ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 17-001

Internet Protocol version 6 (IPv6) Transition in Aviation

Step 1: ARINC Project Paper xxx: Roadmap for IPv6 Transition in Aviation

- Identify affected ARINC Standards in a roadmap document

Step 2: Update ARINC Standards identified by Step1.

1.1 Name of Originator and/or Organization

Airbus

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

Network Infrastructure and Security (NIS) Subcommittee

Chairman: Steve Arentz, United Airlines

2.2 Support for the activity (as verified)

Airlines: Southwest, TAP Portugal, UPS, United Airlines

Airframe Manufacturers: Airbus, Boeing

Suppliers: Astronautics, GE Aviation, Honeywell, Panasonic, Rockwell Collins, Teledyne, Thales Avionics

Others: TBD

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines: United Airlines

Airframe Manufacturers: Airbus, Boeing

Suppliers: Astronautics, Honeywell, Panasonic, Rockwell Collins, Teledyne

Others: TBD

2.4 Recommended Coordination with other groups

AeroMACS

AGCS Subcommittee

Data Link User Forum

Data Link Systems Subcommittee

Internet Protocol Suite for Aeronautical Safety Services Subcommittee (IPS)

KSAT Subcommittee

SAI Subcommittee

3.0 Project Scope (why and when standard is needed)

3.1 Description

Current ARINC Standards for airborne equipment and air-ground interoperability are based on the Internet Protocol Version 4 (IPv4), (e.g., ARINC 664, ARINC 822A, etc.)

Nevertheless, IP Version 6 deployment is growing in all domains:

- IPv4 addresses are all distributed in major parts of the world
- Addresses can be obtained on a second-hand market only, currently growing
- More than 10% of worldwide traffic is now full IPv6 (2016) against less than 1% 4 years ago (2012)

Current aircraft systems are IPv4 capable only, when ground equipment migration to IPv6 could impact aircraft to ground communication (service provider network to connect radios, ground network services to exchange data). Airborne communication systems will need to be modified to ensure connectivity with a mixed IPv4/IPv6 ground infrastructure.

Although the exact migration date is not known, IPv6 is coming with current technology and planning is needed to support the migration (e.g., when an airline will not be able to get a public IPv4 address for its ground servers).

A two steps approach is proposed:

Step 1: A common IPv6 strategy for aircraft connectivity should be defined to:

- Anticipate the current capability in the coming product developments
- Better manage the transition (including IPv4 remaining addresses and “second hand market”), develop first roadmap
- Recommend candidate end-to-end solutions in the case where IPv4 and IPv6 coexist
- Recommend AEEC work program, including scope and schedule
- Plan for address allocation and management
- Be ready when the sunset date is reached
- Outcome of this step is common understanding of strategy in the form of presentation materials and meeting reports.
- Identify ARINC Standards to be updated to include IPv6

Step 2: Work with SAI Subcommittee to prepare APIM(s) necessary to update ARINC Standards identified by Step1.

- ARINC Report 660B
- ARINC Specification 664
- ARINC Specification 822A
- Others TBD as identified by Step 1

Notes:

- IPS (Internet Protocol for safety services) is expected to be IPv6 only
- Non-safety air-ground networks, e.g., ARINC Project Paper 848 will need to support IPv6.

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

Airbus: (TBD) yes ☒ no ☐

Boeing: (TBD) yes ☒ no ☐

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: IPv6 is envisioned to replace IPv4 in the medium term

When is the ARINC standard required? To be defined in Step 1

What is driving this date? IPv6 deployments

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

Step 1:

- Definition of IPv6 strategy
- Draft recommendations that answer Airlines questions on IPv6
- Discuss address allocation
- Identification of requirements and solutions:
    - Mixed V4/V6 capability
    - Data security requirements
    - Identification of standards to be updated for a full support of IPv6

Step 2:

- Update ARINC 664 to support IPv6 compatible nodes
- Update ARINC 822A to support a full IPv6 Airport infrastructure
- Identify related ARINC Standards TBD

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: IPv6

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

The aircraft being now a node in the overall network, a full IPv6 capability will simplify the configuration and management of the end-to-end communication services. A full IPv6 capability may also offer better performances than IPv4-IPv6 mixed solutions (encapsulation or translation).

During the transition period between IPv4 and IPv6, it will allow for continuous operation and reduce the risk of incompatibility as new systems are introduced that only communicate via IPv6 (e.g., IPS).

4.2.2 Benefits for Airframe Manufacturers

Similar to airline benefits

4.2.3 Benefits for Avionics Equipment Suppliers

Similar to airline benefits

5.0 Documents to be Produced and Date of Expected Result

ARINC Project Paper xxx: Roadmap for IPv6 Transition in Aviation

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
Prepare PPxxx IPv6 Transition Strategy (Step 1)	4	4 (1 day at each meeting)	May 2017	Oct 2018

Full complement of NIS Subcommittee meetings shown. A portion of each NIS Subcommittee meeting will be dedicated to preparing an IPv6 Transition Strategy. This effort may be discussed in teleconferences as needed.

6.0 Comments

(none)

6.1 Expiration Date for the APIM

April 2019

Completed forms should be submitted to the AEEC Executive Secretary.