ARINC Project Initiation/Modification (APIM)

# Name of Proposed ProjectAPIM #: \_\_\_\_\_\_\_\_\_\_\_

Supplement 9 to ARINC Specifications 618 - *Air/Ground Character-Oriented Protocol Specification* and Supplement 4 to ARINC Characteristic 758 - *Communications Management Unit (CMU) Mark 2*, to define CMU Ethernet interfaces with the SDU and other IP transceivers such as AeroMACS

## Name of Originator and/or Organization

Honeywell and Rockwell Collins

# Subcommittee Assignment and Project Support

## Suggested AEEC Group and Chairman

Group: Data Link Systems Subcommittee (DLK)

Chairman: Bob Slaughter, American Airlines

## Support for the activity (as verified)

Airlines: American Airlines

Airframe Manufacturers: Boeing

Suppliers: Honeywell, Rockwell Collins

Others: Rockwell Collins IMS

## Commitment for Drafting and Meeting Participation (as verified)

Airlines: American Airlines

Airframe Manufacturers: Boeing

Suppliers: Honeywell, Rockwell Collins

Others: Rockwell Collins IMS

## Recommended Coordination with other groups

Internet Protocol Suite for Aeronautical Safety Services Subcommittee (IPS)

Air-Ground Communications Systems Subcommittee (AGCS)

AeroMACS Working Group

# Project Scope (why and when standard is needed)

## Description

With recent activity in the commercial aviation industry, including the publication of the Second Edition of ICAO 9896 (Manual on ATN using IPS) and creation of the AEEC Internet Protocol Suite (IPS) for Aeronautical Safety Services Subcommittee, it is clear that the industry is moving toward use of IP-based data communication to and from all aircraft domains (passenger, cabin and now cockpit). Avionics standards need to be updated to accommodate these changes.

It is recognized that the CMU will need Ethernet interfaces to communicate with IP-based transceivers and possibly other on-board devices. The provisions in the current ARINC CMU Characteristic 758-3 for Ethernet interfaces are incomplete. Rear connector pins have been defined, but nothing else. Therefore, it is proposed to investigate whether the defined #22 contacts will pass the emissions requirements as is, or whether the recommendations in A664 for #22 contacts will pass the emissions. If neither pass, then decide whether to create A758A with a CMU connector change to add Quadrax contacts. In either case (use of Quadrax contacts or #22 contacts) add references to A664 Part 2 to fully define the Ethernet protocol and IP protocol to the CMU consistent with what is specified in the A781 SBB SDU characteristic.

In addition, ARINC 618 will be modified to include a section on simple ACARS messaging over IP using Ethernet interface(s) between the CMU and transciever(s). The new section would include the ability to transfer ACARS messages to/from the transceiver using one or two “super” blocks, instead of the traditional sized ACARS blocks. (Note that for SBB SATCOM, the interface would use the SDU’s prioritized IP port.)

This ACARS over IP is to be used in the interim while A658 IPS is being developed. When the IPS Subcommittee has completed its work, the A758 CMU would potentially be upgraded to implement A658 IPS, via a separate APIM.

Additions and modifications to ARINC 758 will include:

* Modify A758 as needed OR create new CMU characteristic (A758A) to include Quadrax contacts in the rear connector for Ethernet interfaces, and revise the other pinouts to accommodate the Quadrax contacts.
* Additions/changes to Section 2 (Interchangeability Standard) for the added/modified interfaces and references to A664 part 2.
* Additions/changes to Section 3 (System Architecture)
* Additions to Section 4 (Functional Capability) for IP subnetworks, security considerations, etc.
* Additions to Section 5 (Interfaces and Protocols)
* Additions/changes to the applicable Attachments, as needed.

Two phases are proposed in this APIM:

1. The first phase includes the necessary physical interface changes (possibly connector and pinout) as determined by testing and analysis, and descriptive material for those including the addition of A664 part 2 Ethernet protocol.
2. The second phase is the addition of a simple ACARS over IP that will allow operators to take advantage of the benefits of IP while the IPS subcommittee completes its work. A618 would be modified in this phase in order to take advantage of Ethernet and IP. A758/758A would be modified to refer to the A618 update.

The intent of the proposed phases is to allow the time consuming CMU hardware design and hardware qualification testing to begin (after the Phase 1), while the details of the upper layers are being finalized. This is followed by the definitiion of simple ACARS over IP functionality to provide some benefit before the IPS subcommittee work is fully completed.  Note that the Phase 2 work may occur in parallel with the Phase 1 work as time allows.

If the output of the IPS Subcommittee work determines that IPS functionality may reside in an ARINC 758 CMU, a separate APIM will be initiated to accomplish that addition to 758.

## 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: To be used on forward fit Boeing 737MAX and potentially in retrofit applications

Needed for airframe manufacturer or airline project yes  no

Specify: Boeing (737MAX)

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?

Phase 1 December 2018

Phase 2 December 2020

What is driving this date? Need date is flexible, but the new interfaces and functionality are desired as soon as can be reasonably developed in the standards.

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: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

## Issues to be worked

* Determine number and type of Ethernet interfaces to include
* Determine rear connector type(s) and pinout
* Determine how much material can be documented by reference to other documents (A664, A766, etc.) and what gaps will need to be filled.
* Determine need to address security aspects
* Determine ACARS over IP message format

# Benefits

## Basic benefits

Operational enhancements yes  no

For equipment standards:

* + - * 1. Is this a hardware characteristic? yes  no
        2. Is this a software characteristic? yes  no
        3. Interchangeable interface definition? yes  no
        4. Interchangeable function definition? yes  no

If not fully interchangeable, please explain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Is this a software interface and protocol standard? yes  no

Specify: Additions to 618 as noted above

Product offered by more than one supplier yes  no

Identify: Honeywell, Rockwell Collins

## Specific project benefits (Describe overall project benefits.)

### Benefits for Airlines

Equipping of aircraft with a CMU designed to the new characteristic (and the necessary IP capable transceivers) will provide the capability to use ACARS over IP. This provides for higher data throughput and use of lower cost links. It also provides standard CMU hardware that can be used for IPS functionality if and when needed. Use of an ARINC characteristic for this equipment provides for interchangeability (standard form factor, connector, interwiring, etc.)

### Benefits for Airframe Manufacturers

Equipping of aircraft with a CMU designed to the new characteristic (and the necessary IP capable transceivers) will provide the capability to use ACARS over IP. This provides for higher data throughput and use of lower cost links. It also provides standard CMU hardware that can be used for IPS functionality if and when needed. Use of an ARINC characteristic for this equipment provides for interchangeability (standard form factor, connector, interwiring, etc.)

### Benefits for Avionics Equipment Suppliers

Provides an industry characteristic for an interchangeable federated CMU that includes the necessary interfaces and capabilities to support messaging over IP and potentially IPS, which are recognized by the industry to be the future of aircraft data communications.

# Documents to be Produced and Date of Expected Result

Publication of an ARINC 758/758A initial grey cover at end of Phase 1, and new A758/758A supplement and new A618 supplement grey cover at end of Phase 2.

## 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** |
| Phase 1: Add physical Ethernet interfaces (physical and datalink layers) and Ethernet protocol (A664 part 2) release supplement to A758 or ARINC 758A. | 3 (Include as part of normal DLK meeting schedule) | 3 (beyond the normal DLK meeting schedule) | 06/2017 | 12/2018 |
| Phase 2: Add material addressing ACARS over IP and basic security, etc. (items above datalink layer) supplement to ARINC 758(A) and supplement to A618. | 4 (Include as part of normal DLK meeting schedule) | 4 (beyond the normal DLK meeting schedule) | 12/2018 (may begin earlier as time allows) | 12/2020 |

# Comments

It is envisioned that the work proposed in this APIM can be completed as part of the normal meeting schedule (twice annual) and web conference schedule of the DLK subcommittee, perhaps needing to expand some or all meetings to three days each instead of two. This will depend on the other tasks at hand for the subcommittee over the next several years.

## Expiration Date for the APIM

May 2021

***Completed forms should be submitted to the AEEC Executive Secretary.***