



AEROSPACE STANDARD

AS6513™**REV. A**Issued 2016-12
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Superseding AS6513

(R) Unmanned Systems (UxS) Control Segment (UCS) Architecture: Conformance Specification

RATIONALE

This revision of AS6513 concerns conformance to the UCS Architecture Library Revision A (or later), designated AS6512A (or later). The superseded AS6513 concerned conformance to the original UCS Architecture Library, designated AS6512.

The original AS6512 comprised the authoritative UCS Architecture Model (AS6518) plus derived views of that model for various stakeholders. These were AIR6514, AIR6515, AIR6516, and AIR6517. In AS6512A, these derived views have been removed, simplifying conformance to only AS6518A (or later).

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1. SCOPE

This revision of AS6513 concerns conformance to the SAE Unmanned Systems (UxS) Control Segment (UCS) Architecture Revision A Library, designated AS6512A (or later). The superceded AS6513 concerned conformance to the original UCS Architecture Library, designated AS6512.

This document is the authoritative specification within the UCS Architecture for establishing conformance requirements for UCS products. The UCS products addressed by this specification are UCS software components and UCS software configurations that provide one or more UCS services, and UCS systems that employ one or more UCS services.

The conformance of UCS products is determined by assessing the conformance of the UCS product description to the UCS Architecture. The UCS product description includes test artifacts.

1.1 Purpose

The purpose of this specification is to establish verifiable conformance requirements for UCS products.

1.2 Field of Application

This specification applies to all conformant UCS software components, UCS software configurations, and UCS systems that are described in a UCS product registry or UCS product repository. The document is applicable to the complete lifecycle of UCS product descriptions, including requirements definition, acquisition and development, deployment and maintenance, and obsolescence.

1.3 Precedence

This document is the authoritative source of conformance requirements for UCS products and takes precedence over all other documents in the UCS Architecture Library and all other references on the subject of UCS product conformance. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The stated issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AS6512A	Unmanned Systems (UxS) Control Segment (UCS) Architecture: Architecture Description
AS6518A	Unmanned Systems (UxS) Control Segment (UCS) Architecture: UCS Architecture Model
AS6522A	Unmanned Systems (UxS) Control Segment (UCS) Architecture: Architecture Technical Governance

2.1.2 ISO Publications

Available at <http://webstore.ansi.org/>.

ISO/IEC/IEEE 42010 Systems and Software Engineering - Architecture Description

2.2 Definitions

The following technical definitions apply to this publication.

AUTHORITATIVE: Recognized as true and dependable.

NORMATIVE: A statement against which conformance can be evaluated.

RESOURCE: An identifiable entity that has value to a stakeholder.

SERVICE DESCRIPTION: The description of a service provided by a software component, software configuration, or system if the technical assumptions are satisfied.

SERVICE REACHABILITY: The means by which service presence is known and the service is accessed, and the means by which service contracts are established.

UCS PRODUCT: A UCS product is a separately managed UCS system or unit of deployable software that may be acquired and used independently of other UCS products.

UCS PRODUCT ARTIFACT: A configuration item that is part of a UCS product description. UCS product artifacts include documents, drawings, models, and software.

UCS PRODUCT CONFORMANCE: Adherence of a UCS product description or a UCS product artifact to a release of the UCS Architecture.

UCS PRODUCT DESCRIPTION: The metadata and artifacts that collectively describe a UCS product.

UCS PRODUCT METAMODEL: Searchable public data about a UCS product. The term includes descriptive metadata, structural metadata, and administrative metadata.

UCS PRODUCT REGISTRY: A database containing metadata about UCS products.

UCS PRODUCT REPOSITORY: A database containing metadata and artifacts about UCS products.

UCS SOFTWARE COMPONENT: A UCS software component is a unit of deployable UCS software that is not further decomposed into other separately managed software components described in a UCS registry or repository. A UCS software component may be as small as a single UCS service participant or as large as a complete UCS domain or collection of UCS domains. Note: a conformant UCS software component will be assigned at least one UCS Architecture Model service package as specified herein.

UCS SOFTWARE CONFIGURATION: A UCS software configuration is a unit of deployable UCS software that comprises multiple UCS software components and/or (separately managed) UCS software configurations described in a UCS registry or repository. Note: a conformant UCS software configuration will be assigned at least one UCS Architecture Model service package as specified herein.

UCS SYSTEM: A UCS system is a physical item that independently satisfies its system-of-interest use cases¹, has external communication interfaces, and at least one human/machine interface (HMI). UCS systems may include man-portable systems, vehicle-transportable systems, and fixed facilities. UCS systems include UCS software configurations and/or UCS software components. These MAY be described in a UCS product repository or UCS product registry. Note: a conformant UCS system will be assigned at least one UCS service package as specified herein.

VERIFICATION: The authoritative establishment that an item is conformant to a requirement.

VERIFICATION PROCEDURE: The means by which verification is achieved.

¹ Conformance to the Use Case Model package in UCS-SPEC-MODEL is not required.

2.3 Terminology

The following terminology applies to this specification.

SHALL: This term requires that there is no deviation in conformance.

SHOULD: This term is to be used wherever the criterion for conformance is to meet a business objective. Failure to meet a “should” statement **SHALL** be justified.

MUST: This term is used for a legislative or regulatory requirement (e.g., safety or security) with which the parties shall comply. It is not used to express a requirement of the specification.

WILL: This term is used for the future tense. It does not express a requirement of the specification.

MAY: This term expresses a permissible practice or action. It does not express a requirement of the specification.

3. OVERVIEW

3.1 Background

The UCS products of interest to this specification are UCS software components and UCS software configurations that provide one or more UCS services, and UCS systems that employ one or more services. This specification establishes UCS product conformance requirements based on UCS product description artifacts as summarized below.

- Product identification/metadata
- Service description
- Application programming interfaces
- Architecture description
- Product test results

3.2 Application Areas and Limitations

This specification is intended for use in the governance and management of all UCS product descriptions including those held in UCS registries and UCS product repositories such as those managed by government and industry. This specification is applicable throughout the UCS product lifecycle, including acquisition planning, acquisition, development, deployment, maintenance, and obsolescence phases.

This specification does not define conformance verification procedures or conformance verification artifacts, and does not establish conformance verification roles and responsibilities. This specification does not provide governance on how UCS products are to be described in a UCS product registry or UCS product repository. This specification does not establish requirements for UCS product policies.

3.3 Basic Structure

This specification establishes the general requirements for UCS product description artifacts in Section 4. Sections 5 through 9 establish the specific requirements for each product description artifact identified in 3.1. Section 10 provides additional notes and is not normative.

4. GENERAL REQUIREMENTS

The following UCS product types SHALL be conformant to the UCS Architecture Model (AS6518A) as specified herein:

- UCS software components
- UCS software configurations
- UCS systems

Conformance SHALL be determined using the UCS product description. UCS products SHALL have a UCS product description in accordance with the requirements herein. A product description SHALL exist for each released configuration of a UCS product.

The UCS product description MAY be extended and MAY be made available to other parties via a UCS product registry or UCS product repository.

UCS product conformance verification procedures and conformance verification artifacts are not considered part of the UCS product description. UCS product policies are not considered part of the UCS product description.

4.1 Delivery Requirements

The UCS product description SHALL be delivered to the conformance verification agent in machine-readable form via DVD or pre-arranged electronic submittal. Text documents SHALL be delivered in “.docx” format (ECMA-376, 5th Edition, 2016) or “.pdf” format (ISO 19005) with text that can be searched and parsed; PDF files consisting of scanned images SHALL NOT be submitted as conformance artifacts. All model information SHALL be delivered in two forms: the original model file(s), with tool(s) and version clearly identified, and in export XMI format suitable for importation into other design tools.

5. PRODUCT IDENTIFICATION/METADATA

At a minimum the UCS product description SHALL include the following technical metadata.

- Name of UCS product
- Product version
- UCS product type, which SHALL be one of the following (see 2.2):
 - UCS software component
 - UCS software configuration
 - UCS system
- List of UCS logical service packages in AS6518 Revision A (or later) that are assigned to the UCS product (see Section 6). The version of each service interface SHALL be identified. For each assigned UCS logical service package, it SHALL be indicated if the base logical service package in AS6518 Revision A (or later) has been extended (see 6.2).
- List of UCS logical services (if any) in AS6518 Revision A (or later) that are required by the UCS product. The version of each service interface SHALL be identified for each required UCS logical service. For each required UCS logical service, it SHALL be indicated if the base logical service package in AS6518 must be extended (see 6.2).

Additional metadata MAY be required for a UCS registry or UCS repository.

6. SERVICE DESCRIPTION

The UCS product description SHALL include one or multiple UCS product service descriptions. A UCS product service description SHALL comprise two distinct elements:

- Service interface description
- Service reachability description

UCS Architecture conformance applies to the logical service interface description. The service reachability description is system/platform-specific, but is required to communicate with and test the service.

6.1 Service Interface Description

The UCS product service interface description MAY be provided in any format/tool. However, the UCS product service interface description SHALL clearly show the correspondence between it and the logical service packages in the UCS Architecture Model. See Section 10.

In the authoritative UCS Architecture Model, services are described in service packages (packages that contain service interfaces). The location of service packages in the UCS Architecture Model, AS6518, is shown below:

Model

UCS Architectural Model
Logical Model
Logical Services Model
 <<Domain>>Domain Package
 Subdomain Package
 Service Package

A UCS product SHALL be assigned at least one logical service package. For each assigned service package, the UCS product description SHALL conform to the logical service package with the following exceptions and clarifications:

- The participant represents a role that is allocated to the UCS product.
- For each assigned logical service package, the participant service ports SHALL be implemented.
- The UCS product is not required to implement the participant request ports; however, consideration MAY be given to implementing these. The participant request ports may be used in the UCS Architecture System Use Case Model, which is provided for information only.
- The UCS Architecture logical service packages reference the UCS Architecture Logical Message Model package via <<MessageType>> stereotyped classes used by the interfaces. Therefore, UCS products WILL conform to the UCS Architecture Logical Message Model if they conform to the UCS Architecture logical service packages.

6.2 Service Package Extensions

A UCS product service description MAY extend² logical service packages as follows in the chosen format.

Additional service packages MAY be created and assigned to the UCS product if and only if the required service functionality is not supported by an existing UCS service package. Additional service packages SHALL NOT be offered as substitutes for existing UCS service packages. Additional service packages SHALL be specified at the conceptual and logical level in accordance with SAE AS6522 Revision A (or later).

² In this context the term extend does not imply UML specialization.

An existing UCS service MAY be extended. To provide conformance traceability, extensions to a UCS service package SHALL be separate from the base UCS service package in the UCS product description. No modification to the base UCS service package SHALL be accepted. An existing UCS service package MAY be extended as follows.

- The description of the participant MAY be extended if the additional description does not alter the conformance of the UCS product to the original description.
- Additional service ports MAY be added to the participant if and only if the existing service ports do not support the required service functionality. Additional service ports SHALL NOT be offered as substitutes for existing UCS service ports. Additional service ports SHALL be outside the scope of UCS Architecture conformance.
- The service interface protocol associated with each service port MAY be extended if the protocol extension does not alter the conformance of the UCS product to the original protocol.
- Additional service requests and responses MAY be added if and only if the existing service requests and responses do not support the required service functionality. Additional service requests and responses SHALL NOT be offered as substitutes for existing UCS service requests and responses. Additional service requests and responses SHALL be outside the scope of UCS Architecture conformance.
- Additional signals MAY be added to service request interfaces and service response interfaces if and only if the existing signals do not support the required service functionality. Additional signals SHALL NOT be offered as substitutes for existing UCS service signals. Additional signals SHALL be outside the scope of UCS Architecture conformance.
- The message type associated with each operation MAY be extended if the extension does not alter the conformance of the UCS product to the original message type.
- Any number of participant request ports MAY be added to a service package. Note: participant request ports in the base UCS service package are not normative.

Proposed extensions to the UCS service package MAY be reported to the SAE AS-4UCS Technical Committee, including any associated extensions to the UCS Architecture Information Model.

6.3 Service Reachability Description

The service reachability description describes the means by which a logical service is accessed via a system-external communications interface or system-internal middleware. The service reachability description MAY be specific to the UCS system and/or its environment. One or more means to access a logical service MAY be described.

There are no UCS Architecture conformance requirements for service reachability except as follows in this section.

6.3.1 Platform-Specific Protocol

The service reachability description SHALL include a complete description of the platform-specific messaging protocol to communicate with the UCS logical service. The service reachability description SHALL describe the correspondence between the platform-specific protocol and the service interface description.

6.3.2 Service Presence and Endpoint

Where supported by the system-external communications interface or system-internal middleware, the service reachability description SHALL describe the means by which the service presence and endpoint are known and a service-level connection is established.

6.3.3 Service Contract

The service reachability description SHALL describe the means by which any service contracts are established between the service provider (the UCS product) and the service consumer. Non-functional properties that form part of a service level agreement within the service contract SHALL be in accordance with available non-functional properties in the UCS Architecture Model, Non-Functional Properties package.