

## ARINC Project Initiation/Modification (APIM)

- 1.0 Name of Proposed Project** **APIM #: 11-002**  
ARINC Project Paper 660B: CNS/ATM Avionics Architectures Supporting NextGen/SESAR Concepts
- 1.1** CNS/ATM Avionics Architectures Supporting NextGen/SESAR concepts
- 1.2 Name of Originator and/or Organization**  
Airbus on behalf of SAI Members
- 2.0 Subcommittee Assignment and Project Support**
- 2.1 Suggested AEEC Group and Chairman**  
SAI or new SAI Sub-Group to be formed.  
Chairman: To be identified, preferably an Airline
- 2.2 Support for the activity (as verified)**  
Airlines: Continental Airlines  
Airframe Manufacturers: Airbus, Boeing  
Suppliers: GE Aviation, Honeywell, **Jeppesen**, Rockwell Collins, Thales  
Others:
- 2.3 Commitment for Drafting and Meeting Participation (as verified)**  
Airlines: Air France, American, Continental Airlines, UPS, United  
Airframe Manufacturers: Airbus, Boeing  
Suppliers: GE Aviation, Honeywell, Rockwell Collins, Thales  
Others:
- 2.4 Recommended Coordination with other groups**  
It is mandated that:
- expertise on numerous avionics systems and ARINC standards (COM, NAV, SURV) be brought in the activity
  - coordination is organized with NextGen/SESAR programs
  - **Coordinate with RTCA/EUROCAE and other pertinent bodies, e.g.,**
    - o **RTCA SC-186,**
    - o **RTCA SC-206, Aeronautical Information and Meteorological Data Link Services**
    - o **RTCA SC-213,**
    - o RTCA SC-214/EUROCAE WG-78, Standards for Air Traffic Data Communication Services
    - o EUROCAE WG 85, 4D Navigation

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→ and other

### 3.0 **Project Scope** (why and when standard is needed)

#### 3.1 **Description**

##### Objective of the activity:

To develop an ARINC Report **660B** to:

- Share a common understanding of NextGen/SESAR concepts between the Aeronautical Industry and Airlines, in the frame of ARINC
- Establish a consensus on what should be the aircraft contribution to the concepts
- Assess the impact of the NextGen/SESAR concepts on the aircraft architectures :
  - For production aircraft and for retrofit
  - For the different systems architectures (LRU, IMA, ...)
- Use this information in the frame of other forums
- Identify the new ARINC standards to develop, the ARINC standards to be modified, and thus, make the link with the AEEC Technology Plan

##### Background:

Two ARINC documents are already addressing the subject of CNS architectures and of the potential impacts of the NextGen and SESAR programs on avionics standard:

ARINC Report 660A "CNS/ATM AVIONICS, FUNCTIONAL ALLOCATION AND RECOMMENDED ARCHITECTURES", has been published in January 2001. The document identifies and specifies the aircraft avionics functions necessary for operation in the CNS/ATM environment which was considered as emerging by the end of the 90's. These capabilities were intended to satisfy long-term CNS/ATM operational objectives. The baseline for this document was post ACARS and FANS-1/A applications. It was not based on any CNS/ATM roadmap (from US or Europe). This document is giving a good overview of the CNS functions evolution, which appears to be still valid.

The document describes the functions which were foreseen in the future, by the end of the 90's, and addresses them by domains: Communication, Navigation, and Surveillance. It explains how the different CNS/ATM functions should be implemented by the different avionics systems. Then the document gives the example architectures of a « Classical aircraft » and of an « FM/EFIS aircraft ». The document does not address IMA architecture.

The second document is the AEEC Technology Plan, currently in a draft version issued 15th August 2010. A chapter of the document is dedicated to "Standards that enable CNS/ATM Evolutions". The NextGen and SESAR programs are the main drivers for CNS/ATM evolutions. NextGen and SESAR are based on similar concepts, with some differences, and different roadmaps. So, it has been difficult for SAI to define one roadmap for avionics systems evolutions, in-line with the 2

programs.

Avionics evolutions have been addressed by domains:

- Communication
- Navigation
- Approach and Landing
- Surveillance
- Surface Operations

For each Domain, are addressed:

- Foreseen evolutions
- Foreseen technical enablers
- Impacted systems
- Candidates for new or revised standards
- Standardization activities roadmap
  - Existing standardization activities (already launched)
  - New standardization needed to be activated in the short or mid-term

Deliverable of the activity:

It is proposed that ARINC Report 660A be updated and re-published as ARINC Report 660B with a similar structure and content, but dedicated to NextGen, SESAR (and other) avionics equipment architecture recommendations.

A possible title for this new report could be: « CNS/ATM Avionics Architectures Supporting NextGen/SESAR concepts ».

The document will describe the evolutions of the Avionics Architectures necessary to support the NextGen/SESAR concepts.

The different concepts of NextGen and SESAR will be addressed, **such** as:

- **Data communications**
  - FANS 1/A+
  - ATN Baseline 1 / Link2000+
  - SC 214 ATN Baseline 2
- **RNAv / RNP**
  - RNAv / RNP
  - Advanced RNP
  - RNP AR
  - LPV
- **4D trajectories / Trajectory based operations**

- Initial 4D / Trajectory operations / TBOs
- Uplink Weather
- **Enhanced approaches**
  - GLS Cat 3
  - EVS/ SVS
- **ADS-B**
  - ADS-B out
  - ADS-B in / TIS-B in / ADS-R applications,
    - ATSA-Airb / CDTI,
    - ATSA-VSA / EVAcq / EVApp
    - ATSA-SURF / ASSA / FAROA
    - ATSA-ITP
  - ASPA-S&M / IM
- **Surface Operations**
  - Moving map
  - Surface Traffic
  - Alerts
  - Taxi routing

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**The proposed ARINC Report 660B will take into consideration published NextGen/SESAR roadmaps. It will be used to update the AEEC Technology Plan by identifying the development of new standards to be created and the standards to be modified.**

**The intent is to document recommended architectures based on the best understanding of NextGen/SESAR requirements. (We are not going to document the forks in the road that we're not taking.)**

**The architectures are expected to take into account cross-domain requirements.**

### 3.2 Planned usage of the envisioned specification

Use the following symbol to check yes or no below.

New aircraft developments planned to use this specification      yes  no

Airbus:                      A350

Boeing:                     **TBD**

Other:                        (manufacturer, aircraft & date)

Modification/retrofit requirement                                      yes  no

Specify:                      most of aircraft flying and which will continue to fly over US and Europe in the next decade, production and retrofit of existing aircraft



## 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

Identify: \_\_\_\_\_ (company name)

### 4.2 Specific project benefits (Describe overall project benefits.)

#### 4.2.1 Benefits for Airlines

To **ensure** NextGen and SESAR concepts **are harmonized, as well as the** impact on avionics systems. This information can also help the Airlines to make decisions regarding fleet equipage **and the timeline for doing so.**

#### 4.2.2 Benefits for Airframe Manufacturers

To share and consolidate their understanding of avionics architecture evolution due to NextGen and SESAR, thanks to discussions with other Airframe Manufacturers, Avionics Vendors, and Airlines, the end-users.

#### 4.2.3 Benefits for Avionics Equipment Suppliers

To propose **common** solutions to implement the new NextGen/SESAR concepts, and get feedback and directions from the Airlines Manufacturers and the Airlines.

#### 4.2.4 Benefits for the whole ARINC community

To share an understanding on the NextGen and SESAR concepts, and how the Aircraft should contribute to the 2 programs, through one set of Avionics system **recommendations.**

To define which evolutions of the avionics system should be performed, and as a consequence to identify which ARINC standard will need to be created or modified.

**To provide avionics architecture data to stakeholders in the community that can be used to influence NextGen/SESAR initiatives.**

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

ARINC Report 660B (TBD)

**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 660B	4	8	06/2011	04/2013

It is proposed that the proposed work is performed by a small working group of Aircraft Manufacturers and Avionics Suppliers, chaired by an Airline.

The Working Group will develop the ARINC Report and will present its progress, as well as the content of the ARINC Report during SAI meetings. It will be a means for the Working Group to get comments and directions to further develop the document, until a complete draft is ready. SAI will then review the draft, before submission for approval to AEEC.

The Working Group will use **monthly** web conferences to progress, and will organize face to face meeting, just before the SAI, or independently of SAI meeting dates.

\* Indicate unsupported meetings and meeting days, i.e., technical working group or other ad hoc meetings that do not requiring AEEC staff support.

**6.0 Comments**

(Insert any other information deemed useful to the committee for managing this work.)

**6.1 Expiration Date for this APIM**

October 2014

Submit completed form to the AEEC Executive Secretary (pjp@arinc.com)	
Date Received: MM/DD/YYYY	AEEC staff : _____
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: _____	