AIAA S-133-2-2013

Standard

Space Plug-and-Play Architecture Standard

Networking

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Sponsored by

American Institute of Aeronautics and Astronautics

Approved August 2012

Abstract

This document specifies the overall SPA network methodology, the approach to abstraction of unique transport details, and methods of communicating across multiple similar and dissimilar networks.

This document does not discuss details about messaging protocol families, message structure, or the format of specific SPA messages. Those specifications are expressed in the SPA Logical Interface document.

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

Printed in the United States of America

ISBN 978-1-62410-230-1

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Foreword

This document was developed by the Space Plug and Play Architecture (SPA) Standards Working Group as one of a series of 10 documents describing the various components of the standard. The SPA standards were initially recorded in earlier documentation. This document set separates content along logical boundaries to better organize the volumes (so that developers or domain experts need only reference the documents applicable to their needs) and to avoid duplication of content between documents in the standard series. This 2013 AIAA standard supersedes all previous documentation of the SPA standards.

This particular volume of the SPA Networking standard contains information not recorded in previous documentation. It is part of a set of 10 documents describing other components of the standard:

- SPA Guidebook
- 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
- SPA System Capability Guide

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 May 2012.

The AIAA Standards Executive Council (VP-Standards, Laura McGill, Chairperson) accepted the document for publication in August 2012.

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*****Alternate CoS participant.

Introduction

SPA is a collection of standards designed to facilitate rapid construction of spacecraft systems using modular components. The SPA Networking standard is intended to specify the overall SPA network methodology. To this end it discusses how packets are routed and how component discovery occurs, with attention given to topology concerns.

The SPA Networking standard does not discuss the specific fields of individual packet formats, nor does it attempt to limit the types of networks that might connect to a SPA network; those are considerations addressed in the SPA Logical Interface Standard (AIAA S-133-3-2013) and the various subnet standards (of which SPA SpaceWire, AIAA S-133-9-2013, is the only currently approved subnet standard).

This standard describes the minimum requirements for the components in a SPA network and for the functions of network topology discovery, routing table construction and distribution, packet routing, and dynamic reconfiguration.

1 Scope

This document specifies the overall SPA network methodology, the approach to abstraction of unique transport details, and methods of communicating across multiple similar and dissimilar networks.

This document does not discuss details about messaging protocol families, message structure, or the format of specific SPA messages. Those specifications are expressed in the SPA Logical Interface Standard (AIAA S-133-3-2013).

2 Applicable Documents

The following standards 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-133-3-2013 *Space Plug-and-Play Architecture Standard Logical Interface*

AIAA S-133-9-2013 *Space Plug-and-Play Architecture Standard SpaceWire Subnet Adaptation*

3 Vocabulary

3.1 Acronyms and Abbreviated Terms

AIAA	American Institute of Aeronautics and Astronautics
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
CAS	central addressing service
EOP	end of packet
EP	endpoint
MTU	maximum transmission unit
SM-L	SPA manager for the SPA local interconnects
SM-s	SPA manager for SpaceWire protocol subnet
SM-x	SPA subnet manager, where x represents a given technology protocol
SPA	Space Plug-and-Play Architecture
SPA-L	SPA local interconnect
UUID	universally unique identifier
xTEDS	extensible transducer electronic data sheet