SLOVENSKI STANDARD
SIST EN 4660-001:2011

01-december-2011

Aeronavtika - Modularne in odprte letalske elektronske arhitekture - 001. del: Arhitektura

Aerospace series - Modular and Open Avionics Architectures - Part 001: Architecture

Luft- und Raumfahrt - Modulare und offene Avionikarchitekturen - Teil 001: Architektur

Série aérospatiale - Architectures Avioniques Modulaires et Ouvertes - Partie 001: Architecture

Ta slovenski standard je istoveten z: **EN 4660-001:2011**

ICS:

49.090	Oprema in instrumenti v zračnih in vesoljskih plovilih	On-board equipment and instruments

SIST EN 4660-001:2011 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 4660-001

February 2011

ICS 49.090

English Version

Aerospace series - Modular and Open Avionics Architectures - Part 001: Architecture

Série aérospatiale - Architectures Avioniques Modulaires et Ouvertes - Partie 001: Architecture

Luft- und Raumfahrt - Modulare und offene Avionikarchitekturen - Teil 001: Architektur

This European Standard was approved by CEN on 26 June 2010.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 4660-001:2011: E

Contents

Page

Foreword 4

0 Introduction 4
0.1 Purpose 5
0.2 Document Structure 6

1 Scope 7

2 Normative references 7

3 Terms, definitions and abbreviations 7
3.1 Terms and definitions 7
3.2 Abbreviations 8
3.3 Definitions 9

4 IMA Drivers and Characteristics 9
4.1 Drivers 9
4.2 Introduction to IMA Concepts 10
4.2.1 Non-IMA Systems 10
4.2.2 Characteristics for an IMA System 11
4.2.3 IMA System Design 11

5 Requirements and the Architecture Standard 13
5.1 Software Architecture 13
5.2 Common Functional Module 15
5.3 Communication / Network 15
5.4 Packaging 16

6 Guidelines 16
6.1 System Management 17
6.2 Fault Management 17
6.3 System initialisation and shutdown 17
6.4 System Configuration / reconfiguration 18
6.5 Time Management 18
6.6 Security Aspects 18
6.7 Safety 19

Annex A (informative) **Power Distribution Architecture** 20
A.1 General Description 20
A.2 The Double Conversion Architecture 20
A.3 The Line Replaceable Chamber 21

Table of Figures

Page

Figure 1 — ASAAC Standard Documentation Hierarchy 5
Figure 2 — A Typical Federated Aircraft System 10
Figure 3 — IMA Core System 12
Figure 4 — IMA System 12
Figure 5 — An IMA System 13
Figure 6 — Three Layer Software Architecture 14
Figure A.1 — Double Conversion Architecture 20

Table of Tables

Page

Table 1 — Architectural Characteristics 11
Table 2 — Software Layer Independence 14

Foreword

This document (EN 4660-001:2011) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2011, and conflicting national standards shall be withdrawn at the latest by August 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

0 Introduction

0.1 Purpose

This document was produced under the ASAAC Phase II Contract.

The purpose of the ASAAC Programme is to define and validate a set of open architecture standards, concepts and guidelines for Advanced Avionics Architectures (A3) in order to meet the three main ASAAC drivers. The standards, concepts and guidelines produced by the Programme are to be applicable to both new aircraft and update programmes.

The three main drivers for the ASAAC Programme are:

— Reduced life cycle costs,

— Improved mission performance,

— Improved operational performance.

The Standards are organised as a set of documents including:

— A set of agreed standards that describe, using a top down approach, the Architecture overview to all interfaces required to implement the core within avionics systems,

— The guidelines for system implementation through application of the standards.

The document hierarchy is given hereafter: *(in this figure, the current document is highlighted)*

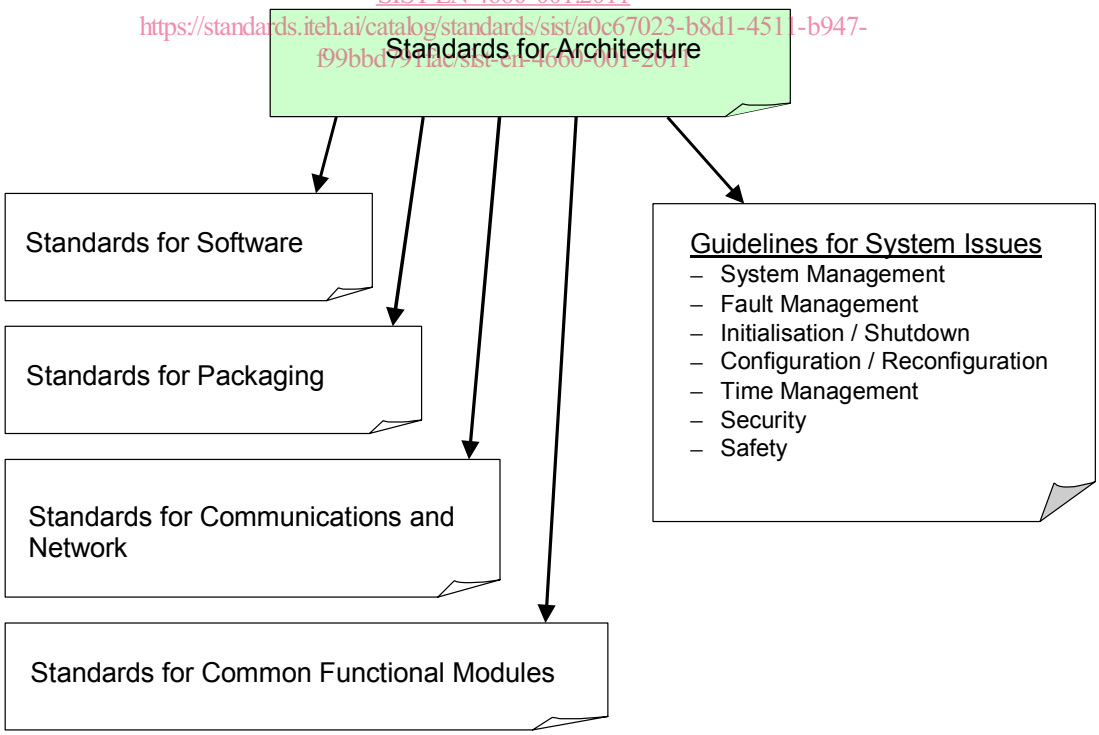

Figure 1 — ASAAC Standard Documentation Hierarchy

0.2 Document Structure

The document contains the following clauses:

Clause 1, gives the scope of the document,

Clause 2, identifies normative references,

Clause 3, gives the terms, definitions and abbreviations,

Clause 4, presents the set of architecture drivers and characteristics as well as an introduction to IMA,

Clause 5, defines the architecture standard, and introduces the other standards,

Clause 6, introduces the guidelines for implementing an IMA architecture,

Annex A, presents the power supply architecture.

1 Scope

The purpose of this standard is to establish uniform requirements for the architecture for Integrated Modular Avionic (IMA) systems as defined by the ASAAC Programme.

The IMA architecture can be built by using common components. These components are specified in separate standards. Ways of using these components are described in a set of guidelines. This document gives references to these Standards and Guidelines as well as a short introduction to IMA.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 4660-002, *Aerospace series — Modular and Open Avionics Architectures — Part 002: Common Functional Modules*

EN 4660-003, *Aerospace series — Modular and Open Avionics Architectures — Part 003: Communications/Network*

EN 4660-004, *Aerospace series — Modular and Open Avionics Architectures — Part 004: Packaging*

EN 4660-005, *Aerospace series — Modular and Open Avionics Architectures — Part 005: Software*

ASAAC2-GUI-32450-001-CPG Issue 01, *Final Draft of Guidelines for System Issues* [1)]

— *Volume 1 — System Management.*

— *Volume 2 — Fault Management.*

— *Volume 3 — Initialisation and Shutdown.*

— *Volume 4 — Configuration / Reconfiguration.*

— *Volume 5 — Time Management.*

— *Volume 6 — Security.*

— *Volume 7 — Safety.*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

Use of “shall”, “should” and “may” within the standards observe the following rules:

— The word SHALL in the text expresses a mandatory requirement of the standard.

1) Published by: Allied Standard Avionics Architecture Council.

— The word SHOULD in the text expresses a recommendation or advice on implementing such a requirement of the standard. It is expected that such recommendations or advice will be followed unless good reasons are stated for not doing so.

— The word MAY in the text expresses a permissible practice or action. It does not express a requirement of the standard.

3.2 Abbreviations

A3 : Advanced Avionics Architectures

AM : Application Management

AL : Application Layer

APOS : Application Layer / Operating System Layer Interface

ASAAC : Allied Standard Avionics Architecture Council

BIT : Built-In Test

BW : Band-Width

CFM : Common Functional Modules

CNI : Communication / Navigation / Identification

COMSEC : Communication Security

COTS : Commercial Off The Shelf

CPU : Computer Processing Unit

DC : Direct Current

DPM : Data Processing Module

EO : Electro-Optic

EMI : Electro-Magnetic Interference

EW : Electronic Warfare

GPM : Graphic Processing Module

GSM : Generic System Management

HDD : Head-Down Display

HUD : Head-Up Display

HW : Hardware

IED : Insertion / Extraction Device

IF : Interface

IFF : Identification Friend or Foe

IMA : Integrated Modular Avionics

LRC : Line Replaceable Chamber

LRM : Line Replaceable Module

MMM : Mass Memory Module

MOS : Module Support Layer / Operating System Layer Interface

MPI : Module Physical Interface

NSM : Network Support Module

OS : Operating System

PCM : Power Conversion Module

PCU : Power Conversion Unit

PSE : Power Supply Element

SPM : Signal Processing Module

TD&T : Target Detection and Tracking

TRANSEC : Transmission Security

UAV : Unmanned Aerial Vehicle

3.3 Definitions

3.3.1
IMA System
full system that is built from an IMA Core System and non-Core equipment

3.3.2
IMA Core System
avionics system comprising one or a series of avionic racks containing sets of standardised CFMs linked together by a unified communication network and executing reusable functional applications that are hardware independent, operating systems and system management software

3.3.3
Common Functional Modules (CFM)
line replaceable items and provide an IMA Core System with a computational capability, network support capability and power conversion capability

3.3.4
Software Layered Architecture
common software model based on the concept of a layered software architecture. Within this model, the layers are separated by standardised interfaces in order to provide independence of these layers

3.3.5
System Management
management of the resources and services of an IMA Core System during initialisation, all operational phases in flight and on ground, and system shutdown

4 IMA Drivers and Characteristics

4.1 Drivers

The three principle drivers for the architecture are: