

ARINC Project Initiation/Modification (APIM)

- 1.0 Name of Proposed Project** **APIM 12-007**
XML Encoding and Compression Standard
- 1.1 Name of Originator and/or Organization**
Airbus, Jeppesen
- 2.0 Subcommittee Assignment and Project Support**
It is recognized that this activity will consider data bases, e.g., AMDB, NDBX, Terrain/Obstacle.
- 2.1 Suggested AEEC Group and Chairman**
Working Group activity / Expand scope of AMDB Subcommittee
- 2.2 Support for the activity (as verified)**
Airlines: **American**, Lufthansa, **Southwest, TAP, UPS, United**
Airframe: Airbus, Boeing
Suppliers: Jeppesen
Others:
- 2.3 Commitment for Drafting and Meeting Participation (as verified)**
Airlines: Lufthansa
Airframe: Airbus
Suppliers: Jeppesen
Others:

2.4

Recommended Coordination with other groups

The following activities are relevant to this topic:

- XML based database formats
 - Embedded Interchange Format for Airport Mapping Database – ARINC 816
 - Embedded Interchange Format for Terrain and Obstacle Database – [proposed ARINC xxx]
 - Navigation Data Base Open Standard (NDBX) – [proposed ARINC xxx]
- XML based Data Link Protocols
 - Aircraft/Ground Information Exchange (AGIE) – ARINC 830
 - Standards for Air Traffic Data Communication Services – RTCA SC-214
 - AIS & MET Datalink, RTCA SC-206
- W3C EXI (Efficient XML Interchange) working group
- OGC Binary XML working group

3.0 Project Scope

3.1 Description

XML is being used more and more as a file format in data exchange standards. Due to the large size of typical XML files, additional compression methods are desired. Binary XML encoding is being discussed in various places like ARINC 816. Also, the proposed ARINC xxx (NDBX) and proposed ARINC xxx Embedded Terrain and Obstacle Databases, may benefit from XML compression.

The goal of this proposal is to consolidate the work on XML compression methods and define a single (framework of) compression format(s) that can be utilized by other standards.

The new format will be optimized for small file sizes and processing efficiency (CPU, RAM) on the decoding side (aircraft). The most efficient method in this area is the W3C EXI Format 1.0 (Efficient XML Interchange), <http://www.w3.org/TR/exi/>. It was specially developed for mobile devices, and with having limited hardware resources and low bandwidth in mind.

This project will start from EXI and extend it by a framework of aviation domain specific codings and/or profile(s).

Comparing plain EXI with Binary-XML as used in ARINC 816 shows a 5-10% better compression rate for AMDBs (ARINC 816), 50% better for Navigation Data (NDBX), and up to 70% for Terrain and Obstacles.

Provision should be made for new features in AirZIP as follows:

- The standard should have provisions to function with an aeronautical database server that could be used for both future and existing data bases e.g. Terrain, Airport, Performance, Navigation, Obstacle, and Configuration databases of any kind.
- The standard should be extensible for new data types, metadata, or indices.
- In order to reduce load time, methods should be implemented to enable loading of complete databases or partial updates if only small fractions are changed or added (called differential loading, delta load, short load, etc.).
- The standard should provide flexibility to preserve or remove XML elements like white-spaces, tabs, line-breaks, comments, processing instructions, name spaces, doctypes etc. Removing these elements improves the compression ratio, but may constrain certain applications.
- The standard should support signing of the compressed file.
- Data access and data access protocols should be considered.

This project will require coordination with database vendors and suppliers of applications using those databases (e.g. FMS, Airport Moving Map, EFB) to establish this new open standard.

The Airport Mapping Data Base Standard (ARINC 816) should consider an updated to allow AirZIP as the compression format in the future.

3.2 Planned usage of the envisioned specification

Note: New airplane programs must be confirmed by manufacturer prior to completing this section.

Use the following symbol to check yes or no below.

New aircraft developments planned to use this specification yes no
~~no~~

Airbus: (aircraft & date)
Boeing: (aircraft & date)
Other: (manufacturer, aircraft & date)

Modification/retrofit requirement yes
no

Specify: (aircraft & date)

To be used with new release of ARINC 816, ARINC xxx, centralized database servers etc.

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
Specify (e.g., ARINC 429)

Yes, similar to ARINC 665 for CRCs.

When is the ARINC Standard required?
_____ 12/2013 _____

The date is not driven by a specific aircraft program. 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.

This standard should be available for the FMS-optimized XML Version envisioned for ARINC xxx.

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

- Identify use cases / demo scenarios for benchmarking
- Develop compression algorithms
- Extended EXI format
 - Profile for gzipped format
 - Profile for random access format
 - Indices
- Delta Updates
- Signing / CRCs

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

- Better compression means smaller files, leading to
 - Shorter load times for databases
 - Reduced communication costs for SatCom datalink messages

4.2.2 Benefits for Airframe Manufacturers

- Smaller storage requirements onboard; less weight, less costs

4.2.3 Benefits for Avionics Equipment Suppliers

- Only need to support a single compression format for XML data instead of three
- Reduced effort needed to meet RTCA DO-200A / DO-178B/C

5.0 Documents to be Produced and Date of Expected Result

Identify Project Papers expected to be completed per the table below.

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.

Product/Activity	Mtgs	Mtg-Days (Total)	Expected Start Date	Expected Completion Date
<i>XML Compression open standard</i>	4	12	<i>June 08/20132</i>	<i>Dec 12/20153</i>

Please note the number of meetings, the number meeting days and the frequency of web conferences to be supported by the IA staff.

6.0 Comments

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

6.1 Expiration Date for this APIM

April/October 20XX

For IA staff use only	
Date Received: _____	IA 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: _____	

Submit completed form to the AEEC Executive Secretary.