

ISO/IEC 30115-1:2022-08 (E)

Information technology - Redfish scalable platforms management API specification - Part 1: Redfish Specification v1.13.0

Contents	Page
1 Foreword {-}	11
1.1 Acknowledgments {-}	11
2 Introduction {-}	13
3 Scope	14
4 Normative references	15
5 Terms, definitions, symbols, and abbreviated terms	17
5.1 Hardware terms	17
5.1.1 baseboard management controller (BMC)	17
5.1.2 IPMI	17
5.1.3 KVM-IP	18
5.1.4 NIC	18
5.1.5 PCI	18
5.1.6 PCIe	18
5.2 Web development terms	18
5.2.1 CORS	18
5.2.2 CRUD	18
5.2.3 CSRF	18
5.2.4 event	18
5.2.5 excerpt	18
5.2.6 HTTP	19
5.2.7 HTTPS	19
5.2.8 hypermedia API	19
5.2.9 IP	19
5.2.10 JSON	19
5.2.11 member	19
5.2.12 message	19
5.2.13 OData	19
5.2.14 OData service document	19
5.2.15 operation	20
5.2.16 parent resource	20
5.2.17 property	20
5.2.18 request	20
5.2.19 response	20
5.2.20 subscription	20
5.2.21 task	20
5.2.22 task monitor	20
5.2.23 TCP	20
5.2.24 TLS	21
5.2.25 XSS	21
5.3 Redfish terms	21
5.3.1 collection	21

5.3.2 Redfish client	21
5.3.3 Redfish protocol	21
5.3.4 Redfish schema	21
5.3.5 Redfish service	21
5.3.6 resource	21
5.3.7 resource collection	22
5.3.8 resource tree	22
5.3.9 resource type	22
5.3.10 service root	22
5.3.11 subordinate resource	22
6 Typographical conventions	23
7 Overview	24
7.1 Goals	24
7.2 Design tenets	25
7.3 Limitations	25
7.4 Additional design background and rationale	26
7.4.1 REST-based interface	26
7.4.2 Data-oriented	26
7.4.3 Separation of protocol from data model	26
7.4.4 Hypermedia API service root	26
7.4.5 OpenAPI v3.0 support	26
7.4.6 OData conventions	27
7.5 Service elements	27
7.5.1 Synchronous and asynchronous operation support	27
7.5.2 Eventing mechanism	27
7.5.3 Actions	28
7.5.4 Service discovery	28
7.5.5 Remote access support	28
7.6 Security	28
8 Protocol details	29
8.1 Universal Resource Identifiers	29
8.2 HTTP methods	31
8.3 HTTP redirect	32
8.4 Media types	32
8.5 ETags	32
8.6 Protocol version	33
8.7 Redfish-defined URIs and relative reference rules	34
9 Service requests	36
9.1 Request headers	36
9.2 GET (read requests)	39
9.2.1 GET (read requests) overview	39
9.2.2 Resource collection requests	39
9.2.3 Service root request	40

9.2.4 OData service and metadata document requests	40
9.3 Query parameters	41
9.3.1 Query parameter overview	41
9.3.2 The \$expand query parameter	43
9.3.3 The \$select query parameter	45
9.3.4 The \$filter query parameter	46
9.4 HEAD	47
9.5 Data modification requests	48
9.5.1 Data modification requests overview	48
9.5.2 Modification success responses	48
9.5.3 Modification error responses	49
9.6 PATCH (update)	49
9.7 PATCH on array properties	50
9.8 PUT (replace)	51
9.9 POST (create)	51
9.10 DELETE (delete)	52
9.11 POST (action)	52
9.12 Operation apply time	54
9.13 Deep operations	57
10 Service responses	61
10.1 Response headers	61
10.2 Link header	63
10.3 Status codes	63
10.4 OData metadata responses	66
10.4.1 OData metadata responses overview	66
10.4.2 OData \$metadata	66
10.4.2.1 Referencing other schemas	67
10.4.2.2 Referencing OEM extensions	67
10.4.3 OData service document	68
10.5 Resource responses	68
10.6 Error responses	69
11 Data model	71
11.1 Resources	71
11.2 Resource types	71
11.3 Resource collections	72
11.4 OEM resources	72
11.5 Common data types	73
11.5.1 Primitive types	73
11.5.2 Empty string values	73
11.5.3 GUID and UUID values	74
11.5.4 Date-Time values	74
11.5.5 Duration values	74
11.5.6 Reference properties	75

11.5.7 Non-resource reference properties	75
11.5.8 Array properties	76
11.5.9 Structured properties	76
11.5.10 Message object	77
11.5.10.1 Overview	77
11.5.10.2 Messageld format	78
11.6 Properties	79
11.6.1 Properties overview	79
11.6.2 Resource identifier (@odata.id) property	79
11.6.3 Resource type (@odata.type) property	79
11.6.4 Resource ETag (@odata.etag) property	80
11.6.5 Resource context (@odata.context) property	80
11.6.6 Id	81
11.6.7 Name	81
11.6.8 Description	81
11.6.9 MemberId	81
11.6.10 Count (Members@odata.count) property	81
11.6.11 Members	82
11.6.12 Next link (Members@odata.nextLink) property	82
11.6.13 Links	82
11.6.13.1 Reference to a related resource	82
11.6.13.2 References to multiple related resources	83
11.6.14 Actions property	83
11.6.14.1 Action representation	83
11.6.14.2 Action responses	84
11.6.15 Oem	84
11.6.16 Status	85
11.7 Naming conventions	85
11.7.1 Naming rules	85
11.7.2 URI naming rules	86
11.8 Extending standard resources	87
11.8.1 Extending standard resources overview	87
11.8.2 OEM property format and content	87
11.8.3 OEM-specified object naming	87
11.8.4 OEM resource types	88
11.8.5 OEM registries	88
11.8.6 OEM URIs	89
11.8.7 OEM property examples	89
11.8.8 OEM actions	90
11.9 Payload annotations	91
11.9.1 Payload annotations overview	91
11.9.2 Allowable values	91
11.9.3 Extended information	92

11.9.3.1	Extended object information	92
11.9.3.2	Extended property information	93
11.9.4	Action info annotation	93
11.9.5	Settings and settings apply time annotations	94
11.9.6	Operation apply time and operation apply time support annotations	94
11.9.7	Maintenance window annotation	94
11.9.8	Collection capabilities annotation	95
11.9.9	Requested count and allow over-provisioning annotations	97
11.9.10	Zone affinity annotation	97
11.9.11	Supported certificates annotation	98
11.9.12	Deprecated annotation	98
11.10	Settings resource	98
11.11	Special resource situations	101
11.11.1	Overview	101
11.11.2	Absent resources	101
11.12	Registries	101
11.13	Schema annotations	102
11.13.1	Schema annotations overview	102
11.13.2	Description annotation	102
11.13.3	Long description annotation	103
11.13.4	Resource capabilities annotation	103
11.13.5	Resource URI patterns annotation	103
11.13.6	Additional properties annotation	104
11.13.7	Permissions annotation	105
11.13.8	Required annotation	105
11.13.9	Required on create annotation	105
11.13.10	Units of measure annotation	105
11.13.11	Expanded resource annotation	105
11.13.12	Owning entity annotation	106
11.13.13	Deprecated annotation	106
11.14	Versioning	106
11.15	Localization	107
12	File naming and publication	108
12.1	Registry file naming	108
12.2	Profile file naming	108
12.3	Dictionary file naming	108
12.4	Localized file naming	108
12.5	DMTF Redfish file repository	109
13	Schema definition languages	111
13.1	OData Common Schema Definition Language	111
13.1.1	OData Common Schema Definition Language overview	111
13.1.2	File naming conventions for CSDL	111
13.1.3	Core CSDL files	111

13.1.4 CSDL format	112
13.1.4.1 Referencing other CSDL files	112
13.1.4.2 CSDL data services	113
13.1.5 Elements of CSDL namespaces	113
13.1.5.1 Qualified names	114
13.1.5.2 Entity type and complex type elements	114
13.1.5.3 Action element	115
13.1.5.4 Action element for OEM actions	116
13.1.5.5 Action with a response body	116
13.1.5.6 Property element	117
13.1.5.7 Navigation property element	118
13.1.5.8 Enum type element	118
13.1.5.9 Annotation element	119
13.2 JSON Schema	122
13.2.1 JSON Schema overview	122
13.2.2 File naming conventions for JSON Schema	122
13.2.3 Core JSON Schema files	122
13.2.4 JSON Schema format	123
13.2.5 JSON Schema definitions body	123
13.2.5.1 Resource definitions in JSON Schema	123
13.2.5.2 Enumerations in JSON Schema	124
13.2.5.3 Actions in JSON Schema	125
13.2.5.4 OEM actions in JSON Schema	126
13.2.5.5 Action with a response body	127
13.2.6 JSON Schema terms	128
13.3 OpenAPI	129
13.3.1 OpenAPI overview	129
13.3.2 File naming conventions for OpenAPI schema	129
13.3.3 Core OpenAPI schema files	129
13.3.4 openapi.yaml	130
13.3.5 OpenAPI file format	132
13.3.6 OpenAPI components body	132
13.3.6.1 Resource definitions in OpenAPI	132
13.3.6.2 Enumerations in OpenAPI	133
13.3.6.3 Actions in OpenAPI	133
13.3.6.4 OEM actions in OpenAPI	135
13.3.7 OpenAPI terms used by Redfish	135
13.4 Schema modification rules	136
14 Service details	138
14.1 Eventing	138
14.1.1 Eventing overview	138
14.1.2 POST to subscription collection	138
14.1.3 Open an SSE connection	139

14.1.4	EventType-based eventing	140
14.1.5	Subscribing to events	140
14.1.6	Event formats	141
14.1.7	OEM extensions	142
14.2	Asynchronous operations	142
14.3	Resource tree stability	144
14.4	Discovery	144
14.4.1	Discovery overview	144
14.4.2	UPnP compatibility	145
14.4.3	USN format	145
14.4.4	M-SEARCH response	145
14.4.5	Notify, alive, and shutdown messages	146
14.5	Server-sent events	146
14.5.1	General	146
14.5.2	Event service	147
14.5.2.1	Event message SSE stream	149
14.5.2.2	Metric report SSE stream	150
14.6	Update service	151
14.6.1	Overview	151
14.6.2	Software update types	151
14.6.2.1	Simple updates	151
14.6.2.2	Multipart HTTP push updates	151
15	Security details	154
15.1	Transport Layer Security (TLS) protocol	154
15.1.1	Transport Layer Security (TLS) protocol overview	154
15.1.2	Cipher suites	154
15.1.3	Certificates	155
15.2	Sensitive data	155
15.3	Authentication	155
15.3.1	Authentication overview	155
15.3.2	Authentication requirements	156
15.3.2.1	Resource and operation authentication requirements	156
15.3.2.2	HTTP header authentication requirements	156
15.3.2.3	Authentication failure requirements	156
15.3.3	HTTP Basic authentication	157
15.3.4	Redfish session login authentication	157
15.3.4.1	Redfish login sessions	157
15.3.4.2	Session login	158
15.3.4.3	Session lifetime	159
15.3.4.4	Session termination or logout	159
15.4	Authorization	159
15.4.1	Authorization overview	159
15.4.2	Privilege model	160

15.4.2.1 Roles	160
15.4.2.2 Restricted roles and restricted privileges	161
15.4.2.3 OEM privileges	162
15.4.3 Redfish service operation-to-privilege mapping	162
15.4.3.1 Why specify operation-to-privilege mapping?	162
15.4.3.2 Representing operation-to-privilege mappings	162
15.4.3.3 Operation map syntax	163
15.4.3.4 Mapping overrides syntax	164
15.4.3.5 Property override example	164
15.4.3.6 Subordinate override	165
15.4.3.7 Resource URI override	166
15.4.3.8 Privilege AND and OR syntax	167
15.5 Account service	168
15.5.1 Account service overview	168
15.5.2 Password management	168
15.5.3 Password change required handling	169
15.6 Asynchronous tasks	169
15.7 Event subscriptions	169
16 Redfish Host Interface	170
17 Redfish composability	171
17.1 Composition requests	172
17.1.1 Composition requests overview	172
17.1.2 Specific composition	172
17.1.3 Constrained composition	173
17.1.4 Expandable resources	174
17.2 Updating a composed resource	174
18 Aggregation	175
18.1 Classes of aggregators	175
18.1.1 Implicit and complex aggregators	175
18.1.2 Use cases	176
18.2 Aggregation service	176
18.2.1 Aggregation service overview	176
18.2.2 Aggregator requirements	176
18.2.3 Aggregates	177
18.2.4 Aggregation sources and connection methods	177
19 ANNEX A (informative) Change log	179
20 Bibliography	192