

Aerospace series - Modular and Open Avionics
Architectures - Part 005: Software

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 4660-005:2019 sisaldab Euroopa standardi EN 4660-005:2019 ingliskeelset teksti.	This Estonian standard EVS-EN 4660-005:2019 consists of the English text of the European standard EN 4660-005:2019.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 21.08.2019.	Date of Availability of the European standard is 21.08.2019.
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ICS 49.090

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English Version

Aerospace series - Modular and Open Avionics Architectures - Part 005: Software

Série aérospatiale - Architectures Avioniques
Modulaires et Ouvertes - Partie 005 : Logiciel

Luft- und Raumfahrt - Modulare und offene
Avionikarchitekturen - Teil 005: Software

This European Standard was approved by CEN on 2 December 2018.

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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 4660-005:2019) 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of an identical text or by endorsement, at the latest by February 2020, and conflicting national standards shall be withdrawn at the latest by February 2020.

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

This document supersedes EN 4660-005:2011.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

The purpose of this MOAA standard is to define a set of open architecture standards, concepts & guidelines for Advanced Avionics Architectures (A3).

The three main goals for the MOAA Standards are:

- reduced life cycle costs;
- improved mission performance;
- improved operational performance.

The MOAA 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 system and
- the guidelines for system implementation through application of the standards.

The document hierarchy is given hereafter: (in Figure 1 the document is highlighted)

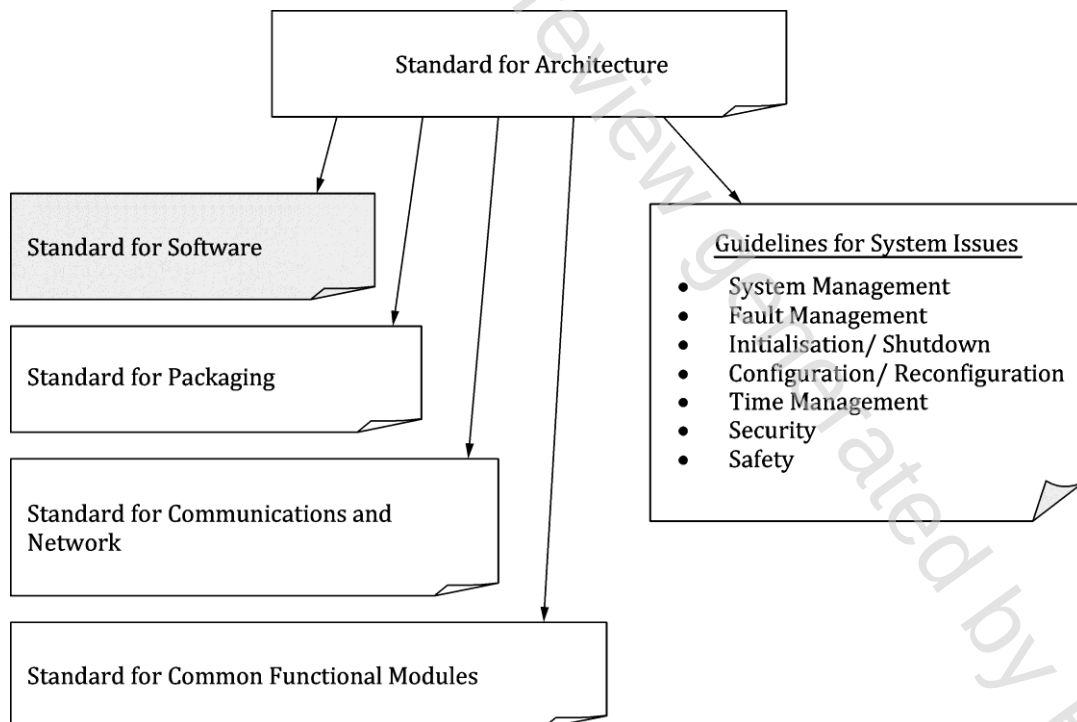


Figure 1 — MOAA Standard Documentation Hierarchy

1 Scope

1.1 General scope

This European Standard establishes uniform requirements for design and development of software architecture for modular avionics systems.

1.2 Software Architecture Overview

The MOAA Software Architecture is based on a three-layer stack as shown by a simplified Figure 2.

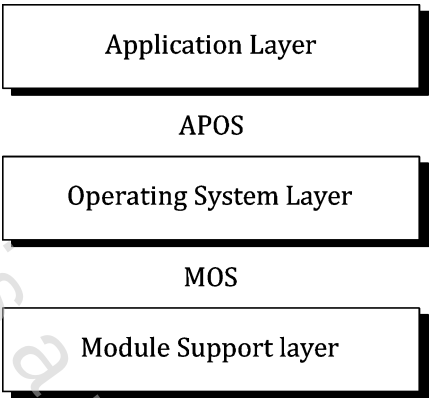


Figure 2 — MOAA Three Layer Software Architecture

Each layer is described in terms of it dependency/independency on both the aircraft system and the underlying hardware.

Table 1 — Software Layer Independence

Software Layer	Aircraft Dependency	Hardware Dependency
Application Layer (AL)	Dependent	Independent
Operating System Layer (OSL)	Independent	Independent
Module Support Layer (MSL)	Independent	Dependent

1.3 Software Architectural Components

1.3.1 General

Figure 3 provides an overview of the software architectural components and software interfaces.

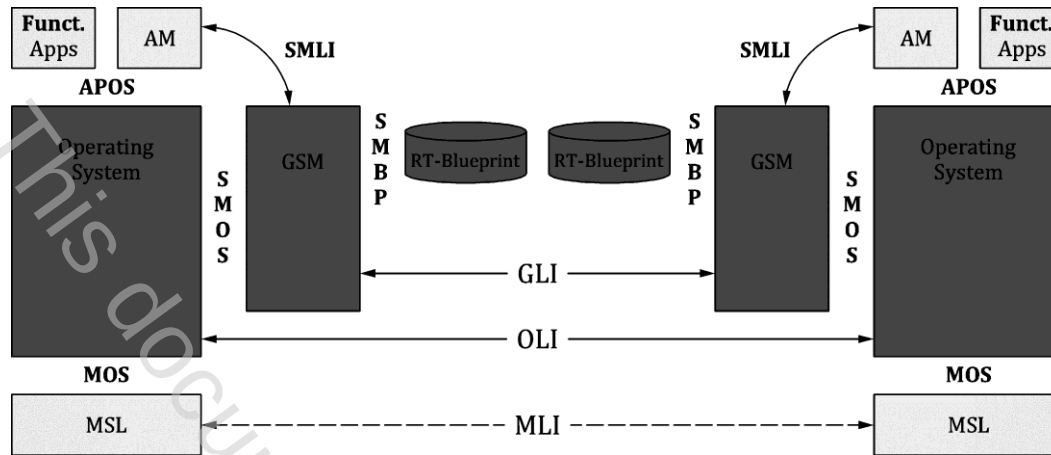


Figure 3 — The Software Architecture Model

1.3.2 Functional Applications

The term “Functional Applications” relates to all functions that handle the processing of operational data, e.g.

- Radar Applications;
- Mission Management;
- Stores Management;
- Vehicle Management System;
- Communication, Navigation and Identification.

1.3.3 Application Management (AM)

AM is responsible for the non-standardised system management, i.e. the AM performs the non-generic system management. As an example, the AM may perform the mission/moding management. The interface between the AM and GSM is the System Management Logical Interface (SMLI) (see 4.1.3).

1.3.4 Operating System (OS)

A Real-Time OS provides the part of OSL functionality that controls the real-time behaviour of the Processing Element and its associated resources (see 5.2.2).

1.3.5 Generic System Management (GSM)

The GSM is responsible for the management of the core processing (see 4.1.2 and 5.2.1). This functionality is divided into four areas:

- Health Monitoring;
- Fault Management;
- Configuration Management;
- Security Management.

1.3.6 Run-Time Blueprints (RTBP)

The RTBP contain the information (e.g. process description, routing information, fault management data) required to configure and manage the core processing on which it is hosted (see 5.3).

1.3.7 Module Support Layer (MSL)

The MSL encapsulates the details of the underlying hardware and provides generic, technology independent access to low-level resources (see 5.1).

1.3.8 Application to OS Interface (APOS)

The APOS is a direct interface that separates the aircraft dependent software (AL) from the aircraft independent software (OSL). Its purpose is to provide the processes in the AL with a standardised OS independent interface to those services provided by the OS, thus promoting the portability and re-use of application software (see 6.1).

1.3.9 Module Support to OS Interface (MOS)

The MOS is a direct interface that separates the OSL from the hardware dependent software (MSL). Its purpose is to provide the OS with a hardware independent/technology transparent interface to the functionality contained within the MSL. The MOS therefore allows the same OSL software to reside on different implementations of a CFM regardless of the underlying hardware (see 6.2).

1.3.10 System Management to Blueprints Interface (SMBP)

This direct interface, encapsulated within the OSL between the GSM and the blueprints, allows the structure and implementation of the blueprints to remain non-standardised, while defining a standardised interface to them (see 6.2.3).

1.3.11 System Management to OS Interface (SMOS)

This direct interface, encapsulated within the OSL, describes the services provided by the OS to the GSM (see 6.3).

1.3.12 OS Logical Interface (OLI)

The OLI describes the intercommunications between two instantiations of OS's regarding Virtual Channel (VC) communications and data presentation (see 7.1).

1.3.13 GSM Logical Interface (GLI)

The GLI describes the intercommunications between GSM instances on separate RE (see 7.2).

1.3.14 System Management Logical Interface (SMLI)

The SMLI standardises a VC based communication protocol between the AM and GSM. AM and the GSM must cooperate and to do so, they communicate and synchronise themselves via the SMLI (see 7.3).

1.3.15 Module Logical Interface (MLI)

This logical interface (communication protocol) defines the logical interactions between modules to meet the module interoperability and system buildability requirements (see 7.4).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

IEEE 1588:2008, *Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems*¹

IEEE 754:1985, *Binary Floating-Point Arithmetic*

IEEE 802.3, *IEEE Standard for Ethernet*

ISO/IEC 14977:1996, *Information technology — Syntactic metalanguage — Extended BNF*²

ASAAC2-GUI-32450-001-CPG Issue 01, *Final Draft of Guidelines for System Issues*³

— *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*

ARINC 653P1, *Avionics Application Software Standard Interface, Part 1, Required Services*, (Version 3, 11-2010)⁴

ARINC 653P2, *Avionics Application Software Standard Interface, Part 2, Extended Services*, (Version 2, 06-2012)⁴

OpenGL® ES, The Khronos Group Inc.⁵

RFC 1350:1992, *The TFTP Protocol (Revision 2)*⁶

RFC 2347:1998, *TFTP Option Extension*⁶

1 Published by: IEEE (Institute of Electrical and Electronics Engineers), <http://standards.ieee.org>

2 Published by: International Organization for Standardization (ISO), www.iso.org

3 In preparation at the date of publication of this standard.

4 Published by: ARINC, www.aviation-ia.com/product-categories

5 Published by: The Khronos group, www.khronos.org

6 Published by: RFC Editor, www.rfc-editor.org

RFC 2348:1998, *TFTP Block Size Option*⁶

RFC 2349:1998, *TFTP Timeout Interval and Transfer Size Options*⁶

RFC 951:1985, *Bootstrap Protocol (BOOTP)*⁶

RFC 1542:1993, *Clarification and Extensions for the Bootstrap Protocol*⁶

RFC 2132:1997, *DHCP options and BOOTP Vendor Extensions*⁶

3 Terms, definitions and abbreviations

For the purposes of this document, the terms, definitions and abbreviations apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

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;
- 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 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

AC	Aircraft
AGT	Absolute Global Time
AL	Application Layer
ALT	Absolute Local Time
AM	Application manager
APOS	Application to OS [interface]
ASAAC	Allied Standard Avionics Architecture Council
ATM	Asynchronous Transfer Mode
BIT	Built-In Test
BMC	Best Master Clock
BMC	Between Module Communication
CBIT	Continuous BIT