

## **ARINC Project Initiation/Modification (APIM)**

- 1.0 Name of Proposed Project** **APIM 20-001**  
ARINC Project Paper 792A: Multi-Modem Ku/Ka Satcom System with Fiber Optic Interfaces
- 1.1 Name of Originator and/or Organization**  
Mark Sorensen, Delta Air Lines
- 2.0 Subcommittee Assignment and Project Support**  
Ku/Ka Satcom Subcommittee
- 2.1 Suggested AEEC Group and Chairman**  
Ku/Ka Satcom Subcommittee, Mark Sorensen and Chris Schaupmann
- 2.2 Support for the Activity (as verified)**  
Airlines: Delta Air Lines, FedEx, Lufthansa, TAP Portugal, United Airlines  
Airframe Manufacturers: Boeing, Airbus, Mitsubishi  
Suppliers: Viasat, Carlisle, Astronics, GEE, Collins Aerospace, Gogo, Panasonic Avionics, Honeywell, Gilat (TBC), Hughes (TBC), Smiths Interconnect, Thinkom, Satixfy (TBC), Safran (TBC)  
Others: Inmarsat, Cotsworks, Gore, SCI Technology, Glenair, iDirect, Space X
- 2.3 Commitment for Drafting and Meeting Participation (as verified)**  
Airlines: Delta Air Lines, United Airlines  
Airframe Manufacturers: Boeing, Airbus, Mitsubishi  
Suppliers: Viasat, Carlisle, Astronics, GEE, Collins Aerospace, Gogo, Panasonic Avionics, Honeywell  
Others: Cotsworks, Gore, SCI Technology, iDirect, Space X
- 2.4 Recommended Coordination with other groups**  
Cabin Systems Subcommittee (CSS)  
Fiber Optic Subcommittee
- 3.0 Project Scope**  
Define a new Ku/Ka satcom system interwiring standard using fiber optic cabling for both radio channel and Ethernet interconnections.  
The standard will leverage ARINC 792 equipment architecture and form factors and will change connector inserts.
- 3.1 Description**  
Emerging Electronically Steerable Antenna (ESA) has the capability to support multiple simultaneous beams, each with unique, selectable waveforms. These features are critical to support Non-Geostationary (NGSO) Satellite Networks, including Low Earth Orbit (LEO) and Medium Earth Orbit (MEO). Existing coaxial interconnections require difficult measures for this mode of operation.

ESA and Modem interfaces are moving towards a digital baseband interface instead of Intermediate Frequency. This technology allows the flexibility in positioning the modem, specifically to be inside the Outside Antenna Equipment. Furthermore, these measures are ideally suited for software defined modems.

Fiber optic bundles are lighter, can scale to support multiple beams, and can be easily adapted to installations that use both very short and very long bundle runs. Alternate application of IF over Fiber or RF over Fiber to support analog waveforms.

### 3.2 Planned usage of the ARINC Standard

New aircraft developments planned to use this specification      yes  no

Boeing plans on using this specification on future aircraft.

Mitsubishi plans on using this specification as an option on future aircraft

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

Adding ARINC 600 (shell size 1 fiber insert)

When is the ARINC standard required?      May 2022

What is driving this date? ESA and NGSO networks are coming into service by 2022.

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

- Modman Connector
- Pressure Bulkhead Interface
- Transmit and Receive Link Budget
- Reference Frequency
- Number of channels to support
- Simplex/Duplex Ethernet fiber interface
- Baseband (I/Q) signal characteristics
- Analog IF or RF over Fiber
- Maintainability
- Software Selectable waveform

### 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

(Discuss the level of cyber security guidance needed, the specific topics to be covered, and whether these topics are covered elsewhere by reference, e.g., ICAO Documents, RTCA/EUROCAE Standards, existing ARINC Standards, or if they need to be defined by a new or revised ARINC Standard.)

### 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: \_\_\_\_\_
- Product offered by more than one supplier    yes  no

#### 4.2 Specific Project Benefits

- Simple, scalable, lighter installation.
- Support for NGSO networks.
- Support for multiple, simultaneous beams.
- Support for Software Selectable Waveforms
- Avoids coaxial cable challenges
- More freedom for locating equipment
- Reduced EMI, Lightning and Bonding challenges

##### 4.2.1 Benefits for Airlines

- Weight saving
- Improved access to NGSO satellite networks

##### 4.2.2 Benefits for Airframe Manufacturers

- Simple, scalable, lighter installation.
- Support for NGSO networks.
- Support for multiple, simultaneous beams.
- Support for Software Selectable Waveforms

Avoids coaxial cable challenges  
 More freedom for locating equipment  
 Reduced EMI, Lightning and Bonding challenges

**4.2.3 Benefits for Avionics Equipment Suppliers**

Digital baseband modem/antenna interface  
 Reduced EMI, Lightning and Bonding challenges  
 Support for multiple, simultaneous beams.  
 Support for Software Selectable Waveforms  
 Support for NGSO networks.

**5.0 Documents to be Produced and Date of Expected Result**

New ARINC Project Paper 792A, May 2022

**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.

<b>Activity</b>	<b>Mtgs</b>	<b>Mtg-Days (Total)</b>	<b>Expected Start Date</b>	<b>Expected Completion Date</b>
ARINC PP 792A	6	18*	May 2020	April 2022
Web Conferences	monthly			

\*concurrent with other KSAT projects

**6.0 Comments**

ARINC 792 specifies the use of coaxial interwiring. A new characteristic will differentiate the fiber/digital interwiring from the legacy coaxial interwiring. Any given installation will operate with either fiber or coaxial interwiring, but not both.

**6.1 Expiration Date for the APIM**

September 2022

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