AEEC

Together "We Set the Standard."

To	Aviation Industry	**Date**	November 8, 2016
From	P. J. Prisaznuk AEEC Executive Secretary pjp@sae-itc.org tel +1 410-212-0913	**Reference**	16-135/AXX-202 klp

Subject **AEEC Work Program Update for 2016 - 2017**
AEEC Mid-Term Session
October 13-14, 2016, in Toulouse, France

Summary The AEEC Executive Committee approved 12 project proposals in Toulouse:

16-001	New ARINC Project Paper 6xx, Standardization of Avionics Software Performance and Reliability Metrics
16-009	Update ARINC Specification 653, Avionics Application Software Standard Interface
16-010	Update ARINC Specification 620, Datalink Ground System Standard and Interface
16-011	New ARINC Project Paper 8xx, Next Generation Cabin Data Bus (ARINC 485 replacement)
16-013	Update ARINC Characteristic 743A, GNSS Sensor, ARINC Characteristic 743B, GNSS Landing System Sensor Unit (GLSSU) and ARINC Characteristic 755 MMR and initiate ARINC Project Paper 743C
16-014	New ARINC Project Paper 8xx, Broadband Network Interface for non-Safety Services (replaces APIM 14-008)
16-015	New ARINC Project Paper 8xx, eEnabled Aircraft Ground System for Managing and Distributing Software Parts
16-007A	Update ARINC Specification 622 (and others) to support ATS Winds Service used with Advanced Interval Management
13-014B	Update ARINC Specification 800, Cabin System Connectors and Cables – Parts 1 and 3
12-004C	Update ARINC Specification 664, Fiber Optic 10 GbE Cabling and Connectors for Cabin
08-011B	Prepare ARINC Project Paper 836A, Cabin Standard Enclosures
10-013B	Update ARINC Specification 631, VDL 2 Implementation Provisions

The statement of work for each project is attached in the form of an ARINC Proposal to Initiate/Modify an ARINC Standard (APIM).

Summary The purpose of this letter is twofold:

1. Actions of the Airlines Electronic Engineering Committee (AEEC) are hereby announced and,

2. ARINC Industry Activities invites its Members, Corporate Sponsors, and other interested parties to participate in ARINC Standards development activities.

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

cc AEEC Executive Committee, AGCS, CSS, DLK, GNSS, NIS, SAI, SDL, SWM

Attachment 1

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 16-001

Airplane Software Quality Metric and Reporting Interface Definition

Name of Originator and/or Organization

Reinhard Andreae, Lufthansa Airlines

2.0 Subcommittee Assignment and Project Support

Suggested AEEC Group and Chairman

Software Quality Working Group of SAI Subcommittee

Reinhard Andreae, Lufthansa

Support for the activity (as verified)

Airlines: Alaska, American, Delta, FedEx, KLM, Lufthansa, TAP Portugal, United, UPS

Airframe Manufacturers: Airbus, Boeing

Suppliers: Honeywell, Panasonic, Rockwell Collins, Thales Avionics

Commitment for Drafting and Meeting Participation (as verified)

Airlines: FedEx, Lufthansa, FedEx, + TBD

Airframe Manufacturers: Boeing, + TBD

Suppliers: Esterline, Rockwell Collins, + TBD

Others:

Recommended Coordination with other groups

SAI Subcommittee

Avionics Maintenance Conference (AMC)

3.0 Project Scope

Description

Software functions are replacing hardware more and more in new aircraft projects. In addition, more and increasingly complex and integrated functions are included, most of which are realized in software. Because of this, the ability of software to reliably perform its function is a dominant factor in an airlines ability to operate and maintain an airplane in an efficient and effective manner.

For hardware parts technical performance measures clearly exist (e.g., MTBF or MTBUR). For software those measures are not defined, standardized or monitored. Hardware performance measures take advantage of the inherent property that hardware obeys the laws of physics, and can be reliably modeled statistically. Software functions do not necessarily obey the laws of physics, therefore standard and accepted quality and performance measures are hard to define.

For enabling a type of quality control loop for airplane systems with software functionality the first step is to define categories of software failures, incompleteness, and other operational deficiencies for operators to monitor. This will lead to an effort to standardize a set of technical quality metrics. This will include software used in Aircraft Control (AC), Airline Information System (AIS) and Passenger Information and Entertainment System (PIES) domains. This is the main scope of this effort.

The technical measures defined by the proposed standard could be used to exchange data pertinent to software performance among industry participants.

In order to develop good material for guidance on technical performance and quality standards a stepped approach is suggested.

> Phase 1: Investigate categories of software failures to monitor, define potential software quality metrics, and agree to the scope of the proposed standard. The output of the Phase 1 will be a report of the proposed metrics and recommendations as to how they might be captured.
>
> Phase 2: The output of the Phase 2 will be an ARINC Report as recommended by Phase 1.

Planned usage of the envisioned specification

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

Use the following symbol to check yes or no below.

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

Airbus: (any new aircraft program TBA)

Boeing: (any new aircraft program TBA)

Other: (TBA)

Modification/retrofit requirement yes ❑ no ☒

Specify: (TBA)

Needed for airframe manufacturer or airline project yes ☒ no ❑

Specify: (TBA)

Mandate/regulatory requirement yes ❑ no ☒

Program and date: (N/A)

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

Specify: (TBD)

When is the ARINC Standard required? Phase 1 target: Dec 2017

Phase 2 target: Dec 2019

What is driving this date?

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

If NO please specify solution:

Are Patent(s) involved? yes ❑

If YES please describe, identify patent holder:

Not that we are aware of.

Issues to be worked

Phase 1: Define the problem space.

a) Research existing standards and review applicability to airline industry.
b) Define types of in-service issues that should be measured against software-related quality.
c) Define the criteria for classification of software-related errors, such as:
   1. Criticality of a function (safety)
   2. Availability of a specified function
   3. Operational Impact
   4. Impact to economic aircraft operation
   5. Possible effect of combinations of failures
   6. Impact to maintenance
d) Determine if additional operational/contextual information is required to be reported through the review of actual in-service issues.
e) Propose the measurement technique (airline reporting processes or data collection features in onboard software).

Phase 2: Proposal for standard technical measures

a) Define software-related quality metrics.
b) Propose standard operational / contextual information to assist in root cause determination of in-service issues.

4.0 Benefits

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: Any airborne software product

Specific project benefits (Describe overall project benefits.)

4.1.1 Benefits for Airlines

Airlines have parameters to measure the actual performance of software against committed values. Consequently, airlines have a foundation to claim functional corrections of identified non-conforming software parts. The goal is to have software updates available to the airlines on an agreed timely basis.

4.1.2 Benefits for Airframe Manufacturers

Outcome of this proposal has the potential to provide more relevant and focused information to assist in prioritization and investigation of software-related in-service problems.

4.1.3 Benefits for Avionics Equipment Suppliers

Suppliers get a framework of technical measures and software quality definitions that would enable internal targets for compliance and external predictability of quality efforts.

5.0 Documents to be Produced and Date of Expected Result

- ARINC Report – Guidance (Dec 2019)

Meetings and Expected Document Completion

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

Product/Activity	**Mtgs**	**Mtg-Days (Total)**	**Expected Start Date**	**Expected Completion Date**
Phase 1 kickoff / work plan	Three 2-day meetings	6	Jan 2017	Dec 2017
Phase 2 (TBD) as determined by Phase 1	TBD			
Activity Summary	TBD			

6.0 Comments

This APIM will be updated to describe Phase 2 scope and schedule.

6.1 Expiration Date for this APIM

December 2018

Submit completed form to the AEEC Executive Secretary.

Attachment 2

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 16-009

ARINC Specification 653: *Avionics Application Software Standard Interface*

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: DDC-I, GE Aviation, GMV, Green Hills Software, Honeywell, Lynx Software, Rockwell Collins, Sysgo, Thales, Verocel, Wind River Systems

Others: TUBITAK (The Scientific and Technological Research Council of Turkey)

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: TBD

Airframe Manufacturers: Airbus, Boeing

Suppliers: DDC-I, GE Aviation, GMV, Green Hills Software, Honeywell, Lynx Software, Rockwell Collins, Sysgo, Thales, Verocel, Wind River Systems

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

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

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:	(aircraft & date)
Boeing:	777X, Dec 2019

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? September 2019

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

- Update ARINC 653 Part 1 Required Services and Part 2 Extended Services
  - o Allow for concurrent execution of multiple module schedules in a multi-core configuration.
  - o Investigate parallel initialization of a partition on multiple cores in order to facilitate improved system startup times.
  - o Resolve 64-bit support issues
  - o Revise XML specification to remove portability issues
  - o Include XML schema files and necessary links
  - o Investigate addition of FACE initialization functions to Part 1 or 2
  - o Miscellaneous updates to correct errors, omissions, and resolve ambiguities
- Update Part 0 as necessary based on changes to other parts.
- Complete Part 3B, Conformity Test Specification, started under APIM 08-003B
- Ensure Part 4 is consistent with the modifications made to Part 1
- Update Part 5 as necessary based on impact of other work

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
- 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 if standardized multi-core is mastered.

5.0 Documents to be Produced and Date of Expected Result

ARINC 653 Part 0, Supplement 2	Sept 2019
ARINC 653 Part 1, Supplement 5	Sept 2019
ARINC 653 Part 2, Supplement 4	Sept 2019
ARINC 653 Part 3A, Supplement 1	[TBD]
ARINC 653 Part 3B	April 2017
ARINC 653 Part 4, Supplement 1	Sept 2019 (if needed)
ARINC 653 Part 5, Supplement 1	Sept 2019 (if needed)

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
Part 3B	1	3	On-going	April 2017
Other Parts	6	18	Oct 2016	Sept 2019

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

6.0 Comments

6.1 Expiration Date for the APIM

October 2020

Completed forms should be submitted to the AEEC Executive Secretary.

Attachment 3

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 16-010

Supplement 9 to ARINC Specification 620: *Datalink Ground System Standard and Interface Specification (DGSS/IS)*

1.1 Name of Originator and/or Organization

Jose Godoy, ARINC IA Staff

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

DLK Systems Subcommittee – Bob Slaughter, American Airlines

2.2 Support for the activity (as verified)

Airlines: American, FedEx, BA, UAL

Airframe Manufacturers: Airbus, Boeing

Suppliers: Honeywell, Rockwell Collins, Universal Avionics Systems (TBC)

Others: SITA, Rockwell Collins IMS (TBC)

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: American Airlines

Airframe Manufacturers: Airbus, Boeing

Suppliers: Honeywell, Rockwell Collins, Universal Avionics Systems (TBC)

Others: SITA, Rockwell Collins IMS (TBC)

2.4 Recommended Coordination with other groups

Data Link Users Forum, EFB Standards, SAI

3.0 Project Scope (why and when standard is needed)

3.1 Description

It has been discovered that media independent ACARS messages that use a Message Function Indicator (MFI) are not being routed correctly. Datalink Service Providers (DSP), SITA and Rockwell Collins IMS, are not processing MIAM messages in the same manner. This was discovered in the preparation of ARINC 841, MIAM, and needs to be corrected.

Supplement 9 to ARINC 620 will:

1) Add guidance on how DSPs should process ACARS/AOA/MIAM messages that use MFIs.
2) Address interoperability issue associated with EFB ACARS messages with a Supplementary Field Address (SFA).
3) Assign MFIs to Onboard Network System (ONS) applications (Boeing requested).
4) Correct ISO 5 Characters tables in Appendix E.
5) Any editorial corrections viewed to be necessary.

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 (e.g., ARINC 429)

When is the ARINC standard required?

October 2017

What is driving this date? A350 MIAM messages are not being routed correctly

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

(Describe the major issues to be addressed.)

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: Air - Ground Interoperability

Product offered by more than one supplier yes ☒ no ☐

Identify: SITA, Rockwell Collins IMS

4.2 Specific project benefits (Describe overall project benefits.)

4.2.1 Benefits for Airlines

MIAM AOC messages will be routed efficiently.

4.2.2 Benefits for Airframe Manufacturers

A350 aircraft use the MIAM protocol. This effort will improve the routing of MIAM messages.

4.2.3 Benefits for Avionics Equipment Suppliers

Incremental product requirement.

5.0 Documents to be Produced and Date of Expected Result

Supplement 9 to ARINC 620, October 2017

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.

Supplement 9 to ARINC 620	Mtgs	Mtg-Days (Total)	Expected Start Date	Expected Completion Date
2016	1	3	Oct 2016	
2017	2	6		Oct 2017

Meetings to develop Supplement 9 will take place within the DLK Systems Subcommittee. Dedicated web conferences will be held on a monthly basis or as needed.

6.0 Comments

6.1 Expiration Date for the APIM

April 2018

Completed forms should be submitted to the AEEC Executive Secretary.

Attachment 4

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project — APIM 16-011

Next-Generation Cabin Equipment Network Bus

1.1 Name of Originator and/or Organization

Cabin Systems Subcommittee (CSS)

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, TAP Portugal, United

Airframe Manufacturers: Airbus, Boeing

Suppliers: Amphenol, Astonics, Diehl, Esterline, ITT Cannon, KID Systeme, Lumexis, Molex, Panasonic, Rockwell-Collins, Radiall, Souriau, TE Connectivity, Thales, W. L. Gore, Zodiac Seats France, Zodiac, ZII

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: Delta

Airframe Manufacturers: Airbus, Boeing (TBC)

Suppliers: Amphenol, Astonics, Diehl, Esterline, ITT Cannon, KID Systeme, Lumexis, Molex, Panasonic, Rockwell-Collins, Radiall, Souriau, TE Connectivity, Thales, W. L. Gore, Zodiac Seats France, Zodiac, ZII

2.4 Recommended Coordination with other groups

NIS Subcommittee, SAI Subcommittee

3.0 Project Scope (why and when standard is needed)

3.1 Description

ARINC Specification 485 defines a standard bus and messaging protocol used extensively for cabin equipment. However, ARINC 485 has outlived its usefulness. Originally intended for status and simple ON/OFF control, this bus does not provide adequate performance for current and emerging equipment with more sophisticated controls and smart microcontrollers. A higher performance networking alternative is needed. The alternative definition must consider minimizing conductors for the LAN, maximizing data throughput, and leveraging of existing COTS LAN technologies.

The CSS investigated and discussed trade-offs among proven, commercial solutions. The determination was that IEEE 802.3bw, which is a single twisted pair 100 Mbps Ethernet link was the best alternative.

This APIM authorizes the following activities:

- Develop Supplement 4 to ARINC Specification 664 Part 2 to define the physical and network layers for 100BaseT1 and 1000BaseT1 Ethernet, based on IEEE 802.3 bw (100BaseT1) and 802.3 bp (1000BaseT1). 100BaseT1 supports full duplex 100 Mbps performance over a single twisted pair. There are proven components available from multiple sources. 1000BaseT1 is a relatively new capability with promise for future performance enhancement.

- Develop a new ARINC Project Paper 8xx to define a new data bus applicable to cabin systems, initially for the following cabin functions:
  (1) In-Seat Network. Define physical interface (connectors and cabling), electrical interfaces, bus protocols, and messaging protocols for an Ethernet in-seat network, including seat equipment components such as electronic control unit, seat actuator controller, seat electronics, and in-seat lighting. The messaging protocols will expand on similar messaging developed for communications between seat components in ARINC 485 Part 2.
  (2) Cabin Lighting System Interfaces. Define standard physical interfaces (connectors and cabling), electrical interfaces, bus protocols, and messaging protocols for Ethernet networks for lighting system components.
- Consider developing a “legacy mode” to be used via the new physical layer to allow existing LRUs to maintain the currently-defined ARINC 485 messaging for seat elements.

3.2 Planned usage of the envisioned specification

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

Airbus: all new

Boeing: 777X (in-seat network)

Modification/retrofit requirement yes ☐ no ☒

Specify: Airlines are retrofitting cabin 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

- Definition of standard Ethernet physical layer for commercial aircraft applications
- Definition of standard IP network layer for commercial aircraft applications
- Connectors and cabling and electrical interfaces for an Ethernet in-seat network
- Bus protocols for in-seat equipment, similar to ARINC 485, Part 2
- Connectors and cabling and electrical interfaces for Ethernet networking for lighting components
- Bus protocols for lighting system components
- Network security considerations

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.)

A higher-performance data bus to cabin peripherals using the same universal interface would support implementation of new, smarter systems while reducing development cost and time to implement new functions.

Definition of bus implementation for in-seat networks and cabin lighting would preclude custom network implementations, reduce design and development time, and simplify integration testing for these components.

4.2.1 Benefits for Airlines

- Equipment interoperability between suppliers
- Reduction in development cost, improved reliability, and therefore reduced cost for the airlines

4.2.2 Benefits for Airframe Manufacturers

- Equipment interoperable between suppliers
- Flexibility and reduced costs by working from the same set of guidelines
- Reduction of time and cost for new developments due to reuse of proven solutions

4.2.3 Benefits for Avionics Equipment Suppliers

- Eliminates the need to design custom provisions for each installation
- Reduction of time and cost for new developments due to reuse of proven solutions

5.0 Documents to be Produced and Date of Expected Result

- Supplement 4 to ARINC Specification 664 Part 2
- ARINC Project Paper 8XX

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 4 to ARINC 664P2	6	18	Oct 2016	Mar 2018
ARINC Project Paper 8XX	6	18	Nov 2016	Mar 2019

* Meeting days reflect CSS meetings responsible for multiple ARINC Standards. In addition to the in-person meetings identified above, web conferences will be called to support specific project goals.

6.0 Comments

ARINC Specification 800 Parts 2 and 3 may need to be updated to define connector and cable components necessary for a new cabin bus. Should this be the case, this APIM will be updated to reflect the scope and schedule changes.

6.1 Expiration Date for this APIM

April 2019

Completed forms should be submitted to the AEEC Executive Secretary.

Attachment 5

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 16-013

Prepare the following new standards:

- Supplement 6 to ARINC Characteristic 743A, GNSS
- Supplement 1 to ARINC Characteristic 743B, GLSSU
- New ARINC Project Paper 743C, GLSSU with VDB Receiver
- Supplement 5 to ARINC Characteristic 755, MMR

1.1 Name of Originator and/or Organization

CMC Electronics & Airbus

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

Group: GNSS Working Group

Chairman: Julien Sanscartier, Esterline CMC Electronics and Francois Tranchet, Airbus

2.2 Support for the Activity

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

Airframe Manufacturers: Airbus, Boeing

Suppliers: CMC Electronics, Rockwell Collins, Honeywell, Thales

2.3 Commitment for Drafting and Meeting Participation

Airlines: TBD

Airframe Manufacturers: Airbus, Boeing

Suppliers: CMC Electronics, Honeywell, Rockwell Collins, Thales

2.4 Recommended Coordination with other groups

SAI Subcommittee and RTCA SC-159

3.0 Project Scope

3.1 Description

Aviation standards development committees such as RTCA, EUROCAE, and ICAO, are in the process of extending functional capabilities in GPS navigation (integration of IMUs), SBAS (increasing number of SBAS PRNs), and GBAS updates (as per the current RTCA DO-253D MOPS in development & various ICAO working papers).

Attachment 6

Attachment 6

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project — APIM 16-014

ARINC Project Paper 848: Secure Broadband IP Air-Ground Interface Standard
Note: This APIM supersedes APIM 14-008.

1.1 Name of Originator and/or Organization

Network Infrastructure and Security (NIS) Subcommittee

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

NIS Subcommittee

Steve Arentz, Chairman

2.2 Support for the Activity (as verified)

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

Airframe Manufacturers: Boeing, Airbus

Service Providers: Global Eagle, Gogo, Panasonic, ViaSat

Suppliers: Cobham, Honeywell, Intelsat, Rockwell Collins, Tecom, Teledyne, Thales, Kymeta, Zodiac Inflight

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: Delta, United

Airframe Manufacturers: Airbus, Boeing

Service Providers: Global Eagle, Gogo, Panasonic, ViaSat

Suppliers: Cobham, Honeywell, Intelsat, Rockwell Collins, Tecom, Teledyne, Thales, Kymeta, Zodiac Inflight

2.4 Recommended Coordination with other groups

Air/Ground Communications Systems (AGCS) Subcommittee

Cabin Systems Subcommittee (CSS)

Electronic Flight Bag (EFB) Subcommittee

Internet Protocol Suite for Aeronautical Safety Services (IPS) Subcommittee

Ku-Band and Ka-Band Satcom (KSAT) Subcommittee

Systems Architecture and Interfaces (SAI) Subcommittee

3.0 Project Scope (why and when standard is needed)

The main objective of this project is to specify a single solution for connecting, at the network level, any non-safety airborne IP communication system (e.g., AISD) with one or several ground systems, whatever link is used and anywhere the ground system is located (airline, airframe manufacturer, service provider, third party, etc.) The main benefit is to avoid multiplication of solutions which make complex and expensive the deployment of IP connectivity end-points, in particular inside the ground infrastructures.

It will provide requirements for interoperability of aircraft and ground IP-based networks for non-safety end-to-end communication between on-board and off-board systems. This standard should be compatible with any IP based broadband system such as Ku-band, Ka-band, cellular, commercial air-to-ground, and T-W LAN. The following areas will be addressed:

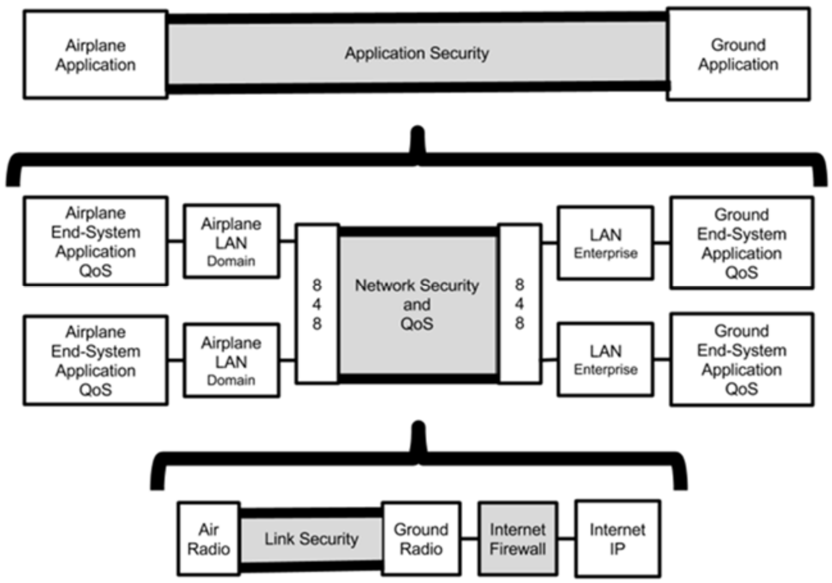
- Secure channel detailed definition (e.g., VPN) in order to guarantee that any ground network end point compliant with the standard is interoperable with the aircraft
- Definition of end-to-end Quality of Service (QoS) classes (including priority management) and how to signal a secure channel's QoS requirement for end-to-end differentiation of traffic
- Support for systems that service one or more network domains over a single carrier. (e.g. for allowing AISD secure channel to utilize a PIESD broadband link or vice-versa) This effort will be limited to non-safety applications.
- Architectural and design considerations taking both forward-fit and retrofit configurations into account.

Note: This project is not intended to define either (a) data exchange protocols between end-system applications, as that specified in ARINC Specification 830, or (b) communication management services, as specified in ARINC Specification 839. Rather, this standard will complement those services at the Network layer.

3.1 Description

The primary objective is to enable secure communication between each onboard LAN providing non-safety services and Enterprise LANs on the ground while not impacting secure segregation between onboard LANs. Each individual radio may have the ability to carry traffic from multiple domains but this standard will not specify the overall architecture.

This project would standardize the broadband IP network interface between the airplane LAN and the Enterprise LAN as shown in the figure below. The following figure illustrates the layered security model, at Link, Network and Application level. This project defines only the Network level, taking into account the overall security context.



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) – [to be considered]

Boeing: 777X, 2020

Other: (manufacturer, aircraft & date)

Modification/retrofit requirement yes ☒ no ❑

Airbus:

Boeing:

Needed for airframe manufacturer or airline project yes ☒ no ❑

Airbus: A320, during 2017

Boeing: 777X

Mandate/regulatory requirement yes ❑ no ☒

Program and date: (program & date)

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

Specify: Network infrastructure, non-safety services

When is the ARINC standard required? 2018

What is driving this date? Continued Implementation in forward fit and retrofit applications.

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

If No, please specify solution: ___________________

Are Patent(s) involved? yes ❑

If YES please describe, identify patent holder: ___________________

3.3 Issues to be worked

Definition of generic IP network protocols for non-safety broadband communication services.

- End-to-end IP network security, including:
    - o Secure channel detailed specification (e.g. based on IPsec) in order to guarantee end-to-end interoperability
    - o Preventing unauthorized traffic from entering the LAN.
    - o Strong authentication.
- End-to-end Quality of Service (QoS) and priority management
    - o Means to identify which QoS classes can be supported by the network.
    - o Means to tag\identify which specific QoS to apply to traffic in real time (if the traffic QoS is not profile-defined).
    - o Guidance for QoS application and traffic prioritization per tunnel, as applicable for specific carriers.
- Rely as much as possible on COTS communications components and solutions to minimize impact on intermediate networks.

Provide use cases that describe how the secure air-ground network can contribute to non-safety Airborne domains segregation.

4.0 Benefits

The goal is to reduce airplane design and installation costs, reduce system design cost for multiple airplanes, and reduce airline operation and support costs for air-ground connectivity deployment. The referenced solution will facilitate the increasing deployment of IP connectivity and the operational services it supports offering a high assurance security.

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: Interoperable IP network interface definition

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

Specify: __________________

Product offered by more than one supplier? yes ☒ no ❑

Identify: TBD

4.2 Specific Project Benefits

4.2.1 Benefits for Airlines

Standardized interfaces have the potential to reduce maintenance and ease deployment across airplane models and client end systems.

4.2.2 Benefits for Airframe Manufacturers

The goal is to simplify the deployment of IP non-safety end-to-end communication solution through a standard air-ground IP network definition.

4.2.3 Benefits for Avionics Equipment Suppliers

Avionics suppliers are able to design standardized equipment applicable to multiple airplane manufacturers, models and multiple client end systems.

5.0 Documents to be Produced and Date of Expected Result

ARINC Project Paper 848 is expected to define common broadband network protocols and interfaces. A mature draft is desired in 2017 (ahead of schedule).

5.1 Meetings and Expected Document Completion

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

Activity	Mtgs	Mtg-Days (Total)	Expected Start Date	Expected Completion Date
ARINC Project Paper 848	8**	9*	October 2016	October 2018

* In addition, monthly web conferences will be scheduled, as needed.

** Although the number of meetings is set for 8, only 1 to 1 ½ meeting days will be allocated per meeting.

6.0 Comments

(none)

6.1 Expiration Date for this APIM

April 2019

Completed forms should be submitted to the AEEC Executive Secretary.

Attachment 7

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 16-015

eEnabled Aircraft Ground Systems

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

Co-chairs Ted Patmore and Rod Gates

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: Esterline, Honeywell, Rockwell Collins, Teledyne

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: American Airlines, Delta Air Lines

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 airframer's airplane software distribution mechanisms. This is represented in the diagram as API-1. This phase provides value to the airlines by simplifying a portion of their ground infrastructure requirements

For future development under new or updated APIM(s), the second phase would attempt to harmonize the interfaces from the airframer's ground tools to the aircraft (API-2). This phase will entail defining the link, security transport layer, and software management protocols to provide for API-2 (some of this is defined in ARINC Project Paper 848).

This by far would provide an incredible value to airlines. Although the airlines desire to retrofit this API-2 to existing airframes, this APIM recognizes the immense challenges for airframers to implement. Once this API-2 is defined by the ARINC 8XX Standard, it would be voluntary for airframers and airlines to implement for existing airframes.

However, 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

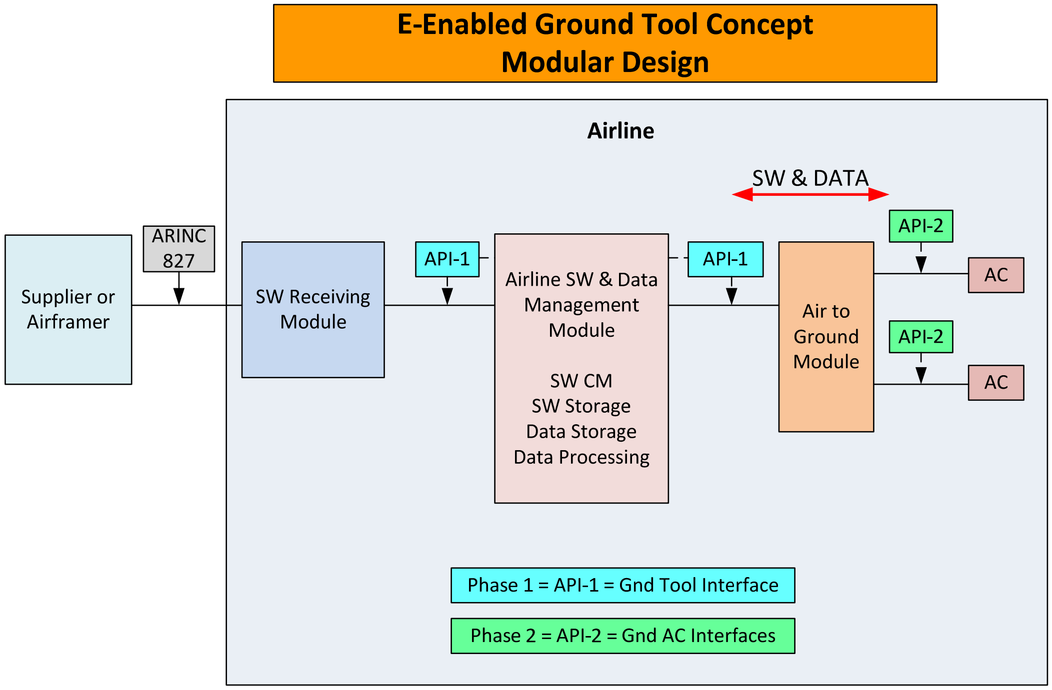


Figure 1 – Modular e-Enabled Ground Support System

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: 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 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 8XX: Part 0, Overview ARINC Project Paper 8XX: Part 1, API-1	5	15	Jan 2017	Mar 2019
ARINC Project Paper 8XX: Part 2, API-2	5	15	Jan 2020	Mar 2021
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 8

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 16-007A

Air Traffic Services (ATS) Wind Service Standardization

Supplement 5 to ARINC Specification 622: *ATS Data Link Applications over ACARS Air-Ground Networks*

And related changes to:

- **Supplement 9 to ARINC Specification 618:** ***Air/Ground Character-Oriented Protocol Specification***
- **Supplement 5 to ARINC Specification 619:** ***ACARS Protocols for Avionic End Systems***
- **Supplement 9 to ARINC Specification 620:** ***Data Link Ground System Standard (also see APIM 16-010)***

1.1 Name of Originator and/or Organization

Boeing and Airbus

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

Group: Data Link Systems Subcommittee

Note: If possible, handle review and discussion of items via teleconference.

Chairman: Bob Slaughter, AA

2.2 Support for the activity

Airlines: American, United, UPS, Alaska,

Airframe Manufacturers: Boeing, Airbus

Suppliers: GE Aviation, Honeywell, Rockwell Collins, Thales

Others: FAA

2.3 Commitment for Drafting and Meeting Participation

Airlines: N/A

Airframe Manufacturers: Boeing, Airbus

Suppliers: GE Aviation, Honeywell, Rockwell Collins, Thales

Others: FAA

2.4 Recommended Coordination with other groups

RTCA SC-214

3.0 Project Scope

3.1 Description

Air Traffic Service Wind Service would allow for the transmission of wind and temperature gradient information to aircraft by an Air Traffic Control Center (ATCC). It is designed to support Interval Management and 4-D trajectory functions.

In order to provide the ATS wind service with minimal impact to the airborne equipment, the implementation described in the joint Boeing and Airbus paper was created.

In the proposed implementation, the existing Airline Operational Communication (AOC) (ARINC 702A) message format would be utilized for transmitting ATS winds. The main addition is the use of the ACARS supplemental address to identify the Originator (i.e. ATC).

This implementation would utilize existing air/ground message formats described in ARINC Specification 620.

3.2 Planned usage of the envisioned specification

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

Specify: TBD

Modification/retrofit requirement yes ☐ no ☒

Specify: If airlines want to take advantage of ATS winds services, then they must retrofit the capability via enabling the existing AOC communication feature within the Flight Management Computer/Function (FMC/FMF).

Needed for airframe manufacturer or airline project yes ☒ no ☐

Specify:

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? 2018

What is driving this date?

Standard development is required to support ATN baseline 2 implementation. Development of ATS wind service standards is also required to facilitate development of standards for the FIM function.

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

The work to be done consists of two tasks as follows:

1) Prepare Supplement 5 to ARINC 622 to include the proposed ATS winds functionality.

2) Review document for editorial changes as needed (e.g., update document references, etc.).

3) Coordinate changes, as required, for ARINC Specifications 618, 619, and 620). Note: Since this feature is envisioned for future architectures, no change is presently planned for ARINC Characteristic 758.

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: TBD

4.2 Specific project benefits (Describe overall project benefits.)

4.2.1 Benefits for Airlines

The benefit for Airlines is expected to come from enhanced airspace capability using existing aircraft technology. There will be minimal impact to Avionics resulting in minimal cost to the operator. Additionally, since the technology being utilized has been in service for a long time, it is a mature technology which is already available on most older model aircraft. This will reduce the impact on retrofit aircraft.

This enables FIM development without major changes to the aircraft to support ATS wind uplinks.

4.2.2 Benefits for Airframe Manufacturers

The benefit to the airframe manufacturer will be the capability to use existing standards and capability to offer ATS wind service enhancement. By using existing capability, there will be minor impact to production and retrofit aircraft models. Only required change would be to enable AOC wind feature within the current FMC/FMF if not already enabled.

4.2.3 Benefits for Avionics Equipment Suppliers

Avionics equipment supplier benefits will be similar to the airframe manufacturer benefits. Due to the minimal impact to existing Avionics equipment, there will be minimal impact to the suppliers.

5.0 Documents to be Produced and Date of Expected Result

Supplement 5 to ARINC Specification 622 to include Air Traffic Services Wind Service information.

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
Addition of ATS Wind Services implementation section to ARINC 622 **Make associated changes to ARINC 618, 619 and 620**	3	3	Feb 2016	Dec 2016

These are intended to be virtual meetings with the interested parties.

6.0 Comments

None

6.1 Expiration Date for the APIM

~~December 2016~~

May 2017

Attachment 9

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project **APIM 13-014B**

Cabin Cables and Connectors

1.1 Name of Originator and/or Organization

CSS Subcommittee

Connector Working Group

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

CSS Subcommittee

Connector Working Group

Chairman: Dale Freeman

2.2 Support for the activity (as verified)

Airlines: Delta

Airframe Manufacturers: Boeing, Airbus

Suppliers: Lumexis, Panasonic, Rockwell Collins, Thales, Zodiac, Astronics, Amphenol, TEC, Glenair, Souriau, Radial, Cinch, Molex, ITT, Carlisle

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: Delta

Airframe Manufacturers: Boeing, Airbus

Suppliers: Lumexis, Panasonic, Rockwell Collins, Thales, Zodiac, Astronics, Amphenol, TEC, Glenair, Souriau, Radial, Cinch, Molex, ITT, Carlisle

2.4 Recommended Coordination with other groups

FOS Subcommittee, GAIN Subcommittee

3.0 Project Scope

3.1 Description

The CSS has developed a catalogue of standard connectors and cables for cabin applications. ARINC Specification 800 describes the characteristics and form factors of connectors and cables used for ARINC-specified cabin systems for commercial aircraft. Components are referenced in relevant system specifications and their designation is specified in this specification.

ARINC Specification 800 was published in four parts.

- **Part 1**: General description of new development process for cables and connectors for cabin systems; component identification; objectives; and qualification guidelines.
- **Part 2**: Listing of connector, contacts, and backshells; test specifications for connectors, test groups; and test requirements.
- **Part 3**: Listing of cable categories; test specifications; test groups; and test requirements.

- **Part 4**: Definition of test methodology for characterizing ARINC 664 Ethernet performance using aviation-grade connectors and cables.

ARINC Specification 800 provides component standards necessary to achieve interchangeability between equipment providers. The connectors and cables described in this Specification should be used for the cabin equipment.

The purpose of this APIM is to develop or modify ARINC Specification **800** to support standardization of cabin connectors and cables.

Specifically, this APIM authorizes the following activities:

- **Supplement 1 to ARINC 800, Part 2, Cabin Connectors to define a hybrid (i.e., fiber optic-copper) connector insert for use in cabin equipment retrofit and line-fit installations and to define connectors and contacts to support 10 Gbps Ethernet (reference APIM 12-004C).**
- **Supplement 1 to ARINC 800, Part 3, Cabin Cables to (1) define 4-pair aviation Cat 6A cables to support 10 Gbps Ethernet (reference APIM 12-004C) and (2) to incorporate hybrid fiber optic- copper composite cable defined by the CSS and intended for use with 4GCNs compliant with ARINC Specification 832-1.**

3.2 Planned usage of the envisioned specification

Use the following symbol to check yes or no below. ☒

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

Airbus: A350

Boeing: 777X

Other: (manufacturer, aircraft & date)

Modification/retrofit requirement yes ☒ no ❑

Airbus: All Airbus Aircraft types

Boeing: All Boeing Aircraft types

Needed for airframe manufacturer or airline project yes ☒ no ❑

Specify: Line fit and retro-fit on all existing aircraft types

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? October 2015

What is driving this date? Availability for future line-fit and retrofit projects

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

❑

If NO please specify solution: ________________

Are Patent(s) involved? yes ❑

If YES please describe, identify patent holder: ________________

3.3 Issues to be worked

Definition of key parameters for the hybrid **and 10 Gbps Ethernet** interface**s**, including the following:

- Connector insert selection.
- **8ax 4-pair contact definition**
- Seat-to-seat cabling
- Referencing from source documents

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: ________________

Products offered by more than one supplier yes ☒ no ❑

Identify: Amphenol, TEC, Glenair, Souriau, Radial, Cinch, Molex, ITT, Carlisle

4.2 Specific Project Benefits

4.2.1 Benefits for Airlines

By providing a common document for these definitions it will be easier to specify standard wiring and connectors for the entire class of cabin systems. Standardized cables and connectors being used in several systems will reduce the cost for stock and repair.

4.2.2 Benefits for Airframe Manufacturers

The standardization of connectors and cables allows airframe manufacturers to reference industry approved and standardized cables and connectors leading to reduction of time and cost for new developments due to reuse of proven solutions.

4.2.3 Benefits for Equipment Suppliers

The equipment suppliers get an industry-approved catalog with cables and connectors, enabling reduction of time and cost for new developments due to reuse of proven solutions. A single standard among different suppliers allows interchangeability and reduces development cost, which enhances competitiveness.

5.0 Documents to be Produced and Date of Expected Result

- Initial release of ARINC Project Paper 800, Part 3 - completed
- Supplement 1 to ARINC Specification 800, Part 2
- **Supplement 1 to ARINC Specification 800, Part 3**
- Supplement 3 to ARINC Specification 809 - completed
- Supplement 4 to ARINC Specification 810 – completed
- Initial release of ARINC Project Paper 800, Part 4 **- completed**

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.

Product/Activity	Mtgs	Mtg-Days (Total)	Expected Start Date	Expected Completion Date
Supplement 1 to ARINC Specification 800 Part 2	***2***	***6****	*October 2013*	*April **2017***
Supplement 1 to ARINC Specification 800 Part 3	***2***		*October 2013*	*April **2017***

***NOTES:** This effort will take place within the regularly scheduled CSS meeting. In addition, web conferences will be arranged between CSS meetings to review action items and the draft Supplement material.

6.0 Comments

These efforts would take place within the CSS Subcommittee.

6.1 Expiration Date for this APIM

April **2017**

Submit completed form to the AEEC Executive Secretary.

Attachment 10

ARINC IA Project Initiation/Modification (APIM)

1.0 Name of Proposed Project — APIM 12-004C

Aircraft Data Network – 10 GbE Physical and Data Link Layer

Supplement 3 to ARINC Specification 664, Part 2

Supplement 3 to ARINC Report 803, Fiber Optic design Guidelines

Supplement 2 to ARINC Report 804, Fiber Optic Active Device Specification

1.1 Name of Originator and/or Organization

Airbus and Boeing

2.0 Subcommittee Assignment and Project Support

2.1 Identify AEEC Group

Cabin System Subcommittee (CSS) and Fiber Optics Subcommittee (FOS)

2.2. Support for the activity

Airlines: Delta Air Lines, United Airlines

Airframe: Airbus, Boeing

Suppliers: Thales, TE Connectivity, Radiall, Glenair, Panasonic, Lumexis, Amphenol, Souriau, ITT Canon

2.3. Commitment for resources

Airlines: Delta Air Lines, United Airlines

Airframe: Airbus, Boeing

Suppliers: Thales, TE Connectivity, Radiall, Glenair, Panasonic, Lumexis, Amphenol, Souriau, ITT Canon

2.4 Chairmen:

CSS Chairman: Dale Freeman, Delta Air Lines
FOS Chairman: Robert Nye, Boeing

2.5. Recommended Coordination with other groups

Cabin Systems Subcommittee (CSS)
Fiber Optic Subcommittee (FOS)

3.0 Project Scope

Update ARINC 664, Part 2, to include the physical and data layer for 10 GbE interface for commercial aircraft. Both copper and fiber will be included.

Update the fiber optic set to consider implementation of 10GBASE-SR fiber optic link. The following standards will be affected:

- ARINC Report 803 to define Link Budget/Optical interface requirements
- ARINC Report 804 to define the Active Device (transceiver) transmit and receive minimal requirements

3.1 Description

This effort will standardize cable and connection devices for use with 10 GbE data buses for multiple high-speed applications.

3.2 Planned usage of the envisioned specifications

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

Airbus: all future aircraft types

Boeing: all future aircraft types

Other:

Modification/retrofit requirement yes ☐ no ☒

Airbus:

Boeing:

Other:

Needed for airframe manufacturer or airline project yes ☒ no ☐

Airbus: all aircraft types

Boeing: all aircraft types

Other:

Mandate/regulatory requirement yes ☐ no ☒

Program and date:

When is the ARINC standard required? October 2015

What is driving this date? Development of new In-Flight Entertainment Systems

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

If no please specify solution: _______________

Patent(s) involved? yes ☐

If YES please describe, identify patent holder: _______________

3.3 Issues to be worked

Consensus on a standard contact capable of 10Gb/s Ethernet performance

For 10GbE applications:

- Link details
- Equipment Physical Layer Design considerations
- Aircraft network link components
- Reference Plane Definition
- Link test Guidelines (Appendix F)
- Implementation Guidelines for 10GBASE-T Links
- Listen Only Interface (Research/Investigate)
- Implementation Guidelines for 10GBASE-SR fiber optic links

4.0 Benefits

The goal is to reduce equipment design, integration and installation cost and to reduce maintenance cost for airlines.

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: IEEE 802.3

Product offered by more than one supplier yes ☒ no ☐

Identify: Thales, Lumexis

4.2 Specific project benefits

Simplify and lower the cost of development, installation, integration and maintenance for 10GbE in commercial aircraft. This is expected to improve the ability of airlines to download and distribution of high volume of entertainment content in cabin systems.

4.3 Benefit for Airlines

Standardization will lower acquisition cost of equipment using this standard. It will also lower maintenance and spare cost across the airlines multiple airplane models.

4.4 Benefit for Airframe Manufacturers

Simplifies the design for high speed links, lowering the cost of interconnection and installation, which ultimately lowers the acquisition cost

4.5 Project Benefit for Avionics Equipment Suppliers

Enables equipment suppliers to design standardized equipment applicable to multiple airplane manufacturers and models with the goal of minimizing their design effort and cost.

5.0 Documents to be Produced and Date of Expected Result

Supplement 3 to ARINC Specification 664 Part 2, **April 2017**.

Supplement 3 to ARINC Report 803, **October 2017**.

Supplement 2 to ARINC Report 804, **October 2017**.

Consider the impact on other ARINC Standards, including ARINC Specification 800, Parts 2 and 3.

5.1 Meetings/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)	Start Date	Expected Completion Date
CSS - Prepare Supp 3 to ARINC 664 Part 2	2 meetings*	6*	October 2012	April 2017
FOS – Prepare Supp 3 to ARINC 803	2 meetings*	6*	April 2015	October 2017
FOS – Prepare Supp 2 to ARINC 804			April 2015	

***NOTE**: This effort will take place within the regularly scheduled meetings of the Cabin Systems Subcommittee. FOS meeting activity included for reference. In addition, web and telephone conferences will be held between meetings to review action items and the draft Supplement material.

6.0 Comments

The materials will be coordinated and reviewed by interested parties.

6.1 Expiration of this APIM

October 2017

Submit completed form to the AEEC Executive Secretary.

Attachment 11

ARINC IA Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 08-011B

Cabin Enclosures - Mini Modules for Modular Rack Concept

2.0 Subcommittee Assignment and Project Support

2.1 Identify AEEC Group

It is recommended that the Cabin Systems Subcommittee (CSS), augmented with systems, integration and communications experts, be assigned to perform this work.

Airlines, aircraft manufacturers, cabin equipment/system suppliers and cable and connector manufacturers with an interest in cabin systems and its peripherals, are regularly participants in this activity.

2.2 Support for the activity

Airlines: Delta Air Lines

Airframe Manufacturers: Airbus

Suppliers: Panasonic Avionics, Thales, TE Connectivity, Molex, Amphenol, Radiall, Lufthansa Technik

Others:

2.3 Commitment for resources

Airlines: Delta

Airframe Manufacturers: Airbus will provide the necessary manpower and active support as required.

Suppliers: Panasonic Avionics, Thales, TE Connectivity, Molex, Amphenol, Radiall, Lufthansa Technik

Others:

2.4 Chairmen:

Chairman: Dale Freeman, Delta
Co-Chairmen: Gerald Lui-Kwan, Boeing and Rolf Goedecke, Airbus

2.5 Recommended Coordination with other groups

N/A

3.0 Project Scope

3.1 Description

ARINC Specification 836: Cabin Standard Enclosures – Modular Rack Principle (MRP), defines standard cabin equipment enclosures and provisions for equipment attachment on monuments.

This project will define and standardize mini modules for equipment being installed into a modular rack concept. The mini modules are mounted in frames (rack type slots) and can be installed and removed without tools. The mini modules include locking mechanisms for easy insertion and extraction. The standard can be used for selected equipment being installed in cabin area. The physical footprint of these enclosures considers miniature circuit board standards to cover a large range of applications. When using the mini modular form factor, the space and weight requirements are drastically reduced compared with existing equipment. The mini modules are compatible with ARINC Specification 836 and set forth the standardization of cabin boxes in order to install cabin equipment quicker and easier.

The result of this project will be ARINC Project Paper 836A, which will include the previous form factors (Type I Enclosures) as well as the new miniature modules (Type II Enclosures).

3.2 Planned usage of the envisioned specification

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

Airbus:

Boeing:

Modification/retrofit requirement yes ☐ no ☒

Airbus:

Boeing:

Needed for airframe manufacturer or airline project yes ☒ no ☐

The timetable for this project is mainly driven by the development time needed to provide a mature definition. Introduction is not linked to a specific aircraft project. Introduction can be done as soon as possible to get the advantages of this standard.

Mandate/regulatory requirement yes ☐ no ☒

Program and date:

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

When is the ARINC standard required? October **2017**

What is driving this date? _ Aircraft development schedules.

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

Issues will include the development of form factors, mounting methods, and grounding/bonding methods for mini-modules and the associated mounting rack.

4.0 Benefits

The usefulness of an ARINC specification shall be led by the spirit to reduce the Direct Operating Cost (DOC) of an aircraft. As the DOC includes production cost (via the sales price) as well as the relevant operating cost, this method ensures the whole life time of an aircraft is covered.

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:

4.2 Specific project benefits

ARINC Specification 836**A** will provide a cabin equipment mini module standard to enable provisioning of the aircraft independent from customizing and options. The goal is to provide a modular box system supplemental to **existing** ARINC 836 **Type I enclosures** considering the specific need for cabin equipment.

4.3 Benefits for Airlines

Mini modular standardized enclosures simplify maintenance due to harmonized installation and quick replacement. Retrofits become much simpler as form and fit is pre-defined. Equipment becomes lighter and smaller and operating cost is reduced.

4.4 Benefits for Airframe Manufacturers

It will allow design of provisions for the aircraft independent of customization and options, reduces installation time and cost, and reduces weight and space requirements. Modules are stackable, both vertically and horizontally, resulting in a high package density.

4.5 Benefits for Avionics Equipment Suppliers

Predefined standardized mini-modules reduce development time and qualification cost. The boxes can be selected from a catalog and are manufactured in higher quantities. Standardized boards and standardized interface modules can be used.

5.0 Documents to be Produced and Date of Expected Result

ARINC **Project Paper** 836**A**.

6.0 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 836**A**	**4***	Maximum ½ day each*	**5/2014**	**10/2017**

***NOTE:** This effort will take place within the regularly scheduled CSS meeting schedule. In addition, web conferences will be arranged between CSS meetings to review action items and the draft Supplement material.

6.1 Expiration Date for this APIM

October 2017

7.0 Comments

None

Attachment 12

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project — APIM 10-013B

Supplement 7 to ARINC Specification 631 – *VHF Digital Link (VDL) Mode 2 Implementation Provisions*

1.1 Name of Originator & Organization

Jose Godoy, ARINC IA Staff

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

Datalink (DLK) Systems Subcommittee

Chairman: Bob Slaughter, American Airlines

2.2 Support for the activity (to be confirmed)

Airlines: American Airlines, FedEx, Lufthansa,

Airframe Manufacturers: Airbus, Boeing

Suppliers: Honeywell, Rockwell Collins

Others: Rockwell Collins IMS, SITA

2.3 Commitment for Drafting and Meeting Participation (to be confirmed)

Airlines: American Airlines

Airframe Manufacturers: Airbus, Boeing

Suppliers: Honeywell, Rockwell Collins

Others: DSPs - Rockwell Collins IMS, SITA

2.4 Recommended Coordination with other groups

DLK Users Forum, RTCA SC-214 VDLSG, EUROCAE WG-92, EUROCONTROL Single European Sky (SES) Data Link Services (DLS).

3.0 Project Scope

Prepare Supplement 7 to ARINC Specification 631 on a schedule aligned to European Single European Sky (SES) Data Link Services (DLS) initiatives.

Supplement 7 will provide guidance on the allocation of VDLM2 ground station addresses, define the downlink of perceived avionics channel utilization, add ground station requirements, address excessive ATN disconnects (i.e., provider aborts) and other long ATN delays plaguing the operation of European Data Link Services. It will consider any changes needed to support FAA Data Comm Services.

Supplement 7 will address frequency management (including multi-frequency provisions, autotune procedures, ground station handoff selection, excessive retries, etc.).

The DLK Systems Subcommittee will also consider the recent output from the European Large-Scale ATN (ELSA) Consortium regarding the ATN-over-VDL Mode 2 problems.

The schedule for Supplement 7 is based upon European VDL multi-frequency deployment and related activities within the SESAR Joint Undertaking (SJU).

3.1 Planned usage of the envisioned specification

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?

October ~~2011, 2016~~, **2018**

What is driving this date?

European Single European Sky (SES) Data Link Services (DLS) initiatives

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

Are Patent(s) involved? — yes ☐ no ☒

If YES please describe, identify patent holder: ____________________

3.2 Issues to be worked

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:

Air-Ground Interoperability

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

Specify: Air-Ground Interoperability

Product offered by more than one supplier yes ☒ no ❑

Honeywell, Rockwell Collins, Rockwell Collins IMS, SITA

4.2 Specific Project Benefits

4.2.1 Benefits for Airlines

Required for SES DLS operation in Europe

4.2.2 Benefits for Airframe Manufacturers

Required for compliance with CNS/ATM

4.2.3 Benefits for Avionics Equipment Suppliers

Meets customer needs

5.0 Documents to be Produced and Date of Expected Result

Supplement 7 to ARINC Specification 631: October ~~2016~~ 2018

5.1 Meetings and Expected Document Completion

These meetings will be coordinated by the AEEC staff assigned to this activity. Expected document completion: October ~~2011 2016~~ **2018**

Activity	Mtgs	Mtg-Days (Total)	Expected Start Date	Expected Completion Date
Supplement 7 to ARINC 631	~~12~~16	~~36~~48	**Nov 2010**	**Oct ~~2016~~ 2018**

Proposals for inclusion in Supplement 7 to ARINC Specification 631 will be coordinated through web conference meetings and in-person DLK Systems Subcommittee meetings.

6.0 Comments

6.1 Expiration Date for the APIM

April ~~2012 2017~~ **2019**

Completed forms should be submitted to the AEEC Executive Secretary.