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

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Contents

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of an identical text or by endorsement, at the latest by February 2020, and conflicting national standards shall be withdrawn at the latest by February 2020.

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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)

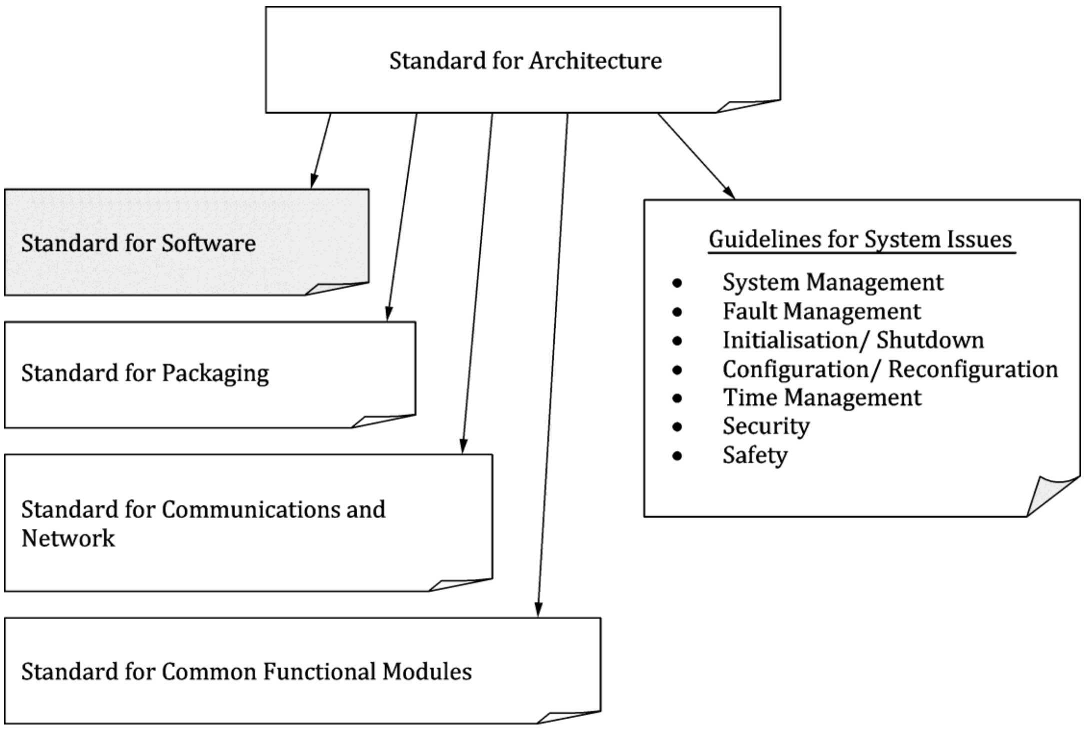

Figure 1 — MOAA Standard Documentation Hierarchy

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.

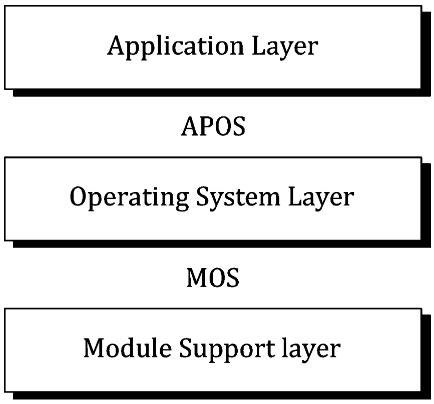

Figure 2 — MOAA Three Layer Software Architecture

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.

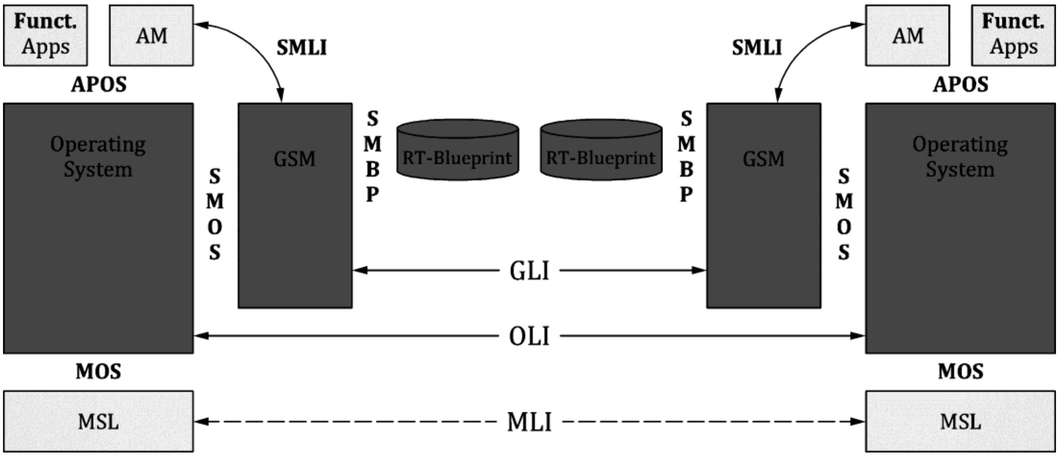

Figure 3 — The Software Architecture Model

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]

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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]