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Second edition
2023-05

Information technology — Swordfish Scalable Storage Management API Specification



Reference number
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This document was prepared by SNIA (as Swordfish Scalable Storage Management API Specification, Version, 1.2.4a) and drafted in accordance with its editorial rules. It was adopted, under the JTC 1 PAS procedure, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

This second edition cancels and replaces the first edition (ISO/IEC 5965:2021), which has been technically revised.

The main changes are as follows:

— document has been aligned with DMTF's Redfish Forum 2021.1 release of the Redfish Specification, schema bundle, and other supporting materials;

— support for NVMe and NVMe-oF has been added, expanding the API to support the management of NVMe and NVMe-oF devices and systems;

— the Swordfish Standalone Configuration has been added in the /Storage collection at the ServiceRoot. This simplification of the hierarchy features Storage systems at the ServiceRoot and makes standalone implementations easier to instrument;

— substantial schema changes have been made, including:

  — enhancements to Volume, including new Actions (e.g., ChangeRAIDLayout, ForceEnable); addition of InitializeMethod, IOPerfModeEnabled, and OwningStorageResource and link to JournalingMedia; added InitializeMethod property; added IsBootCapable,

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  - enhancements to StoragePools,
  - addition of NVMeDomain schema, and Split NVMeFirmwareImage and NVMeDomains schemas,
  - deprecation of use of NetworkPort; replacement with Port;
- security has been improved, including:
  - new requirements added to NVMeDrive to conform to schema updates for SecureErase,
  - enhancement of CHAP definitions and usage in StorageGroup;
- Profiles have been expanded, including:
  - addition of new profiles for Access Rights management, Connectivity Rights management, Management Controllers, NVMe EBOF, PCIe JBOF, and NVMe-oF,
  - movement of Swordfish profiles to SwordfishInteroperabilityProfile as base – extends Redfish Interoperability Profile, adding support for “conditionals” and comparison for Required Profiles,
  - update of FeaturesRegistry to v1.3.0 to correspond to latest versions of all profiles,
  - updates in multiple profiles to correct conformance to interoperability schema. Modifications to support change for new RequiredProfiles conditionals support.
  - addition of new profile for Swordfish NVMe Front End (used by complex devices such as arrays),
  - enhancement of profiles to include support / requirements for /Storage (move support to v1.1.0 level),
  - addition of NVMe drive, Advanced Features and Ethernet Attach profiles,
  - enhancement of Swordfish event profile,
  - addition of SupportedPoolTypes to StoragePool Profiles.

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Revision History

The evolution of this document is summarized in Table 1.

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Table 1: Revision history

Date	Rev	Notes
19 September 2016	1.0.0	Initial Release
12 October 2016	1.0.1	Errata release for general clean up and formatting consistency
1 November 2016	1.0.2	Errata release to change multiple collections' types from collections (arrays) to ResourceCollections to conform to Redfish usage guidelines Change multiple collections' types from collections (arrays) to ResourceCollections to conform to Redfish usage guidelines and move NavigationProperties from Links section.
24 January 2017	1.0.3	Errata release to move complex types and enum to versioned namespace Schedule schema: add property json schema fix (Swordfish to swordfish) Specification enhancements, multiple areas User's guide: multiple new use cases and new document section
25 April 2017	1.0.4	Errata release with minor updates to schema: move FileShare collection, integrate DMTF and SNIA versions of Volume, fix incorrect property references and update descriptions. Update mockups. User's guide: Update cross-references.
3 October 2017	1.0.5	Errata release to include schema simplifications and other lessons from initial implementations, as well as general cleanup of specification.
13 February 2018	1.0.6	Updated Storage Systems model – added notion of Integrated Service Configuration in addition to (and named) Hosted Service Configuration Added ComplexType common definition section

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Date	Rev	Notes
		Added/updated common Redfish property definitions
		Updates to conform to new SNIA templates.
12 October 2018	1.0.7	Enhanced Spare Capacity Management Model; Deprecated Remaining Capacity
		Added OpenAPI support: schema references and OpenAPI YAML files
		Added iSCSI properties for CHAP
		Event usage enhancements and guidance
		Volume schema updates – RAID Type enum (deprecating VolumeType usage), add ReplicaTargets
		Schema updates: Annotations enhancements: Capabilities designations, owning entities, Redfish.Required usage
		Clarified and updated ClassOfService IsDefault property usage
		Updated Capabilities location in hierarchy
		Fix cardinality issue of StorageReplicaInfo usage in StorageGroups and Volume
		Consolidate Client and Server Endpoint Groups into single Endpoint Group entity (deprecate usage of separate Client Endpoint Group and Server Endpoint Group)
		Add MappedVolume construct to StorageGroup – adds LUN info and other properties
		Clarified and updated ClassOfService IsDefault property usage
		Updated Capabilities location in hierarchy
		Fix cardinality issue of StorageReplicaInfo usage in StorageGroups and Volume

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Date	Rev	Notes
		Consolidate Client and Server Endpoint Groups into single Endpoint Group entity (deprecate usage of separate Client Endpoint Group and Server Endpoint Group)
		Add MappedVolume construct to StorageGroup – adds LUN info and other properties
8 November 2018	1.0.7a	Restored RAIDType property that was missing from 1.0.7
		Minor correction to schema versioning
22 August 2019	1.1.0	Restructured to add features and profiles
		Add description of SupportedFeatures usage and requirements
		Add requirements for subsets of Add language to clarify support for use with and without the class of service (now an optional feature)
		Added descriptions of support for seamless extension of Redfish Storage model to Swordfish
		Add updated model diagrams to reflect new model permutations
		Added descriptions of new constructs (e.g., Consistency Groups)
		Cleaned up references to Redfish Specification based on latest version
		Add Status Codes clarification and constraints section
12 November 2019	1.1.0	Released as Technical Position
12 November 2019	1.1.0a	Released as Corrected Technical Position
		Formatting fixes – word wrap in pdf doc format to fix truncated lines
		Consistent object labeling in images (replace drive with disk)

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Date	Rev	Notes
		Editorial and grammar changes and cleanup to status code guidance section
24 March 2020	1.1.0b	Released as Corrected Technical Position
		TLS requirements now based on both ISO and SNIA standards
		Redfish references now based on both ISO and SNIA standards
		Bibliography added
29 May 2020	1.2.0	Note: This release is done in conjunction with the DMTF's Redfish Forum Work-in-Progress June 2020 release of DSP-IS0014 (v0.95), which contains multiple schema to support this work. Both are released as Working Drafts / work-in-progress for public review, and plan simultaneous releases in early fall 2020 to support full technical specification level capability and availability.
		Functionality availability in Swordfish includes:
		• Enhancements to Volume, StoragePools
		• New schema: NVMeDomain
		Other supporting documentation released in conjunction with this specification and schema bundle:
		• Multiple mockups reflecting multiple implementation permutation options (available on swordfishmockups.com)
		• Model overview documentation (NVMe to RF/SF Model Mapping Working Draft, dated May 2020)
18 August 2020	1.2.1	Note: This release is done in conjunction with the DMTF's Redfish Forum 2020.3 Release of the Redfish Specification, schema bundle and other supporting materials.
		Functionality availability in Swordfish includes:

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Date	Rev	Notes
		• NVMe Mapping Support, Enhancements to Volume, StoragePools Additional Enhancements in the Specification and schema: • Added InitializeMethod property to Volume. • Made DedicateSpareDrives ReadWrite-able • Added enhanced Volume Access Capabilities and usage in StorageGroup. • Fix multiple URI issues across various schema. Updated formatting of tables to support automatic table numbering and ISO compatible table representation.
29 September 2020	1.2.1a	Added bibliography and updated TLS references
20 October 2020	1.2.1c	Updated with additional Redfish.URI annotations.
31 October 2020	1.2.1c	Released as SNIA Standard
2 March 2021	1.2.2	Added sections to document use of complex types. Updated common properties sections. Schema changes: Add actions to Add and Remove drives directly from StoragePool. Split NVMeFirmwareImage and NVMeDomains schemas. Deprecate use of NetworkPort; replace with Port. Update Redfish.URI references. Corrected $ref references in JSON schema files. Fix incorrect references in deprecated JSON files.
30 August 2021	1.2.3	Adds updates / corrections to Redfish.URI annotations Add IsBootCapable to Volume

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Date	Rev	Notes
		Add SupportedPoolTypes to StoragePool
5 December 2021	1.2.3	Release as SNIA Standard
12 April 2022	1.2.4	Release as Working Draft. Schema changes: • FeaturesRegistry: Errata fix – make Features property a collection. • IOStatistics: clarify intent regarding reset / wrap. • StoragePool: errata fixes for Actions. • Volume: errata fixes for Actions. Add: LBAFormatsSupported property to NVMeNamespaceProperties.
12 July 2022	1.2.4a	Release as SNIA Standard. Includes Errata fixes to multiple profiles.

About SNIA

The Storage Networking Industry Association (SNIA) is a non-profit organization made up of member companies spanning information technology. A globally recognized and trusted authority, SNIA's mission is to lead the storage industry in developing and promoting vendor-neutral architectures, standards and educational services that facilitate the efficient management, movement and security of information.

Acknowledgements

The SNIA Scalable Storage Management Technical Work Group, which developed and reviewed this work in progress, would like to recognize the significant contributions made by the following members listed in Table 2.

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1 Abstract

The Swordfish Scalable Storage Management API (“Swordfish”) defines a RESTful interface and a standardized data model to provide a scalable, customer-centric interface for managing storage and related data services. It extends the Redfish Scalable Platforms Management API Specification (DSP0266) from the DMTF.

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2 Scope

2.1 Document Goals

Swordfish extends the Redfish Scalable Platforms Management API Specification to define a comprehensive, RESTful API for storage management that addresses block storage, file systems, object storage, and storage network infrastructure. It is centered around common operational and business concerns of storage management, including:

- Configuration and provisioning
- Monitoring
- Event and log management
- Performance assessment
- Diagnostics
- Fault detection and remediation
- Security
- Accounting and resource consumption

Swordfish's storage model is built around well-defined classes of service, which provide a means to map high-level business goals and objectives to specific, storage-based actions and requirements, in a clear and consistent way that can be applied uniformly across a broad spectrum of storage configurations and storage types (e.g., block storage, file systems, object stores). Common storage management functionality covered by class of service includes snapshots, replication, mapping and masking, and provisioning.

The Redfish specification provides the protocols and a core set of data models and behaviors for the management of systems. It defines the elements and behaviors that are mandatory for all Redfish implementations. Additionally it defines additional elements and behaviors that can be chosen by system vendors or manufacturers. The specifications also defines points at which OEM (system vendor) extensions can be provided by a given implementation. The specifications specifies normative requirements for Redfish Services and associated materials, such as Redfish Schema files. The Redfish specifications does not set requirements for Redfish clients, but will indicate what a Redfish client should do in order to access and utilize a Redfish Service successfully and effectively.

The Swordfish specification defines additional data models and behaviors for the management of storage systems and storage infrastructure. A Swordfish implementation shall conform to all requirements specified in the Redfish specifications.

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Swordfish is suitable for a wide range of storage, from small-scale object drives, integrated RAID cards or RBODs providing storage services, to external disk arrays or file servers, to infrastructure providing storage services for converged, hyperscale and large scale cloud environments.

This document defines the Swordfish Scalable Storage Management API.

2.2 Audience Assumptions

As Swordfish is designed as an extension of the Redfish specification, this document is written with the presumption that the reader has a detailed understanding of the Redfish specification. This document cannot be fully understood without that context.

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3 Normative References

3.1 Overview

The documents referenced in Table 3 are indispensable for the application 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.

3.2 Approved references

The approved references that contribute to this document are summarized in Table 3.

Table 3: Approved normative references

Tag	Title (Version)	Author	URL
ISO - 8601	Data elements and interchange formats – Information interchange – Representation of dates and times – Part 1: Basic rules	ISO / IEC	http://www.iso.org/iso/home/store/catalogue_ics/catalogue_detail_ics.htm?csnumber=70907
ISO - Direct	ISO / IEC Directives, Part 2: Principles and rules for the structure and drafting of ISO and IEC documents	ISO / IEC	https://www.iso.org/sites/directives/current/part2/index.xhtml
Redfish	Redfish Scalable Platforms Management API Specification (v1.15.1)	DMTF	https://www.dmtf.org/sites/default/files/standards/documents/DSP0266_1.15.1.pdf
OData	Open Data Protocol (v. 4.01)	OASIS	http://docs.oasis-open.org/odata/odata/v4.01/odata-v4.01-part1-protocol.html

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