

ARINC IA Project Initiation/Modification (APIM)

1. Name of Proposed Project

APIM #: 06-003

FMS Navigation Data Base Open Standard (NDBX)

Software specification only

yes no

2. Suggested Subcommittee Assignment (who acts)

2.1 Identify AEEC group

New AEEC project

2.2. Support for the activity

Airlines: Lufthansa (DLH), British Airways, **Air France, KLM, TAP**, (others to be confirmed)

Airframers: Airbus, Boeing

Suppliers: CMC, **Smiths Aerospace**, Thales, (others to be confirmed)

Others: Lufthansa Systems Flight NAVinc. (Lido), Jeppesen

2.3. Commitment for resources (directly from participant)

Chairman: **(just in case Lufthansa stands by, but other chairmen welcome)**

Airlines: Lufthansa, British Airways, (others to be confirmed)

Airframers: Airbus, (**Boeing to be confirmed**)

Suppliers: CMC, (**Thales to be confirmed**)

Others: Lido, (**Jeppesen to be confirmed**)

2.4. Recommended Coordination with other groups

The following activities are relevant to this topic:

- Navigation Data Base (NDB) – ARINC 424
- Flight Management System – ARINC 702A
- Airport Mapping Data Base - ARINC 816
- Software Data Loading - ARINC 615A
- Electronic Distribution of Software - ARINC 666
- Other FMS developers in General Aviation, Military, etc.

3. Project Scope

3.1 Description

This project will start from ARINC 424 NDB as a minimum set of elements to be coded **and will establish a navigation data base open standard (NDBX) that can grow.**

Other than “classic” FMCs using ARINC 424 NDB, this project should provide the definition of an open standard (NDBX) that is direct readable by the FMC, not needing conversion to the FMC machine readable/loadable format.

This will require coordination with FMS suppliers to establish this **new open standard (NDBX) for any new FMC.**

For existing FMC in **service, suppliers would be encouraged to adapt their existing production processes to convert from the ARINC 424 NDB file to the new open standard (NDBX) input file.**

The format of the new open standard (NDBX) will be based on XML.

Synergy as much as possible with the Airport Mapping Data Base Standard (**ARINC 816**).

Provision should be made for new features in the **open standard NDBX as follows:**

- The open standard NDBX **should be extensible.** Freedom for addition of new data fields if applications or new functions in the FMC would need those data.
- In order to reduce load time, methods should be implemented to enable loading of the complete NDBX **or partial NDBX**, if only small fractions are changed or added. (called differential loading, delta load, short load, etc.)
- Remote loading of NDBX (via data link) should be accounted for.
- **In the future, it is expected that ARINC 424 NDB, changed every 28 days, will migrate toward a dynamic environment where actual procedures will be uplinked as required is envisioned.** Therefore provisions must be defined how new data elements can be transferred in to the active data base, including while airborne. This requires architectural changes in the FMC and should be accounted for in the open standard NDBX.
- The open standard NDBX should add flags for dynamic data elements. This flag should make data elements erasable or give a life limit (till touchdown, etc.) Such elements in the beginning could be approach procedures or departures (STAR and SID) for airports with a highly variable procedure design. In a next stage this could be tailored procedures for individual aircraft tail signs in order to meter incoming outgoing traffic for 4 D navigation. (curved or complex routing).
- **The open standard NDBX should have provisions to function with an “Aeronautical Database Server”.** This server could be dedicated hardware or a software partition of a general purpose computer resource. This server could be used for **both future and**

existing data bases e.g. Terrain, Airport, Performance, Navigation and Configuration data bases of any kind.

3.2. Planned usage of the envisioned specification

New aircraft developments planned to use this specification yes no

Airbus: e.g., **A350 (to be confirmed)**

Boeing: **consider using on future programs,** e.g., B737 family next generation

New avionics equipment for major retrofit programs (schedule TBD) **yes no**

Mandate/regulatory requirement yes no

Please specify program and date: N/A

Modification/retrofit requirement yes no

Please specify: Not at this moment

Airframer and/or airline projects to use this specification yes no

Intended for Airbus and Boeing some retrofit and new projects forward fit.

Is the infrastructure standard for the aircraft defined? yes no

Yes: partial.

When is the ARINC standard required? end of 2008

Date is not driven by a specific aircraft programs, it is an infrastructure strategic requirement. No mature plan for a new aircraft program exists. Because a new program can come up suddenly, an approved standard **must** be in place **in order to be considered**.

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

If 'No' please specify solution: N/A

Patent(s) involved?

yes no

If 'Yes' please describe:

Up to now no known conflict has been detected. The plan is to use open standards and public domain knowledge.

3.3. Issues to be worked

The main issues are:

- **Industry would have to change the NDB development and distribution processes, including processes to assure data integrity.**
- ARINC 702A impact, perhaps substantial addition of definition
- Aviation Data Base Server function may need to be considered
- Airframe mfgs caution that new NDBX standard may add cost to the FMS

4. Benefits envisioned

4.1. Basic benefits

Projects benefiting from this effort would be future production aircraft and major retrofit programs that could utilize a common process and format for a standard NDBX across all aircraft. The open format will also simplify data base integrity checks and eliminate one source of potential failure in the processing chain. The steps required from the data supplier to end user will be made more efficient.

Operational enhancements (reduction in DOC?)

yes no

Form, Fit, Function, (FFF) standard (HW and/or SW):

a. ARINC 600 form (only HW)

yes no

b. Interchangeable fit (plug, mount, SW loading interface, etc)

yes no

c. Interchangeable function

yes no

If not fully interchangeable, please explain:

Interface and protocol standard (for aircraft defined in 3 scope)

yes no

Please specify: Protocol standard for data format and transfer function

Product offerable from more than one supplier (competitive environment)

yes no

Please identify: Jeppesen, Lido, EAG, FMS suppliers, Chart Providers, etc.

4.2 Specific project benefits

- Complexity of a highly recurrent process (every 28 days) could be reduced.

- **The NDBX development and delivery cycle could be made more efficient**
- Growth potential to support emerging ATN environment creating an open standard would enable direct competition for NAV Data suppliers and FMC suppliers.

4.3 Project Benefit for Airlines

This standard will provide several benefits to Airlines:

- **Increased flexibility in supplier selection (Hardware versus NDBX supplier)**
- **Future proof equipment and procedures**
- **Growing potential and adaptivity for new requirements**
- **More cost-effective processes compared to existing methods.**
- **Ensure the integrity and reliability of NDBX**

4.4 Project Benefit for Airframe Manufacturers

- The Airframe Manufacturers will benefit from being able to use any NAV data supplier **in any FMS equipment.**
- The Airframe Manufacturers can define a single data base configuration for each aircraft family independent of the supplier.
- Flexibility to add new data to the data base and flexibility to add new functions to the aircraft.
- Enable Airframe Manufacturers to offer new business models to the airlines/operators.

4.5 Project Benefit for Avionics Equipment Suppliers

The key advantages for Avionic Equipment Suppliers are as follows:

- Reduction of effort needed to meet RTCA DO-200A
- Allows for an open market place for manufacturers **to supply** interoperable equipment

5. Documents to be Produced and Date of Expected Result

ARINC Specification for open Standard NDBX.

6. Meetings/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 2006	Mtg-Days 2007	Mtg-Days 2008
Establish XML standard for NDBX	4	2	6	2

7. Comments

Any other information deemed useful to the committee for managing this work.

For IA Staff use only:	
Date Received:	IA Staff Assigned:
Potential impact:	<i>(Safety, Regulatory, New aircraft/system, Other)</i>
Forwarded to <i>(AEEC, AMC, FSEMC)</i> :	Date Forwarded:
Resolution:	Date of Resolution:
<i>(Withdrawn, Authorized, Deferred, More detail needed, Rejected)</i>	