

## **ARINC Project Initiation/Modification (APIM)**

- 1.0 Name of Proposed Project** **APIM 22-003**  
ARINC Project Paper 822B: On-Ground Aircraft Wireless Communication /  
Gatelink Wireless Security Updates
- 1.1 Name of Originator and/or Organization**  
Jeffrey Rae – United Airlines
- 2.0 Subcommittee Assignment and Project Support**
- 2.1 Suggested AEEC Group and Chairman**  
ARINC NIS Subcommittee, Jeffrey Rae – United Airlines
- 2.2 Support for the Activity (as Verified)**  
Airlines: United Airlines, American Airlines (TBC), Delta Air Lines, Lufthansa  
Airframe Manufacturers: Airbus  
Suppliers: Panasonic, Collins Aerospace  
Others:
- 2.3 Commitment for Drafting and Meeting Participation (as verified)**  
Airlines: United Airlines, American Airlines (TBC), Delta Air Lines, Lufthansa  
Airframe Manufacturers: Airbus  
Suppliers: Panasonic, Collins Aerospace (TBC)  
Others:
- 2.4 Recommended Coordination with Other Groups**  
TBD
- 3.0 Project Scope (Why and When Standard is Needed)**
- 3.1 Description**  
Review and update ARINC SPECIFICATION 822A: On-Ground Aircraft Wireless Communication in order to maintain alignment with recent improvements to Wi-Fi standards (e.g. 802.11ax), encryption protocols (WPA3), cellular connectivity changes, and varied implementations as described in ARINC Report 848.  
The review and associated updates will remain within the ARINC Specification 822A Introduction and Scope as pasted below:

### **1.0 Introduction**

*This specification describes the functionality and interfaces of an Internet Protocol (IP)-based wireless communications system between an aircraft on the ground and a ground-based network using Wireless Local Area Network (WLAN) and/or cellular radios and protocols. The ground-based network will be primarily*

*used to provide connectivity to an airline's back office or to its back-end maintenance systems although other uses are also possible when there is a need to transfer data to or from the aircraft's applications while it is taxiing or parked. "Gatelink" is the accepted industry term for this type of connection. This document is a major revision to ARINC Specification 822 released in 2008.*

*Additionally, this document addresses cyber security measures necessary to ensure that the Gatelink connection can only be accessed by authorized users or systems, and that transferred data cannot be intercepted or modified by unauthorized persons. Certain requirements are intended to raise the bar on security and, thereby, contribute to an overall reduced level of cyber risk in the aviation environment. These requirements may go beyond basic interoperability.*

*Key airline operational benefits of Gatelink include:*

*High bandwidth IP data connection that enables transfer of larger data sets during an aircraft's gate turn, while taxiing, and while at a maintenance facility.*

*Automatic establishment of a Gatelink connection when the aircraft lands or arrives at its parking position (no flight or ground crew intervention needed).*

*Timely download of flight segment-specific data sets, e.g., Flight Operations Quality Assurance (FOQA) data, engine performance data, and cabin logbook entries, that enable rapid response to aircraft problems and tuning of in-flight performance parameters for maximum flight efficiency.*

*Upload of time-sensitive In-Flight Entertainment (IFE) content, e.g., daily news and sports programs, that enhances the passenger experience*

*Wireless staging of Loadable Software Parts (LSPs), reducing time spent by maintenance personnel moving LSPs to the aircraft using legacy methods.*

*One area of significant interest by airlines is the use of cellular data modems to supplement or even replace existing WLAN-based radios. This can enable required ground data connectivity at airports that lack supporting Gatelink WLAN infrastructure or have infrastructure operated by non-contracted providers.*

*In consideration of new technologies and use cases and keeping functional specifications separate from form and fit, this document introduces the following terms:*

*Ground Wireless Local Area Network Function (GWLF) encompasses the full set of airborne Wi-Fi and/or cellular radio functions described in this specification for the aircraft part of the Gatelink network. These functions may be distributed across more than one Line Replaceable Unit (LRU) on the aircraft's network, or they may be contained in a single LRU (GWLU).*

*Ground Wireless LAN Unit (GWLU) refers to a specific design approach that incorporates the major GWLF functions into a single LRU. This is the more common approach for large transport aircraft; smaller aircraft may use a less-integrated approach.*

*Broad adherence to this specification will help ensure interoperability when a Gatelink-equipped aircraft lands at an airport offering terminal Wi-Fi connectivity or in an area with available contracted cellular data service. Use of commercial industry standard communications protocols helps meet this primary objective, as does close coordination on implementations between airlines, airports, Maintenance Repair Organizations (MROs), mobile telecom carriers, and other service providers. Although functionality will be specified to enable the onboard equipment to choose the correct provider and link type depending on its location,*

*an aircraft should not require different system configurations to connect at different airports.*

*Please note that Gatelink provides a method for authorized clients (such as an aircraft) to access the Gatelink provider's network. Security protocols are specified, in order to authenticate the endpoints, provide access control, and protect the data between the client and the Gatelink access point. After this, there are no provisions for the security of the data.*

*Operators must assume that their connections, once established via the Gatelink service, are routed on the open Internet. Operators are responsible for the end-to-end protection of their application data between the client and the ultimate destination, even if routed across the Gatelink network.*

### **1.1 Document Scope**

*This specification addresses the following types of IPv4-based connections between an aircraft on the ground and the airline's network infrastructure:*

*Connections based on IEEE 802.11 wireless LAN standards*

*Connections using cellular technologies: 3G, Universal Mobile Telecommunications System (UMTS), 4G, and Long Term Evolution (LTE)*

*This specification does not address the following technologies, nor does it preclude their future addition based on market demand:*

*Wired connections to the aircraft at the gate, e.g., powerline communications*

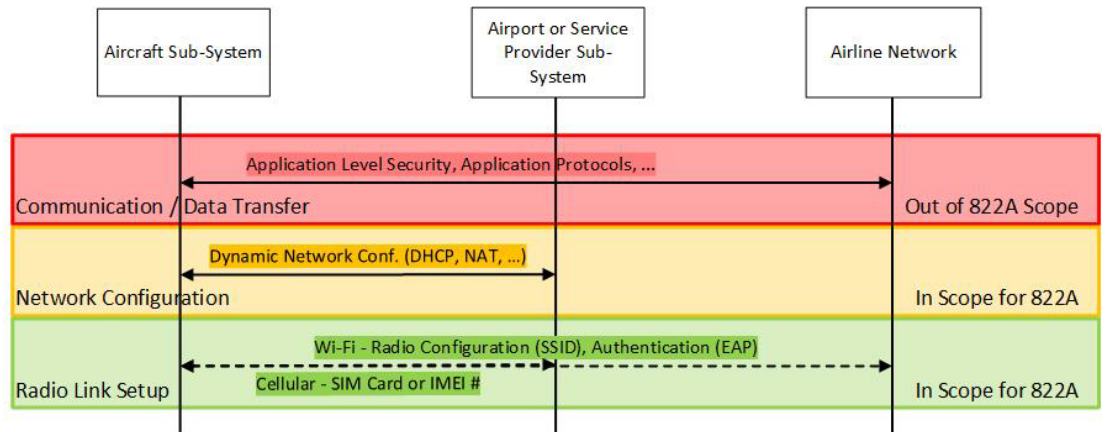
*AeroMACS, an aviation implementation of IEEE 802.16e (WiMAX) that uses protected spectrum to carry safety communications*

*5G cellular*

*IPv6*

*Elements necessary for interoperability in the radio and network layers are addressed while methods for application data transfer are out of scope.*

*Measures to enhance cyber security are included and may go beyond basic interoperability.*



**Figure 1-1 – ARINC 822A Scope**

*It is not the intent of this document to specify a system’s implementation, define components, or imply an approach to such an implementation. Ultimately, it is up to suppliers, manufacturers, and end customers (i.e., airlines) to determine the requirements for, and acceptance of, products that comply with this specification. Manufacturers and suppliers are encouraged to exceed the features and functionality described by this specification to meet evolving market needs.*

*This document does not specify the form and fit of the airborne equipment, nor other physical and electrical characteristics. These are defined in ARINC Characteristics 763 and 763A.*

### 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?

\_\_\_\_\_

What is driving this date? \_\_\_ Technology \_\_\_\_\_

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 main issues to be worked as part of this APIM are:

- Update Wi-Fi security standards defined within ARINC 822A ON-GROUND WIRELESS COMMUNICATION (GATELINK) report to reflect recent updates to Wi-Fi standards such as 802.11ax and WPA3.
- Align 822A technical recommendations with other published ARINC reports (e.g., ARINC 687 SECURE ONBOARD WIFI PROFILE).
- Review and update cellular security, connectivity, and authentication recommendations including 5G.
- Overall review and update as needed

### **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

Identify: (company name)

**4.2 Specific Project Benefits (Describe Overall Project Benefits.)**

**4.2.1 Benefits for Airlines**

- Improved security and data protection for on-ground aircraft wireless connectivity.
- Improved data transfer throughput for on-ground wireless connections.
- Ensures aircraft component capabilities align with improved standards employed by newer Wi-Fi infrastructures for higher data throughput, encryption and compatibility.

**4.2.2 Benefits for Airframe Manufacturers**

- Compliance with ground Wi-Fi infrastructures deployed by airports or operators

**4.2.3 Benefits for Avionics Equipment Suppliers**

- Better market opportunities through enhanced interoperability between products

**5.0 Documents to be Produced and Date of Expected Result**

- Update of ARINC 822A by October 2023

**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.

<b>Activity</b>	<b>Mtgs</b>	<b>Mtg Days (Total)</b>	<b>Expected Start Date</b>	<b>Expected Completion Date</b>
<i>ARINC 822B</i>	<i>7</i>	<i>7</i>	<i>05/2022</i>	<i>10/2023</i>

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

**6.0 Comments**

**6.1 Expiration Date for the APIM**

May 2024

***Completed forms should be submitted to Paul Prisaznuk ([pjp@sae-itc.org](mailto:pjp@sae-itc.org))  
AEEC Executive Secretary & Program Director***