ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project

Ethernet-compatible FieldBus for Airborne Communication Platforms

1.1 Name of Originator and /or Organization

Valentin KRETZSCHMAR, Airbus

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

New subcommittee

2.2 Support for the Activity (as verified)

Airlines:

Airframe Manufacturers: Airbus, Boeing

Suppliers:

Others:

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines:

Airframe Manufacturers: Airbus

Suppliers:

Others:

2.4 Recommended Coordination with other Groups

SAI and NIS

3.0 Project Scope (why and when standard is needed)

3.1 Description

Airborne data communication networks for latest aircraft models rely on Ethernet-type communications (such as ARINC 664 Part 7), which offer a variety of interesting features: high bandwidth, easy design, multiple services and features and a wide market of components.

These technologies have not replaced legacy fieldbuses (such as A429, CAN, MILT-STD 1553, RS422) and rather coexist with them. These fieldbuses offer some great advantages, such as reduced complexity and price of components and intrinsic determinism suited for critical communications.

However, this coexistence drives the need to integrate complex and costly gateway functions to perform signal translation between the Ethernet-type platforms and the fieldbuses. Furthermore, transverse applications such as BITE, Data Collection, or dataloading are impossible or very complex to set up on these fieldbuses, jeopardizing the advent of end-to-end connectivity on aircraft platforms.

Other industries (industrial networking, Automotive) are tackling this issue by developing Ethernet-compatible fieldbuses (e.g., 10BASE-T1S) which keep the low cost and simplicity of fieldbus but make it compatible with Ethernet.

To reduce the amount of different technologies used for communication, simplify onboard communication interfaces and remove costly gateway functions, the standardization of an Ethernet compatible fieldbus is necessary to complement existing ARINC 664 standards.

This standardization effort will investigate available solutions in aerospace or other industries and select one or several solutions which provide the required compatibility and support for network services while being suitable in cost and complexity with the fieldbus usage domain.

3.2 Planned usage of the ARINC Standard

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

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

Airbus: (aircraft & date)

Boeing (aircraft & date)

Other: (manufacturer, aircraft & date)

Modification/retrofit requirement yes ☐ no ☒

Specify: (aircraft & date)

Needed for airframe manufacturer or airline project yes ☐ no ☐

Specify: (aircraft & date)

Mandate/regulatory requirement yes ☐ no ☒

Program and date: (program & date)

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

Specify (e.g., ARINC 429)

When is the ARINC standard required? 12/2024

What is driving this date? Earliest date

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: ARINC 664-compatible fieldbus patent (held by Airbus, but willing to grant free access)

3.3 Issues to be Worked

Identify and assess potential solutions from various industries

Evaluate compatibility with existing and future platforms

Evaluate value wrt other fieldbuses

Complement existing standardization as required for aerospace usage

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 ☐

Security is not a primary objective of this standardization effort but shall be discussed at least to identify any security risks/opportunities brought the selected solution(s).

4.0 Benefits

4.1 Basic Benefits

Operation enhancements yes ☐ no ☒

For equipment standards:

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

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

c) Interchangeable interface definition? yes ☒ no ☐

d) Interchangeable function definition? yes ☐ no ☒

If not fully interchangeable, please explain: _____

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

Specify: _____

Product offered by more than one supplier yes ☒ no ☐

Identify: _____

4.2 Specific Project Benefits

The standard will specify one or several fieldbus solutions compatible with Ethernet platforms.

4.2.1 Benefits for Airlines

The reduced set of technologies will enable simpler maintenance operations. Access to more data enabled by the extended platform will enable faster operations and more reliable products.

4.2.2 Benefits for Airframe Manufacturers

The reduced set of interoperable technologies will enable simpler design and certification. The added performances and the compatibility will allow for easier, more efficient transverse applications (dataloading, data collection, BITE) design.

4.2.3 Benefits for Avionics Equipment Suppliers

A standardized interface will reduce the development complexity by providing a large set of components and associated resources (software, tools, framework).

5.0 Documents to be Produced and Date of Expected Result

List and evaluation of candidate technologies – 31/12/2023

Specification of Ethernet-compatible fieldbus – 31/12/2024

5.1 Meetings and Expected Document Completion

The following table identified 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
List and evaluation of candidate technologies	*3*	*9*	*06/23*	*12/23*
Specification of Ethernet-compatible fieldbus	*6*	*18*	*01/24*	*03/25*

1. Web call to be held every 2-3 weeks depending on the project phase

2.

6.0 Comments

N/A

6.1 Expiration Date for the APIM

April 2025

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