

# Swordfish Working Draft Notice

**Version 1.2.1c**

Publication of this *Working Draft* for review and comment has been approved by the Scalable Storage Management Technical Work Group. This draft represents a “best effort” attempt by the Scalable Storage Management Technical Work Group to reach preliminary consensus, and it may be updated, replaced, or made obsolete at any time. This document should not be used as reference material or cited as other than a “work in progress.” Suggestions for revision should be directed to <http://www.snia.org/feedback>.

## SNIA Working Draft

**October 20, 2020**

**The following files are included in this Working Draft Release  
(Swordfish\_v1.2.1c.zip):**

- **Swordfish\_v1.2.1c\_WorkingDraft.pdf (this file)**
- **Swordfish\_v1.2.1c\_Schema.zip**
- **Swordfish\_v1.2.1\_Profiles.zip**
- **Swordfish\_v1.2.1c\_Specification.pdf**
- **Swordfish\_v1.2.1\_UserGuide.pdf**
- **Swordfish\_v1.2.1\_ErrorGuide.pdf**
- **Swordfish\_v1.2.1\_NVMeMappingGuide.pdf**

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## Revision History

Revision	Date	Changes
V0.5	3/16/16	Initial work in progress release
V0.6	5/24/16	Updated to include content including replication for block services
V0.8	7/28/16	Updated to include content including filesystem schema, json schema
V0.9	8/30/16	<p>First draft of <i>Swordfish Scalable Storage Management API User's Guide</i>.  First draft of <i>Swordfish Scalable Storage Management API Specification</i>.  Changes to schema:</p> <ul style="list-style-type: none"> <li>• Clarifications to use of Collections vs ResourceCollections and appropriate notation of Read/Write on Collections</li> <li>• Some updates to how LineOfService is represented in ClassOfService (to simplify hierarchy)</li> <li>• Clarifications in File System schemas</li> </ul>
V1.0	9/19/16	<p>First Release of <i>Swordfish Scalable Storage Management API User's Guide</i>.  First Release of <i>Swordfish Scalable Storage Management API Specification</i>.  Schema changes:</p> <ul style="list-style-type: none"> <li>• Simplified StorageServices</li> <li>• Updated descriptions and long descriptions</li> <li>• Changed GeographicScope to FailureDomainScope</li> </ul>
V1.0.1	10/12/16	<p>Errata release v1.0.1.  Mockup Overview document updated for clarity.  Mockups updated to reflect changes in schema.  Spec and schema updates:</p> <ul style="list-style-type: none"> <li>• General clean up and formatting consistency</li> <li>• Clarify use of StorageGroup</li> <li>• Detail interactions between DefaultValue and Nullable in schema attributes</li> <li>• Set default values for Boolean attributes</li> <li>• Clarify appropriate EntitySet referencing</li> <li>• Improve descriptions for many schema attributes</li> <li>• Replace IsDefault with reference to ClassOfService in StoragePool and StorageService</li> <li>• Align Location with Redfish model</li> <li>• Change time values to conform to ISO 8601</li> <li>• Collapse TargetEndpointGroup and InitiatorEndpointGroup into EndpointGroup</li> <li>• Property and enumeration deleted from StorageReplicaInfo to remove redundancy with ReplicaSyncType</li> <li>• Add DefaultClassOfService link to StoragePool and StorageVolume in lieu of ClassOfService.IsDefault</li> <li>• Remove invalid measurement annotation from DataProtectionLoSCapabilities</li> <li>• Moved schedule to Redfish</li> </ul> <p>User's Guide:</p> <ul style="list-style-type: none"> <li>• General clean up and formatting consistency</li> <li>• A discussion of unused CoS and LoS entries in ServiceCatalog</li> <li>• Improve purpose for many use cases</li> </ul>
1.0.2	11/1/16	<p>Errata release v1.0.2  Specification and user's guide minor formatting fixes.  Clarifications to specification language.  Mockups updated to reflect changes in schema.</p>

Revision	Date	Changes
		<p>Spec and schema updates:</p> <ul style="list-style-type: none"> <li>Change multiple collections' types from collections (arrays) to ResourceCollections to conform to Redfish usage guidelines: <ul style="list-style-type: none"> <li>Capacity.CapacitySource ProvidingVolumes, ProvidingPools and ProvidingDrives</li> <li>StorageService.StorageService StorageGroups, ClientEndpointGroups and ServerEndpointGroups</li> </ul> </li> <li>Change multiple collections' types from collections (arrays) to ResourceCollections to conform to Redfish usage guidelines and move NavigationProperties from Links section: <ul style="list-style-type: none"> <li>EndpointGroup Endpoints</li> <li>FileShare EthernetInterfaces</li> <li>StoragePool ClassesOfService</li> <li>StorageService ClassesOfService</li> </ul> </li> </ul>
1.0.2a	11/8/16	<p>Schema changes to 5 files to fix include directories to specify <a href="http://redfish.dmtf.org/schemas/swordfish/v1">http://redfish.dmtf.org/schemas/swordfish/v1</a> instead of <a href="http://redfish.dmtf.org/schemas/v1">http://redfish.dmtf.org/schemas/v1</a></p> <p>Updated schedule_v1 schema to 8601 format compliance.</p>
1.0.3	1/24/17	<p>Schema changes:</p> <ul style="list-style-type: none"> <li>Move complex types and enum to versioned namespace</li> <li>Schedule schema: add property</li> <li>json schema fix (Swordfish to swordfish)</li> </ul> <p>Specification enhancements, multiple areas</p> <p>User's guide: multiple new use cases and new document section</p>
1.0.4	4/25/17	<p>Errata release with minor updates to schema:</p> <ul style="list-style-type: none"> <li>Move FileShare collection</li> <li>Integrate DMTF and SNIA versions of Volume</li> <li>Fix incorrect property references and update descriptions.</li> </ul> <p>Update mockups.</p> <p>User's guide: Update cross-references.</p>
1.0.5	10/3/17	<p>Errata release with updates to schema:</p> <ul style="list-style-type: none"> <li>Simplifications to StorageGroups and EndpointGroups based on implementation feedback.</li> <li>Addition of Swordfish Message Registry</li> <li>Addition of performance metrics, added to block</li> <li>Add DMTF Volume changes: Dedicated Spare collection</li> </ul> <p>Fix inconsistencies in mockups.</p> <p>User's Guide:</p> <ul style="list-style-type: none"> <li>Add introductory material to actors and management domain</li> <li>Minor fixes and updates to use cases</li> </ul>
1.0.6	2/13/18	<p>Specification:</p> <ul style="list-style-type: none"> <li>Updated Storage Systems model – added notion of Integrated Service Configuration in addition to (and named) Hosted Service Configuration.</li> <li>Added ComplexType common definition section.</li> <li>Added/updated common Redfish property definitions.</li> <li>Updates to conform to new SNIA templates.</li> </ul> <p>Errata release with updates to schema:</p> <ul style="list-style-type: none"> <li>Deprecated use of Swordfish Location schema in favor of Redfish Resource.Location</li> <li>Added support for PersistentMemory capacity source types</li> <li>New event message entries</li> <li>Moved enum and ComplexType definitions to unversioned namespaces (ensures proper json schema version generation from tools), cleaned up references to abstract types and unreferenced versions</li> </ul> <p>Removed mockups from release bundle. Refer to <a href="http://snia.org/swordfish">snia.org/swordfish</a> and <a href="http://swordfishmockups.com">swordfishmockups.com</a> for mockup availability.</p> <p>User's Guide:</p>

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		<ul style="list-style-type: none"> <li>Add on-demand replication use cases</li> </ul>
1.0.7	10/12/18	<p>Specification:</p> <ul style="list-style-type: none"> <li>Updated Enhanced Spare Capacity Management Model</li> <li>Deprecated Remaining Capacity</li> <li>Added OpenAPI support: schema references and OpenAPI YAML files</li> <li>Added iSCSI properties for CHAP</li> <li>Event usage enhancements and guidance</li> <li>Volume schema updates – RAID Type enum (deprecating VolumeType usage), add ReplicaTargets</li> </ul> <p>Schema updates:</p> <ul style="list-style-type: none"> <li>Annotations enhancements: Capabilities designations, owning entities, Redfish.Required usage</li> <li>Clarified and updated ClassOfService IsDefault property usage</li> <li>Updated Capabilities location in hierarchy</li> <li>Fix cardinality issue of StorageReplicaInfo usage in StorageGroups and Volume</li> <li>Consolidate Client and Server Endpoint Groups into single Endpoint Group entity (deprecate usage of separate Client Endpoint Group and Server Endpoint Group)</li> <li>Add MappedVolume construct to StorageGroup – adds LUN info and other properties</li> </ul> <p>User's Guide:</p> <ul style="list-style-type: none"> <li>Editorial cleanup of JSON</li> </ul>
1.0.7a	11/8/18	<p>Specification:</p> <ul style="list-style-type: none"> <li>Restored RAIDType property that was missing from 1.0.7</li> <li>Minor correction to schema versioning Deprecated Remaining Capacity</li> </ul>
1.1.0	8/22/19	<p>Added Features and Profiles Definitions</p> <ul style="list-style-type: none"> <li>Defined required functionality to support multiple Swordfish features for block and file: Discovery, Event Notification, IO Performance, Provisioning, Capacity Management, Local and Remote Replication, Mapping and Masking (block only), EnergyStar reporting</li> <li>Add SupportedFeatures Registry definition</li> <li>Add SwordfishSupportedFeatures standard registry</li> </ul> <p>Clarified support for use with and without class of service:</p> <ul style="list-style-type: none"> <li>Added support for seamless extension of Redfish Storage model to Swordfish, using Swordfish schema attached to the Storage schema</li> </ul> <p>Volume updates:</p> <ul style="list-style-type: none"> <li>Added Collection of related Endpoints, StorageGroups and ConsistencyGroups</li> <li>Added new properties: ProvisioningPolicy, OwningStorageService, StripSizeBytes, ReadAheadPolicy, VolumeUsage, WritePolicy, CacheState, LogicalUnitNumber, MediaSpanCount, Deduplicated, Compressed, WriteHoleProtectionPolicy, and DisplayName.</li> <li>Added Actions for replication: AssignReplicaTarget, CreateReplicaTarget, RemoveReplicaRelationship, ResumeReplication, ReverseReplicationRelationship, SplitReplication, and SuspendReplication</li> </ul> <p>StoragePool:</p> <ul style="list-style-type: none"> <li>Added properties: SupportedRAIDTypes, SupportedProvisioningPolicies, Compressed, Deduplicated, Encrypted.</li> </ul> <p>Class of Service / Line of Service model changes:</p> <ul style="list-style-type: none"> <li>Changed to make abstract LineOfService be base class for both types</li> <li>Added SupportedProvisioningPolicies to StoragePool and Volume</li> <li>Clarified DataProtectionLineOfService usage in StorageReplicaInfo</li> </ul> <p>Replication usage:</p> <ul style="list-style-type: none"> <li>Changed use model to ReplicaTargets array in source, ReplicaInfo in target</li> <li>Clarified terminology / properties in StorageReplicaInfo structures</li> </ul>

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		<p>Consistency Groups added for group volume management (manage multiple volumes as a single entity), and StorageGroups clarified to only manage Mapping and Masking (references to consistency in StorageGroups deprecated),</p> <ul style="list-style-type: none"> <li>Replication capability added to Consistency Groups</li> </ul> <p>Other Schema Fixes:</p> <ul style="list-style-type: none"> <li>CSDL corrections throughout</li> <li>ReadWrite changes to multiple properties: ExportedShares and ImportedShares in FileSystem, CapacitySources made consistently ReadWrite in Volume/StoragePool/FileSystems</li> <li>Capabilities Annotations updated and added throughout</li> <li>Removed FileSystemPersistenceType enum (not used)</li> <li>Add Redfish.Uri annotations</li> </ul> <p>User's Guide:</p> <ul style="list-style-type: none"> <li>Restructured to add features and feature cross references, and many new use cases added: <ul style="list-style-type: none"> <li>Create Volume for multiple scenarios (including Redfish Storage)</li> <li>Create Storage Pool for multiple scenarios</li> <li>Replication use cases using single Volume</li> <li>Replication use cases using Consistency Groups</li> </ul> </li> </ul> <p>Specification:</p> <ul style="list-style-type: none"> <li>Restructured to add features and profiles <ul style="list-style-type: none"> <li>Add description of SupportedFeatures usage and requirements</li> <li>Add requirements for subsets of features</li> </ul> </li> <li>Add language to clarify support for use with and without the class of service (now an optional feature) <ul style="list-style-type: none"> <li>Added descriptions of support for seamless extension of Redfish Storage model to Swordfish</li> <li>Add updated model diagrams to reflect new model permutations</li> </ul> </li> <li>Added descriptions of new constructs (e.g., Consistency Groups)</li> <li>Cleaned up references to Redfish Specification based on latest version</li> <li>Add Status Codes clarification and constraints section</li> </ul>
1.1.0 (TP)	11/12/19	Released as Technical Position
1.1.0a (TP Corrected)	11/12/19	<p>Released as Technical Position, Corrected</p> <p>User's Guide:</p> <ul style="list-style-type: none"> <li>Formatting fixes – word wrap in pdf doc format to fix truncated lines</li> <li>Added cross referencing of Features to use cases</li> <li>Editorial changes and cleanup</li> </ul> <p>Specification:</p> <ul style="list-style-type: none"> <li>Formatting fixes – word wrap in pdf doc format to fix truncated lines</li> <li>Consistent object labeling in images (replace drive with disk)</li> <li>Editorial and grammar changes and cleanup to status code guidance section</li> </ul> <p>Schema:</p> <ul style="list-style-type: none"> <li>Add missing LinesOfService schema in StorageService</li> <li>Add missing Revision/Kind annotations to Actions added in 1.1.0</li> <li>Fix issues in Redfish.Uri</li> <li>Add RDE Dictionary binaries and map types to published schema types</li> <li>Add additional enum to WriteCachePolicyTypes</li> </ul>
1.1.0b	3/24/20	<p>Released as Technical Position, Corrected</p> <p>Specification:</p> <ul style="list-style-type: none"> <li>TLS requirements now based on both ISO and SNIA standards</li> <li>Redfish references now based on both ISO and SNIA standards</li> </ul> <p>Bibliography added</p>
1.2.0	5/29/20	Added support for NVMe and NVMe-oF: added concepts and enhancements to the Redfish and Swordfish models and schema, to support the management of NVMe and NVMe-oF devices and systems.

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		<p>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.</p> <p>Functionality availability in Swordfish includes:</p> <ul style="list-style-type: none"> <li>Enhancements to Volume, StoragePools</li> <li>New schema: NVMeDomain</li> </ul> <p>Other supporting documentation released in conjunction with this specification and schema bundle:</p> <ul style="list-style-type: none"> <li>Multiple mockups reflecting multiple implementation permutation options (available on swordfishmockups.com)</li> <li>Model overview documentation (NVMe to RF/SF Model Mapping Working Draft, dated May 2020)</li> </ul> <p>Additional Enhancements in the Specification and schema:</p> <ul style="list-style-type: none"> <li>The addition of the Swordfish Standalone Configuration 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.</li> <li>Added support to Volume for new Actions: ChangeRAIDLAYOUT, ForceEnable.</li> <li>Added InitializeMethod, IOPerfModeEnabled, and OwningStorageResource and link to JournalingMedia to Volume.</li> <li>Enhanced CHAP definitions and usage in StorageGroup.</li> <li>Fix multiple URI issues across various schema.</li> <li>Add additional enum members: <ul style="list-style-type: none"> <li>None to RAIDType</li> <li>Off to WriteCachePolicy</li> </ul> </li> <li>Enhanced support for RDE Dictionaries</li> <li>Add LinesOfService to StorageService</li> </ul> <p>Additional Documentation:</p> <ul style="list-style-type: none"> <li>Initial Release of the Swordfish SSM Error Handling Guide. The Swordfish Scalable Storage Management Error Handling Guide provides a summary of the preferred handling of errors and error messages in a Swordfish implementation, and is targeted as a guide for implementers.</li> </ul> <p>New mockups:</p> <ul style="list-style-type: none"> <li>In conjunction with the 1.2.0 release, the swordfishmockups.com site has been updated with 10 new mockups. These include NVMe configuration mockups, as well as several new configurations showing examples of the Swordfish Standalone Configuration in the /Storage collection at the ServiceRoot, the Swordfish Integrated Configuration in use attached to a server (Computer system).</li> </ul>
1.2.1	18 August 2020	<p>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.</p> <p>This release adds to the Swordfish bundle:</p> <ul style="list-style-type: none"> <li>Swordfish profiles (previous releases have been distributed separately)</li> </ul> <p>New Documentation:</p> <ul style="list-style-type: none"> <li>Initial Release of the Swordfish NVMe Model Overview and Mapping Guide. The Swordfish NVMe Model Overview and Mapping Guide defines the model to manage NVMe and NVMe-oF storage systems with Redfish and Swordfish. It provides the detailed mapping information between the NVMe, NVMe-oF specifications and the Redfish and Swordfish specifications.</li> </ul>



Revision	Date	Changes
		<p>Functionality availability in Swordfish includes:</p> <ul style="list-style-type: none"> <li>NVMe Mapping Support, Enhancements to Volume, StoragePools</li> </ul> <p>Additional Enhancements in the Specification and schema:</p> <ul style="list-style-type: none"> <li>Added InitializeMethod property to Volume.</li> <li>Made DedicateSpareDrives ReadWrite-able</li> <li>Added enhanced Volume Access Capabilities and usage in StorageGroup.</li> <li>Fix multiple URI issues across various schema.</li> </ul> <p>Profiles:</p> <ul style="list-style-type: none"> <li>Enhance profiles to include support / requirements for /Storage (move support to v1.1.0 level)</li> </ul> <p>User's Guide:</p> <ul style="list-style-type: none"> <li>Add use cases for NVMe specific cases: <ul style="list-style-type: none"> <li>Provision / deprovision namespace</li> <li>Attach / Detach a namespace</li> <li>Report capacity for a namespace</li> <li>Report remaining life for a namespace</li> </ul> </li> </ul> <p>All documents:</p> <ul style="list-style-type: none"> <li>Updated formatting of tables to support automatic table numbering and ISO compatible table representation.</li> </ul>
1.2.1a	9/29/20	<p>Updated JSON and YAML schema copyrights, and YAML OpenSchema reference changed to v4 instead of v4.0.3.</p> <p>Specification:</p> <ul style="list-style-type: none"> <li>Added bibliography</li> <li>Updated TLS references</li> </ul>
1.2.1c	10/20/20	<p>Schema fixes:</p> <ul style="list-style-type: none"> <li>Updated JSON and YAML schema to fix OdataSchema include issues.</li> <li>Fix \$ref issues throughout openapi.yaml.</li> <li>Fix issues with updateable Annotations.</li> <li>Update with additional Redfish.URI annotations.</li> </ul> <p>Specification:</p> <ul style="list-style-type: none"> <li>Updated with additional Redfish.URI annotations.</li> </ul>

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