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This document was prepared by DMTF (as DMTF Redfish Specification, DSP0266, Version 1.13.0) 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 first edition cancels and replaces the first edition (ISO/IEC 30115:2018), which has been technically revised.

The main changes are as follows:

— a number of clauses have been added expanding the functionality of the protocol, including additions for controlling software-defined composable systems, for performing software or firmware updates and for aggregating multiple service instances;

— the protocol itself has been enhanced to provide a number of optional query parameters to enable more efficient transactions;

— the specification and its data model have been enhanced to provide compatibility with the OpenAPI v3.0 specification allowing the use of the OpenAPI toolchain for both documentation and code generation.

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1 Foreword {-}

The Redfish Forum of the DMTF develops the Redfish standard.

DMTF is a not-for-profit association of industry members that promotes enterprise and systems management and interoperability. For information about the DMTF, see DMTF.

This version supersedes version 1.12.1. For a list of the changes, see ANNEX A (informative) Change log.

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2 Introduction {-}

Redfish is a standard that uses RESTful interface semantics to access a schema based data model to conduct management operations. It is suitable for a wide range of devices, from stand-alone servers, to composable infrastructures, and to large-scale cloud environments.

The initial Redfish scope targeted servers. The DMTF and its alliance partners expanded that scope to cover most data center IT equipment and other solutions, and both in- and out-of-band access methods.

Additionally, the DMTF and other organizations that use Redfish as part of their industry standard or solution have added educational material.

This document defines the RESTful interface protocol and the various concepts and services necessary to implement a Redfish interface. The definition of the schema based data model and standard messages for the Redfish interface are covered separately in the following documents:

- DMTF DSP8010, *Redfish Schema Bundle*, https://www.dmtf.org/dsp/DSP8010 contains the individual schema definition files in multiple schema description languages.
- DMTF DSP0268, *Redfish Schema Supplement*, https://www.dmtf.org/dsp/DSP0268 contains the normative descriptions and example payloads for all standard Redfish schema in a single reference guide.
- DMTF DSP8011, *Redfish Standard Registries Bundle*, https://www.dmtf.org/dsp/DSP8011 contains the message registries used for error reporting and event messages.

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3 Scope

This specification defines the required protocols, data model, behaviors, and other architectural components for an interoperable, multivendor, remote, and out-of-band capable interface. This interface meets the cloud-based and web-based IT professionals' expectations for scalable platform management. While large and hyperscale environments are the primary focus, clients can use the specification for individual system management.

The specification defines the required elements for all Redfish implementations, and the optional elements that system vendors and manufacturers can choose. This specification also defines at which points an implementation can provide OEM-specific extensions.

The specification sets normative requirements for *Redfish services* and associated materials, such as Redfish schema files. In general, the specification does not set requirements for Redfish clients but indicates how a client can successfully and effectively access and use a Redfish service.

The specification does not require that implementations of the Redfish interfaces and functions require particular hardware or firmware.

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4 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

- DMTF DSP0270, *Redfish Host Interface Specification*, https://www.dmtf.org/sites/default/files/standards/documents/DSP0270_1.0.0.pdf
- Redfish Schema: RedfishExtensions v1.0.0, https://redfish.dmtf.org/schemas/v1/RedfishExtensions_v1.xml
- *Transport Layer Security (TLS) Parameters*, https://www.iana.org/assignments/tls-parameters/tls-parameters.xhtml
- *JSON Schema: A Media Type for Describing JSON Documents draft-handrews-json-schema-01*, https://tools.ietf.org/html/draft-handrews-json-schema-01
- *JSON Schema Validation: A Vocabulary for Structural Validation of JSON draft-handrews-json-schema-validation-01*, https://tools.ietf.org/html/draft-handrews-json-schema-validation-01
- IETF RFC1738, T. Berners-Lee et al, *Uniform Resource Locators (URL)*, https://tools.ietf.org/html/rfc1738
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- IETF RFC5280, D. Cooper et al, *Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile*,
- IETF RFC6585, M. Nottingham et al, *Additional HTTP Status Codes*, https://tools.ietf.org/html/rfc6585
- IETF RFC6901, P. Bryan, Ed. et al, *JavaScript Object Notation (JSON) Pointer*, https://tools.ietf.org/html/rfc6901
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5 Terms, definitions, symbols, and abbreviated terms

Some terms and phrases in this document have specific meanings beyond their typical English meanings. This clause defines those terms and phrases.

The terms "shall" ("required"), "shall not", "should" ("recommended"), "should not" ("not recommended"), "may", "need not" ("not required"), "can" and "cannot" in this document are to be interpreted as described in ISO/IEC Directives, Part 2, Clause 7. The terms in parenthesis are alternatives for the preceding term, for use in exceptional cases when the preceding term cannot be used for linguistic reasons. Note that ISO/IEC Directives, Part 2, Clause 7 specifies additional alternatives. Occurrences of such additional alternatives shall be interpreted in their normal English meaning.

The terms "clause", "subclause", "paragraph", and "annex" in this document are to be interpreted as described in ISO/IEC Directives, Part 2, Clause 6.

The terms "normative" and "informative" in this document are to be interpreted as described in ISO/IEC Directives, Part 2, Clause 3. In this document, clauses, subclauses, or annexes labeled "(informative)" do not contain normative content. Notes and examples are always informative elements.

The term "deprecated" in this document is to be interpreted as material that is not recommended for use in new development efforts. Existing and new implementations may use this material, but they should move to the favored approach. Deprecated material may be implemented in order to achieve backwards compatibility. Deprecated material should contain references to the last published version that included the deprecated material as normative material and to a description of the favored approach. Deprecated material may be removed from the next major version of the specification.

This document defines these additional terms:

5.1 Hardware terms

5.1.1 baseboard management controller (BMC)

embedded device or service

Note 1 to entry: Typically an independent microprocessor or system-on-chip with associated firmware in a computer system that completes out-of-band systems monitoring and management-related tasks.

5.1.2 IPMI

Intelligent Platform Management Interface

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5.1.3 KVM-IP

keyboard, video, mouse redirection over IP

5.1.4 NIC

network interface controller

5.1.5 PCI

Peripheral Component Interconnect

5.1.6 PCIe

Peripheral Component Interconnect Express

5.2 Web development terms

5.2.1 CORS

cross-origin resource sharing

5.2.2 CRUD

basic **C**reate, **R**ead, **U**pdate, and **D**elete operations that any interface can support

5.2.3 CSRF

cross-site request forgery

5.2.4 event

data structure that corresponds to one or more alerts

5.2.5 excerpt

subset of data that is copied from one resource and presented in another resource

Note 1 to entry: An excerpt provides data in convenient locations without duplication of entire resources.

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5.2.6 HTTP

Hypertext Transfer Protocol

5.2.7 HTTPS

Hypertext Transfer Protocol Secure

Note 1 to entry: TLS secures HTTP.

5.2.8 hypermedia API

API that enables you to navigate through URIs that a service returns

5.2.9 IP

Internet Protocol

5.2.10 JSON

JavaScript Object Notation

5.2.11 member

single resource instance in a resource collection

5.2.12 message

complete HTTP-formatted or HTTPS-formatted request or response

Note 1 to entry: In the REST-based Redfish protocol, every request results in a response.

5.2.13 OData

Open Data Protocol (OData), as defined in OData Version 4.0 Part 1: Protocol

5.2.14 OData service document

resource that provides information about the service root for generic OData clients

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5.2.15 operation

HTTP `POST`, `GET`, `PUT`, `PATCH`, `HEAD`, and `DELETE` request methods that map to generic CRUD operations

5.2.16 parent resource

parent to another resource if the initial segment of the resource URI is the same as the URI of the other resource, but is at least one level higher

Note 1 to entry: For example, `/redfish/v1/Chassis/A88` is a parent resource of `/redfish/v1/Chassis/A88/Assembly`.

5.2.17 property

name-value pair in a Redfish-defined request or response

Note 1 to entry: A property can be any valid JSON data type.

5.2.18 request

message from a client to a service

5.2.19 response

message from a service to a client in response to a request message

5.2.20 subscription

registration of a destination to receive events

5.2.21 task

representation of a long-running operation

5.2.22 task monitor

opaque service-generated URI that the client who initiates the request can use to monitor an asynchronous operation

5.2.23 TCP

Transmission Control Protocol

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5.2.24 TLS

Transport Layer Security

5.2.25 XSS

cross-site scripting

5.3 Redfish terms

5.3.1 collection

see resource collection

5.3.2 Redfish client

communicates with a Redfish service and accesses one or more of the service's resources or functions

5.3.3 Redfish protocol

discovers, connects to, and inter-communicates with a Redfish service

5.3.4 Redfish schema

a set of human and machine-readable documents that define Redfish resources using one or more of the supported schema definition languages

5.3.5 Redfish service

implementation of the protocols, resources, and functions that deliver the interface that this specification defines and its associated behaviors for one or more managed systems

Note 1 to entry: Also known as the *service*.

5.3.6 resource

URI-addressable Redfish data structure

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5.3.7 resource collection

set of similar resources where the number of instances can shrink or grow

5.3.8 resource tree

tree structure of resources accessible through a well-known starting URI

Note 1 to entry: A client can discover the available resources on a Redfish service by following the resource hyperlinks from the base of the tree.

5.3.9 resource type

set of definitions for properties and actions contained within a resource and documented in the Redfish schema files

5.3.10 service root

starting-point resource for locating and accessing the other resources and associated metadata that make up an instance of a Redfish service

5.3.11 subordinate resource

is subordinate to another resource if the initial segment of the resource URI is the same as the URI of the other resource, but is at least one level deeper

Note 1 to entry: For example, `/redfish/v1/Chassis/A88/Assembly` is a subordinate resource of the `Chassis` resource named `A88`.

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