THE JOINT ARCHITECTURE FOR UNMANNED SYSTEMS

Compliance Specification (CS)

Version 1.2

25 October 2006

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1. SCOPE

The scope of this document is to define compliance with the Joint Architecture for Unmanned Systems (JAUS) in accordance with the JAUS Domain Model Specification and Reference Architecture (RA) Specification. The application of these definitions is valid for determining compliance for research, development, and acquisition of government or commercially developed products.
Procedures and methodologies for implementing compliance testing are not within the scope of this document.

2. INTRODUCTION

The JAUS is an architecture specified for use in research, development, and acquisition primarily for Unmanned Systems (UMS). The implementation of JAUS requirements provides for an interoperability capability for commanding and controlling all UMS platforms.

The JAUS Working Group (WG), including Commercial, Government, and Academia, was established to develop the JAUS requirements and address all issues related to JAUS. Committees have been established to address specific issues related to the implementation and application of JAUS. The JAUS WG and its committees continue to develop JAUS requirements, expand the JAUS capability, and address compliance issues.

JAUS is described in two documents: the JAUS Domain Model (DM), which is the model of the operational specification requirements; and the JAUS RA, which is the technical specification implementation of the JAUS DM. The DM and RA constitute the definitions of JAUS. Additional documents support the JAUS standards. A JAUS Document Control Plan (DCP) has been developed to address the configuration management issues associated with JAUS requirements development. Also, a JAUS Standard Operating Procedure (SOP) has been developed to address issues concerning the JAUS Working Group (WG). The SOP addresses issues such as membership, establishment of subcommittees, and voting procedures.

3. AUTHORITY

The JAUS WG has the authority to specify the requirements for compliance with the JAUS Reference Architecture. The WG is responsible for implementing and maintaining this specification.

4. DEFINITION

JAUS compliance is defined as verification that message traffic between system elements (subsystems, nodes and components) meets the RA specification. The message traffic being verified will only consist of JAUS messages specified in the RA. Supported JAUS messages are the messages an element has implemented from the JAUS RA. JAUS is a message-based architecture and it lends itself well to compliance testing. Three levels of compliance are defined between the elements. These levels of compliance are described in the Domain Model document. The three levels of compliance are: Level I – Inter-Subsystem, Level II – Inter-Nodal, and Level III – Inter-Component, as shown graphically in Figure 4-1. Verification can be

performed independently at any one of the three levels. Compliance at one level does not infer compliance at another.

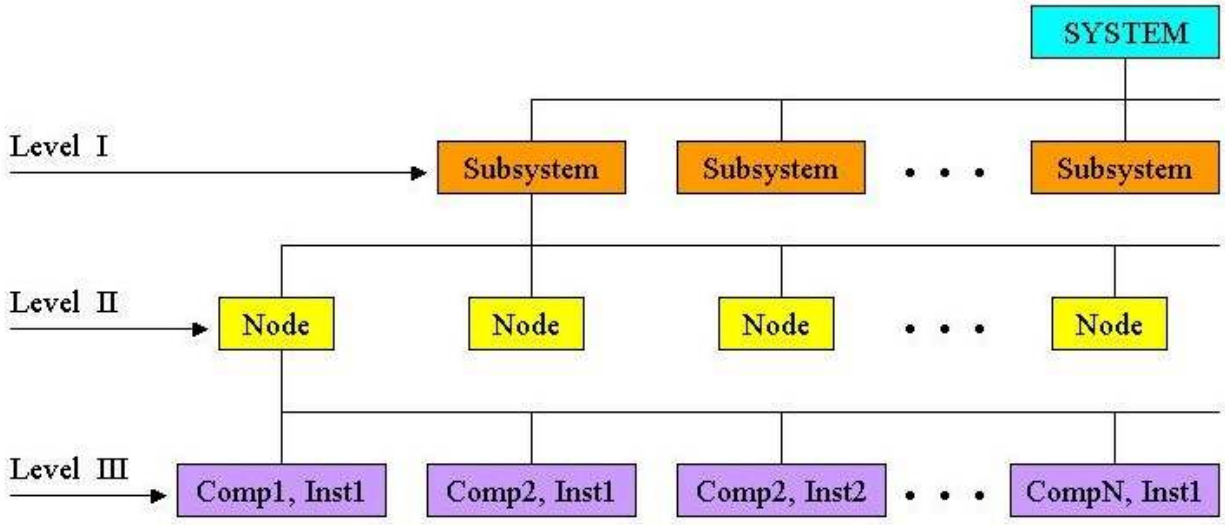

Figure 4-1 Levels of Compliance

4.1 LEVEL I COMPLIANCE—INTER-SUBSYSTEM

Level I compliance addresses the requirements between subsystems (i.e., Robot to Robot, Robot to Controller, or Controller to Controller). The purpose of Level I is to support the interoperation of subsystems.

4.2 LEVEL II COMPLIANCE—INTER-NODAL

Level II compliance addresses the requirements between nodes (i.e., payload to payload, payload to on-board controller.) The purpose of Level II is to support the interoperation of nodes.

4.3 LEVEL III COMPLIANCE—INTER-COMPONENT

Level III compliance addresses the requirements between components (i.e., component to component). The purpose of Level III is to support software source code reuse. The technical mechanism for Level III compliance has not been defined within the JAUS standards at this time; therefore, level III compliance is not testable.

5. REQUIREMENTS

This section defines the JAUS compliance requirements.

Compliance includes conformance to the JAUS Standard (Standards Compliance) and conformance to application specific requirements (Applications Compliance). An element can therefore be Standards Compliant, Applications Compliant, or both. This document only addresses the requirements for Standards Compliance. It is left to the application effort and its verification authority to determine Applications Compliance where Applications Compliance

includes use of User Defined Messages that either extend or conflict with JAUS Standards Compliance requirements.

All supported JAUS messages shall be identified for the element under test. For each supported message, the latency and timing tolerances shall be identified. An element is defined as compliant if all supported JAUS messages meet compliance rules defined in Section 5.1.

5.1 COMPLIANCE RULES

The compliance rules are defined as follows:

1) All supported messages shall be explicitly listed for JAUS compliance of the subject element.
2) All supported messages shall explicitly state the version of the RA.
3) All supported messages shall follow the JAUS message conventions, definitions, formats, and messaging rules as defined in the RA.
4) All supported Inform messages shall respond to the corresponding Query messages.
5) All supported Event Notification messages shall respond to the corresponding Event Setup messages.

5.2 USER DEFINED MESSAGES

User Defined messages shall not be used for compliance testing. Even though the JAUS RA provides the capability to create User Defined messages, they can not be used to validate that an element is compliant to the JAUS RA. An element is not JAUS compliant if 1) User Defined messages are used exclusively in its final configuration or 2) any User Defined message circumvents or duplicates a JAUS message defined in the RA version specified.

APPENDIX A—ACRONYMS

DCP	Document Control Plan
DM	Domain Model
JAUS	Joint Architecture for Unmanned Systems
JAUS WG	Joint Architecture for Unmanned Systems Working Group
JCS	JAUS Compliance Specification
RA	Reference Architecture
SOP	Standard Operating Procedure
UMS	Unmanned Systems
WG	Working Group

APPENDIX B—REFERENCE DOCUMENTS

[1] The Joint Architecture for Unmanned Systems, Compliance Whitepaper – Inter-Subsystem Compliance Recommendation, 14 January 2004.

[2] The Joint Architecture for Unmanned Systems, Domain Model (DM), Volume I, Version 3.0, 03 December 2003.

[3] The Joint Architecture for Unmanned Systems, Reference Architecture (RA), Volume II, Version 3.1 12 December 2003.

[4] The Joint Architecture for Unmanned Systems, Transport Protocol (TP), Draft being developed, 2004.

APPENDIX C—COMPLIANCE RULES TABLE

The table below is for illustrative purposes to help clarify the content of section 5.1. It is intended to show, in a tabular format, what information is needed to perform compliance testing.

Message ID	RA version	Latency (ms)	Timing (ms)	Expected Response Msg