AIAA G-133-10-2013

Guide

Space Plug-and-Play Architecture Guide

System Capabilities

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Sponsored by

American Institute of Aeronautics and Astronautics

Approved August 2013

Abstract

The SPA System Capabilities Guide defines the principles upon which the architecture is based, the services that a SPA system provides, and the capabilities that are required of a SPA system. Each requirement in the Capabilities document is mapped to the other SPA standards where they are discussed in detail.

Published by
American Institute of Aeronautics and Astronautics
1801 Alexander Bell Drive, Reston, VA 20191

Printed in the United States of America

ISBN 978-1-62410-238-7

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Foreword

This guide was developed through a partnership of the Air Force Research Laboratory Space Vehicles Directorate, the Air Force Office of Operationally Responsive Space, numerous government contractor teams, independent contractor teams, and academic experts. The Space Plug-and-Play Architecture is a collection of standards developed to facilitate rapid constitution of spacecraft systems using modular components. This document enumerates the principles upon which the SPA approach is based, the services provided by a SPA system, and the requirements for SPA system capabilities.

This volume of the SPA System Capability Guide contains information not recorded in previous documentation. It is part of a set of 10 documents describing other components of the SPA standards:

- SPA Guidebook
- SPA Networking
- SPA Logical Interface
- SPA Physical Interface Standard
- SPA 28V Power Service Standard
- SPA System Timing Standard
- SPA Ontology Standard
- SPA Test Bypass Standard
- SPA SpaceWire Subnet Adaptation Standard

At the time of approval, the members of the AIAA SPA Committee on Standards were:

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The above consensus body approved this document in June 2013.

The AIAA Standards Executive Council (VP-Standards, Laura McGill, Chairperson) accepted the document for publication in August 2013.

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*Alternate CoS participant.

Introduction

SPA is a collection of standards designed to facilitate rapid constitution and testing of spacecraft systems using modular components. The SPA concept was initiated by the Air Force Research Laboratory (AFRL) Space Vehicle Directorate in 2005. Since that time the approach has been investigated through collaboration with the Air Force Office of Operationally Responsive Space (ORS) and numerous industry partners. The concept has been demonstrated through both ground-based and flight experiments.

1 Scope

This document defines what constitutes a SPA system by outlining the basic principles of the architecture and the services that a SPA system provides. The capabilities defined herein flow-down to the individual SPA Standards documents.

2 Tailoring

When viewed from the perspective of a specific program or project context, the requirements defined in this Standard may be tailored to match the actual requirements of the particular program or project. Tailoring of requirements shall be undertaken in consultation with the procuring authority where applicable.

NOTE Tailoring is a process by which individual requirements or specifications, standards, and related documents are evaluated and made applicable to a specific program or project by selection, and in some exceptional cases, modification and addition of requirements in the standards.

3 Applicable Documents

The following documents contain provisions which, through reference in this text, constitute provisions of this standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

AIAA G-133-1-2013	*Space Plug and Play Architecture Guidebook*
AIAA S-133-2-2013	*Space Plug and Play Architecture Standard Networking*
AIAA S-133-3-2013	*Space Plug and Play Architecture Standard Logical Interface*
AIAA S-133-4-2013	*Space Plug and Play Architecture Standard Physical Interface*
AIAA S-133-5-2013	*Space Plug and Play Architecture Standard 28V Power Service*
AIAA S-133-6-2013	*Space Plug and Play Architecture Standard System Timing*
AIAA S-133-7-2013	*Space Plug and Play Architecture Standard Ontology*
AIAA S-133-8-2013	*Space Plug and Play Architecture Standard Test Bypass*
AIAA S-133-9-2013	*Space Plug and Play Architecture Standard SpaceWire Adaption Subnet*
IEEE 1451 Standards family	*Standard for a Smart Transducer Interface for Sensors and Actuators*

4 Vocabulary

4.1 Acronyms and Abbreviated Terms

AIAA	American Institute of Aeronautics and Astronautics
ASIM	Appliqué Sensor Interface Module
PPS	pulse-per-second
QoS	quality of service