

ARINC Project Initiation/Modification (APIM)

- 1.0 Name of Proposed Project** **APIM #: 10-007**
SwiftBroadband Safety Services Provisions, ATCt Interference Management, Extended L Band Operation, and legacy HF, VHF, and satcom standards as needed.
- 1.1 Name of Originator & Organization**
Air Ground Communications Systems (AGCS) Subcommittee
- 2.0 Subcommittee Assignment and Project Support**
- 2.1 Suggested AEEC Group**
Air Ground Communications Systems (AGCS) Subcommittee
- 2.2 Support for the activity (as verified)**
Airlines: Continental Airlines, others TBD
Airframe Manufacturers: Airbus, Boeing, Bombardier
Suppliers: EMS SATCOM, Honeywell, Rockwell/Collins, Thales
CMC Electronics, Cobham/Chelton, COM DEV, Thrane and Thrane
Others: Inmarsat, SITA, ARINC, Vizada, Stratos, SkyTerra
- 2.3 Commitment for Drafting and Meeting Participation (as verified)**
Airlines: Chairman - Open
Airframe Manufacturers: Manufacturers: Airbus, Boeing
Suppliers: EMS SATCOM, Honeywell, Rockwell/Collins, Thales
CMC Electronics, Cobham/Chelton, COM DEV
Others: Inmarsat, SITA, ARINC, SkyTerra
- 2.4 Recommended Coordination with other groups**
Manager of Air/Ground Interface Communications (MAGIC), Network Infrastructure and Security (NIS) Subcommittee, Data Link (DLK) Systems Subcommittee, Data Link Users Forum (DLUF), Media Independent ACARS Messaging (MIAM) Working Group, RTCA Special Committee SC-222 Inmarsat AMS(R)S, ICAO Working Group M and/or F.

3.0 Project Scope (why and when standard is needed)

3.1 Description

3.1.1 SwiftBroadband (SBB) Safety Services

Update ARINC 781 to define equipment capable of supporting SwiftBroadband safety services on the Inmarsat I4 satellite constellation. This is a continuation of APIM 04-001A Phase 2. Changes will be included in ARINC 781, Satellite Data Unit (SDU) functional definition, and then applied to ARINC 741 and ARINC 761, by specific reference to ARINC 781.

3.1.1.1 Design for existing aircraft:

- A. ARINC 429 Interface to Satellite Data Unit (SDU) - Gateway function in SDU to redirect data link traffic over background class SBB channel. Assume no changes required (other than SDU software) to aircraft (ACARS/CMU, FMC, etc.)
- B. Analog Flight Deck safety voice over SBB using existing audio systems

3.1.1.2 Design for future aircraft:

- A. ARINC 664 Part 7 Ethernet interface between SDU and ACARS/CMU
- B. Option for digital audio interface for flight deck voice

3.1.2 Management of Ancillary Terrestrial Component (ATCt) Interference to Inmarsat Aeronautical Services

Background to ATCt

Ancillary Terrestrial Component (ATCt) is a wireless terrestrial service designed to operate in an integrated fashion with mobile satellite services (MSS). SkyTerra Communications, headquartered in Reston, Virginia, is a United States MSS provider with a license to operate ATCt in the United States and Canada. ATCt reuses spectrum utilized for MSS by SkyTerra and Inmarsat, creating the potential for interference to some Inmarsat aeronautical services in North America. The deployment of ATCt is contingent upon SkyTerra securing strategic partnerships and capital investment and the timeline for that is not firmly defined at this time, but deployment is expected to occur in the next 3 to 5 years.

It is noted that RTCA SC-222 has, in November 2009, provisionally concluded that ATCt will not interfere with Classic Aero safety service, since the Classic Aero safety service is provided to aircraft that are at significant distances from the proposed location of ATCt base stations. Equipment changes may be needed for other services over North America and for running radio checks on the ground.

Why and When Standard Needed

Define equipment standards for Inmarsat Aeronautical terminals capable of operating in the Ancillary Terrestrial Component (ATCt)

Specify: (See Airbus/Boeing programs above)

Mandate/regulatory requirement yes no

SwiftBroadband safety services will be required for certain routes requiring long range communication over SATCOM when Inmarsat sunsets Classic Aeronautical service. The sunset date is TBD, and will not be known prior to completion of this project.

The schedule for ATCt ground infrastructure rollout is TBD. There is potential for future FAA and/or FCC mandates.

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

Specify (ARINC 781)

When is the ARINC standard required?

July 2011

What is driving this date? _____ (state reason) _____

Inmarsat availability of service, requirements for more robust safety communication in remote regions.

Potential ATCt rollout schedule.

Expected launch of Alphasat satellite in 2012.

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

3.3.1 Define equipment standards for SwiftBroadband safety services.

Define & investigate requirements for the migration of AMS(R)S ATC services (voice and data) into a native IP based environment within the L-Band spectrum. The technical drive towards this migration is an expected reduction in datalink message transit delay. A voice service under an IP environment also provides an alternative to (but not strictly a replacement of) the current public telephony based ATC voice services. Determine whether to establish a satellite based party line voice implementation so that there is no need for flight crews to wait for ATC to "pick up the phone", and other aircraft will have awareness of the communications being conducted within the same FIR.

Items to work:

- Define priority and pre-emption for flight deck voice communication
- Define priority and pre-emption for flight deck data communication
- Define method for placing secure ground to air voice calls over SwiftBroadband

- Refine Segregation and Security Principles for each domain (Aircraft Control Domain (ACD), Airline Information Services Domain (AISD), Passenger Information Entertainment Services Domain (PIESD))
- Identify Functional and Non-Functional Requirements to be met
- Ensure Ground/Air Communication Management
- Ensure End-to-End Interoperability
- Ensure interoperability with other applicable ARINC standards
- Identify certification considerations

3.3.2 Update equipment standards to manage ATCt/Inmarsat spectrum sharing.

- Determine in which airspace Inmarsat Aeronautical Terminals need to operate in terms of 'closeness' to ATCt base stations, and determine RF specification for DLNA. This work is expected to be carried out in conjunction with RTCA SC-222.
- Ensure Inmarsat Aeronautical Terminals can operate, when required, in the presence of ATCt interference in North American Airspace
- Ensure Inmarsat Aeronautical Terminals can operate using ATCt frequency bands when outside North American Airspace
- Determine issues and identify solutions to instruct the DLNA to change filter characteristics for both forward fit and retrofit aircraft.

3.3.3 Update equipment standards to support Extended L Band.

- Determine additional services beyond running existing services over the extended band.
- Determine and investigate technical driving issues which include protection of radio astronomy band (1660-1670MHz) and intermodulation products.
- Update equipment standards for SDU, HPA, DLNA, Antenna.

4.0 Benefits

4.1 Basic benefits

Operational enhancements yes no

For equipment standards:

a. Is this a hardware characteristic? yes no

SwiftBroadband safety services are not expected to impact hardware.

ATCt rollout and Extended L band would probably impact hardware.

b. Is this a software characteristic? yes no

SwiftBroadband safety services will impact software.

ATCt rollout and Extended L Band would probably impact software.

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: The satellite data unit software will need to be designed to be compatible with priority and preemption definitions in the I4 satellite constellation.

Product offered by more than one supplier yes no

Identify: (See company list above)

4.2 Specific project benefits (Describe overall project benefits.)

Provide robust satellite based Air Traffic Control communication for the purpose of increased efficiency in oceanic airspace. Increase throughput, reduce latency, and improve overall reliability by providing a second independent safety service from Classic Aero. Meet Required Communication Performance (RCP) for 30 nautical mile separation of aircraft.

4.2.1 Benefits for Airlines

Shorter flight routes in oceanic airspace resulting in reduced fuel consumption and reduced flight time. Ensure ATC system has capacity to support capacity and direct flight routing.

4.2.2 Benefits for Airframe Manufacturers

Ensure ATC system capacity is not a limiting factor in number of aircraft purchased by airlines.

4.2.3 Benefits for Avionics Equipment Suppliers

Additional sales of new equipment.

5.0 Documents to be Produced and Date of Expected Result

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 |
|-------------------------|------|--|---------------------|--------------------------|
| ARINC 781 Supplement 5 | 3 | 9 days total (some of which includes SC-222) | 06/2010 | 07/2011 |
| ARINC 741 Supplement 14 | | | 06/2010 | 07/2011 |
| ARINC 761 Supplement 5 | | | 06/2010 | 07/2011 |

Boeing has offered to host teleconferences and web conferences to further development of draft material between official AGCS Subcommittee meetings.

6.0

Comments

This APIM supercedes Phase 2 of APIM # 04-001A, providing an update of the planned work for Swiftbroadband safety services and identifying new work required as a result of potential ATCt rollout.

6.1

Expiration Date for the APIM

December 2011

| | |
|--|--------------------------------|
| For AEEC Secretary use | |
| Date Received: Jan 21, 2010 | Assigned: <u>Mike Rockwell</u> |
| Potential impact: _____ | |
| (A. Safety B. Regulatory C. New aircraft/system D. Other) | |
| Resolution: _____ | |
| <i>Authorized, Deferred, Withdrawn, More Detail Needed, Rejected</i> | |
| Assigned to SC/WG: _____ | |