3 Aviation Satellite Communication Systems
22-007	CSS	**ARINC Project Paper 8XX:** Cabin Autonomous System Secure Interconnection

The scope and schedule for each project is attached to this document in the form of an APIM (ARINC Proposal to Initiate/Modify an ARINC Standard).

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Action The purpose of this letter is twofold:

1. The actions of the Airlines Electronic Engineering Committee (AEEC) are hereby announced.
2. ARINC Industry Activities invites all interested parties to participate in the development of ARINC Standards.

For additional information on AEEC's Work Program visit the AEEC website: *https://aviation-ia.sae-itc.com/activities/aeec*.

cc AEEC Executive Committee, AGCS, CSS, KSAT, NIS, SAI,

Attachment 1

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project — APIM 16-006B

Broadband Satellite System Installation and Equipment Interfaces
Supplement 2 to ARINC Characteristic 791 Part 2
ARINC Project Paper 791 Part 3

1.1 Name of Originator and/or Organization

Ku/Ka Band Satellite Communications (KSAT) Subcommittee

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Co-Chairs

Ku/Ka Band Satellite Communications (KSAT) Subcommittee
Chris Schaupmann, Airbus
Michael Reinbold, The Boeing Company

2.2 Support for the activity (as verified)

Airlines: American Airlines, Delta Air Lines, FedEx, United Airlines
Airframe Manufacturers: Boeing, Airbus, Bombardier (TBC), Embraer (TBC)
Service Providers: Viasat, Panasonic, Intelsat, Inmarsat (TBC), Hughes
Suppliers: IDirect, Carlisle, Kontron, SCI Technologies, Kymeta, Honeywell, Astronics, ThinKom
Others: Totaport, Seamless Air Alliance

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: American Airlines, Delta Air Lines (TBC), FedEx (TBC), United Airlines
Airframe Manufacturers: Boeing, Airbus, Bombardier (TBC)
Service Providers: Viasat, Panasonic, Intelsat, Inmarsat (TBC), Hughes
Suppliers: IDirect, Carlisle, Kontron, SCI Technologies, Kymeta, Honeywell, Astronics, ThinKom
Others: Totaport, Seamless Air Alliance

2.4 Recommended Coordination with other groups

Air/Ground Communications Systems (AGCS) Subcommittee
Cabin Systems Subcommittee (CSS)
Fiber Optics Subcommittee (FOS)
Internet Protocol Suite (IPS) Subcommittee
Network Infrastructure and Security (NIS) Subcommittee
Seamless Air Alliance

3.0 Project Scope (why and when standard is needed)

3.1 Description

ARINC 791, Part 1 and ARINC 791, Part 2 define Ku-Band and Ka-Band satellite communication (satcom) equipment, installation and necessary interfaces to aircraft systems. Airlines, aircraft manufacturers, avionics suppliers, IFE suppliers, cabin communication suppliers and service providers with an interest in providing this equipment and services have participated in these activities.

It is recommended that the following work be performed to maintain these standards:

Supplement 3 to ARINC Characteristic 791 Part 1, including the following:

Revise fittings to address installation issues identified during installation programs and to accommodate a broader range of antenna options.

Revise antenna location and blockage maps for selected single aisle configurations

Clarify labeling of bulkhead penetrations

Revise form factor length dimension for the KRFU and KANDU enclosures

Revise and correct RTCA DO-160 section and category references, including updates for DO-160G

Provide guidance on minimum agility to track satellites in taxi, in approach/departure, and enroute

Provide guidance for waveguide installation

Notes:
1) ARINC Characteristic 791 Part 1 is Closed.
2) Supplement 3 to ARINC Characteristic 791 Part 1 published: September 19, 2019.

Supplement 2 to ARINC Characteristic 791 Part 2 and Project Paper 791 Part 3:

(Part 2) Modify the network interface definition to correct port labeling and VLAN trunk definition.

(Part 3) Alignment with ARINC Network Security Standards

Revise aircraft geometry/blockage data section to include asymmetric blockage cases (Part 2)

(Part 3) Update the management information base (MIB) for Ku-band and Ka-band satcom systems. Update maintenance protocol per NIS recommendation TBD

(Part 3) Update Quality of Service (QoS) and Class of Service (CoS) definitions

(Part 3) Update Antenna-Modem Interface Protocol (AMIP) Attachment

(Part 2) Remove ARINC 629 interfaces

(Part 2) Clarify that the Introduce virtual Airplane Personality Module (APM)

(Part 3) Introduce the Auxiliary Modem Unit (AMU) and define provisions required to support multiple modem operation

(Part 3) Satellite Antenna Equipment Recommendations for a flexible terminal capable of seamless connection to numerous networks

(Part 3) Add guidance on protecting control and maintenance KSAT interfaces to the Ground Earth Station (GES).

(Part 3) Align network interface definition to support optional connectivity to IPS router/host with alignment with ARINC 858 – Part 1, IPS Technical Requirements. This connectivity will be provided with the assumption that Ka/Ku satcom is a non-guaranteed link, and integrity requirements of using this satcom link for advisory / safety services will be defined in ARINC Specification 858 or other applicable standards.

(Part 3) Supplement 2 to ARINC Characteristic 791 Part 2 will also include applicability to the interfaces of the KSAT system/s defined in ARINC Characteristic 792.

3.2 Planned usage of the envisioned specification

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

Airbus: Airplane retrofit and forward fit programs

Boeing: Airplane retrofit and forward fit programs

Modification/retrofit requirement yes ☒ no ☐

Specify: Airlines are retrofitting connectivity systems into their existing fleets.

Needed for airframe manufacturer or airline project yes ☒ no ☐

Specify: driven by the need to provide common definitions for the airplane programs and retrofit programs

Mandate/regulatory requirement yes ☐ no ☒

Program and date: No mandate

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

Specify:

When is the ARINC Standard required? Per aircraft program

What is driving this date? Aircraft Development Schedules

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

Take advantage of improvements or corrections identified in the development of ARINC Characteristic 792.

Incorporate items identified in service implementation of ARINC 791 by the suppliers, service providers, airlines, and airframe manufacturers

4.0 Benefits

4.1 Basic benefits

Operational enhancements yes ☒ no ☐

For equipment standards:

Is this a hardware characteristic? yes ☒ no ☐

Is this a software characteristic? yes ☐ no ☒

Interchangeable interface definition? yes ☒ no ☐

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.)

Simplify and lower the cost of installation and interconnection of these Ku band and Ka band satellite communication systems in new and retrofit airplanes.

4.2.1 Benefits for Airlines

Lowers acquisition cost of these systems for new and retrofit airplanes. Standardized equipment will also lower maintenance and spares costs across the airlines multiple airplane models.

4.2.2 Benefits for Airframe Manufacturers

Simplifies the design for installation of these systems, lowering the cost of installation and interconnection which ultimately lowers the acquisition cost.

4.2.3 Benefits for Avionics Equipment Suppliers

Avionics suppliers are able to design standard equipment applicable to multiple airplane manufacturers and models decreasing their design effort and cost.

5.0 Documents to be Produced and Date of Expected Result

Supplement 3 to ARINC 791 Part 1 (Completed) and Supplement 2 to ARINC 791 Part 2 and Part 3.

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 791 Part 1	*3*	*9*	*July 2016*	*Completed Sept 2019*
Supplement 2 to ARINC 791 Part 2	*10 to 14 (monthly online)*	*30 to 40 Hrs*	*July 2016*	*October 2023*
PP792 Part 3 (Hybrid Meetings)	*2 to 3*	*6 to 9*	*October 2022*	*October 2023*

Part 2 and Part 3 to be developed concurrently (same meetings) In addition to the proposed meetings identified above, the subcommittee will have monthly online meetings (or as needed).

6.0 Comments

None

6.1 Expiration Date for the APIM

April 2024

***Completed forms should be submitted to (**aeec@sae-itc.org*)

Attachment 2

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 19-001A

Prepare **Supplement 2 to ARINC Characteristic 792:** Second-Generation Ku-Band and Ka-Band Satellite Communication System

1.1 Name of Originator and/or Organization

KSAT Subcommittee

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

Ku/Ka-band Satellite Subcommittee

Chris Schaupmann - Airbus

Michael Reinbold, The Boeing Company

2.2 Support for the activity (as verified)

Airlines: Delta Air Lines, United Airlines

Airframe Manufacturers: Airbus, Boeing, Bombardier TBC), Embraer (TBC), Gulfstream

Suppliers: Gogo (TBC), Intelsat, VIASAT, SPI (TBC), Smiths Interconnect, ThinKom, Astronics, , Carlisle, Collins Aerospace, Kymeta, Honeywell, SCI Technologies

Others: TotaPort, Seamless Alliance

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: Delta Air Lines, United Airlines

Airframe Manufacturers: Airbus, Boeing, Bombardier (TBC), Embraer (TBC), Gulfstream

Suppliers: GoGo, VIASAT, SPI (TBC), Smiths Interconnect, ThinKom, Astronics, SCI Technologies, Carlisle, Collins Aerospace, Kymeta, Honeywell

Others: TotaPort, Seamless Alliance

2.4 Recommended Coordination with other groups

CSS

3.0 Project Scope (why and when standard is needed)

3.1 Description

Develop alternative form factor antenna installations for Ku and Ka Band Satcom systems.

Develop new interface between the Modem Manager (MODMAN) and Outside Antenna Equipment (OAE).

Provide antenna thermal management guidance.

Add new MODMAN form factor to accommodate multiple interchangeable modem which is industry driven

Airlines want to change service provider

Service providers want to incorporate new modems

Allows using multiple modem suppliers

Multiple networks (location dependent: regional and global) Completed in Supplement 1

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: Maybe Retrofit (To be confirmed)

Boeing: B777-X (To be confirmed)

Bombardier To be confirmed

Embraer To be confirmed

Gulfstream To be confirmed

Modification/retrofit requirement yes ☒ no ☐

Specify: There is interest but no commitment for alternative form factor/s.

Needed for airframe manufacturer or airline project yes ☐ no ☒

Mandate/regulatory requirement yes ☐ no ☒

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

When is the ARINC standard required?

April 2023

What is driving this date?

Maturing antenna technologies.

Alignment with the LEO Constellation timeline.

Operators desire for narrower profile antennas (lower weight and drag).

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

Are Patent(s) involved? yes ☐ no ☒

None that are known

3.3 Issues to be worked

Evaluate and Develop alternative feedthrough and fitting locations.

Facilitate new cooling solutions (Antenna/Radome).

4.0 Benefits

4.1 Basic benefits

Operational enhancements yes ☒ no ☐

For equipment standards:

Is this a hardware characteristic? yes ☒ no ☐

Is this a software characteristic? yes ☐ no ☒

Interchangeable interface definition? yes ☒ no ☐

Power and Cooling interfaces may be changed

Interchangeable function definition? yes ☒ no ☐

Will reuse ARINC 791 and ARINC 792 provisioning (as much as possible).

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

Product offered by more than one supplier yes ☒ no ☐

Astronics, Stellar Blu, Gilat, ThinKom, Collins Aerospace, Smith Interconnect, Satixfy

4.2 Specific project benefits (Describe overall project benefits.)

4.2.1 Benefits for Airlines

Less fuel burn (lower operating cost/carbon emissions).

Regional Aircraft compatibility (move to satellite systems).

GEO and NGEO solutions with smaller antenna form factor.

Flexibility to change modem (Completed – Supplement 1)

Reusing standard structural provisions

4.2.2 Benefits for Airframe Manufacturers

Lessen installation time and cost, reduce weight, reduce rework, consistency (narrow bodied and wide-bodied aircraft).

4.2.3 Benefits for Avionics Equipment Suppliers

Increase product line (Support for alternate antennas).

Ease of introducing new modems.

5.0 Documents to be Produced and Date of Expected Result

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 792	*6 meetings*	*18 days*	*May 2019*	*Adopted May 2022*
Supp 2 to ARINC 792	*3 meetings*	*9 days*	*Oct 2022*	*May 2023*

6.0 Comments

Meetings will take place within KSAT Subcommittee
Monthly conference calls will be held as needed.

6.1 Expiration Date for the APIM

October 2023

Completed forms should be submitted to (*aeec@sae-itc.org*)

Attachment 3

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project — APIM 19-004B

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)
Jecelin Peterson, Boeing / Fritz Urban, Airbus

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 suppliers 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 the following:

- 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, 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.

■ NOTE: October 2022, the security aspects of the CSMIM project have been transferred/removed from this APIM 19-004B and moved to new work of the CSS under **APIM 22-0XX:** *Cabin Autonomous System Secure Interconnection*

■ The CSMIM standard is being broken up into two standards to enable airframe manufacturers to rapidly publish a standard for messaging internal to central cabin networks while separately defining a cabin network architecture capable of intersystem communications that, while compatible with central cabin systems, does not rely on central cabin network features or services for secure intersystem communications.

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 2025*

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

The APIM update in 2021 moved expected completion dates forward 48 months due to world economic pressures, as well as internal corporate priorities.

The APIM update in 2022 removed all security aspects of a CSMIM related network to a new CSS project, APIM 22-0XX.

6.0 Comments

none

6.1 Expiration Date for the APIM

October 2025

Completed forms should be submitted to (aeec@sae-itc.org)

APIM 19-004
Cabin Secure Media Independent Messaging

1.0 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.

7.0 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.

8.0 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.

9.0 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

10.0 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.

11.0 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.

12.0 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.

13.0 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 4

Attachment 4

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 20-001A

ARINC Project Paper 792A: Multi-Modem Ku/Ka Satcom System with Fiber Optic Interfaces

1.1 Name of Originator and/or Organization

Mark Sorensen, Delta Air Lines

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Co-Chairs

Ku/Ka Satcom Subcommittee,

Chris Schaupmann, Airbus
Mike Reinbold, The Boeing Company

2.2 Support for the Activity (as verified)

Airlines: Delta Air Lines, FedEx, Lufthansa, TAP Portugal, United Airlines

Airframe Manufacturers: Boeing, Airbus,

Suppliers: Viasat, Carlisle, Astronics, GEE, Collins Aerospace, Gogo, Panasonic Avionics, Honeywell, Gilat, Hughes, Smiths Interconnect, ThinKom, Satixfy (TBC), Safran (TBC)

Others: Inmarsat, Cotsworks, Gore, SCI Technologies, Glenair, iDirect, Space X (TBC), Wavestream, TE

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: Delta Air Lines, United Airlines

Airframe Manufacturers: Boeing, Airbus,

Suppliers: Viasat, Carlisle, Astronics, GEE, Collins Aerospace, Gogo, Panasonic Avionics, Honeywell, Gilat, Hughes, Smiths Interconnect, ThinKom, Satisfy (TBC), Safran (TBC)

Others: Cotsworks, Gore, SCI Technology, iDirect, Space X (TBC), Glenair, TE, Wavestream

2.4 Recommended Coordination with other groups

Cabin Systems Subcommittee (CSS)

Fiber Optic Subcommittee

DIFI (Non-ARINC IA Subcommittee or Work Group)
Seamless Air Alliance

3.0 Project Scope

Define a new Ku/Ka satcom system interwiring standard using fiber optic cabling for both radio channel and Ethernet interconnections.

The standard will leverage ARINC 792 equipment architecture and form factors and will change connector inserts.

3.1 Description

Emerging Electronically Steerable Antenna (ESA) has the capability to support multiple simultaneous beams, each with unique, selectable waveforms. These features are critical to support Non-Geostationary (NGSO) Satellite Networks, including Low Earth Orbit (LEO) and Medium Earth Orbit (MEO). Existing coaxial interconnections require difficult measures for this mode of operation.

ESA and Modem interfaces are moving towards a digital baseband interface instead of Intermediate Frequency. This technology allows the flexibility in positioning the modem, specifically to be inside the Outside Antenna Equipment. Furthermore, these measures are ideally suited for software defined modems.

Fiber optic bundles are lighter, can scale to support multiple beams, and can be easily adapted to installations that use both very short and very long bundle runs. Alternate application of IF over Fiber or RF over Fiber to support analog waveforms.

3.2 Planned usage of the ARINC Standard

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

Boeing plans on using this specification on future aircraft.

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 ☐

Adding ARINC 600 (shell size 1 fiber insert)

When is the ARINC standard required? May 2024

What is driving this date? ESA and NGSO networks are coming into service by 2022.

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

- Modman Connector
- Pressure Bulkhead Interface
- Transmit and Receive Link Budget
- Reference Frequency
- Number of channels to support
- Simplex/Duplex Ethernet fiber interface

- Baseband (I/Q) signal characteristics
- Analog IF or RF over Fiber
- Maintainability
- Software Selectable waveform

3.4 Security Scope

Is Cyber Security Impacted (if yes, check box(es) below)	yes ☒ no ☐
Aircraft Control Domain	yes ☐ no ☐
Airline Information Services Domain	yes ☐ no ☐
PAX Information and Entertainment Systems	yes ☒ no ☐
Other ________________________________	yes ☐ no ☐

(Discuss the level of cyber security guidance needed, the specific topics to be covered, and whether these topics are covered elsewhere by reference, e.g., ICAO Documents, RTCA/EUROCAE Standards, existing ARINC Standards, or if they need to be defined by a new or revised ARINC Standard.)

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 ☐

4.2 Specific Project Benefits

Simple, scalable, lighter installation.

Support for NGSO networks.

Support for multiple, simultaneous beams.

Support for Software Selectable Waveforms

Avoids coaxial cable challenges

More freedom for locating equipment

Reduced EMI, Lightning and Bonding challenges

4.2.1 Benefits for Airlines

Weight saving

Improved access to NGSO satellite networks

4.2.2 Benefits for Airframe Manufacturers

Simple, scalable, lighter installation.

Support for NGSO networks.
Support for multiple, simultaneous beams.
Support for Software Selectable Waveforms
Avoids coaxial cable challenges
More freedom for locating equipment
Reduced EMI, Lightning and Bonding challenges

4.2.3 Benefits for Avionics Equipment Suppliers

Digital baseband modem/antenna interface
Reduced EMI, Lightning and Bonding challenges
Support for multiple, simultaneous beams.
Support for Software Selectable Waveforms
Support for NGSO networks.

5.0 Documents to be Produced and Date of Expected Result

New ARINC Project Paper 792A, May 2024

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 PP 792A	*12 to 18*	*36*	*May 2020*	*April 2024*
Web Conferences	*Monthly*			

*concurrent with other KSAT projects/Subcommittee meetings

6.0 Comments

ARINC 792 specifies the use of coaxial interwiring. A new characteristic will differentiate the fiber/digital interwiring from the legacy coaxial interwiring. Any given installation will operate with either fiber or coaxial interwiring, but not both.

6.1 Expiration Date for the APIM

October 2024

Completed forms should be submitted to (***aeec@sae-itc.org***)

Attachment 5

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project **APIM #: 22-005**

Supplement 2 to ARINC Characteristic 771

1.1 Name of Originator and /or Organization

Guillaume de Bony de Lavergne, Airbus

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

Air-Ground Communications System Subcommittee – Robert Holcomb, Cobham

2.2 Support for the Activity (as verified)

Airlines: American Airlines (TBC), FedEx, United Airlines
Airframe Manufacturers: AIRBUS, The Boeing Company
Suppliers: Cobham, Collins Aerospace, Honeywell, AVIONICA
Others: Iridium, SITA

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: American Airlines, FedEx, United Airlines
Airframe Manufacturers: AIRBUS, The Boeing Company
Suppliers: Cobham, Collins Aerospace, Honeywell, AVIONICA
Others: Iridium and Inmarsat; SITA

2.4 Recommended Coordination with other Groups

RTCA SC-222/ EUROCAE WG-82

3.0 Project Scope (why and when standard is needed)

3.1 Description

Supplement 2 to ARINC 771 (Airbus Proposal)

a. Modify Arinc 429 label 350 BITE message to add new generation antenna ALGA (configuration 2) and HGA (configuration 3).
b. Modify Ethernet MIB to fix minor errors
c. Modify Label ARINC 429 label 271 SDU to ACARS join/leave to add ATN/OSI
d. Other cleanups of document as required

3.2 Planned usage of the ARINC Standard

Note: New airplane programs must be confirmed by the aircraft 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 (e.g., ARINC 429)

When is the ARINC standard required? May 2023

What is driving this date?
Launch of Iridium Certus AMS(R)S terminals in 2023.

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

Are Patent(s) involved? yes ☐ no ☒

3.3 Issues to be Worked

N/A

3.4 Security Scope

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

Aircraft Control Domain yes ☐ no ☐

Airline Information Services Domain yes ☐ no ☐

PAX Information and Entertainment Systems yes ☐ no ☐

Other: ______________________________ yes ☐ no ☐

This system is used for safety ATC communications. The changes have no new effects; same as before

4.0 Benefits

4.1 Basic Benefits

Operation enhancements yes ☒ no ☐

For equipment standards:

a) Is this a hardware characteristic? yes ☐ no ☒
b) Is this a software Characteristic: yes ☒ no ☐
c) Interchangeable interface definition? yes ☒ no ☐
d) Interchangeable function definition? yes ☒ no ☐

If not fully interchangeable, please explain: ____________________

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

Specify: ____

Product offered by more than one supplier yes ☒ no ☐

Identify: Cobham, Collins Aerospace, Honeywell

4.2 Specific Project Benefits

4.2.1 Benefits for Airlines

Improved BITE and defining ATN/OSI interface/s

4.2.2 Benefits for Airframe Manufacturers

Improved BITE and defining ATN/OSI interface/s

4.2.3 Benefits for Avionics Equipment Suppliers

Facilitates a common product for multiple customers

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 an Expected Document Completion

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

Activity	Mtgs	Mtg-Days (Total)	Expected Start Date	Expected Completion Date
Document a	*# of mtgs*	*# of meeting days*	*Oct 2022*	*May 2023*

Will be discussed/addressed during regular AEEC AGCS Subcommittee meetings/conferences.

Monthly online conferences, or as needed.

6.0 Comments

ARINC 771-2 is required for the planned launch of Iridium Certus AMS(R)S terminals in 2023

6.1 Expiration Date for the APIM

October 2023

Completed forms should be submitted to (aeec@sae-itc.org)

Attachment 6

Attachment 6

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM #: 22-006

Supplement 3 to ARINC Characteristic 771

Supplement 9 to ARINC Characteristic 781

Item # 1: Add IPS Radio Interface to the ARINC 771 and ARINC 781 Satcom Systems (add reference to ARINC 858)

Item # 2: Update to clarify Dual Dissimilar satcom configuration (A771 and A781 Satcom Systems)

Item # 3: Add ELGA antenna to GNSS Antenna isolation for ARINC 781. Evaluate if required for A771.

1.1 Name of Originator and /or Organization

Item #2, and #3: Guillaume de Bony de Lavergne, Airbus

Item #1: Alan Schuster Bruce, Inmarsat, and Zaruba, Radek Zaruba, Honeywell (IPS Radio Interface)

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

Air-Ground Communications System Subcommittee – Robert Holcomb, Cobham

2.2 Support for the Activity (as verified)

Item 1:

Airlines: American Airlines (TBC), FedEx, United Airlines

Airframe Manufacturers: The Boeing Company, AIRBUS (TBC)

Suppliers: Cobham, Collins Aerospace, Honeywell, AVIONICA

Others: Iridium and Inmarsat; SITA

Item 2:

Airlines: American Airlines (TBC), FedEx, United Airlines

Airframe Manufacturers: The Boeing Company, AIRBUS (TBC)

Suppliers: Cobham, Collins Aerospace, Honeywell, AVIONICA

Others: Iridium and Inmarsat; SITA. L2 Aviation (TBC)

Item 3:

Airlines: American Airlines (TBC), FedEx, United Airlines

Airframe Manufacturers: The Boeing Company, AIRBUS (TBC)

Suppliers: Cobham, Collins Aerospace, Honeywell, AVIONICA

Others: Iridium and Inmarsat; SITA. L2 Aviation (TBC)

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: American Airlines, FedEx, United Airlines

Airframe Manufacturers: AIRBUS, The Boeing Company

Suppliers: Cobham, Collins Aerospace, Honeywell, AVIONICA

Others: Iridium and Inmarsat; SITA

2.4 Recommended Coordination with other Groups

AEEC IPS Subcommittee and other Industry IPS Groups

RTCA SC-222/ EUROCAE WG-82

ICAO OPDLWG - Project Team VOICE / Dual SATCOM subgroup

3.0 Project Scope (why and when standard is needed)

3.1 Description

Item 1: Supplement 3 to ARINC 771 and Supplement 9 to ARINC 781 (Honeywell and Inmarsat Proposal)

a. Add IPS Radio Interface Guidance to A771 and A781

b. Consider two types of interfaces between the airborne IPS system and the SDU: One based on modification of the existing ARINC 429 interface and one based on "Common IPS Radio Interface" currently being developed by the AEEC IPS working group.

c. Review both ARINC 771 and ARINC 781 and introduce IPS as a new service in all the relevant sections.

d. Other cleanups of document as required

Item 2: Supplement 3 to ARINC 771 and Supplement 9 to ARINC 781 (Airbus Proposal)

a. Clarify the dual dissimilar configuration to support Iridium and Inmarsat (A771 and A781) systems intended to be used as the sole mean of long range communication. Including when the Iridium and Inmarsat avionics is provided by different avionics manufacturer.

Item 3: Supplement 3 to ARINC 771 and Supplement 9 to ARINC 781 (Airbus Proposal)

a. Add ELGA antenna to GNSS Antenna isolation for ARINC 781.

Evaluate if required for A771.

3.2 Planned usage of the ARINC Standard

Note: New airplane programs must be confirmed by the aircraft 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: Needed to Support IPS operation – from 2026 (Item 2)

Needed for airframe manufacturer or airline project yes ☒ no ☐

Specify: Needed to Support IPS operation – from 2026 (Item 2)

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?

May 2024

What is driving this date?

Item 1: Introduction of IPS in 2026 per Industry Roadmap

Item 2: Performance requirements for switching between satcom 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

Item 1: Development of IPS Interfaces

N/A

3.4 Security Scope

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

Aircraft Control Domain yes ☐ no ☐

Airline Information Services Domain yes ☐ no ☐

PAX Information and Entertainment Systems yes ☐ no ☐

Other: This will be used for ATC communications, same as before yes ☐ no ☐

(Discuss the level of cyber security guidance needed, the specific topics to be covered, and whether these topics are covered elsewhere by reference, e.g., ICAO Documents, RTCA/EUROCAE Standards, existing ARINC Standards, or if they need to be defined by a new or revised ARINC Standard.)

Security guidance is as existing. This is already included in A771 and A781.

4.0 Benefits

4.1 Basic Benefits

Operation enhancements yes ☒ no ☐

For equipment standards:

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

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

c) Interchangeable interface definition? yes ☒ no ☐

d) Interchangeable function definition? yes ☒ no ☐

If not fully interchangeable, please explain: ____________

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

Specify: ____________

Product offered by more than one supplier yes ☒ no ☐

Identify: Cobham, Collins Aerospace, Honeywell

4.2 Specific Project Benefits

(Describe overall project benefits.)

4.2.1 Benefits for Airlines

Item 1: Enable IPS Operation, Interchangeability, unified air/ground communication infrastructure.

Enhanced operational benefits using standardized interfaces

In using the IPS, airlines will have improved aircraft data communications performance, and reduced costs for current applications while providing the performance necessary for next generation broadband applications.

Provide backward compatibility with existing applications and ability to make use of BLOS and BLOS subnetworks will further increase effectiveness and applicability for AOC and ATS operations.

Item 2: incorporate decisions by ICAO OPDLWG - Project Team VOICE / Dual SATCOM subgroup

4.2.2 Benefits for Airframe Manufacturers

Item 1: Required for IPS Operation and the development of IPS Avionics

Item 2: Improved dual satcom operation

4.2.3 Benefits for Avionics Equipment Suppliers

Facilitates a common product for multiple customers

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 an Expected Document Completion

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

Activity	Mtgs	Mtg-Days (Total)	Expected Start Date	Expected Completion Date
ARINC 771-3 *ARINC 781-9*	*3*	*9*	*Oct 2022*	*May 2024*

Monthly online conference calls or as need.

6.0 Comments

6.1 Expiration Date for the APIM

October 2024

Completed forms should be submitted to (aeec@sae-itc.org)

Attachment 7

Attachment 7

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 22-007

ARINC Project Paper 8XX: *Cabin Autonomous System Secure Interconnection*

1.1 Name of Originator and/or Organization

Laurent Genevay, Safran Seats
Steven Rines, Safran Cabin

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

Cabin Systems Subcommittee

Co-Chairs:

Klaus-Friedrich Urban, Airbus

Jecelin Petersen, The Boeing Company

2.2 Support for the Activity (as verified)

Airlines:

Airframe Manufacturers: Airbus, Boeing

Suppliers: Safran Seats, Safran Cabin, Crane Aerospace

Others:

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines:

Airframe Manufacturers: Airbus, Boeing

Suppliers: Safran Seats, Safran Cabin,

Others:

2.4 Recommended Coordination with other groups

AEEC Network Infrastructure and Security (NIS) Subcommittee

AEEC Software Distribution and Loading (SDL) Subcommittee

AEEC Systems Architecture and Interfaces (SAI) Subcommittee

AEEC Internet Protocol Suite (IPS) Subcommittee

AEEC Data Link (DLK) Users Forum

3.0 Project Scope (why and when standard is needed)

3.1 Description

Cabin systems are evolving to utilize commercial network technologies for intersystem communications such as Ethernet, fiber optics and Wi-Fi. No standards exist to define common network security boundaries between cabin systems or the manner in which the privacy and integrity of information is assured as it traverses such shared network media types between systems.

Guidance is needed to enable suppliers and airframe manufacturers to independently develop cabin systems capable of secure intersystem communications.

Cybersecurity is one of the major challenges for Cabin Systems, with an exponential increase of potential threats each year. The expectation is to build a good practice documentation for cybersecurity at cabin systems level, including reliability-known checking tools and / or cryptology and / or signatures processes.

3.2 Planned usage of the ARINC Standard

Note: New airplane programs must be confirmed by the aircraft 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: Other Cabin Standards ARINC 485P1/P2, ARINC 854, etc.

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

What is driving this date?The CSS' CSMIM Project (ARINC PP 8XX, Part 1)

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 the good practices regarding cybersecurity to align all Cabin Systems stakeholders which are in interfaced with each other (i.e., IFE Systems and Actuation Systems)

Define:

- Architectural model for interconnection of autonomous systems;
- Common security model for autonomous cabin systems;
- Standard system network boundary and interface;
- Minimum requirements to ensure secure intersystem information exchange;
- Guidance for development of compatible autonomous systems;
- Definition of cabin system integration process.

Note: The issues above were previously being addressed as part of the ARINC CSMIM standard.

The CSMIM standard is being broken up into two standards to enable airframe manufacturers to rapidly publish a standard for messaging internal to central cabin networks while separately defining a cabin network architecture capable of intersystem communications that, while compatible with central cabin systems, does not rely on central cabin network features or services for secure intersystem communications.

The attachment offers additional details regarding issues that will be addressed by this APIM.

3.4 Security Scope

Is Cyber Security Impacted (if yes, check box(es) below)	yes ☒ no ☐
Aircraft Control Domain	yes ☐ no ☒
Airline Information Services Domain	yes ☒ no ☐
PAX Information and Entertainment Systems	yes ☒ no ☒
Other - All Software Loaded Using Ground Infrastructure	yes ☒ no ☐

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

Having Cabin Systems stakeholders working under the same security model and intersystem communications model enables independent development of next generation cabin systems that can be combined as required to meet airline customer requirements for both forward and retrofit applications. Common network interface definition enables system product interoperability and cybersecurity while encouraging supplier product innovation.

4.2.1 Benefits for Airlines

Enable widest possible market for innovative cabin products to meet the need for cabin commonality across mixed aircraft fleets. Interoperability between cabin systems expands airline purchasing options. Airlines retain the ability of MROs to integrate and retrofit cabin systems on existing fleets.

4.2.2 Benefits for Airframe Manufacturers

Enable airframe manufacturer development of advanced airframe-specific cabin system features based on Internet of Things (IoT) while retaining the option to integrate supplier cabin systems to meet specific airline customer requirements for common functionality across mixed fleets.

4.2.3 Benefits for Avionics Equipment Suppliers

Similar to airline benefits.

5.0 Documents to be Produced and Date of Expected Result

ARINC Project Paper 8XX: *Cabin Autonomous System Secure Interconnection*

The material for the new document will draw from the work on the CSMIM Project. Expected maturity time for this new document is 12-18 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
Review strawman and architecture and security from CSMIM draft	1	1	December 2022	Same
Bi-weekly / monthly organizational & technical web meeting	Monthly/ Ad-Hoc		December 2022	May 2023
Workshops (develop strawman into draft)	5	5	January 2023	December 2023
Develop and revise draft for committee review	4	4	January 2024	May 2024
CSS committee review and approval			May 2024	October 2024

As ARINC IA and AEEC meetings move to F2F in 2023, the project will be reviewed/worked during the CSS 3-day physical meetings, in addition to the outline of specific drafting sessions above.

Any full CSS meeting (physical or virtual) will have an ARINC IA Secretariat in attendance.

6.0 Comments

(none)

6.1 Expiration Date for the APIM

May 2025

Completed forms should be submitted to (*aeec@sae-itc.org*)

Attachment to APIM 22-xxx Cabin Autonomous System Secure Interconnection

Secure intersystem communications between autonomous aircraft systems across a shared network medium requires the standardization of hardware and/or services by which each system can independently:

- Manage its own security boundary at the network interface;
- Limit incoming network information traffic to known, verifiable information sources;
- Verify the integrity of the information source;
- Verify the integrity of information received;
- Protect the privacy of information traversing shared media;
- Protect information traversing shared media from modification or duplication;
- Verify that received information is temporally/sequentially relevant.

Autonomous aircraft systems require aircraft-level integration to identify and associate information producers with information consumers in other autonomous systems. The aircraft integration process will produce configuration files that define the intersystem network architecture and information flows between systems across the shared network media.

The aircraft cabin network defined in APIM 19-004 Cabin Secure Media Independent Messaging (CSMIM) is an autonomous aircraft system. CSMIM utilizes an MQTT message broker to distribute information between sensors, actuators, and applications within the aircraft cabin network.

The aircraft cabin network is expected to be a major consumer of the information produced by other autonomous cabin systems. However, the cabin network's MQTT broker cannot be used for intersystem communications without invalidating the autonomy (and therefore the independent certification) of those other cabin systems.

A protocol translator will be defined as part of the aircraft cabin network's external network interface to facilitate intersystem communications between the cabin network's MQTT broker and information sources/sinks in other cabin systems while maintaining the autonomy of those systems.