

ARINC Project Initiation/Modification (APIM)

- 1.0 Name of Proposed Project** **APIM 19-008**
New ARINC Project Paper 7XX: Airborne Weather Radar System and Aircraft Installation Standards
- 1.1 Name of Originator and/or Organization**
Boeing / Jessie Turner
- 2.0 Subcommittee Assignment and Project Support**
- 2.1 Suggested AEEC Group and Chairman**
Systems Architecture and Interfaces (SAI) Subcommittee
SAI Chairmen: Reinhard Andreae and Rich Stillwell
Surveillance Working Group Chairman: Mohammed Ahmed, Boeing
- 2.2 Support for the activity**
Airlines: American, Delta, FedEx, TAP Portugal, UPS
Airframe Manufacturers: Airbus, Boeing
Suppliers: Collins (TBC), Garmin, Honeywell (TBC), Gables
Others:
- 2.3 Commitment for Drafting and Meeting Participation**
Airlines:
Airframe Manufacturers: Airbus, Boeing
Suppliers: Garmin
Others:
- 2.4 Recommended Coordination with other groups**
None
- 3.0 Project Scope**
- 3.1 Description**
This project calls for a new Weather Radar ARINC Project Paper 7XX to support new, ARINC 664 network-based, aircraft designs.
- ARINC Characteristic 708A “Airborne Weather Radar with Forward Looking Windshear Detection Capability” was last updated with Supplement 3 in 1999. The ARINC 708A-3 architecture has the WXR antenna and antenna drive under the nose radome, and interconnected, via a waveguide, to a Receiver/Transmitter (that contains the RF front-end and processing) installed in a tray inside the pressure vessel.

In the last 10 years, suppliers have designed and fielded newer WXR system installations that are not compliant with ARINC 708A (or any other standard). In these WXR installations, the RF front end is installed within a Receiver/Transmitter Module (RTM) under the nose radome and is interconnected with a standalone ARINC 600 rack-mounted WXR processor in the EE bay. Also, no separate waveguide installation is required for these newer WXR installations. [Note: This type of newer WXR architecture (with an RTM under the nose radome) is documented in the ARINC 768 Integrated Surveillance System (ISS) characteristic, but ARINC 768 has an ISS Processor Unit in lieu of a standalone WXR Processor in the EE bay].

Although these newer WXR installations provide cost and Size, Weight, and Power (SWaP) benefits over-and-above the ARINC 708A WXR installations, these newer, standalone WXR installations do not follow an industry standard and are not interchangeable between suppliers. Consequently, if one supplier's WXR system needs to be swapped-out to install another supplier's WXR system, extensive aircraft changes are required to be made (e.g. the WXR Processor's ship-side connector, RTM ship-side connector, and wiring between the WXR Processor and RTM need to be changed). This has a significant impact if an airframer or airline wants to switch between WXR equipment suppliers.

For future network-based aircraft, the WXR system installation needs to be standardized so that these extensive aircraft changes are not required. Note that this standard would allow interchangeability at the WXR system level. For example, it is not expected that one supplier's WXR RTM be compatible with another supplier's WXR Processor. The working group should consider an interface definition for accommodating the receipt and transmission of raw weather data.

3.2 **Planned usage of the envisioned specification**

- New aircraft developments planned to use this specification yes no
 Specify: Next new Boeing air transport aircraft
 Next new Airbus air transport aircraft
- Modification/retrofit requirement yes no
 Specify:
- Needed for airframe manufacturer or airline project yes no
 Specify: Next new Boeing air transport aircraft
- Mandate/regulatory requirement yes no
- Is the activity defining/changing an infrastructure standard? yes no
 Specify:
- When is the ARINC Standard required? May 2021
 What is driving this date? Target design date
- Are 18 months (min) available for standardization work? yes no
 Are Patent(s) involved? yes no

If YES please describe, identify patent holder:

3.3 Issues to be worked

It is expected that the following specific items will be addressed as part of the WXR standard development (and others as they arise):

- 1) Standardize WXR processor form, fit, function, and interfaces with reduced SWaP compared to ARINC 708A
- 2) Specify the WXR Processor connector size, keying, and pinouts to support:
 - a) ARINC 664 network-based connections (e.g., fiber, and others if required)
 - b) Connections to the RTM (see item 4 below)
- 3) Specify RTM interfaces (not form factor or installation)
- 4) Specify a single Weather Radar Antenna Unit (WRAU) connector that supports connections to the WXR Processor that includes:
 - a) Two uni-directional fiber connections (and others if required)
 - b) Power/Power Return (power to RTM is provided by the Processor)
- 5) Single or dual WXR System installations are supported (e.g. single or dual antenna drives). Installation of a single RTM into a dual drive (with provisions for the 2nd RTM) shall be supported.

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: Collins Aerospace, Honeywell

4.2 Specific project benefits (Describe overall project benefits.)

4.2.1 Benefits for Airlines

- Supplier system interchangeability

4.2.2 Benefits for Airframe Manufacturers

- Common installation(s)/solution(s), less variability
- Supplier system interchangeability

4.2.3 Benefits for Avionics Equipment Suppliers

- Provide equipment that can be installed on multiple aircraft platforms, across multiple aircraft OEMs.

5.0 Documents to be Produced and Date of Expected Result

ARINC Characteristic 7XX, Airborne Weather Radar System and Aircraft Installation Standards, May 2021.

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
<i>ARINC 7XX - WXR</i>	4 (plus teleconferences)	12	October 2019	March 2021

6.0 Comments

6.1 Expiration Date for the APIM

October 2021

Completed forms should be submitted to the AEEC Executive Secretary & Program Director, Paul Prisaznuk (pjp@sae-itc.org).