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:

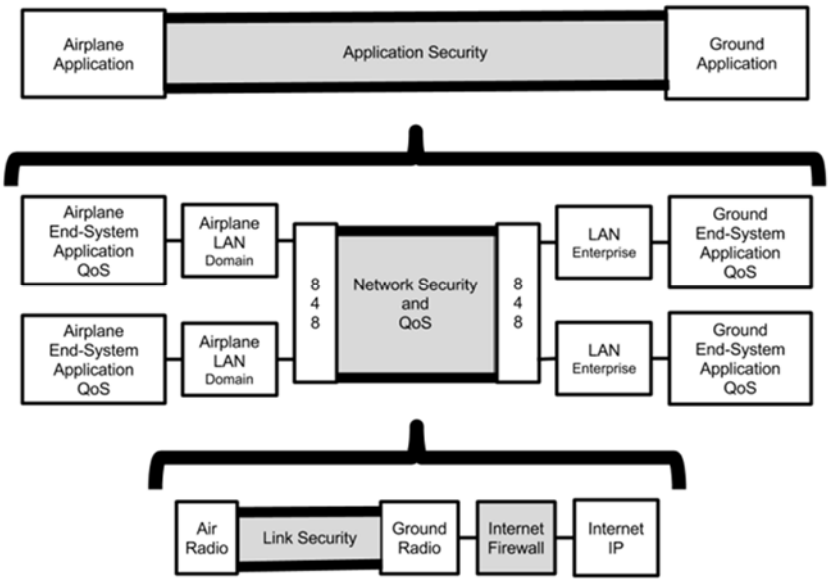
- Secure channel detailed definition (e.g., VPN) in order to guarantee that any ground network end point compliant with the standard is interoperable with the aircraft
- Definition of end-to-end Quality of Service (QoS) classes (including priority management) and how to signal a secure channel's QoS 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:
  - Secure channel detailed specification (e.g. based on IPsec) in order to guarantee end-to-end interoperability
  - Preventing unauthorized traffic from entering the LAN.
  - Strong authentication.
- End-to-end Quality of Service (QoS) and priority management
  - Means to identify which QoS classes can be supported by the network.
  - Means to tag\identify which specific QoS to apply to traffic in real time (if the traffic QoS is not profile-defined).
  - 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.