ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project APIM 17-002

Supplement 8 to ARINC Specification 631: *VHF Digital Link (VDL) Mode 2 Implementation Provisions*

1.1 Name of Originator & Organization

Mike Matyas, Boeing

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

Datalink (DLK) Systems Subcommittee

Chairman: Bob Slaughter, American Airlines

2.2 Support for the activity (to be confirmed)

Airlines: American Airlines, Delta, Lufthansa, Southwest, TAP Portugal, UPS, United,

Airframe Manufacturers: Airbus, Boeing

Suppliers: Honeywell, Rockwell Collins

Others: Rockwell Collins IMS, SITA OnAir

2.3 Commitment for Drafting and Meeting Participation

Airlines: American Airlines, UPS

Airframe Manufacturers: Airbus, Boeing

Suppliers: Honeywell, Rockwell Collins

Others: Rockwell Collins IMS, SITA

2.4 Recommended Coordination with other groups

DLK Users Forum, RTCA SC-214 VDLSG, EUROCAE WG-92

3.0 Project Scope

This project will create Supplement 8 to ARINC Specification 631.

Supplement 8 will include two sets of changes: [1] VDL Mode 2 air-ground interoperability tests and [2] implementation provisions for the connectionless VDL Mode 2 capability. These changes are intended to further improve VDL Mode 2 operation and performance beyond the changes made with Supplement 7.

Experience with implemented ATN/OSI B1 CPDLC in Europe has shown that VDL Mode 2 air-ground interoperability tests are desirable. Such tests will provide greater assurance that the VDL Mode 2 system will work as intended and allow early detection of potential interoperability issues.

Connectionless VDL Mode 2 will allow airplanes and ground stations to exchange messages without having to establish an explicit connection, similar to how POA (VDL Mode 0/A) works. It

will exercise the previously unused connectionless message exchange capability already described in relevant standards, namely the Unnumbered Information (UI) frame defined in ISO 4335/7809 and ICAO Doc 9776 (the “VDL Tech Manual”). Connectionless VDL Mode 2 will be fully compatible with existing VDL Mode 2. Both variants will work on the same frequency at the same time and a particular airplane could use both variants at same time.

Connectionless VDL Mode 2 is intended to further address the performance issues seen in Europe by providing greater efficiency and robustness. The greater efficiency of connectionless VDL Mode 2 will increase effective VDL Mode 2 capacity – the limits of which are a valid concern in both Europe and the US – and accordingly its sustainability. Additionally, connectionless VDL Mode 2 will leverage investments already made in VDL Mode 2 (as opposed to starting over with new technology) and be highly beneficial for existing ACARS and ATN/OSI network technology as well as for future ATN/IPS network technology. Boeing, Honeywell, SITA have already performed successful ground and flight trials of IPS-over-connectionless VDL Mode 2. The DLK Subcommittee will define connectionless VDL Mode 2 to carry ACARS messages (AOA packets), ATN/OSI messages (ISO 8208 packets), and ATN/IPS messages (IP packets).

3.1 Planned usage of the envisioned specification

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

- Airbus: (aircraft & date)
- Boeing: To be determined
- Other: (manufacturer, aircraft & date)

Modification/retrofit requirement: yes ☒ no ☐

- Specify: Boeing 787 and 777X, 2020

Needed for airframe manufacturer or airline project: yes ☒ no ☐

- Specify: Boeing 787 and 777X, 2020

Mandate/regulatory requirement: yes ☐ no ☒

- Program and date: (program & date)

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

- Specify ARINC 631 VDL Mode 2

When is the ARINC Standard required?

- October 2019

What is driving this date?

- This date is driven by the need for the benefits that VDL Mode 2 air-ground interoperability tests and connectionless VDL Mode 2 will bring.

Are 18 months (min) available for standardization work? yes ☒ no ☐

Are Patent(s) involved? yes ☐ no ☒

If YES please describe, identify patent holder: _____

3.2 Issues to be worked

One issue to be worked is whether an airplane should use both existing VDL Mode 2 and connectionless VDL Mode 2 simultaneously as appropriate or use only one variant at a time. Define the best way to perform frequency management when using connectionless VDL Mode 2 and how connectionless VDL Mode 2 will carry ATN/OSI messages. Data security will be addressed.

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. Is this an interchangeable interface definition? yes ☐ no ☒

d. Is this an interchangeable function definition? yes ☐ no ☒

If not fully interchangeable, please explain:

Air/Ground Interoperability

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

Specify: Air/Ground Interoperability

Is this product offered by more than one supplier? yes ☒ no ☐

Universal Avionics, Honeywell, Rockwell Collins, Rockwell Collins IMS, SITA

4.2 Specific Project Benefits

4.2.1 Benefits for Airlines

Benefits for airlines of connectionless VDL Mode 2 include more efficient and robust communication of AOC and ATS messages via VDL Mode 2. As demonstrated in Europe with implemented ATN/OSI B1 CPDLC, current connection-oriented VDL Mode 2 has proven to be less efficient and robust than desired.

For example, ELSA “peer loss of communication” (also known as “N2 events”) will be less likely to occur with connectionless VDL Mode 2 because of antenna diversity. In particular, an airplane will accept uplinks from any ground station of the selected service provider and all ground stations of the selected service provider will accept downlinks from an airplane.

4.2.2 Benefits for Airframe Manufacturers

Benefits for airframe manufacturers of VDL Mode 2 air-ground interoperability tests include greater assurance that VDL Mode 2 systems will perform as intended and early detection of potential interoperability issues. Benefits for airframe manufacturers of connectionless VDL Mode 2 include more efficient and robust communication via VDL Mode 2 that better satisfy the needs of their customers.

4.2.3 Benefits for Avionics Equipment Suppliers

Benefits for avionics equipment suppliers of VDL Mode 2 air-ground interoperability tests include greater assurance that VDL Mode 2 systems will perform as intended and early detection of potential interoperability issues. Benefits for avionics equipment suppliers of connectionless VDL Mode 2 include more efficient and robust communication via VDL Mode 2 that better satisfy the needs of their customers.

5.0 Documents to be Produced and Date of Expected Result

Supplement 8 to ARINC Specification 631, June 2019

5.1 Meetings and Expected Document Completion

These meetings will be coordinated by the AEEC staff person assigned to this activity.

Activity	Mtgs	Mtg-Days (Total)	Expected Start Date	Expected Completion Date
Supplement 8 to ARINC 631	5	15	June 2017	June 2019

Proposals for inclusion in Supplement 8 to ARINC 631 will be coordinated through web conference meetings. Final document review will take place as part of the regularly scheduled DLK Systems Subcommittee meetings.

6.0 Comments

6.1 Expiration Date for the APIM

December 2019

Completed forms should be submitted to the AEEC Executive Secretary.