INTERNATIONAL STANDARD

ISO/IEC 30115

First edition
2018-03

Information technology — Redfish scalable platforms management API specification

Technologies de l'information — Spécification API (interface de programmation d'applications) relative à la gestion des plates-formes évolutives Redfish

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO/IEC 30115:2018
https://standards.iteh.ai/catalog/standards/sist/e4837d11-f7ec-4bb6-a126-e57dc8abbb26/iso-iec-30115-2018

Reference number
ISO/IEC 30115:2018(E)

© ISO/IEC 2018

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO/IEC 30115:2018
https://standards.iteh.ai/catalog/standards/sist/e4837d11-f7ec-4bb6-a126-e57dc8abbb26/iso-iec-30115-2018

COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2018

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Published in Switzerland

© ISO/IEC 2018 – All rights reserved

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.s

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

ISO/IEC 30115:2018
https://standards.iteh.ai/catalog/standards/sist/e4837d11-f7ec-4bb6-a126-

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by the Distributed Management Task Force, Inc. (DMTF) (as DSP0266) 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*.

© ISO/IEC 2018 – All rights reserved

CONTENTS

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO/IEC 30115:2018
https://standards.iteh.ai/catalog/standards/sist/e4837d11-f7ec-4bb6-a126-e57dc8abbb26/iso-iec-30115-2018

© ISO/IEC 2018 – All rights reserved

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO/IEC 30115:2018
https://standards.iteh.ai/catalog/standards/sist/e4837d11-f7ec-4bb6-a126-e57dc8abbb26/iso-iec-30115-2018

© ISO/IEC 2018 – All rights reserved

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO/IEC 30115:2018
https://standards.iteh.ai/catalog/standards/sist/e4837d11-f7ec-4bb6-a126-e57dc8abbb26/iso-iec-30115-2018

© ISO/IEC 2018 – All rights reserved

Foreword

The Redfish Scalable Platforms Management API ("Redfish") was prepared by the Scalable Platforms Management Forum of the DMTF.

DMTF is a not-for-profit association of industry members dedicated to promoting enterprise and systems management and interoperability. For information about the DMTF, see http://www.dmtf.org.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO/IEC 30115:2018
https://standards.iteh.ai/catalog/standards/sist/e4837d11-f7ec-4bb6-a126-e57dc8abbb26/iso-iec-30115-2018

© ISO/IEC 2018 – All rights reserved

Acknowledgments

The DMTF acknowledges the following individuals for their contributions to this document:

- Jeff Autor - Hewlett Packard Enterprise
- Patrick Boyd - Dell Inc.
- David Brockhaus - Emerson Network Power
- Richard Brunner - VMware Inc.
- Lee Calcote - Seagate Technology
- P Chandrasekhar - Dell Inc.
- Chris Davenport - Hewlett Packard Enterprise
- Gamma Dean - Emerson Network Power
- Daniel Dufresne - EMC
- Samer El-Haj-Mahmoud - Lenovo, Hewlett Packard Enterprise
- George Ericson - EMC
- Wassim Fayed - Microsoft Corporation
- Mike Garrett - Hewlett Packard Enterprise
- Steve Geffin - Emerson Network Power
- Joe Handzik - Hewlett Packard Enterprise
- Jon Hass - Dell Inc.
- Jeff Hilland - Hewlett Packard Enterprise
- Chris Hoffman - Emerson Network Power
- Steven Krig - Intel Corporation
- John Leung - Intel Corporation
- Jagan Molleti - Dell Inc.
- Milena Natanov - Microsoft Corporation
- Michael Pizzo - Microsoft Corporation
- Chris Poblete - Dell Inc.
- Michael Raineri - EMC
- Irina Salvan - Microsoft Corporation
- Hemal Shah - Broadcom Limited
- Jim Shelton - Emerson Network Power
- Tom Slaight - Intel Corporation
- Donnie Sturgeon - Emerson Network Power
- Pawel Szymanski - Intel Corporation
- Paul Vancil - Dell Inc.
- Linda Wu - Super Micro Computer, Inc.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO/IEC 30115:2018
https://standards.iteh.ai/catalog/standards/sist/e4837d11-f7ec-4bb6-a126-e57dc8abbb26/iso-iec-30115-2018

© ISO/IEC 2018 – All rights reserved

1. Abstract

The Redfish Scalable Platforms Management API ("Redfish") is a new specification that uses RESTful interface semantics to access data defined in model format to perform out-of-band systems management. It is suitable for a wide range of servers, from stand-alone servers to rack mount and bladed environments but scales equally well for large scale cloud environments.

There are several out-of-band systems management standards (defacto and de jour) available in the industry. They all either vary widely in implementation, were developed for single server embedded environments or have their roots in antiquated software modeling constructs. There is no single industry standard that is simple to use, based on emerging programming standards, embedded friendly and capable of meeting large scale data center & cloud needs.

2. Normative references

The following referenced documents are indispensable for the application of this document. For dated or versioned references, only the edition cited (including any corrigenda or DMTF update versions) applies. For references without a date or version, the latest published edition of the referenced document (including any corrigenda or DMTF update versions) applies.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO/IEC 30115:2018
https://standards.iteh.ai/catalog/standards/sist/e4837d11-17ec-4bb6-a126-e57dc8abbb26/iso-iec-30115-2018

- IETF RFC 3986 T. Berners-Lee et al, Uniform Resource Identifier (URI): Generic Syntax, http://www.ietf.org/rfc/rfc3986.txt
- IETF RFC 4627, D. Crockford, The application/json Media Type for JavaScript Object Notation (JSON), http://www.ietf.org/rfc/rfc4627.txt
- IETF RFC 5789, L. Dusseault et al, PATCH method for HTTP, http://www.ietf.org/rfc/rfc5789.txt
- IETF RFC 5280, D. Cooper et al, Web linking, http://www.ietf.org/rfc/rfc5280.txt
- IETF RFC 5988, M. Nottingham, Web linking, http://www.ietf.org/rfc/rfc5988.txt
- IETF RFC 6901, P. Bryan, Ed. et al, JavaScript Object Notation (JSON) Pointer, http://www.ietf.org/rfc/rfc6901.txt
- IETF RFC 6906, E. Wilde, The 'profile' Link Relation Type, http://www.ietf.org/rfc/rfc6906.txt
- IETF RFC 7230, R. Fielding et al., Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing, http://www.ietf.org/rfc/rfc7230.txt
- IETF RFC 7231, R. Fielding et al., Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content, http://www.ietf.org/rfc/rfc7231.txt
- IETF RFC 7232, R. Fielding et al., Hypertext Transfer Protocol (HTTP/1.1): Conditional Requests, http://www.ietf.org/rfc/rfc7232.txt
- IETF RFC 7234, R. Fielding et al., Hypertext Transfer Protocol (HTTP/1.1): Caching, http://www.ietf.org/rfc/rfc7234.txt
- IETF RFC 7235, R. Fielding et al., Hypertext Transfer Protocol (HTTP/1.1): Authentication, http://www.ietf.org/rfc/rfc7235.txt

© ISO/IEC 2018 – All rights reserved

- ISO/IEC Directives, Part 2, Rules for the structure and drafting of International Standards, http://isotc.iso.org/livelink/livelink.exe?func=ll&objId=4230456&objAction=browse&sort=subtypeH
- JSON Schema, Core Definitions and Terminology, Draft 4 http://tools.ietf.org/html/draft-zyp-json-schema-04.txt
- JSON Schema, Interactive and Non-Interactive Validation, Draft 4 http://tools.ietf.org/html/draft-fge-json-schema-validation-00.txt
- OData Version 4.0 Part 1: Protocol. 24 February 2014. http://docs.oasis-open.org/odata/odata/v4.0/os/part1-protocol/odata-v4.0-os-part1-protocol.html
- OData Version 4.0 Part 2: URL Conventions. 24 February 2014. http://docs.oasis-open.org/odata/odata/v4.0/os/part2-url-conventions/odata-v4.0-os-part2-url-conventions.html
- OData Version 4.0 Part 3: Common Schema Definition Language (CSDL). 24 February 2014. http://docs.oasis-open.org/odata/odata/v4.0/os/part3-csdl/odata-v4.0-os-part3-csdl.html
- OData Version 4.0: Core Vocabulary. 24 February 2014. http://docs.oasis-open.org/odata/odata/v4.0/os/vocabularies/Org.OData.Core.V1.xml
- OData Version 4.0 JSON Format. 24 February 2014. http://docs.oasis-open.org/odata/odata-json-format/v4.0/os/odata-json-format-v4.0-os.html
- OData Version 4.0: Units of Measure Vocabulary. 24 February 2014. http://docs.oasis-open.org/odata/odata/v4.0/os/vocabularies/Org.OData.Measures.V1.xml
- Simple Service Discovery Protocol/1.0. 28 October 1999. http://tools.ietf.org/html/draft-cai-ssdp-v1-03
- The Unified Code for Units of Measure. http://www.unitsofmeasure.org/ucum.html
- W3C Recommendation of Cross-Origin Resource Sharing. 16 January 2014. http://www.w3.org/TR/cors/
- SNIA TLS Specification for Storage Systems. 20 November 2014. http://www.snia.org/tls/
- DMTF DSP0270 Redfish Host Interface Specification, http://www.dmtf.org/sites/default/files/standards/documents/DSP0270_1.0.pdf

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO/IEC 30115:2018
https://standards.iteh.ai/catalog/standards/sist/e4837d11-f7ec-4bb6-a126-

3. Terms and definitions

In this document, some terms have a specific meaning beyond the normal English meaning. Those terms are defined in this clause.

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, Annex H. 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, Annex H 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 5.

© ISO/IEC 2018 – All rights reserved

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 following additional terms are used in this document.

Term	Definition
Baseboard Management Controller	An embedded device or service, typically an independent microprocessor or System-on-Chip with associated firmware, within a Computer System used to perform systems monitoring and management-related tasks, which are commonly performed out-of-band.
Collection	See Resource Collection.
CRUD	Basic intrinsic operations used by any interface: Create, Read, Update and Delete.
Event	A record that corresponds to an individual alert.
Managed System	In the context of this specification, a managed system is a system that provides information or status, or is controllable, via a Redfish-defined interface.
Member	A Member is a single resource instance contained in a Resource Collection
Message	A complete request or response, formatted in HTTP/HTTPS. The protocol, based on REST, is a request/response protocol where every Request should result in a Response.
Operation	The HTTP request methods that map generic CRUD operations. These are POST, GET, PUT/PATCH, HEAD and DELETE.
OData	The Open Data Protocol, as defined in OData-Protocol.
OData Service Document	The name for a resource that provides information about the Service Root. The Service Document provides a standard format for enumerating the resources exposed by the service that enables generic hypermedia-driven OData clients to navigate to the resources of the Redfish Service.
Redfish Alert Receiver	The name for the functionality that receives alerts from a Redfish Service. This functionality is typically software running on a remote system that is separate from the managed system.
Redfish Client	Name for the functionality that communicates with a Redfish Service and accesses one or more resources or functions of the Service.
Redfish Protocol	The set of protocols that are used to discover, connect to, and inter-communicate with a Redfish Service.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO/IEC 30115:2018
https://standards.iteh.ai/catalog/standards/sist/e4657d71-47ec-4b8c-a128-e57dc8abbb26/iso-iec-30115-2018

© ISO/IEC 2018 – All rights reserved

Term	Definition
Redfish Schema	The Schema definitions for Redfish resources. It is defined according to OData Schema representation that can be directly translated to a JSON Schema representation.
Redfish Service	Also referred to as the "Service". The set of functionality that implements the protocols, resources, and functions that deliver the interface defined by this specification and its associated behaviors for one or more managed systems.
Redfish Service Entry Point	Also referred to as "Service Entry Point". The interface through which a particular instance of a Redfish Service is accessed. A Redfish Service may have more than one Service Entry Point.
Request	A message from a Client to a Server. It consists of a request line (which includes the Operation), request headers, an empty line and an optional message body.
Resource	A Resource is addressable by a URI and is able to receive and process messages. A Resource can be either an individual entity, or a Collection that acts as a container for several other entities.
Resource Collection	A Resource Collection is a Resource that acts as a container of other Resources. The Members of a Resource Collection usually have similar characteristics. The container processes messages sent to the container. The Members of the container process messages sent only to that Member without affecting other Members of the container.
Resource Tree	A Resource Tree is a tree structure of JSON encoded resources accessible via a well-known starting URI. A client may discover the resources available on a Redfish Service by following the resource links from the base of the tree. **NOTE** for Redfish client implementation: Although the resources are a tree, the references between resources may result in graph instead of a tree. Clients traversing the resource tree must contain logic to avoid infinite loops.
Response	A message from a Server to a Client in response to a request message. It consists of a status line, response headers, an empty line and an optional message body.
Service Root	The term Service Root is used to refer to a particular resource that is directly accessed via the service entry point. This resource serves as the starting point for locating and accessing the other resources and associated metadata that together make up an instance of a Redfish Service.
Subscription	The act of registering a destination for the reception of events.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO/IEC 30115:2018
https://standards.iteh.ai/catalog/standards/sist/e4837d11-f7ec-4bb6-a126-e57dc8abbb26/iso-iec-30115-2018

© ISO/IEC 2018 – All rights reserved

4. Symbols and abbreviated terms

The following additional abbreviations are used in this document.

Term	Definition
BMC	Baseboard Management Controller
CRUD	Create, Replace, Update and Delete
CSRF	Cross-Site Request Forgery
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol over TLS
IP	Internet Protocol
IPMI	Intelligent Platform Management Interface
JSON	JavaScript Object Notation
KVM-IP	Keyboard, Video, Mouse redirection over IP
NIC	Network Interface Card
PCI	Peripheral Component Interconnect
PCIe	PCI Express
TCP	Transmission Control Protocol
XSS	Cross-Site Scripting

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO/IEC 30115:2018
https://standards.iteh.ai/catalog/standards/sist/e4837d11-f7ec-4bb6-a126-e57dc8abb626/iso-iec-30115-2018

5. Overview

The Redfish Scalable Platforms Management API ("Redfish") is a management standard using a data model representation inside of a hypermedia RESTful interface. Because it is based on REST, Redfish is easier to use and implement than many other solutions. Since it is model oriented, it is capable of expressing the relationships between components in modern systems as well as the semantics of the services and components within them. It is also easily extensible. By using a hypermedia approach to REST, Redfish can express a large variety of systems from multiple vendors. By requiring JSON representation, a wide variety of resources can be created in a denormalized fashion not only to improve scalability, but the payload can be easily interpreted by most programming environments as well as being relatively intuitive for a human examining the data. The model is exposed in terms of an interoperable

© ISO/IEC 2018 – All rights reserved

Redfish Schema, expressed in an OData Schema representation with translations to a JSON Schema representation, with the payload of the messages being expressed in a JSON following OData JSON conventions. The ability to externally host the Redfish Schema definition of the resources in a machine-readable format allows the meta data to be associated with the data without encumbering Redfish Services with the meta data, thus enabling more advanced client scenarios as found in many data center and cloud environments.

5.1. Scope

The scope of this specification is to define the protocols, data model, and behaviors, as well as other architectural components needed for an inter-operable, cross-vendor, remote and out-of-band capable interface that meets the expectations of Cloud and Web-based IT professionals for scalable platform management. While large scale systems are the primary focus, the specifications are also capable of being used for more traditional system platform management implementations.

The specifications define elements that are mandatory for all Redfish implementations as well as optional elements that can be chosen by system vendor or manufacturer. The specifications also define points at which OEM (system vendor) -specific extensions can be provided by a given implementation.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

The specifications set normative requirements for Redfish Services and associated materials, such as Redfish Schema files. In general, the specifications do 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.

ISO/IEC 30115:2018
https://standards.iteh.ai/catalog/standards/sist/e4837d11-f7ec-4bb6-a126-e57dedabb2b7/iso-iec-30115-2018

The specifications do not set requirements that particular hardware or firmware must be used to implement the Redfish interfaces and functions.

5.2. Goals

There are many objectives and goals of Redfish as an architecture, as a data representation, and of the definition of the protocols that are used to access and interact with a Redfish Service. Redfish seeks to provide specifications that meet the following goals:

- Scalable – To support stand-alone machines to racks of equipment found in cloud service environments.
- Flexible – To support a wide variety of systems found in service today.
- Extensible – To support new and vendor-specific capabilities cleanly within the framework of the data model.
- Backward Compatible - To enable new capabilities to be added while preserving investments in earlier versions of the specifications.
- Interoperable – To provide a useful, required baseline that ensures common level of functionality and implementation consistency across multiple vendors.
- System-Focused – To efficiently support the most commonly required platform hardware

© ISO/IEC 2018 – All rights reserved

management capabilities that are used in scalable environments, while also being capable of managing current server environments.
- Standards based – To leverage protocols and standards that are widely accepted and used in environments today - in particular, programming environments that are being widely adopted for developing web-based clients today.
- Simple – To be directly usable by software developers without requiring highly specialized programming skills or systems knowledge.
- Lightweight – To reduce the complexity and cost of implementing and validating Redfish Services on managed systems.

5.3. Design tenets

The following design tenets and technologies are used to help deliver the previously stated goals and characteristics:

- Provide a RESTful interface using a JSON payload and an Entity Data Model
- Separate protocol from data model, allowing them to be revised independently
- Specify versioning rules for protocols and schema
- Leverage strength of internet protocol standards where it meets architectural requirements, such as JSON, HTTP, OData, and the RFCs referenced by this document.
- Focus on out-of-band access -- implementable on existing BMC and firmware products
- Organize the schema to present value-add features alongside standardized items
- Make data definitions as obvious in context as possible
- Maintain implementation flexibility. Do not tie the interface to any particular underlying implementation architecture. "Standardize the interface, not the implementation."
- Focus on most widely used 'common denominator' capabilities. Avoid adding complexity to address functions that are only valued by a small percentage of users.
- Avoid placing complexity on the management controller to support operations that can be better done at the client.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO/IEC 30115:2018
https://standards.iteh.ai/catalog/standards/sist/d827d1b1-f7ec-4bb6-a126-e57dc8abbb26/iso-iec-30115-2018

5.4. Limitations

Redfish does not guarantee that client software will never need to be updated. Examples that may require updates include accommodation of new types of systems or their components, data model updates, and so on. System optimization for an application will always require architectural oversight. However, Redfish does attempt to minimize instances of forced upgrades to clients using Schemas, strict versioning and forward compatibility rules and through separation of the protocols from the data model.

Inter-operable does not mean identical. A Redfish client may need to adapt to the optional elements that are provided by different vendors. Implementation and configurations of a particular product from a given vendor can also vary.

For example, Redfish does not enable a client to read a Resource Tree and write it to another Redfish

© ISO/IEC 2018 – All rights reserved