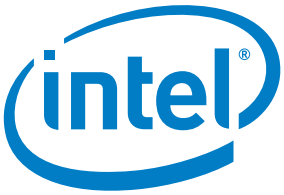

Intel® Rack Scale Design (Intel® RSD) Storage Services

API Specification
Software v2.3.2

September 2018

Revision 003US

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Revision History

Revision	Description	Date
003US	Intel® RSD minor software v2.3.2 release • Updated Section 4.12 paragraph table references • Updated table 25, 45 and 46 titles	September 2018
002US	Minor updates to the Intel® RSD Storage Services software v2.3.1	July 2018
001US	Initial release for Intel® RSD Storage Services software v2.3.	May 2018

§

1.0 Introduction

1.1 Scope

The *Intel® Rack Scale Design (Intel® RSD) Storage Services Software v2.3.2* API specification defines the interface to the Intel® RSD Storage Services module to support the discovery, composability, and manageability of Intel® RSD drawers. It covers the functionality designed and implemented in the Intel® RSD Software v2.3.2.

The interfaces specified in this document are based on the *Distributed Management Task Force's (DMTF) Redfish* Interface Specification and Schema v2017.3* and *Storage Networking Industry Association (SNIA) Swordfish* Version 1.0.4* (refer to Table 2).

1.2 Intended Audience

The intended audience for this document includes designers and engineers working with the Intel® RSD Software v2.3.2 release, such as:

- Independent software vendors (ISVs) of POD Management software, who make use of the storage service API to discover, compose, and manage Rack Scale drawers, regardless of the hardware vendor and/or manage drawers in a multivendor environment.
- Software vendors (OxMs) who implement storage services software for hardware platforms, providing Intel® RSD-compliant systems.

1.3 Conventions

The key words/phrases "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119, refer to Table 2.

1.4 Notes and Symbol Conventions

Symbol and note conventions are similar to typographical conventions used in the Cloud Infrastructure Management Interface (CIMI) specification (refer to Table 2). Notation used in JavaScript* Object Notation (JSON*) serialization description:

- Values in *italics* indicate data types instead of literal values.
- Characters are appended to items to indicate cardinality, as follows:
  - ? (0 or 1)
  - * (0 or more)
  - + (1 or more)
- Vertical bars, |, denote choice. For example, a|b means a choice between a and b.
- Parentheses, ( ), indicate the scope of the operators ?, *, +, and |.
- Ellipses, ..., indicate points of extensibility. The lack of an ellipsis does not mean no extensibility point exists; rather, it is just not explicitly called out.

Note: The lack of ellipses doesn't mean no extensibility point exists; it's just not explicitly called out.

1.5 Terminology

Table 1. Terminology

Term	Definition
API	Application Programming Interface
BMC	Baseboard Management Controller
CIMI	Cloud Infrastructure Management Interface
CRC	Cyclic Redundancy Check
ECC	Error-correcting Code
HTTP	Hypertext Transfer Protocol
IETF	Internet Engineering Task Force
iQN	ISCSI Qualified Name Format Defined in RFC3720 and RFC3721
iSCSI	Internet Small Computer Systems Interface. Specification Available at RFC3720 and RFC3721
ISV	Independent Software Vendor
JSON	JavaScript Object Notation
LBA	Logical Block Addressing
LUN	Logical Unit Number
NQN	NVMe Qualified Name
NVMe	Non-Volatile Memory Express
Odata*	Open Data Protocol*
OEM	Original Equipment Manufacturer
POD	Physical collection of multiple racks
PODM	POD Manager
PSME	Pooled System Management Engine
PXE	Pre-boot Execution
REST	Representational State Transfer
SKU	Stock Keeping Unit
SSDP	Simple Service Discovery Protocol
URI	Uniform Resource Identifier
UUID	Universally Unique Identifier

1.6 References

Table 2. Reference Documents and Resources

Doc ID	Title	Location
337196	*Intel® Rack Scale Design (Intel® RSD) Pooled System Management Engine (PSME) User Guide Software v2.3.2*	*http://www.intel.com/intelRSD*
337197	*Intel® Rack Scale Design (Intel® RSD) Conformance and Software Reference Kit Getting Started Guide Software v2.3.2*	
337198	*Intel® Rack Scale Design (Intel® RSD) POD Manager (PODM) Release Notes Software v2.3.2*	
337199	*Intel® Rack Scale Design (Intel® RSD) POD Manager (PODM) Representational State Transfer (RESTful) User Guide Software v2.3.2*	
337200	*Intel® Rack Scale Design (Intel® RSD) Pooled System Management Engine (PSME) Release Notes Software v2.3.2*	
337201	*Intel® Rack Scale Design (Intel® RSD) Firmware Extension Specification Software v2.3.2*	
337202	*Intel® Rack Scale Design (Intel® RSD) Storage Services API Specification Software v2.3.2*	

Doc ID	Title	Location
337203	*Intel® Rack Scale Design (Intel® RSD) Architecture Specification Software v2.3.2*	
337204	*Intel® Rack Scale Design (Intel® RSD) POD Manager (PODM) Representational State Transfer (RESTful) API Specification Software v2.3.2*	
337205	*Intel® Rack Scale Design (Intel® RSD) Rack Management Module (RMM) Representational State Transfer (RESTful) API Specification Software v2.3.2*	
337206	*Intel® Rack Scale Design (Intel® RSD) Generic Assets Management Interface (GAMI) API Software v2.3.2*	
337207	*Intel® Rack Scale Design (Intel® RSD) Pooled System Management Engine (PSME) Representational State Transfer (RESTful) API Specification Software v2.3.2*	
DSP0263	*Cloud Infrastructure Management Interface (CIMI) specification*	*https://www.dmtf.org/sites/default/files/standards/documents/DSP0263_1.0.1.pdf*
DSP0266	*Redfish Scalable Platforms Management API Specification v1.4.0*	*https://www.dmtf.org/sites/default/files/DSP0266_1.4.0.pdf*
DSP8010	*Distributed Management Task Force's Redfish* Interface Specification and Schema Version 2016.3*	*https://www.dmtf.org/sites/default/files/standards/documents/DSP8010_2016.3.zip*
DSP8010	*Storage Networking Industry Association (SNIA) Swordfish* Version 1.4.0*	*https://www.dmtf.org/sites/default/files/DSP0266_1.4.0.pdf*
RFC114	*A File Transfer Protocol*	*https://ietf.org/rfc/rfc114.txt*
RFC1813	*NFS Version 3 Protocol Specification*	*https://ietf.org/rfc/rfc1813.txt*
RFC2068	*Hypertext Transfer Protocol -- HTTP/1.1*	*https://ietf.org/rfc/rfc2068.txt*
RFC2119	*Key Words for Use in RFCs to Indicate Requirement Levels, March 1997*	*https://ietf.org/rfc/rfc2119.txt*
RFC2616	*Hypertext Transfer Protocol -- HTTP/1.1 (Obsoletes RFC2068)*	https://ietf.org/rfc/rfc2616.txt
RFC3720	*Internet Small Computer Systems Interface (iSCSI)*	https://ietf.org/rfc/rfc3720.txt
RFC3721	*Internet Small Computer Systems Interface (iSCSI) Naming and Discovery*	https://ietf.org/rfc/rfc3721.txt
RFC4122	*A Universally Unique IDentifier (UUID) URN Namespace*	https://www.ietf.org/rfc/rfc4122.txt
RFC5042	*Direct Data Placement Protocol (DDP)/Remote Direct Memory Access Protocol (RDMAP) Security*	https://ietf.org/rfc/rfc5042.txt
RFC5043	*Stream Control Transmission Protocol (SCTP) Direct Data Placement (DDP) Adaptation*	https://ietf.org/rfc/rfc5043.txt
RFC5044	*Marker PDU Aligned Framing for TCP Specification*	https://ietf.org/rfc/rfc5044.txt
RFC5246	*The Transport Layer Security (TLS) Protocol Version 1.2*	https://ietf.org/rfc/rfc5246.txt
RFC6176	*Prohibiting Secure Sockets Layer (SSL) Version 2.0*	https://ietf.org/rfc/rfc6176.txt
NA	*Hypertext Transfer Protocol – HTTP/1.1*	https://dmtf.org/sites/default/files/standards/documents/DSP0266_1.1.0.pdf
N/A	*Date and time format - ISO 8601*	*https://www.iso.org/iso-8601-date-and-time-format.html*
NA	*IETF* Internet Small Computer Systems Interface (iSCSI) Specification.*	https://tools.ietf.org/html/rfc7143

Doc ID	Title	Location
NA	*NVM Express* over Fabric Specification* (PDF)	*www.nvmexpress.org/wp-content/uploads/NVMe_Over_Fabrics.pdf*
NA	*NVMe Base Specification*	*www.nvmexpress.org*
NA	*NVMe Base Specification, NVMe Qualified Name Section 7.9*	*www.nvmexpress.org/specifications*

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2.0 Intel® RSD Storage Services Application Programming Interface (API)

2.1 API Structure and Relations

The Intel® RSD Storage Services API provides a representational state transfer (REST)-based interface that allows full management of the storage system, including asset discovery and configuration.

Figure 1 shows the API resource hierarchy. Figure 2 shows the resource connections and relations in the storage service API. Table 3 describes the API Resources and Uniform Resource Identifiers (URIs).

Figure 1. Hierarchy

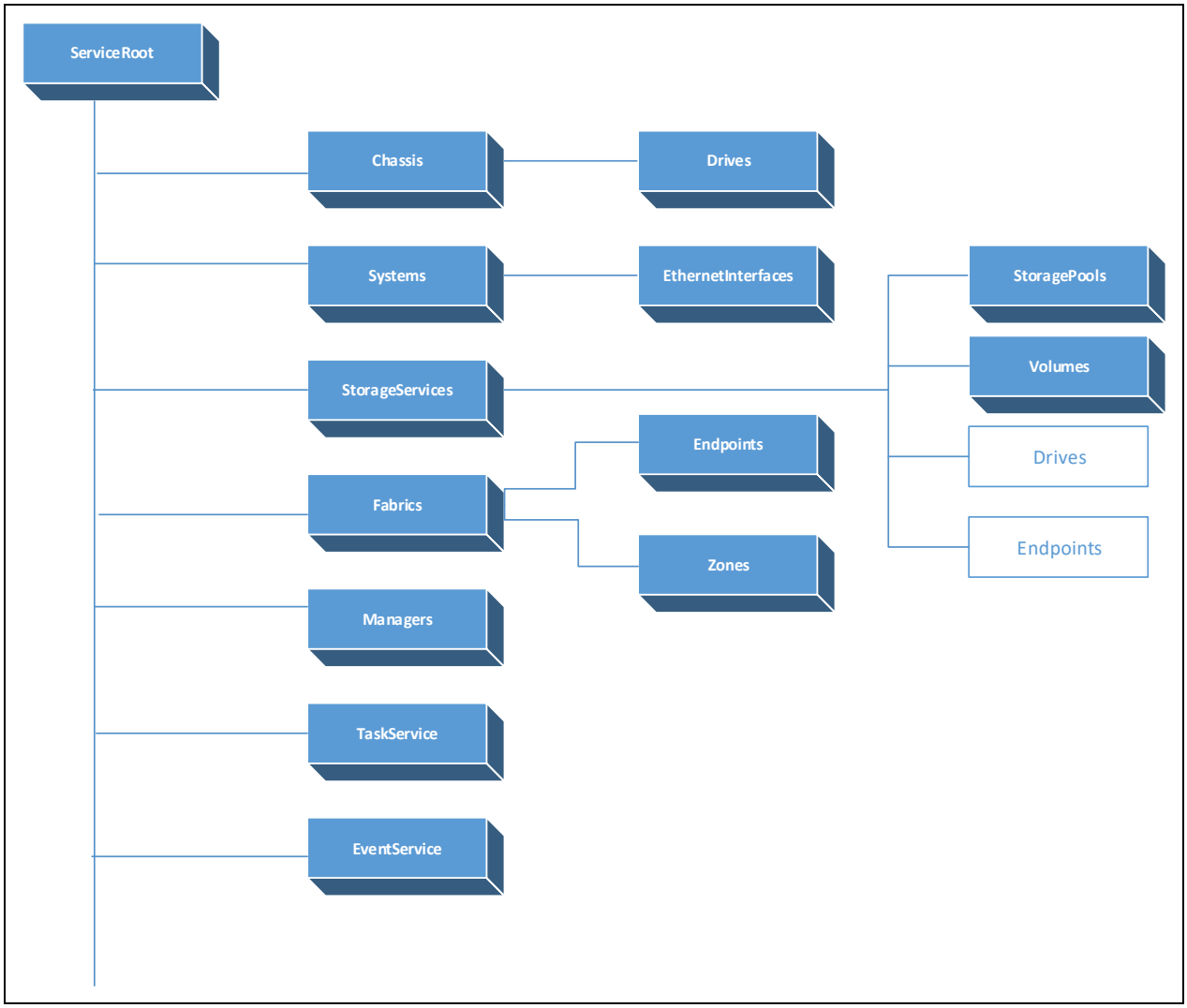

Figure 2. Relations

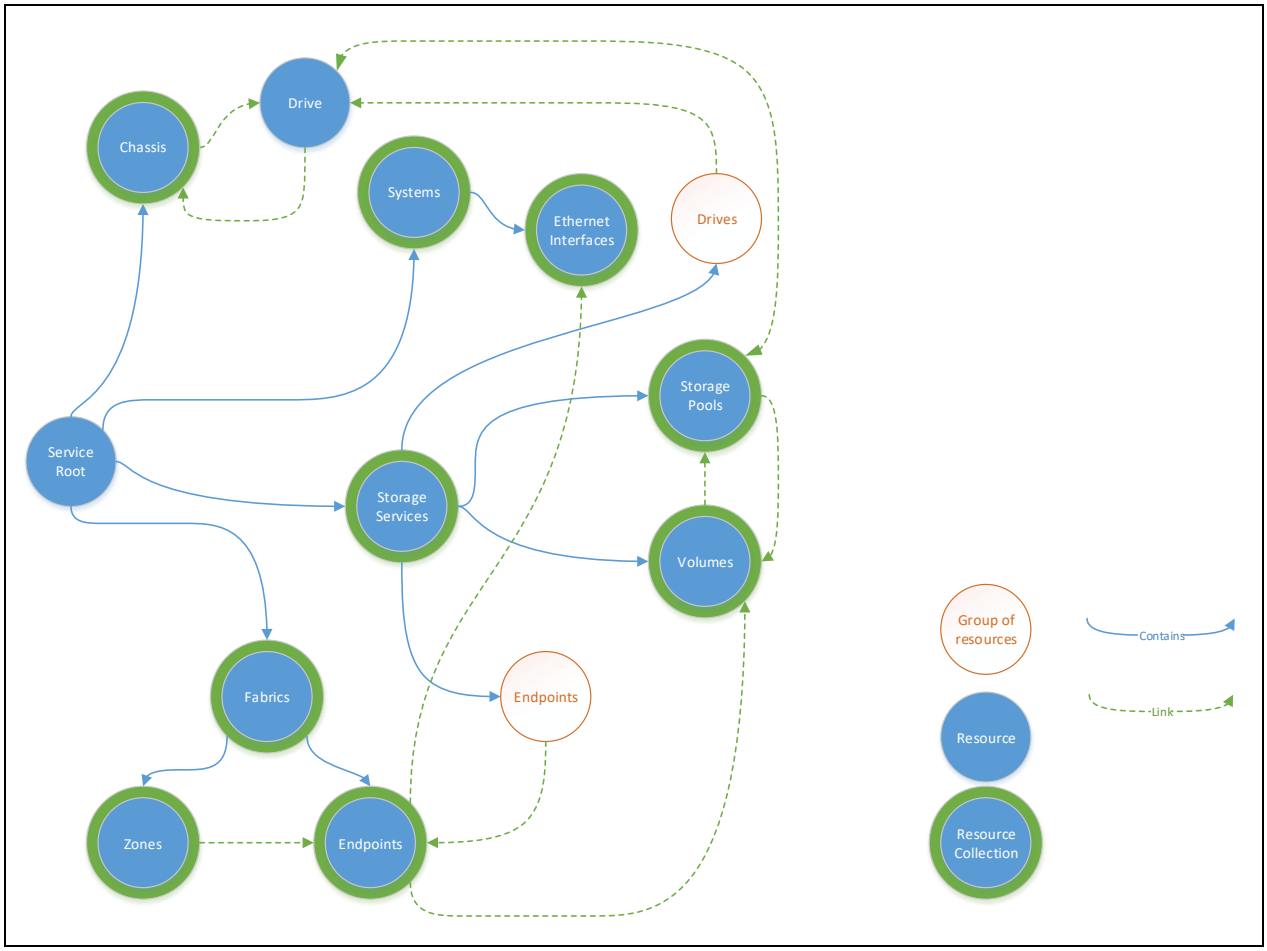

Table 3. API Resources and URIs

Resource	Schema Version	OEM Extended	URI
Chassis	V1_3_0	Yes	/redfish/v1/Chassis/{chassisID}
Chassis Collection		No	/redfish/v1/Chassis
Computer Systems	V1_2_0	Yes	/redfish/v1/Systems/{systemID}
Computer Systems Collection		No	/redfish/v1/Systems
Drive Metrics	V1_0_0	No	/redfish/v1/Chassis/{chassisID}/Drives/{driveID}/Metrics
Drives	V1_1_1	Yes	/redfish/v1/Chassis/{chassisID}/Drives/{driveID}
Endpoints	V1_1_0	Yes	/redfish/v1/Fabrics/{fabricID}/Endpoints/{endpointID}
Endpoints Collection			/redfish/v1/Fabrics/{fabricID}/Endpoints
Ethernet Interfaces	V1_1_0	Yes	/redfish/v1/Systems/{systemID}/EthernetInterfaces/{nicID}

Resource	Schema Version	OEM Extended	URI
Ethernet Interfaces Collection			/redfish/v1/Systems/{systemID}/EthernetInterfaces /redfish/v1/Managers/{managerID}/EthernetInterfaces
Event Service	V1_0_0	No	/redfish/v1/EventService
Event Subscriptions	V1_1_1	No	/redfish/v1/EventService/Subscriptions/{subscriptionID}
Event Subscriptions Collection			/redfish/v1/EventService/Subscriptions
Fabrics	V1_0_0	No	/redfish/v1/Fabrics/{fabricID}
Fabrics Zones	V1_0_0	No	/redfish/v1/Fabrics/{fabricID}/Zones/{zoneID}
Fabrics Zones Collection			/redfish/v1/Fabrics/{fabricID}/Zones
Fabrics Collection			/redfish/v1/Fabrics
Managers	V1_2_0	No	/redfish/v1/Managers/{managerID}
Managers Collection			/redfish/v1/Managers
Memory Collection			/redfish/v1/Systems/{systemID}/Memory
Network Interfaces Collection			/redfish/v1/Systems/{systemID}/NetworkInterfaces
Network Protocol	V1_0_0	No	/redfish/v1/Managers/{managerID}/NetworkProtocol
Processors Collection		No	/redfish/v1/Systems/{systemID}/Processors
Service Root	v1_1_1	Yes	/redfish/v1
Storage Pools	v1_0_0	No	[/redfish/v1/StorageServices/{serviceId}/{storageId}/StoragePools/{poolId}]
Storage Pools Collection			/redfish/v1/StorageServices/{storageId}/StoragePools
Storage Services	v1_0_0	No	/redfish/v1/StorageServices/{serviceId}
Storage Services Collection			/redfish/v1/StorageServices/
Storage Subsystem Collection			/redfish/v1/Systems/{systemID}/Storage
Tasks	V1_0_0	No	/redfish/v1/TaskService/Tasks/{taskID}
Tasks Collection			/redfish/v1//TaskService/Tasks
Tasks Service	V1_0_0	No	/redfish/v1/TaskService
Volume	v1_0_0	No	/redfish/v1/StorageServices/{serviceId}/Volumes/{volumeId}
Volumes Metrics	v1_0_0	No	/redfish/v1/StorageServices/{serviceId}/Volumes/{volumeId}/Metrics
Volumes Collection			/redfish/v1/StorageServices/Volumes

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3.0 REST API Error Codes

This section contains descriptions of the error codes that can be returned by the REST calls implemented in the Storage Services REST API of the Intel® RSD v2.3.2 release.

3.1 API Error Response

In case of an error, the Storage Services REST API responds with a Hypertext Transfer Protocol (HTTP) status code, as defined by the HTTP 1.1 specification and constrained by additional requirements defined in this specification. HTTP response status codes alone often do not provide enough information to enable deterministic error semantics. Storage Services REST API returns extended error information as a JSON object with a single property named `"error"`. The value of the property shall be a JSON object with the properties shown in Table 4.

Table 4. API Error Response Attributes

Attribute	Description
`code`	A string indicating a specific `MessageId` from the message registry. `"Base.1.0.GeneralError"` should be used only when no other message is better.
`message`	A human-readable error message corresponding to the message in the message registry.
`@Message.ExtendedInfo`	An array of message objects describing one or more error message(s).

3.1.1 Message Object

Message objects provide additional information about an object, property, or error response. Messages are represented as JSON objects with the properties shown in Table 5.

Table 5. Message Object Attributes

Attribute	Description
`MessageId`	String indicating a specific error or message (not to be confused with the HTTP status code). This code can be used to access a detailed message from a message registry.
`Message`	A human-readable error message indicating the semantics associated with the error. This is the complete message and does not rely on substitution variables.
`MessageArgs`	An optional array of strings representing the substitution parameter values for the message. This is included in the response if a `MessageId` is specified for a parameterized message.
`Severity`	An optional string representing the severity of an error.
`Resolution`	An optional string describing recommended action(s) to take to resolve an error.
`RelatedProperties`	An optional array of JSON pointers defining the specific properties in a JSON payload described by the message.

3.1.2 Example Error JSON Object

```
{
    "error": {
        "code": "Base.1.0.GeneralError",
        "message": "A general error has occurred. See ExtendedInfo for more
information.",
        "@Message.ExtendedInfo": [
            {
                "@odata.type" : "/redfish/v1/$metadata#Message.v1_0_0.Message",
                "MessageId": "Base.1.0.MalformedJSON",
```

```
                "Message": "The request body submitted was malformed JSON and could
not be parsed by the receiving service",
                "Severity": "Error"
            },
            {
                "@odata.type" : "/redfish/v1/$metadata#Message.v1_0_0.Message",
                "MessageId": "Base.1.0.PropertyNotWriteable",
                "RelatedProperties": [
                    "#/Name"
                ],
                "Message": "The property Name is a read only property and cannot be
assigned a value",
                "MessageArgs": [
                    "Name"
                ],
                "Severity": "Warning",
                "Resolution": "Remove the property from the request body and resubmit
the request if the operation failed"
            }
        ]
    }
}
```

3.2 API Error Codes

If an error is not described in any of the following tables, mapped it as an HTTP 500 Internal Error code.

3.2.1 General Error Codes

For a detailed list of error codes, review the *Redfish Scalable Platforms Management API Specification* (refer to Table 2). The client should be prepared to handle the error codes shown in Table 6.

Table 6. HTTP Error Status Codes

HTTP Status Code	Description
400 Bad Request	The request could not be processed because it contains missing or invalid information (such as validation error on an input field, a missing required value, and so on). An extended error shall be returned in the response body.
404 Not Found	The request specified a URI of a resource that does not exist.
405 Method Not Allowed	The HTTP verb specified in the request (for example, DELETE, GET, HEAD, POST, PUT, PATCH) is not supported for the request URI. The response shall include an Allow header, which provides a list of methods supported by the resource identified by the request URI.
409 Conflict	A creation or update request could not be completed, because it would cause a conflict in the current state of the resources supported by the platform (for example, an attempt to set multiple attributes that work in a linked manner using incompatible values).
500 Internal Server Error	The server encountered an unexpected condition that prevented it from fulfilling the request. An extended error shall be returned in the response body.
501 Not Implemented	The server does not (currently) support the functionality required to fulfill the request. This is the appropriate response when the server does not recognize the request method and is not capable of supporting it for any resource.
503 Service Unavailable	The server is currently unable to handle the request due to temporary overloading or maintenance of the server.

3.2.2 PATCH Method Error Codes

For the PATCH method error codes, the Intel® RSD service conforms to the IETF RFC5789 standard. The service responds with following error codes in the cases listed:

- **400 Bad Request**—Malformed .JSON in the request (such as values are not in range, an unknown property, and so on).
- **405 Method Not Allowed**—Resource does not support the PATCH method.
- **409 Conflict**—Update cannot be executed at the moment. User might be able to resolve the conflict and resubmit the request.
- **501 Not Implemented**—Resource supports the PATCH method, but current implementation does not (for example, underlying hardware does not support the functionality).
- **500 Internal Server Error**—All other situations in which the previous codes do not fit (for instance, underlying hardware does not allow to execute a particular request).

§

4.0 REST API Definition

The JSON examples in this document are informative, not normative. Metadata files referenced in this specification are normative.

4.1 Odata Support

Intel® RSD supports Open Data Protocol (Odata)* v4.0 as it is defined in *Redfish* Scalable Platforms Management API Specification* (refer to Table 2).

All resources in this REST API are identified by a unique identifier property named `"@odata.id"`. Resource identifiers shall be represented in JSON payloads as URI paths relative to the Redfish Schema portion of the URI. For example, they shall always start with `"/redfish/"`. The resource identifier is the canonical URL for the resource and can be used to retrieve or edit the resource, as appropriate.

4.2 Asynchronous Operations

While the majority of operations in this architecture are synchronous in nature, some operations can take a long time to execute, more time than a client typically wants to wait. For this reason, some operations can be asynchronous at the discretion of the service. The request portion of an asynchronous operation is no different from the request portion of a synchronous operation.

The use of HTTP response codes enable a client to determine if an operation is completed synchronously or asynchronously. Clients shall be prepared to handle both synchronous and asynchronous responses for requests using HTTP DELETE, POST, PATCH, and PUT methods.

For details, review *the Redfish Scalable Platforms Management API Specification* (refer to Table 2).

4.3 Protocol Version

The protocol version is separate from the version of the resources or the version of the Redfish Schema supported by them. Each version of the Redfish protocol is strongly typed. This is accomplished using the URI of the Redfish service in combination with the resource obtained at that URI, called the `ServiceRoot`.

The root URI for this version of the Redfish protocol shall be `"/redfish/v1/"`.

While the major version of the protocol is represented in the URI, the major version, minor version, and errata version of the protocol are represented in the version property of the `ServiceRoot` resource, as defined in the Redfish Schema for that resource. The protocol version is a string in the form:

`MajorVersion.MinorVersion.Errata`

Where:

- `MajorVersion` = integer: something in the class changed in a backwards incompatible way.
- `MinorVersion` = integer: a minor update. New functionality may have been added but nothing was removed. Compatibility is preserved with previous minor versions.
- `Errata` = integer: something in the prior version was broken and needed to be fixed.

Any resource discovered through links found by accessing the root service, or any service or resource referenced using references from the root service, shall conform to the same version of the protocol supported by the root service.

4.3.1 Operations

4.3.1.1 GET

Request:

```
GET /redfish
Content-Type: application/json
```

Response:

```
{
  "v1": "/redfish/v1/"
}
```

4.4 Odata Service Document

The Odata service document provides a standard format for enumerating the resources exposed by the service, enabling generic hypermedia-driven Odata clients to navigate to the resources of the service.

4.4.1 Operations

4.4.1.1 GET

Request:

```
GET /redfish/v1/odata
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata",
  "value": [
    {
      "name": "Service",
      "kind": "Singleton",
      "url": "/redfish/v1/"
    },
    {
      "name": "Systems",
      "kind": "Singleton",
      "url": "/redfish/v1/Systems"
    },
    {
      "name": "Chassis",
      "kind": "Singleton",
      "url": "/redfish/v1/Chassis"
    },
    {
      "name": "Managers",
      "kind": "Singleton",
      "url": "/redfish/v1/Managers"
    },
    {
      "name": "StorageServices",
      "kind": "Singleton",
      "url": "/redfish/v1/StorageServices"
```

```
    },
    {
      "name": "EventService",
      "kind": "Singleton",
      "url": "/redfish/v1/EventService"
    },
    {
      "name": "Tasks",
      "kind": "Singleton",
      "url": "/redfish/v1/TaskService"
    },
    {
      "name": "Registries",
      "kind": "Singleton",
      "url": "/redfish/v1/Registries"
    },
    {
      "name": "Fabrics",
      "kind": "Singleton",
      "url": "/redfish/v1/Fabrics"
    }
  ]
}
```

4.5 Intel® RSD Original Equipment Manufacturer (OEM) Extensions

All Intel® RSD original equipment manufacturer (OEM) extensions to all resources defined in this document shall be supported.

4.6 Service Root

The service root resource is an entry point. Properties details are available in the `ServiceRoot.xml` metadata file. OEM extensions details are available in `IntelRackScaleOem.xml`. Table 7 shows the `ServiceRoot` attributes. Table 8 shows the `ServiceRoot` OEM extensions.

Table 7. ServiceRoot Attributes

Attribute	Type	Nullable	Description
`RedfishVersion`	Edm.String	False	The value of the string shall represent the version of the Redfish service. The format of this string shall be of the format `majorversion.minorversion.errata` in compliance with the Protocol Version section of the Redfish specification.
`UUID`	Resource.UUID	True	The value of the string shall represent the ID of the Redfish service instance. The format of this string shall be a 32-byte value in the form 8-4-4-4-12. If Simple Service Discovery Protocol (SSDP) is used, this value shall be an exact match of the Universally Unique IDentifier (UUID) value returned in a 200OK from an SSDP M-SEARCH request during discovery. *A UUID URN Namespace*, RFC4122, Table 2 describes methods that can be used to create a UUID value. The value should be considered opaque. Client software should only treat the overall value as a universally unique identifier and should not interpret any subfields within the UUID.

Attribute	Type	Nullable	Description
Links	ServiceRoot.v1_0_0.Links	False	The Links property, as described by the Redfish Specification, shall contain references to resources that are related to, but not contained by (subordinate to), the resource.
Systems	ComputerSystemCollection.ComputerSystemCollection	False	This object shall only contain a reference to a collection of resources that comply with the Systems schema.
Chassis	ChassisCollection.ChassisCollection	False	This object shall only contain a reference to a collection of resources that comply with the Chassis schema.
Managers	ManagerCollection.ManagerCollection	False	This object shall only contain a reference to a collection of resources that comply with the Managers schema.
Tasks	TaskService.TaskService	False	The classes' structure shall only contain a reference to a resource that complies with the TaskService schema.
SessionService	SessionService.SessionService	False	The classes' structure shall only contain a reference to a resource that complies with the SessionService schema.
AccountService	AccountService.AccountService	False	The classes' structure shall only contain a reference to a resource that complies with the AccountService schema.
EventService	EventService.EventService	False	The classes' structure shall only contain a reference to a resource that complies with the EventService schema.
Registries	MessageRegistryFileCollection.MessageRegistryFileCollection	False	This object shall contain a reference to the Message Registry.
JsonSchemas	JsonSchemaFileCollection.JsonSchemaFileCollection	False	This object shall only contain a reference to a collection of resources that comply to the SchemaFile schema, where the files are Json-Schema files.
StorageServices	StorageServiceCollection.StorageServiceCollection	False	The referenced collection shall contain references to all StorageService instances.
Fabrics	FabricCollection.FabricCollection	False	The referenced collection shall contain references to all Fabric instances.
UpdateService	UpdateService.UpdateService	False	The classes' structure shall only contain a reference to a resource that complies with the UpdateService schema.
TelemetryService	TelemetryService.TelemetryService	False	The value shall be a link to the TelemetryService.

Intel® RSD OEM extensions:

Table 8. ServiceRoot Attributes (OEM Extensions)

Attribute	Type	Nullable	Description
ApiVersion	Edm.String	False	Version of Intel® RSD API exposed by this service.
EthernetSwitches	EthernetSwitchCollection.EthernetSwitchCollection	True	The classes' structure shall only contain a reference to a resource that complies with the EthernetSwitch schema.

4.6.1 Operations

4.6.1.1 GET

Request:

```
GET /redfish/v1
Content-Type: application/json
```

Response:


```
{
  "@odata.context": "/redfish/v1/$metadata#ServiceRoot",
  "@odata.id": "/redfish/v1",
  "@odata.type": "#ServiceRoot.v1_0_0.ServiceRoot",
  "Id": "RootService",
  "Name": "Root Service",
  "Description": "description-as-string",
  "RedfishVersion": "1.0.2",
  "UUID": "92384634-2938-2342-8820-489239905423",
  "Systems": {
    "@odata.id": "/redfish/v1/Systems"
  },
  "Chassis": {
    "@odata.id": "/redfish/v1/Chassis"
  },
  "Managers": {
    "@odata.id": "/redfish/v1/Managers"
  },
  "EventService": {
    "@odata.id": "/redfish/v1/EventService"
  },
  "TelemetryService": {
    "@odata.id": "/redfish/v1/TelemetryService"
  },
  "StorageServices": {
    "@odata.id": "/redfish/v1/StorageServices"
  },
  "Fabrics": {
    "@odata.id": "/redfish/v1/Fabrics"
  },
  "Tasks": {
    "@odata.id": "/redfish/v1/TaskService"
  },
  "Registries": {
    "@odata.id": "/redfish/v1/Registries"
  },
  "Oem": {
    "Intel_RackScale": {
      "@odata.type": "#Intel.Oem.ServiceRoot",
      "ApiVersion": "2.3.0"
    }
  },
  "Links": {}
}
```


4.6.1.2 PUT

The PUT operation is not allowed on service root resource.

4.6.1.3 PATCH

The PATCH operation is not allowed on service root resource.

4.6.1.4 POST

The POST operation is not allowed on service root resource.

4.6.1.5 DELETE

The DELETE operation is not allowed on service root resource.

4.7 Storage Service Collection

This resource represents a collection of storage services. Properties details are available in `StorageServiceCollection.xml` metadata file. Table 9 shows the `StorageServiceCollection` attribute.

Table 9. StorageServiceCollection Attribute

Attribute	Type	Nullable	Description
`Members`	Collection(StorageService.v1_0_0.StorageService)	True	The referenced collection shall contain references to all `StorageService` instances.

4.7.1 Operations

4.7.1.1 GET

Request:

```
GET /redfish/v1/StorageServices
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#StorageService.StorageService",
  "@odata.id": "/redfish/v1/StorageServices",
  "@odata.type": "#StorageServiceCollection.StorageServiceCollection",
  "Name": "Storage Services Collection",
  "Description": "Storage Service Collection",
  "Members@odata.count": 1,
  "Members": [
    {
      "@odata.id": "/redfish/v1/StorageServices/NVMeoE1"
    }
  ]
}
```

4.7.1.2 PUT

The PUT operation is not allowed on the storage service collection resource.

4.7.1.3 PATCH

The PATCH operation is not allowed on the storage service collection resource.

4.7.1.4 POST

The POST operation is not allowed on the storage service collection resource.

4.7.1.5 DELETE

The DELETE operation is not allowed on the storage service collection resource.

4.8 Storage Service

The storage service is a collection of resources that the system can make available to one or more host systems. The collection can contain block, file, or object storage and local system access points through which the collection is made available—hosts or host access points to which the collection is made available.

Details of this resource are described in the `Drive.xml` metadata file. OEM extensions details are available in `StorageService.xml`. Table 10 shows the `StorageService` attributes, and Table 11 describes the `StorageServiceLinks` attribute for OEM extensions.

Table 10. StorageService Attributes

Attribute	Type	Nullable	Description
`Identifier`	Resource.v1_1_0.Identifier	True	The value identifies the resource. The value shall be unique in the managed ecosystem.
`Status`	Resource.Status	True	Resource status.
`Links`	StorageService.v1_0_0.Links	False	Contains links to other resources related to this resource.
`Actions`	StorageService.v1_0_0.Actions	False	The `Actions` property shall contain the available actions for the resource.
`Volumes`	VolumeCollection.VolumeCollection	False	An array of references to volumes managed by the storage service.
`StoragePools`	StoragePoolCollection.StoragePoolCollection	False	An array of references to `StoragePools`.
`Drives`	DriveCollection.DriveCollection	False	A collection that indicates all the drives managed by the storage service.
`Endpoints`	EndpointCollection.EndpointCollection	False	The value of each entry in the array shall reference an `Endpoint` managed by this service.
`StorageSubsystems`	StorageCollection.StorageCollection	False	The value shall be a link to a collection of type `StorageCollection` having members that represent storage subsystems managed by the storage service.

Intel® RSD OEM extensions:

Table 11. StorageService Links Attribute (OEM Extensions)

Attribute	Type	Nullable	Description
`ManagedBy`	Collection(Manager.Manager)	True	Collection of managers managing the service.

4.8.1 Operations

4.8.1.1 GET

Request:

```
GET /redfish/v1/StorageServices/NVMeoE1
```

```
Content-Type: application/json
```

Response:


```
{
  "@odata.context": "/redfish/v1/$metadata#StorageService.StorageService",
  "@odata.id": "/redfish/v1/StorageServices/NVMeoE1",
  "@odata.type": "#StorageService.v1_0_0.StorageService",
  "Id": "NVMeoE1",
  "Name": "Storage Service",
  "Description": "Storage Service description",
  "Drives": {
    "@odata.id": "/redfish/v1/StorageServices/NVMeoE1/Drives"
  },
  "Endpoints": {
    "@odata.id": "/redfish/v1/Fabrics/1/Endpoints"
  },
  "Links": {
    "HostingSystem": {
      "@odata.id": "/redfish/v1/Systems/Target"
    },
    "Oem": {
      "Intel_RackScale": {
        "@odata.type": "#Intel.Oem.StorageServicesLinks",
        "ManagedBy": [
          {
            "@odata.id": "/redfish/v1/Managers/1"
          }
        ]
      }
    }
  },
  "Oem": {},
  "Status": {
    "Health": "OK",
    "HealthRollup": "OK",
    "State": "Enabled"
  },
  "StoragePools": {
    "@odata.id": "/redfish/v1/StorageServices/1/StoragePools"
  },
  "Volumes": {
    "@odata.id": "/redfish/v1/StorageServices/1/Volumes"
  }
}
```


4.8.1.2 PUT

The PUT operation is not allowed on the storage service collection of resources.

4.8.1.3 PATCH

The PATCH operation is not allowed on the storage service collection of resources.

4.8.1.4 POST

The POST operation is not allowed on the storage service collection of resources.

4.8.1.5 DELETE

The DELETE operation is not allowed on the storage service collection of resources.

4.9 Storage Pool Collection

The `StoragePool` resource represents a factory that has the amount of storage capacity and ability to produce storage volumes, or other storage pools. Properties details are available in the `StoragePoolCollection.xml` metadata file. Table 12 describes the `StoragePoolCollection` attribute.

Table 12. StoragePoolCollection Attribute

Attribute	Type	Nullable	Description
`Members`	Collection(StoragePool.StoragePool)	True	The value of each member entry shall reference a `StoragePool` resource.

4.9.1 Operations

4.9.1.1 GET

Request:

```
GET /redfish/v1/StorageServices/NVMeoE1/StoragePools
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#StoragePools",
  "@odata.id": "/redfish/v1/StorageServices/NVMeoE1/StoragePools",
  "@odata.type": "#StoragePoolCollection.StoragePoolCollection",
  "Description": "Collection of Storage Pools",
  "Members": [
    {
      "@odata.id": "/redfish/v1/StorageServices/1/StoragePools/1"
    },
    {
      "@odata.id": "/redfish/v1/StorageServices/1/StoragePools/2"
    }
  ],
  "Members@odata.count": 2,
  "Name": "StoragePools Collection"
}
```

4.9.1.2 PUT

The PUT operation is not allowed on the storage pool collection of resources.

4.9.1.3 PATCH

The PATCH operation is not allowed on the storage pool collection of resources.

4.9.1.4 POST

The POST operation is not allowed on the storage pool collection of resources.

4.9.1.5 DELETE

The DELETE operation is not allowed on the storage pool collection of resources.

4.10 Storage Pool

The `StoragePool` resource represents a factory that has the amount of storage capacity and ability to produce storage volumes or other storage pools. Properties details are available in the `StoragePool.xml` metadata file. Table 13 describes the `StoragePool` attributes. The following tables provide more information. Table 14 describes the `Identifier` attributes, Table 15 describes the `Capacity` attributes, Table 16 describes the `CapacityInfo` attributes, and Table 17 describes the `CapacitySource` attributes.

Table 13. StoragePool Attributes

Attribute	Type	Nullable	Description
`Identifier`	Resource.v1_1_0.Identifier	True	The value identifies this resource. The value shall be unique in the managed ecosystem.
`BlockSizeBytes`	Edm.Int64	True	Maximum size in bytes of the blocks that form the volume. If the block size is a variable, the maximum block size should be specified in bytes. If the block size is unknown or if a block concept is not valid (for example, with Memory), enter a 1.
`Capacity`	Capacity.v1_0_0.Capacity	True	The value of the property shall provide information about the actual use of the capacity in the storage pool.
`CapacitySources`	Collection(Capacity.v1_0_0.CapacitySource)	True	Fully or partially consumed storage from a source resource. Each entry shall provide capacity allocation data from a named source resource.
`Links`	StoragePool.v1_0_0.Links	False	This structure shall contain references to resources that are not contained in the resource.
`Status`	Resource.Status	True	Resource status.
`AllocatedVolumes`	VolumeCollection.VolumeCollection	True	The value of the property shall contain a reference to the collection of volumes allocated from the storage pool.
`AllocatedPools`	StoragePoolCollection.StoragePoolCollection	True	The value of the property shall contain a reference to the collection of storage pools allocated from the storage pool.

Table 14. Identifier Attributes

Attribute	Type	Nullable	Description
`DurableName`	Edm.String	True	This property shall contain the worldwide unique identifier for the resource. The string shall be in the format described by the value of the `Identifier.DurableNameFormat` property.
`DurableNameFormat`	Resource.v1_1_0.DurableNameFormat	True	This property shall represent the format of the `DurableName` property.

Table 15. StoragePool Capacity Attributes

Attribute	Type	Nullable	Description
`Data`	Capacity.v1_0_0.CapacityInfo	True	The value shall be the capacity information relating to provisioned user data.
`Metadata`	Capacity.v1_0_0.CapacityInfo	True	The value shall be the capacity information relating to provisioned system (non-user accessible) data.

Attribute	Type	Nullable	Description
Snapshot	Capacity.v1_0_0.CapacityInfo	True	The value shall be capacity information relating to provisioned snapshot or backup data.
IsThinProvisioned	Edm.Boolean	True	If the value is false, the capacity shall be fully allocated. The default value shall be false.

Table 16. CapacityInfo Attributes

Attribute	Type	Nullable	Description
ConsumedBytes	Edm.Int64	True	The value shall be the number of logical bytes currently consumed in the data store for this data type.
AllocatedBytes	Edm.Int64	True	The value shall be the number of bytes currently allocated by the storage system in the data store for this data type.
GuaranteedBytes	Edm.Int64	True	The value shall be the number of bytes the storage system guarantees can be allocated in the data store for this data type.
ProvisionedBytes	Edm.Int64	True	The value shall be the maximum number of bytes that can be allocated in the data store for this data type.

Table 17. CapacitySource Attributes

Attribute	Type	Nullable	Description
ProvidedCapacity	Capacity.v1_0_0.Capacity	True	The value shall be the amount of space provided from ProvidingDrives, ProvidingVolumes, or ProvidingPools.
ProvidingVolumes	Collection(Volume.Volume)	True	If present, the value shall be a reference to a contributing volume or volumes.
ProvidingPools	Collection(StoragePool.StoragePool)	True	If present, the value shall be a reference to a contributing storage pool or storage pools.
ProvidingDrives	Collection(Drive.Drive)	True	If present, the value shall be a reference to a contributing drive or drives.

4.10.1 Operations

4.10.1.1 GET

Request:

```
GET /redfish/v1/StorageServices/NVMeoE1/StoragePools/2
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#StoragePool.StoragePool",
  "@odata.id": "/redfish/v1/StorageServices/NVMeoE1/StoragePools/2",
  "@odata.type": "#StoragePool.v1_0_0.StoragePool",
  "Description": "Base storage pool",
  "Id": "2",
  "Name": "BasePool",
  "AllocatedVolumes": {
    "@odata.id": "/redfish/v1/StorageServices/NVMeoE1/StoragePools/2/AllocatedVolumes"
  },
  "AllocatedPools": {
    "@odata.id": "/redfish/v1/StorageServices/NVMeoE1/StoragePools/2/AllocatedPools"
```

```
  },
  "Capacity": {
    "Data": {
      "AllocatedBytes": 512174850048,
      "ConsumedBytes": 3071983104
    }
  },
  "CapacitySources": [
    {
      "ProvidingDrives": [
        {
          "@odata.id": "/redfish/v1/Chassis/1/Drives/2"
        }
      ],
      "ProvidedCapacity": {
        "Data": {
          "AllocatedBytes": 512174850048,
          "ConsumedBytes": 3071983104
        }
      }
    }
  ],
  "Oem": {},
  "Status": {
    "Health": "OK",
    "HealthRollup": "OK",
    "State": "Enabled"
  }
}
```


4.10.1.2 PUT

The PUT operation is not allowed on the storage pool resource.

4.10.1.3 PATCH

The PATCH operation is not allowed on the storage pool resource.

4.10.1.4 POST

The POST operation is not allowed on the storage pool resource.

4.10.1.5 DELETE

The DELETE operation is not allowed on the storage pool resource.

4.11 Volume Collection

This collection shall contain references to all volume resource instances sharing the same parent resource. Details of this resource are described in the `VolumeCollection.xml` metadata file. Table 18 describes the `VolumeCollection` attribute.

Table 18. VolumeCollection Attribute

Attribute	Type	Nullable	Description
`Members`	Collection(Volume.Volume)	False	Collection of storage resource instances.

4.11.1 Operations

4.11.1.1 GET

Request:

```
GET /redfish/v1/StorageServices/NVMeoE1/Volumes
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#VolumeCollection.VolumeCollection",
  "@odata.id": "/redfish/v1/StorageServices/1/Volumes",
  "@odata.type": "#VolumeCollection.VolumeCollection",
  "Description": "Volume Collection",
  "Members": [
    {
      "@odata.id": "/redfish/v1/StorageServices/NVMeoE1/Volumes/1"
    }
  ],
  "Members@odata.count": 1,
  "Name": "Volume Collection"
}
```

4.11.1.2 PUT

The PUT operation is not allowed on the volume collection of resources.

4.11.1.3 PATCH

The PATCH operation is not allowed on the volume collection of resources.

4.11.1.4 POST

The properties shown in Table 19 can be provided as body to a POST operation to create a new volume. In addition, Table 20 describes the `ReplicaInfo` format, Table 21 describes the `CapacitySources` format, and Table 22 describes the `StorageAccessCapability` attributes.

Table 19. Volume POST Properties

Attribute	Type	Required	Description
`CapacityBytes`	Int64	Yes	Volume capacity in bytes.
`CapacitySources->ProvidingPools`	Array of Capacity.v1_0_0.CapacitySource	No	Array of `StoragePools` on which the volume is created. If they are provided, the service uses any pool with enough available capacity.
`AccessCapabilities`	Array of StorageAccessCapability.v1_0_0.StorageAccessCapability	No	Supported IO access capabilities. ***Note:*** In the current release, limiting access rights is implemented only for volumes exposed via the iSCSI protocol.

Attribute	Type	Required	Description
ReplicaInfos	Array of StorageReplicaInfo.v1_0_0.ReplicaInfo	No	Should be provided if the created volume shall be a replica of other volume. Only a single ReplicaInfo can be provided in the current service implementation. Detailed format of ReplicaInfo is provided in Table 20.
Oem-> Intel_RackScale-> Bootable	Boolean	No	Determines if the volume should be bootable.

Table 20. ReplicaInfo Format

Attribute	Type	Required	Description
ReplicaType	StorageReplicaInfo.v1_0_0.ReplicaType	Yes	The ReplicaType enumeration literal shall describe the intended outcome of the replication.
Replica	Resource.v1_0_0.Resource	Yes	The value shall reference the resource that is the source of the replica.

Table 21. CapacitySources Format

Attribute	Type	Required	Description
ProvidingPools	Collection(StoragePool.StoragePool)	Yes	Reference to a contributing storage pool.

Table 22. StorageAccessCapability Attributes

Member	Description
Read	This enumeration literal shall indicate that the storage may be read.
Write	This enumeration literal shall indicate that the storage may be written multiple times.
WriteOnce	This enumeration literal shall indicate that the storage may be written only once.
Append	This enumeration literal shall indicate that the storage may be written only to append.
Streaming	This enumeration literal shall indicate that the storage may be read sequentially.

Request:

```
POST /redfish/v1/StorageServices/NVMeoE1/Volumes
Content-Type: application/json
{
  "AccessCapabilities": [
    "Read",
    "Write"
  ],
  "CapacityBytes": 10737418240,
  "CapacitySources": [
    {
      "ProvidingPools": [
        {
          "@odata.id": "/redfish/v1/StorageServices/1/StoragePools/2"
        }
      ]
    }
  ],
  "ReplicaInfos": [
    {
      "ReplicaType": "Clone",
      "Replica": {
        "@odata.id": "/redfish/v1/StorageServices/NVMeoE1/Volumes/1"
      }
```

```
    }
  ],
  "Oem": {
    "Intel_RackScale": {
      "Bootable": true
    }
  }
}
```

Response:

```
HTTP/1.1 201 Created
Location: http://<IP>:<PORT>/redfish/v1/StorageServices/NVMEoE1/Volumes/2
```

4.11.1.5 DELETE

The DELETE operation is not allowed on the volume collection of resources.

4.12 Volume

The volume resource represents a block-addressable container of storage, referred to as a *Logical Unit*, *LU*, *LUN*, or *StorageVolume* in the storage industry. Volumes represent block-addressable capacity that is conformant to a ClassOfService. Properties details are discussed in the Volume.xml metadata file. Table 23 describes the Volume attributes. In addition, Table 24 shows the ReplicaInfo attributes, Table 25 shows the Capacity attributes, Table 26 describes the CapacitySource attributes, Table 27 describes the Links attribute, and Table 28 shows the Intel® RSD OEM extensions volume attributes.

Table 23. Capacity Attributes

Attribute	Type	Nullable	Description
Status	Resource.Status	False	Resource status.
CapacityBytes	Edm.Int64	True	This property shall contain the size in bytes of the associated volume.
VolumeType	Volume.v1_0_0.VolumeType	True	This property shall contain the type of the associated volume.
Encrypted	Edm.Boolean	True	This property shall contain a Boolean indicator whether the volume is currently using encryption or not.
EncryptionTypes	Collection(Volume.v1_0_0.EncryptionTypes)	False	This property shall contain the types of encryption used by the volume.
Identifiers	Collection(Resource.v1_1_0.Identifier)	False	This property shall contain a list of all known durable names for the associated volume.
BlockSizeBytes	Edm.Int32	True	This property shall contain the size of the smallest addressable unit of the associated volume.
Operations	Collection(Volume.v1_0_0.Operations)	False	This property shall contain a list of all currently running operations on the volume.
OptimumIOSizeBytes	Edm.Int32	True	This property shall contain the optimum IO size to use when performing IO on the volume. For logical disks, this is the stripe size. For physical disks, this describes the physical sector size.
Links	Volume.v1_0_0.Links	False	The Links property, as described by the Redfish Specification, shall contain references to resources that are related to, but not contained by (subordinate to), this resource.
Actions	Volume.v1_0_0.Actions	False	The Actions property shall contain the available actions for this resource.

Attribute	Type	Nullable	Description
AccessCapabilities	Collection(StorageAccessCapability.v1_0_0.StorageAccessCapability)	True	Each entry shall specify a current storage access capability.
Capacity	Capacity.v1_0_0.Capacity	True	Information about the use of the capacity allocated to the storage volume.
CapacitySources	Collection(Capacity.v1_0_0.CapacitySource)	True	Fully or partially consumed storage from a source resource. Each entry provides capacity allocation information from a named source resource.
Manufacturer	Edm.String	True	This property shall contain a value that represents the manufacturer or implementer of the storage volume.
Model	Edm.String	True	The value is assigned by the manufacturer and shall represent a specific storage volume implementation.
ReplicaInfos	Collection(StorageReplicaInfo.v1_0_0.ReplicaInfo)	True	This property shall describe the replica relationship between the storage volume and a corresponding source and/or target volume.
AllocatedPools	StoragePoolCollection.StoragePoolCollection	True	The value of the property shall contain references to all storage pools allocated from the volume.

Table 24. ReplicaInfo Attributes

Attribute	Type	Nullable	Description
ReplicaPriority	StorageReplicaInfo.v1_0_0.ReplicaPriority	True	The enumeration literal shall specify the priority of background copy engine IO to be managed relative to host IO operations during a sequential background copy operation.
ReplicaReadOnlyAccess	StorageReplicaInfo.v1_0_0.ReplicaReadOnlyAccess	True	The enumeration literal shall specify whether the source, target, or both elements are read only to the host.
UndiscoveredElement	StorageReplicaInfo.v1_0_0.UndiscoveredElement	True	The enumeration literal shall specify whether the source, target, or both elements involved in a copy operation are undiscovered. An element is considered undiscovered if its object model is not known to the service performing the copy operation.
WhenSynced	Edm.String	True	The value shall be an ISO 8601 conformant time of day that specifies when the elements were synchronized.
SyncMaintained	Edm.Boolean	True	If true, synchronization shall be maintained. The default value for this property is false.
ReplicaRecoveryMode	StorageReplicaInfo.v1_0_0.ReplicaRecoveryMode	True	The enumeration literal shall specify whether the copy operation continues after a broken link is restored.
ReplicaUpdateMode	StorageReplicaInfo.v1_0_0.ReplicaUpdateMode	True	The enumeration literal shall specify whether the target elements update synchronously or asynchronously.
PercentSynced	Edm.Int64	True	Specifies the percent of the work completed to reach synchronization. Shall not be instantiated if implementation is not capable of providing this information. If related to a group, PercentSynced shall be an average of the PercentSynced across all members of the group.
FailedCopyStopsHostIO	Edm.Boolean	True	If true, the storage array shall stop receiving data to the source element if copying to a remote element fails. The default value for this property is false.

Attribute	Type	Nullable	Description
WhenActivated	Edm.String	True	The value shall be an ISO 8601 (refer to Table 2) conformant time of day that specifies when the point-in-time copy was taken or when the replication relationship is activated, reactivated, resumed, or re-established. This property shall be null if the implementation is not capable of providing this information.
WhenDeactivated	Edm.String	True	The value shall be an ISO 8601 conformant time of day that specifies when the replication relationship is deactivated. Do not instantiate this property if implementation is not capable of providing this information.
WhenEstablished	Edm.String	True	The value shall be an ISO 8601 conformant time of day that specifies when the replication relationship is established. Do not instantiate this property if implementation is not capable of providing this information.
WhenSuspended	Edm.String	True	The value shall be an ISO 8601 conformant time of day that specifies when the replication relationship is suspended. Do not instantiate this property if implementation is not capable of providing this information.
WhenSynchronized	Edm.String	True	The value shall be an ISO 8601 conformant time of day that specifies when the replication relationship is synchronized. Do not instantiate this property if implementation is not capable of providing this information.
ReplicaSkewBytes	Edm.Int64	True	Applies to Adaptive mode, and it describes the maximum number of bytes the SyncedElement (target) can be out of sync. If the number of out-of-sync bytes exceeds the skew value, ReplicaUpdateMode shall be switched to synchronous.
ReplicaType	StorageReplicaInfo.v1_0_0.ReplicaType	True	The ReplicaType enumeration literal shall describe the intended outcome of the replication.
ReplicaProgressStatus	StorageReplicaInfo.v1_0_0.ReplicaProgressStatus	True	The ReplicaProgressStatus enumeration literal shall specify the status of the session with respect to Replication activity.
ReplicaState	StorageReplicaInfo.v1_0_0.ReplicaState	True	The ReplicaState enumeration literal shall specify the state of the relationship with respect to Replication activity.
RequestedReplicaState	StorageReplicaInfo.v1_0_0.ReplicaState	True	The last requested or desired state for the relationship. The actual state of the relationship shall be represented by ReplicaState. When RequestedState reaches the requested state, this property shall be null.
ConsistencyEnabled	Edm.Boolean	True	If true, consistency shall be enabled across the source and its associated target replica(s). The default value for this property is false.
ConsistencyType	StorageReplicaInfo.v1_0_0.ConsistencyType	True	The ConsistencyType enumeration literal shall indicate the consistency type used by the source and its associated target group.
ConsistencyState	StorageReplicaInfo.v1_0_0.ConsistencyState	True	The ConsistencyState enumeration literal shall indicate the current state of consistency.
ConsistencyStatus	StorageReplicaInfo.v1_0_0.ConsistencyStatus	True	The ConsistencyStatus enumeration literal shall specify the current status of consistency. Consistency may have been disabled or is experiencing an error condition.

Attribute	Type	Nullable	Description
ReplicaRole	StorageReplicaInfo.v1_0_0.ReplicaRole	True	The ReplicaRole enumeration literal shall represent the source or target role of this replica as known to the containing resource.
Replica	Resource.v1_0_0.Resource	True	The value shall reference the resource that is the source of the replica.

Table 25. Capacity Attributes

Attribute	Type	Nullable	Description
Data	Capacity.v1_0_0.CapacityInfo	True	The value shall be capacity information relating to provisioned user data.
Metadata	Capacity.v1_0_0.CapacityInfo	True	The value shall be capacity information relating to provisioned system (non-user accessible) data.
Snapshot	Capacity.v1_0_0.CapacityInfo	True	The value shall be capacity information relating to provisioned snapshot or backup data.
IsThinProvisioned	Edm.Boolean	True	If the value is false, the capacity shall be fully allocated. The default value shall be false.

Table 26. CapacitySource Attributes

Attribute	Type	Nullable	Description
ProvidedCapacity	Capacity.v1_0_0.Capacity	True	The value shall be the amount of space provided from ProvidingDrives, ProvidingVolumes, or ProvidingPools.
ProvidingVolumes	Collection(Volume.Volume)	True	If present, the value shall be a reference to a contributing volume or volumes.
ProvidingPools	Collection(StoragePool.StoragePool)	True	If present, the value shall be a reference to a contributing storage pool or storage pools.
ProvidingDrives	Collection(Drive.Drive)	True	If present, the value shall be a reference to a contributing drive or drives.

Table 27. Links Attributes

Attribute	Type	Nullable	Description
Drives	Collection(Drive.Drive)	True	The value of the property shall be a reference to the resources that this volume is associated with and shall reference resources of type Drive. This property shall only contain references to drive entities that are currently members of the volume, not hot spare drives that are not currently a member of the volume.

Intel® RSD OEM extensions:

Table 28. Volume Attributes (OEM Extensions)

Attribute	Type	Nullable	Description
Bootable	Edm.Boolean	True	This property provides information about the bootable capability of the volume.
EraseOnDetach	Edm.Boolean	True	This property shall represent the state of policy for protecting data stored on a drive connected to an initiator host. If set to null, it is interpreted as if it is set to true.
Erased	Edm.Boolean	True	This property shall represent the erase state of the volume.
Metrics	VolumeMetrics.VolumeMetrics	False	A reference to the metrics associated with this volume.

4.12.1 Operations

4.12.1.1 GET

Request:

```
GET /redfish/v1/StorageServices/NVMeoE1/Volumes/1
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#Volume.Volume",
  "@odata.id": "/redfish/v1/StorageServices/NVMeoE1/Volumes/1",
  "@odata.type": "#Volume.v1_1_0.Volume",
  "Description": "Volume description",
  "Id": "1",
  "Model": null,
  "Manufacturer": null,
  "Name": "NVMe remote storage",
  "AccessCapabilities": [
    "Read",
    "Write"
  ],
  "CapacityBytes": 3071983104,
  "Actions": {
    "#Volume.Initialize": {
      "target":
"/redfish/v1/StorageServices/NVMeoE1/Volumes/1/Actions/Volume.Initialize"
    },
    "Oem": {}
  },
  "Capacity": {
    "Data": {
      "AllocatedBytes": 3071983104
    }
  },
  "CapacitySources": [
    {
      "ProvidingPools": [
        {
          "@odata.id": "/redfish/v1/StorageServices/1/StoragePools/2"
        }
      ],
      "ProvidedCapacity": {
        "Data": {
          "AllocatedBytes": 3071983104
        }
      }
    }
  ],
  "Identifiers": [
    {
      "DurableName": "/dev/nvme1n1p1",
      "DurableNameFormat": "SystemPath"
    },
    {
      "DurableName": "iqn.2001-04.com.example:diskarrays-sn-a8675309",
      "DurableNameFormat": "iQN"
    }
  ],
```

```
  "Links": {
    "Oem": {
      "Intel_RackScale": {
        "@odata.type": "#Intel.Oem.VolumeLinks",
        "Endpoints": [
          {
            "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Endpoints/1"
          }
        ],
        "Metrics": {
          "@odata.id": "/redfish/v1/StorageServices/NVMeoE1/Volumes/1/Metrics"
        }
      }
    },
    "Drives": []
  },
  "ReplicaInfos": [
    {
      "ReplicaReadOnlyAccess": "SourceElement",
      "ReplicaType": "Snapshot",
      "ReplicaRole": "Target",
      "Replica": {
        "@odata.id": "/redfish/v1/StorageServices/NVMeoE1/Volumes/2"
      }
    }
  ],
  "Status": {
    "Health": "OK",
    "HealthRollup": "OK",
    "State": "Enabled"
  },
  "Oem": {
    "Intel_RackScale": {
      "@odata.type": "#Intel.Oem.Volume",
      "Bootable": false,
      "Erased": null,
      "EraseOnDetach": true
    }
  }
}
```


4.12.1.2 PUT

The PUT operation is not allowed on the volume resource.

4.12.1.3 PATCH

Table 29 shows the volume PATCH properties.

Table 29. Volume PATCH Properties

Attribute	Type	Required	Description
`Bootable`	Boolean	No	Change bootable ability of the volume.
`Erased`	Boolean	No	Provide information if the drive was erased.

Request:

```
PATCH /redfish/v1/StorageServices/NVMeoE1/Volumes/1
Content-Type: application/json
```

```
{
  "Oem": {
    "Intel_RackScale": {
      "Bootable": true,
      "Erased": true
    }
  }
}
```

Response:

```
HTTP/1.1 200 OK
((updated resource body))
```

Or:

```
HTTP/1.1 204 No Content
{}
```

Or (when a task is created):

```
HTTP/1.1 202 Accepted
Location: http://<IP:port>/redfish/v1/TaskService/Tasks/1/TaskMonitor
{
  "@odata.context": "/redfish/v1/$metadata#Task.Task",
  "@odata.id": "/redfish/v1/TaskService/Tasks/1",
  "@odata.type": "#Task.v1_0_0.Task",
  "Id": "1",
  "Name": "Task 1",
  "TaskState": " New",
  "StartTime": "2016-09-01T04:45+01:00",
  "TaskStatus": "OK",
  "Messages": []
}
```

4.12.1.4 POST

The `Actions` parameter is used for volume initialization (erase). Table 30 shows the volume POST `InitializeType` attributes.

Table 30. InitializeType Attributes

Member	Description
`Fast`	Fast initialization (such as zeroing volume)
`Slow`	Slow initialization (such as secure erase)

Request:

```
POST /redfish/v1/StorageServices/NVMeoE1/Volumes/1/Actions/Volume.Initialize
Content-Type: application/json
{
  "InitializeType": "Slow"
}
```

Response:

```
HTTP/1.1 204 No Content
```

Or (when a task is created):

```
HTTP/1.1 202 Accepted
Location: http://<ip>:<port>/redfish/v1/TaskService/TaskMonitors/1
{
  "@odata.context": "/redfish/v1/$metadata#Task.Task",
```

```
  "@odata.id": "/redfish/v1/TaskService/Tasks/1",
  "@odata.type": "#Task.v1_0_0.Task",
  "Id": "1",
  "Name": "Task 1",
  "TaskState": " New",
  "StartTime": "2016-09-01T04:45+01:00",
  "TaskStatus": "OK",
  "Messages": []
}
```

4.12.1.5 DELETE

Request:

```
DELETE redfish/v1/StorageServices/NVMeoE1/Volumes/2
```

Response:

```
HTTP/1.1 204 No Content
```

Or (when a task is created):

```
HTTP/1.1 202 Accepted
Location: http://<ip:port>/redfish/v1/TaskService/Tasks/1/TaskMonitor
{
  "@odata.context": "/redfish/v1/$metadata#Task.Task",
  "@odata.id": "/redfish/v1/TaskService/Tasks/1",
  "@odata.type": "#Task.v1_0_0.Task",
  "Id": "1",
  "Name": "Task 1",
  "TaskState": "New",
  "StartTime": "2017-12-06T04:45+01:00",
  "TaskStatus": "OK",
  "Messages": []
}
```

4.13 Volume Metrics

Volume metrics contains metrics, health data, and lifetime information describing a single volume of a physical disk drive. Details of this resource are described in the `VolumeMetrics.xml` metadata file. Table 31 describes the `VolumeMetrics` attribute.

Table 31. VolumeMetrics Attribute

Attribute	Type	Nullable	Description
`CapacityUsedBytes`	Edm.Int64	True	This property shall contain the size in bytes of the volume's capacity used for storing files.

4.13.1 Operations

4.13.1.1 GET

Request:

```
GET /redfish/v1/StorageServices/NVMeoE1/Volumes/1/Metrics
Content-Type: application/json
```

Response:

```
{
  "@odata.context":
"/redfish/v1/$metadata#StorageServices/Members/1/Volume/Metrics/$entity",
  "@odata.id": "/redfish/v1/StorageServices/NVMeoE1/Volumes/1/Metrics",
  "@odata.type": "#VolumeMetrics.v1_0_0.VolumeMetrics",
  "Name": "Volume Metrics",
  "Description": "Metrics for Volume 1",
  "Id": "Metrics",
  "CapacityUsedBytes": 6799708160
}
```

4.13.1.2 PUT

The PUT operation is not allowed on the volume metrics resource.

4.13.1.3 PATCH

The PATCH operation is not allowed on the volume metrics resource.

4.13.1.4 POST

The POST operation is not allowed on the volume metrics resource.

4.13.1.5 DELETE

The DELETE operation is not allowed on the volume metrics resource.

4.14 Drive Collection

The drive collection shall contain references to all drive resources connected to the storage service. Details of this resource are described in the `DriveCollection.xml` metadata file. Table 32 describes the `DriveCollection` attribute.

Table 32. DriveCollection Attribute

Attribute	Type	Nullable	Description
`Members`	Collection(Drive.Drive)	True	The value of each entry of this property shall reference a drive resource.

4.14.1 Operations

4.14.1.1 GET

Request:

```
GET /redfish/v1/StorageServices/NVMeoE1/Drives
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#DriveCollection.DriveCollection",
  "@odata.id": "/redfish/v1/StorageServices/NVMeoE1/Drives",
  "@odata.type": "#DriveCollection.v1_0_0.DriveCollection",
  "Name": "Drives",
```

```
  "Members@odata.count": 2,
  "Members": [
    {
      "@odata.id": "/redfish/v1/Chassis/1/Drives/1"
    },
    {
      "@odata.id": "/redfish/v1/Chassis/1/Drives/2"
    }
  ]
}
```


4.14.1.2 PUT

The PUT operation is not allowed on the drive collection of resources.

4.14.1.3 PATCH

The PATCH operation is not allowed on the drive collection of resources.

4.14.1.4 POST

The POST operation is not allowed on the drive collection of resources.

4.14.1.5 DELETE

The DELETE operation is not allowed on the drive collection of resources.

4.15 Drive

Drive contains properties describing a single physical disk drive for any system. Details of this resource are described in the `Drive.xml` metadata file. The OEM extensions details are available in `IntelRackScaleOem.xml`. Table 33 describes the `Drive` attributes. In addition, Table 34 describes the `Location` attributes, Table 35 describes the `Identifier` attributes, Table 36 describes the `Protocol` attributes, and Table 37 describes the Media Type attributes. The Intel® RSD OEM extensions `Drive` attributes are shown in Table 38.

Table 33. Drive Attributes

Attribute	Type	Nullable	Description
`StatusIndicator`	Drive.v1_0_0.StatusIndicator	True	The value of the property shall contain the status indicator state for the status indicator associated with this drive. The valid values for this property are specified through the `Redfish.AllowableValues` annotation.
`IndicatorLED`	Resource.v1_1_0.IndicatorLED	True	The value of the property shall contain the indicator light state for the indicator light associated with the drive.
`Model`	Edm.String	True	The value of the property shall be the name by which the manufacturer generally refers to the drive.
`Revision`	Edm.String	True	This property shall contain the revision as defined by the manufacturer for the associated drive.
`Status`	Resource.Status	False	Resource status.
`CapacityBytes`	Edm.Int64	True	This property shall contain the raw size in bytes of the associated drive.
`FailurePredicted`	Edm.Boolean	True	This property shall contain failure information as defined by the manufacturer for the associated drive.

Attribute	Type	Nullable	Description
Protocol	Storage.v1_0_0.Protocol	True	This property shall contain the protocol the associated drive is using to communicate to the storage controller for this system.
MediaType	Drive.v1_0_0.MediaType	True	This property shall contain the type of media contained in the associated drive.
Manufacturer	Edm.String	True	The value of the property shall be the name of the organization responsible for producing the drive. This organization might be the entity from whom the drive is purchased, but this is not necessarily true.
SKU	Edm.String	True	The value of the property shall be the Stock Keeping Unit (SKU) number for the drive.
SerialNumber	Edm.String	True	The value of the property shall be a manufacturer-allocated number used to identify the drive.
PartNumber	Edm.String	True	The value of the property shall be a part number assigned by the organization responsible for producing or manufacturing the drive.
AssetTag	Edm.String	True	The value of the property shall be an identifying string used to track the drive for inventory purposes.
Identifiers	Collection(Resource.v1_1_0.Identifier)	False	This property shall contain a list of all known durable names for the associated drive.
Location	Collection(Resource.v1_1_0.Location)	False	This property shall contain location information of the associated drive.
HotspareType	Drive.v1_0_0.HotspareType	True	This property shall contain the hot spare type for the associated drive. If the drive is currently serving as a hot spare, its Status.State field shall be StandbySpare and Enabled when it is being used as part of a volume.
EncryptionAbility	Drive.v1_0_0.EncryptionAbility	True	This property shall contain the encryption ability for the associated drive.
EncryptionStatus	Drive.v1_0_0.EncryptionStatus	True	This property shall contain the encryption status for the associated drive.
RotationSpeedRPM	Edm.Decimal	True	This property shall contain the rotation speed of the associated drive.
BlockSizeBytes	Edm.Int64	True	This property shall contain the size of the smallest addressable unit of the associated drive.
CapableSpeedGbs	Edm.Decimal	True	This property shall contain the fastest capable bus speed of the associated drive.
NegotiatedSpeedGbs	Edm.Decimal	True	This property shall contain the current bus speed of the associated drive.
PredictedMediaLifeLeftPercent	Edm.Decimal	True	This property shall contain an indicator of the percentage of life remaining in the drive's media.
Links	Drive.v1_0_0.Links	False	The Links property, as described by the *Redfish Specification*, shall contain references to resources that are related to, but not contained by (subordinate to), the resource.
Actions	Drive.v1_0_0.Actions	False	The Actions property shall contain the available actions for the resource.

Table 34. Drive Location Attributes

Attribute	Type	Nullable	Description
Info	Edm.String	True	This property shall represent the location of the resource.
InfoFormat	Edm.String	True	This property shall represent the format of the Info property.

Oem	Resource.Oem	False	This property shall represent OEM extensions.

Table 35. Identifier Attributes

Attribute	Type	Nullable	Description
DurableName	Edm.String	True	This property shall contain the worldwide unique identifier for the resource. The string shall be in the format described by the value of the Identifier.DurableNameFormat property.
DurableNameFormat	Resource.v1_1_0.DurableNameFormat	True	This property shall represent the format of the DurableName property.

Table 36. Drive Protocol Attributes

Member	Description
AHCI	This value shall mean that the device conforms to the Intel Advanced Host Controller Interface Specification.
FC	This value shall mean that the device conforms to the T11 Fibre Channel Physical and Signaling Interface Specification.
FCoE	This value shall mean that the device conforms to the T11 FC-BB-5 Specification.
FTP	This value shall mean that the device conforms to the File Transfer Protocol as defined by RFC114.
HTTP	This value shall mean that the device conforms to the Hypertext Transfer Protocol as defined by RFC2068 or RFC2616.
HTTPS	This value shall mean that the device conforms to the Hypertext Transfer Protocol as defined by RFC2068 or RFC2616 utilizing Transport Layer Security as specified by RFC5246 or RFC6176.
iSCSI	This value shall mean that the device conforms to the IETF* Internet Small Computer Systems Interface (iSCSI) Specification.
NFSv3	This value shall mean that the device conforms to the Network File System protocol as defined by RFC1813.
NFSv4	This value shall mean that the device conforms to the Network File System protocol as defined by RFC3010 or RFC5661.
NVMe	This value shall mean that the device conforms to the Non-Volatile Memory Host Controller Interface Specification.
NVMeOverFabrics	This value shall mean that the device conforms to the NVM Express over Fabrics Specification.
PCIe	This value shall mean that the device conforms to the PCI-SIG PCI Express Base Specification only. Beyond that, it uses some vendor proprietary mechanism to communicate.
SAS	This value shall mean that the device conforms to the T10 SAS Protocol Layer Specification.
SATA	This value shall mean that the device conforms to the Serial ATA International Organization Serial ATA Specification.
SFTP	This value shall mean that the device conforms to the File Transfer Protocol as defined by RFC114 using Transport Layer Security as specified by RFC5246 or RFC6176.
SMB	This value shall mean that the device conforms to the Microsoft* Server Message Block Protocol.
UHCI	This value shall mean that the device conforms to the Intel Universal Host Controller Interface Specification, Enhanced Host Controller Interface Specification, or the Extensible Host Controller Interface specification.
USB	This value shall mean that the device conforms to the USB Implementers Forum Universal Serial Bus Specification.

Table 37. Media Type Attributes

Member	Description
HDD	Hard Disk Drive
SSD	Solid State Drive
SMR	Shingled Magnetic Recording

Intel® RSD OEM extensions:

Table 38. Drive Attributes (OEM Extensions)

Attribute	Type	Nullable	Description
EraseOnDetach	Edm.Boolean	True	This property shall represent the state of policy for protecting data stored on the drive connected to a PCI switch. If set to null, it is interpreted as if it was set to true.
DriveErased	Edm.Boolean	False	This property shall represent the erase state of the drive.
FirmwareVersion	Edm.String	True	This indicates drive firmware version.
Storage	Storage.Storage	True	A reference to the storage controller where the drive is connected.
PCIeFunction	PCIeFunction.PCIeFunction	True	A reference to the PCIe* function that provides the drive functionality.
UsedBy	Collection(StoragePool.StoragePool)	True	The value of the property shall be a reference to the resources that the drive is associated with and shall reference a resource of type storage pool.
Metrics	DriveMetrics.DriveMetrics	False	A reference to the metrics associated with the drive.

4.15.1 Operations

4.15.1.1 GET

Request:

```
GET /redfish/v1/Chassis/1/Drives/1
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#Drive.Drive",
  "@odata.id": "/redfish/v1/Chassis/1/Drives/2",
  "@odata.type": "#Drive.v1_2_0.Drive",
  "Name": "Physical Drive description",
  "Id": "2",
  "Protocol": "NVMe",
  "Type": "NVMe",
  "MediaType": "SSD",
  "CapacityBytes": 2442408680913,
  "Manufacturer": "Intel Corporation",
  "Model": "E323",
  "Revision": null,
  "SKU": null,
  "SerialNumber": "123fed3029c-b23394-121",
  "PartNumber": null,
  "AssetTag": null,
  "RotationSpeedRPM": null,
  "Identifiers": [
    {
      "DurableName": "397f9b78-7e94-11e7-9ea4-001e67dfa170",
      "DurableNameFormat": "UUID"
    }
  ],
  "Location": [
    {
      "Info": "3",
      "InfoFormat": "DriveBay number"
```

```
    }
  ],
  "Status": {
    "Health": "OK",
    "HealthRollup": "OK",
    "State": "Enabled"
  },
  "Oem": {
    "Intel_RackScale": {
      "odata.type": "Intel.Oem.Drive",
      "EraseOnDetach": null,
      "DriveErased": false,
      "FirmwareVersion": "1.0",
      "Storage": null,
      "PCIeFunction": null,
      "UsedBy": [
        {
          "@odata.id": "/redfish/v1/StorageServices/1/StoragePools/2"
        }
      ]
    }
  },
  "Links": {
    "odata.type": "Drive.v1_2_0.Links",
    "Chassis": {
      "@odata.id": "/redfish/v1/Chassis/1"
    },
    "Oem": {},
    "Volumes": [],
    "Endpoints": []
  },
  "StatusIndicator": null,
  "IndicatorLED": null,
  "CapableSpeedGbs": null,
  "NegotiatedSpeedGbs": null,
  "PredictedMediaLifeLeftPercent": 95,
  "Actions": {
    "Oem": {}
  }
}
```


4.15.1.2 PUT

The PUT operation is not allowed on the drive resource.

4.15.1.3 PATCH

The PATCH operation is not allowed on the drive resource.

4.15.1.4 POST

The POST operation is not allowed on the drive resource.

4.15.1.5 DELETE

The DELETE operation is not allowed on the drive resource.

4.16 Drive Metrics

Drive metrics include metrics, health data, and lifetime information describing a single physical disk drive. Details of this resource are described in the `DriveMetrics.xml` metadata file. Table 39 describes the `DriveMatrics` attributes. In addition, Table 40describes the `LifeTime` attributes, and Table 41 describes the `HealthData` attributes.

Table 39. DriveMetrics Attributes

Attribute	Type	Nullable	Description
`TemperatureKelvin`	Edm.Decimal	True	The value of the property shall be the temperature of the drive resource in Kelvin degrees.
`LifeTime`	DriveMetrics.v1_0_0.LifeTime	False	This object shall contain properties that describe the `LifeTime` metrics for the current resource.
`HealthData`	DriveMetrics.v1_0_0.HealthData	False	This object shall contain properties that describe the `HealthData` metrics for the current resource.

Table 40. LifeTime Attributes

Attribute	Type	Nullable	Description
`UnitSizeBytes`	Edm.Int64	True	The value of the property shall be the size of a unit (the value is reported in bytes) that is used by `UnitsRead`/`UnitsWrite` properties as a basic unit.
`UnitsRead`	Edm.Decimal	True	The value of the property shall be the number of units of a size `UnitSizeBytes` read since reset. This can be used to compute average bandwidth by polling the drive at regular intervals.
`UnitsWritten`	Edm.Decimal	True	The value of the property shall be the number of units of a size `UnitSizeBytes` written since reset. This can be used to compute average bandwidth by polling the drive at regular intervals.
`HostReadCommands`	Edm.Decimal	True	The value of the property shall be the number of read commands completed by the disk controller since reset. For an NMVe disk controller specifically, this is the number of compare and read commands.
`HostWriteCommands`	Edm.Decimal	True	The value of the property shall be the number of write commands completed by the disk controller since reset.
`PowerCycles`	Edm.Decimal	True	The value of the property shall be the number of power cycles of the physical drive.
`PowerOnHours`	Edm.Decimal	True	The value of the property shall be the number of power-on hours of the physical drive. This may not include time that the controller was powered and remained in a non-operational power state.
`ControllerBusyTimeMinutes`	Edm.Decimal	True	The value of the property shall be the amount of time (in minutes) the drive controller is busy with IO commands.

Table 41. HealthData Attributes

Attribute	Type	Nullable	Description
`AvailableSparePercentage`	Edm.Decimal	True	The value of the property shall be a normalized percentage (0 to 100%) of the remaining spare capacity available.
`PredictedMediaLifeUsedPercent`	Edm.Decimal	True	This property shall contain an indicator of the percentage of life remaining in the drive's media.
`UnsafeShutdowns`	Edm.Decimal	True	The value of the property shall be the number of unsafe shutdowns of a drive.

Attribute	Type	Nullable	Description
MediaErrors	Edm.Decimal	True	The value of the property shall be the number of media and data integrity errors of a drive. This includes Error-correcting Code (ECC), Cyclic Redundancy Check (CRC) checksum failure, or Logical Block Addressing (LBA) tag mismatch errors.

4.16.1 Operations

4.16.1.1 GET

Request:

```
GET /redfish/v1/Chassis/1/Drives/1/Metrics
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#Chassis/Members/1/Drive/Metrics/$entity",
  "@odata.id": "/redfish/v1/Chassis/1/Drives/1/Metrics",
  "@odata.type": "#DriveMetrics.v1_0_0.DriveMetrics",
  "Name": "Drive Metrics for Drive",
  "Description": "Metrics for Drive 1",
  "Id": "Metrics",
  "TemperatureKelvin": 318,
  "LifeTime": {
    "UnitSizeBytes": 512000,
    "UnitsRead": 1640,
    "UnitsWritten": 2,
    "HostReadCommands": 12344,
    "HostWriteCommands": 2323,
    "PowerCycles": 244,
    "PowerOnHours": 34566566,
    "ControllerBusyTimeMinutes": 545465665656
  },
  "HealthData": {
    "AvailableSparePercentage": 67,
    "PredictedMediaLifeUsedPercent": 120,
    "UnsafeShutdowns": 23,
    "MediaErrors": 10
  }
}
```

4.16.1.2 PUT

The PUT operation is not allowed on the drive metrics resource.

4.16.1.3 PATCH

The PATCH operation is not allowed on the drive metrics resource.

4.16.1.4 POST

The POST operation is not allowed on the drive metrics resource.

4.16.1.5 DELETE

The DELETE operation is not allowed on the drive metrics resource.

4.17 Chassis Collection

Table 42 shows the `ChassisCollection` attribute.

Table 42. ChassisCollection Attribute

Attribute	Type	Nullable	Description
`Members`	Collection(Chassis.Chassis)	False	Collection of Chassis

4.17.1 Operations

4.17.1.1 GET

Request:

```
GET /redfish/v1/Chassis
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#Chassis",
  "@odata.id": "/redfish/v1/Chassis",
  "@odata.type": "#ChassisCollection.ChassisCollection",
  "Name": "Chassis Collection",
  "Description": "description-as-string",
  "Members@odata.count": 1,
  "Members": [
    {
      "@odata.id": "/redfish/v1/Chassis/1"
    }
  ]
}
```

4.17.1.2 PUT

The PUT operation is not allowed on the chassis collection of resources.

4.17.1.3 PATCH

The PATCH operation is not allowed on the chassis collection of resources.

4.17.1.4 POST

The POST operation is not allowed on the chassis collection of resources.

4.17.1.5 DELETE

The DELETE operation is not allowed on the chassis collection of resources.

4.18 Chassis

This is the schema definition for the Chassis resource. It represents the properties for physical components for any system. This resource is intended to represent racks, rackmount servers, blades, standalone, modular systems, enclosures, and all other containers. The non-cpu/device centric parts of the schema are accessed either directly or indirectly through this resource.

Details of this resource are described in the `Chassis.xml` metadata file. OEM extensions details available in `IntelRackScaleOem.xml`. Table 43 describes the `Chassis` attributes. In addition, Table 44 describes the `Location` attributes, Table 45 shows the `Link` attribute, Intel® RSD OEM Links Extensions:

Table 46 shows the `ChassisLinks` attribute, and Table 47 shows the `ChassisType` attributes. For the Intel® RSD OEM extensions, Table 48 describes the `Chassis` attribute, and Table 49 shows the `Location` attributes.

Table 43. Chassis Attributes

Attribute	Type	Nullable	Description
`ChassisType`	Chassis.v1_0_0.ChassisType	False	`ChassisType` shall indicate the physical form factor for the type of chassis.
`Manufacturer`	Edm.String	True	The value of the property shall be the name of the organization responsible for producing the chassis. This organization might be the entity from whom the chassis is purchased, but this is not necessarily true.
`Model`	Edm.String	True	The value of the property shall be the name by which the manufacturer generally refers to the chassis.
`SKU`	Edm.String	True	The value of the property shall be the SKU number for this chassis.
`SerialNumber`	Edm.String	True	The value of the property shall be a manufacturer-allocated number used to identify the chassis.
`PartNumber`	Edm.String	True	The value of the property shall be a part number assigned by the organization responsible for producing or manufacturing the chassis.
`AssetTag`	Edm.String	True	The value of the property shall be an identifying string used to track the chassis for inventory purposes.
`IndicatorLED`	Resource.v1_1_0.IndicatorLED	True	This value of the property shall contain the indicator light state for the indicator light associated with the system.
`Links`	Chassis.v1_0_0.Links	False	The `Links` property, as described by the Redfish Specification, shall contain references to resources that are related to, but not contained by (subordinate to), this resource.
`Actions`	Chassis.v1_0_0.Actions	False	The `Actions` property shall contain the available actions for the resource.
`Status`	Resource.Status	False	Resource status.
`LogServices`	LogServiceCollection.LogServiceCollection	False	The value of the property shall be a link to a collection of type `LogServiceCollection`.
`Thermal`	Thermal.Thermal	False	The value of the property shall be a reference to the resource that represents the thermal characteristics of this chassis and shall be of type `Thermal`.
`Power`	Power.Power	False	The value of the property shall be a reference to the resource that represents the power characteristics of the chassis and shall be of type `Power`.
`PowerState`	Chassis.v1_0_1.PowerState	True	The value of the property shall contain the power state of the chassis.
`PhysicalSecurity`	Chassis.v1_1_0.PhysicalSecurity	False	This value of the property shall contain the sensor state of the physical security.

Attribute	Type	Nullable	Description
Location	Resource.v1_1_0.Location	False	This type shall describe the location of a resource.
HeightMm	Edm.Decimal	True	The value of the property shall represent the height of the chassis (in millimeters) as specified by the manufacturer.
WidthMm	Edm.Decimal	True	The value of the property shall represent the width of the chassis (in millimeters) as specified by the manufacturer.
DepthMm	Edm.Decimal	True	The value of the property shall represent the depth (length) of the chassis (in millimeters) as specified by the manufacturer.
WeightKg	Edm.Decimal	True	The value of the property shall represent the published mass (commonly referred to as weight) of the chassis (in kilograms).

Table 44. Chassis Location Attributes

Attribute	Type	Nullable	Description
Info	Edm.String	True	This property shall represent the location of the resource.
InfoFormat	Edm.String	True	This property shall represent the format of the Info property.
Oem	Resource.Oem	False	This property shall represent OEM extensions.

Table 45. Links Attribute

Attribute	Type	Nullable	Description
PCIeDevices	Collection(PCIeDevice.PCIeDevice)	True	The value of the property shall reference one or more resources of type PCIeDevices.

Intel® RSD OEM Links Extensions:

Table 46. ChassisLinks Attributes (OEM Extensions)

Attribute	Type	Nullable	Description
Switches	Collection(EthernetSwitch.v1_0_0.EthernetSwitch)	True	The value of the property shall reference one or more resources of type EthernetSwitch that are in this Chassis.

Table 47. Chassis Type Attributes

Member	Description
Blade	An enclosed or semi-enclosed, typically vertically oriented, system chassis that must be plugged into a multi-system chassis to function normally.
Card	A loose device or circuit board intended to be installed in a system or other enclosure.
Cartridge	A small self-contained system intended to be plugged into a multi-system chassis.
Component	A small chassis, card, or device that contains devices for a particular subsystem or function.
Drawer	An enclosed or semi-enclosed, typically horizontally oriented, system chassis that may be slid into a multi-system chassis.
Enclosure	A generic term for a chassis that does not fit any other description.
Expansion	A chassis that expands the capabilities or capacity of another chassis.
IPBasedDrive	A chassis in a drive form factor IP-based network connections.
Module	A small, typically removable, chassis or card that contains devices for a particular subsystem or function.
Other	A chassis that does not fit any of the other definitions.
Pod	A collection of equipment racks in a large, likely transportable, container.
Rack	An equipment rack, typically a 19-inch wide freestanding unit.
RackGroup	A group of racks that form a single entity or share infrastructure.

Member	Description
RackMount	A single system chassis designed specifically for mounting in an equipment rack.
Row	A collection of equipment racks.
Shelf	An enclosed or semi-enclosed, typically horizontally oriented, system chassis that must be plugged into a multi-system chassis to function normally.
Sidecar	A chassis that mates mechanically with another chassis to expand its capabilities or capacity.
Sled	An enclosed or semi-enclosed system chassis that must be plugged into a multi-system chassis to function normally similar to a blade type chassis.
StandAlone	A single freestanding system, commonly called a tower or desktop chassis.
Zone	A logical division or portion of a physical chassis that contains multiple devices or systems that cannot be physically separated.

Intel® RSD OEM extensions:

Table 48. Chassis Attribute (OEM Extensions)

Attribute	Type	Nullable	Description
`Location`	Intel.Oem.Location	True	Chassis location in relation to its parent.

Table 49. Location Attributes (OEM Extensions)

Attribute	Type	Nullable	Description
`Id`	Edm.String	True	String containing physical location ID of this chassis.
`ParentId`	Edm.String	True	String containing physical location ID of parent chassis.

4.18.1 Operations

4.18.1.1 GET

Request:

```
GET /redfish/v1/Chassis/1
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#Chassis/Members/$entity",
  "@odata.id": "/redfish/v1/Chassis/1",
  "@odata.type": "#Chassis.v1_3_0.Chassis",
  "AssetTag": "Asset Tag",
  "ChassisType": "Enclosure",
  "Description": "Chassis description",
  "Id": "1",
  "IndicatorLED": null,
  "Links": {
    "@odata.type": "#Chassis.v1_2_0.Links",
    "ComputerSystems": [
      {
        "@odata.id": "/redfish/v1/Systems/Target"
      }
    ],
    "ContainedBy": null,
    "Contains": [],
    "Drives": [
      {
        "@odata.id": "/redfish/v1/Chassis/1/Drives/1"
```

```
      },
      {
        "@odata.id": "/redfish/v1/Chassis/1/Drives/2"
      }
    ],
    "ManagedBy": [
      {
        "@odata.id": "/redfish/v1/Managers/1"
      }
    ],
    "ManagersInChassis": [],
    "Oem": {
      "Intel_RackScale": {
        "@odata.type": "#Intel.Oem.ChassisLinks",
        "Switches": []
      }
    }
  },
  "Manufacturer": "Intel Corporation",
  "Model": "E234",
  "Name": "Chassis",
  "Oem": {
    "Intel_RackScale": {
      "@odata.type": "#Intel.Oem.Chassis",
      "Location": {
        "Id": "2",
        "ParentId": null
      }
    }
  },
  "PartNumber": "29ee2220939",
  "SKU": "SKU",
  "SerialNumber": "123fed3029c-b23094-12",
  "Status": {
    "Health": "OK",
    "HealthRollup": "OK",
    "State": "Enabled"
  }
}
```

4.18.1.2 PUT

The PUT operation is not allowed on the chassis resource.

4.18.1.3 PATCH

Request:

```
PATCH /redfish/v1/Chassis/1
Content-Type: application/json
{
  "AssetTag": "My Asset Tag"
}
```

Response:

```
HTTP/1.1 204 No Content
```

Or:

```
HTTP/1.1 200 OK
{}
```

Or (when a task is created):

```
HTTP/1.1 202 Accepted
Location: http://<ip:port>/redfish/v1/TaskService/Tasks/1/TaskMonitor
{
  "@odata.context": "/redfish/v1/$metadata#Task.Task",
  "@odata.id": "/redfish/v1/TaskService/Tasks/1",
  "@odata.type": "#Task.v1_0_0.Task",
  "Id": "1",
  "Name": "Task 1",
  "TaskState": "New",
  "StartTime": "2016-09-01T04:45+01:00",
  "TaskStatus": "OK",
  "Messages": []
}
```

4.18.1.4 POST

The POST operation is not allowed on the chassis resource.

4.18.1.5 DELETE

The DELETE operation is not allowed on the chassis resource.

4.19 Fabric Collection

The `Fabric` properties details are available in the `FabricCollection.xml` metadata file. Table 50 describes the `FabricCollection` attribute.

Table 50. FabricCollection Attribute

Attribute	Type	Nullable	Description
`Members`	Collection(Fabric.Fabric)	False	Collection of fabrics.

4.19.1 Operations

4.19.1.1 GET

Request:

```
GET /redfish/v1/Fabrics
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#FabricCollection.FabricCollection",
  "@odata.id": "/redfish/v1/Fabrics",
  "@odata.type": "#FabricCollection.FabricCollection",
  "Name": "Fabric Collection",
  "Description": " Fabric Collection",
  "Members@odata.count": 1,
  "Members": [
    {
      "@odata.id": "/redfish/v1/Fabrics/NVMeoE"
```

```
      }
    ]
}
```

4.19.1.2 PUT

The PUT operation is not allowed on the fabric collection of resources.

4.19.1.3 PATCH

The PATCH operation is not allowed on the fabric collection of resources.

4.19.1.4 POST

The POST operation is not allowed on the fabric collection of resources.

4.19.1.5 DELETE

The DELETE operation is not allowed on the fabric collection of resources.

4.20 Fabric

The Fabric resource shall be used to represent a simple fabric for a Redfish implementation. The properties details are available in the `Fabric.xml` metadata file. Table 51 shows the `Fabric` attributes, and Table 52 describes the `Protocol` attributes.

Table 51. Fabric Attributes

Attribute	Type	Nullable	Description
`FabricType`	Storage.v1_0_0.Protocol	True	The value of the property shall contain the type of fabric being represented by this simple fabric.
`Status`	Resource.Status	False	Resource status.
`MaxZones`	Edm.Int64	True	The value of the property shall contain the maximum number of zones the switch can currently configure. This value can change based on changes in the logical or physical configuration of the system.
`Links`	Fabric.v1_0_0.Links	False	The `Links` property, as described by the Redfish Specification, shall contain references to resources that are related to, but not contained by (subordinate to), the resource.
`Actions`	Fabric.v1_0_0.Actions	False	The `Actions` property shall contain the available actions for the resource.
`Zones`	ZoneCollection.ZoneCollection	False	The value of the property shall be a reference to the resources that this fabric uses and shall reference a resource of type `Zone`.
`Endpoints`	EndpointCollection.EndpointCollection	False	The value of the property shall be a reference to the resources that this fabric uses and shall reference a resource of type `Endpoint`.
`Switches`	SwitchCollection.SwitchCollection	False	The value of the property shall be a reference to the resources that this fabric uses and shall reference a resource of type `Switch`.

Table 52. Fabric Protocol Attributes

Member	Description
AHCI	This value shall mean that the device conforms to the Intel Advanced Host Controller Interface Specification.
FC	This value shall mean that the device conforms to the T11 Fibre Channel Physical and Signaling Interface Specification.
FCoE	This value shall mean that the device conforms to the T11 FC-BB-5 Specification.
FTP	This value shall mean that the device conforms to the File Transfer Protocol as defined by RFC114.
HTTP	This value shall mean that the device conforms to the Hypertext Transfer Protocol as defined by RFC2068 or RFC2616.
HTTPS	This value shall mean that the device conforms to the Hypertext Transfer Protocol as defined by RFC2068 or RFC2616 using Transport Layer Security as specified by RFC5246 or RFC6176.
iSCSI	This value shall mean that the device conforms to the IETF* Internet Small Computer Systems Interface (iSCSI) Specification.
NFSv3	This value shall mean that the device conforms to the Network File System protocol as defined by RFC1813.
NFSv4	This value shall mean that the device conforms to the Network File System protocol as defined by RFC3010 or RFC5661.
NVMe	This value shall mean that the device conforms to the Non-Volatile Memory Host Controller Interface Specification.
NVMeOverFabrics	This value shall mean that the device conforms to the NVM Express over Fabrics Specification.
PCIe	This value shall mean that the device conforms to the PCI-SIG PCI Express Base Specification only. Beyond that, it uses some vendor proprietary mechanism to communicate.
SAS	This value shall mean that the device conforms to the T10 SAS Protocol Layer Specification.
SATA	This value shall mean that the device conforms to the Serial ATA International Organization Serial ATA Specification.
SFTP	This value shall mean that the device conforms to the File Transfer Protocol as defined by RFC114 using Transport Layer Security as specified by RFC5246 or RFC6176.
SMB	This value shall mean that the device conforms to the Microsoft* Server Message Block Protocol.
UHCI	This value shall mean that the device conforms to the Intel Universal Host Controller Interface Specification, Enhanced Host Controller Interface Specification, or the Extensible Host Controller Interface specification.
USB	This value shall mean that the device conforms to the USB Implementers Forum Universal Serial Bus Specification.

4.20.1 Operations

4.20.1.1 GET

Request:

```
GET /redfish/v1/Fabrics/NVMeoE
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#Fabric.Fabric",
  "@odata.id": "/redfish/v1/Fabrics/NVMeoE",
  "@odata.type": "#Fabric.v1_0_0.Fabric",
  "Id": "NVMeoE",
  "Actions": {
    "Oem": null
```

```
  },
  "Zones": {
    "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Zones"
  },
  "Endpoints": {
    "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Endpoints"
  },
  "FabricType": "NVMeOverFabrics",
  "Links": {
    "Oem": {}
  },
  "Oem": {},
  "Status": {
    "Health": "OK",
    "HealthRollup": "OK",
    "State": "Enabled"
  }
}
```

4.20.1.2 PUT

The PUT operation is not allowed on the fabric resource.

4.20.1.3 PATCH

The PATCH operation is not allowed on the fabric resource.

4.20.1.4 POST

The POST operation is not allowed on the fabric resource.

4.20.1.5 DELETE

The DELETE operation is not allowed on the fabric resource.

4.21 Zones Collection

The `Zones` properties details are available in the `ZoneCollection.xml` metadata file. Table 53 describes the `ZoneCollection` attribute.

Table 53. ZoneCollection Attribute

Attribute	Type	Nullable	Description
`Members`	Collection(Zone.Zone)	False	Collection of zones.

4.21.1 Operations

4.21.1.1 GET

Request:

```
GET /redfish/v1/Fabrics/NVMeoE/Zones
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#ZoneCollection.ZoneCollection",
  "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Zones",
  "@odata.type": "#ZoneCollection.ZoneCollection",
  "Description": "Zone Collection",
  "Members": [
    {
      "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Zones/1"
    }
  ],
  "Members@odata.count": 1,
  "Name": "Zone Collection"
}
```

4.21.1.2 PUT

The PUT operation is not allowed on the zones collection of resources.

4.21.1.3 PATCH

The PATCH operation is not allowed on the zones collection of resources.

4.21.1.4 POST

To create a new `Fabrics` zone, the initial `Zones` structure should be posted.

Request:

```
POST /redfish/v1/Fabrics/NVMeoE/Zones
Content-Type: application/json
{
  "Links": {
    "Endpoints": [
      {
        "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Endpoints/1"
      },
      {
        "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Endpoints/2"
      }
    ]
  }
}
```

Response:

```
HTTP/1.1 201 Created
Location: http://<IP>:<PORT>/redfish/v1/Fabrics/NVMeoE/Zones/2
```

4.21.1.5 DELETE

The DELETE operation is not allowed on the zones collection of resources.

4.22 Zones

The `Zones` properties details are available in the `Zone.xml` metadata file. Table 54 shows the `Zone` attributes, and Table 55 shows the `Links` attributes.

Table 54. Zones Attributes

Attribute	Type	Nullable	Description
`Status`	Resource.Status	False	Resource status.
`Links`	Zone.v1_0_0.Links	False	The `Links` property, as described by the Redfish Specification, shall contain references to resources that are related to, but not contained by (subordinate to), the resource.

Table 55. Zones Links Attributes

Attribute	Type	Nullable	Description
`Endpoints`	Collection(Endpoint.Endpoint)	False	The value of the property shall be a reference to the resources that the zone is associated with and shall reference a resource of type `Endpoint`.
`InvolvedSwitches`	Collection(Switch.Switch)	False	The value of the property shall be a reference to the resources that the zone is associated with and shall reference a resource of type `Switch`.

4.22.1 Operations

4.22.1.1 GET

Request:

```
GET /redfish/v1/Fabrics/NVMeoE/Zones/1
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#Zone.Zone",
  "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Zones/1",
  "@odata.type": "#Zone.v1_0_0.Zone",
  "Id": "1",
  "Name": "Zone 1",
  "Description": "Zone 1",
  "Status": {
    "State": "Enabled",
    "Health": "OK"
  },
  "Links": {
    "Endpoints": [
      {
        "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Endpoints/1"
      },
      {
        "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Endpoints/2"
      }
    ],
    "InvolvedSwitches": []
  },
  "Oem": {}
}
```

4.22.1.2 PUT

The PUT operation is not allowed on the zones resource.

4.22.1.3 PATCH

The PATCH method can be used to add or remove `Endpoints` from a `Zone`. The service requires to always provide complete representation of the `Endpoints` array. A partial update is not supported.

Request:

```
PATCH /redfish/v1/Fabrics/NVMeoE/Zones/1
Content-Type: application/json
{
  "Links": {
    "Endpoints": [
      {
        "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Endpoints/Initiator2"
      },
      {
        "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Endpoints/1"
      }
    ]
  }
}
```

Response:

```
HTTP/1.1 204 No Content
```

Or:

```
HTTP/1.1 200 OK
{}
```

Or (when a task is created):

```
HTTP/1.1 202 Accepted
Location: http://<ip:port>/redfish/v1/TaskService/Tasks/1/TaskMonitor
{
  "@odata.context": "/redfish/v1/$metadata#Task.Task",
  "@odata.id": "/redfish/v1/TaskService/Tasks/1",
  "@odata.type": "#Task.v1_0_0.Task",
  "Id": "1",
  "Name": "Task 1",
  "TaskState": "New",
  "StartTime": "2016-09-01T04:45+01:00",
  "TaskStatus": "OK",
  "Messages": []
}
```

4.22.1.4 POST

The POST operation is not allowed on the zones resource.

4.22.1.5 DELETE

Request:

```
DELETE redfish/v1/Fabrics/NVMeoE/Zones/1
```

Response:

```
HTTP/1.1 204 No Content
```

Or (when a task is created):

```
HTTP/1.1 202 Accepted
```

```
Location: http://<ip:port>/redfish/v1/TaskService/Tasks/1/TaskMonitor
{
  "@odata.context": "/redfish/v1/$metadata#Task.Task",
  "@odata.id": "/redfish/v1/TaskService/Tasks/1",
  "@odata.type": "#Task.v1_0_0.Task",
  "Id": "1",
  "Name": "Task 1",
  "TaskState": "New",
  "StartTime": "2017-12-06T04:45+01:00",
  "TaskStatus": "OK",
  "Messages": []
}
```

4.23 Endpoint Collection

The `Endpoint` properties details are available in the `EndpointCollection.xml` metadata file. Table 56 shows the `EndpointCollection` attribute.

Table 56. EndpointCollection Attributes

Attribute	Type	Nullable	Description
`Members`	Collection(Endpoint.Endpoint)	True	Collection of endpoints.

4.23.1 Operations

4.23.1.1 GET

Request:

```
GET /redfish/v1/Fabrics/NVMeoE/Endpoints
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#EndpointCollection.EndpointCollection",
  "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Endpoints",
  "@odata.type": "#EndpointCollection.EndpointCollection",
  "Members": [
    {
      "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Endpoints/1"
    },
    {
      "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Endpoints/2"
    }
  ],
  "Members@odata.count": 1,
  "Name": "Endpoint Collection",
  "Description": "Endpoint Collection"
}
```

4.23.1.2 PUT

The PUT operation is not allowed on the endpoint collection of resources.

4.23.1.3 PATCH

The PATCH operation is not allowed on the endpoint collection of resources.

4.23.1.4 POST

Table 57 describes the `Endpoint` POST properties. In addition, Table 58 shows the `Identifiers` POST properties, Table 59 shows `ConnectedEntities` POST properties, Table 60 shows `IPTransportDetails` POST properties, Table 61 shows the `DurableNameFormat` attributes, and Table 62 shows the `EntityRole` attributes.

Table 57. Endpoint POST Properties

Attribute	Type	Required	Description
`EndpointProtocol`	String (enum)	No	Indicates the protocol used by the endpoint.
`Identifiers`	Array of Resource.v1_1_0.Identifier	Yes	Provides ISCSI Qualified Name (iQN) or NVMe Qualified Name (NQN) of created entity (will be generated if not provided).
`ConnectedEntities`	Array of Endpoint.v1_0_0.ConnectedEntity	Yes	Provides information about entities connected to the endpoint.
`IPTransportDetails`	Array of Endpoint.v1_1_0.EndpointTransport	No	Provides information about the transport used for accessing the endpoint.
`Links->Oem->Interface`	Resource.Resource	No	Provides information about the interface that should be used for the endpoint connectivity.
`Oem->Authentication`	Resource.Resource	No	Provides authentication data for target-initiator authentication. Currently supported only for the iSCSI protocol.

Table 58. Identifiers POST Properties

Attribute	Type	Required	Description
`DurableNameFormat`	Resource.v1_1_0.DurableNameFormat	Yes	This represents the format of the `DurableName` property. Allowed values: `"NQN"`, `"iQN"`
`DurableName`	String	Yes	This property contains the worldwide unique identifier for the resource. The string is in the format described by the value of the `Identifier.DurableNameFormat` property.

Table 59. ConnectedEntities POST Properties

Attribute	Type	Required	Description
`EntityLink`	Object (link)	Yes	A link to the associated entity.
`EntityRole`	Endpoint.v1_0_0.EntityRole	Yes	This property contains the worldwide unique identifier for the resource. The string is in the format described by the value of the `Identifier.DurableNameFormat` property.
`Identifiers`	Array of Resource.v1_1_0.Identifier	No	This property can provide additional identifiers for a connected entity. It is used for iSCSI to provide the Logical Unit Number (LUN).

Table 60. IPTransportDetails POST Properties

Attribute	Type	Required	Description
`TransportProtocol`	Protocol.Protocol	No	Protocol used by the IP transport.
`IPv4Address`	IPAddresses.IPv4Address	No	IPv4 address for the transport.

IPv6Address	IPAddresses.IPv6Address	No	IPv6 address for the transport.
Port	Edm.Decimal	No	UDP or TCP port number used for communication with the endpoint.

Table 61. DurableNameFormat Attributes

Member	Description
NAA	This durable name is a hexadecimal representation of the Name Address Authority structure as defined in the *T11 Fibre Channel* Framing and Signaling 3 (FC-FS-3) Specification*.
iQN	This durable name is in the iSCSI Qualified Name format as defined in RFC3720 and RFC3721 (refer to Table 2).
FC_WWN	This durable name is a hexadecimal representation of the World Wide Name format as defined in the *T11 Fibre Channel Physical and Signaling Interface Specification*.
UUID	This durable name is the hexadecimal representation of the Universal Unique Identifier as defined in the International Telecom Union* OSI networking and system aspects *Naming, Addressing, and Registration Specification*.
EUI	This durable name is the hexadecimal representation of the IEEE*-defined 64-bit Extended Unique Identifier as defined in the *IEEE Guidelines for 64-bit Global Identifier (EUI-64) Specification*.
NQN	This durable name is in the NVMe Qualified Name format as defined in the *NVM Express* over Fabric Specification* (refer to Table 2).
NSID	This durable name is in the NVM Namespace Identifier format as defined in the *NVMe Base Specification* (refer to Table 2).
SystemPath	The operating system path to resource.
LUN	The LUN of the device. Used in the iSCSI protocol to enumerate volumes.

Table 62. EntityRole Attributes

Member	Description
InitiatorF	Indicates that the entity is acting as an initiator.
Target	Indicates that the entity is acting as a target.
Both	Indicates that the entity is acting as both an initiator and a target.

The following example shows how to create an NVMeOverFabrics endpoint.

Request:

```
POST /redfish/v1/Fabrics/NVMeoE/Endpoints
Content-Type: application/json
{
  "EndpointProtocol": "NVMeOverFabrics",
  "Identifiers": [
    {
      "DurableNameFormat": "NQN",
      "DurableName": "nqn.2014-08.org.nvmexpress:NVMf:uuid:397f9b78-7e94-11e7-9ea4-
001e67dfa170"
    }
  ],
  "ConnectedEntities": [
    {
      "EntityLink": {
        "@odata.id": "/redfish/v1/StorageServices/1/Volumes/1"
      },
      "EntityRole": "Target"
    }
  ],
  "Links": {
    "Oem": {
      "Intel_RackScale": {
```

```
        "Interfaces": [
          {
            "@odata.id": "/redfish/v1/Systems/Target/EthernetInterfaces/1"
          }
        ]
      }
    }
  }
}
```

Response:

```
HTTP/1.1 201 Created
Location: http://<IP>:<PORT>/redfish/v1/Fabrics/NVMeoE/Endpoints/3
```

The next example shows how to create an iSCSI endpoint.

Request:

```
POST /redfish/v1/Fabrics/iSCSI/Endpoints
Content-Type: application/json
{
  "EndpointProtocol": "iSCSI",
  "Identifiers": [
    {
      "DurableNameFormat": "iQN",
      "DurableName": "iqn.1986-03.com.intel:my_storage-uuid:397f9b78-7e94-11e7-9ea4-
001e67dfa170"
    }
  ],
  "ConnectedEntities": [
    {
      "EntityLink": {
        "@odata.id": "/redfish/v1/StorageServices/1/Volumes/1"
      },
      "EntityRole": "Target",
      "Identifiers": [
        {
          "DurableNameFormat": "LUN",
          "DurableName": "1"
        }
      ]
    }
  ],
  "Oem": {
    "Intel_RackScale": {
      "Authentication": {
        "Username": "userA",
        "Password": "passB"
      }
    }
  }
}
```

Response:

```
HTTP/1.1 201 Created
Location: http://<IP>:<PORT>/redfish/v1/Fabrics/iSCSI/Endpoints/3
```

4.23.1.5 DELETE

The DELETE operation is not allowed on the endpoint collection of resources.

4.24 Endpoint

Endpoint properties details are available in the `Endpoint.xml` metadata file. Table 63 describes the `Endpoint` attributes. In addition, Table 64 shows the `ConnectedEntity` attributes, Table 65 shows the `IPTransportDetails` attributes, Table 66 shows the `Links` attribute, Table 67 shows the `EntityRole` attributes, and Table 68 shows the `Protocol` attributes. For the Intel® RSD OEM extensions, Table 69 shows the `Endpoint` attribute, Table 70 shows the `EndpointAuthentication` attributes, and Table 71 shows the `EndpointLinks` attributes.

Table 63. Endpoint Attributes

Attribute	Type	Nullable	Description
`Status`	Resource.Status	True	Resource status.
`EndpointProtocol`	Protocol.Protocol	True	The value of the property contains the protocol the endpoint uses to communicate with other endpoints on the fabric.
`ConnectedEntities`	Collection(Endpoint.v1_0_0.ConnectedEntity)	True	This value of the property contains all the entities that the endpoint allows access to.
`Identifiers`	Collection(Resource.v1_1_0.Identifier)	True	Identifiers for the endpoint shall be unique in the context of other endpoints that can be reached over the connected network.
`PciId`	Endpoint.v1_0_0.PciId	True	The value of the property is the `Pcild` of the endpoint.
`HostReservationMemoryBytes`	Edm.Int64	True	The value of the property is the amount of memory in Bytes that the host should allocate to connect to the endpoint.
`Links`	Endpoint.v1_0_0.Links	False	Resource links.
`Actions`	Endpoint.v1_0_0.Actions	False	Actions available for the resource.
`Redundancy`	Collection(Redundancy.Redundancy)	True	Redundancy information for the lower-level endpoints supporting this endpoint.
`IPTTransportDetails`	Collection(Endpoint.v1_1_0.IPTTransportDetails)	True	This array contains the details for each IP transport supported by the endpoint.

Table 64. ConnectedEntity Attributes

Attribute	Type	Nullable	Description
`EntityType`	Endpoint.v1_0_0.EntityType	True	The value of the property indicates the type of connected entity.
`EntityRole`	Endpoint.v1_0_0.EntityRole	True	The value of the property indicates if the specified entity is an initiator, target, or both.
`EntityPciId`	Endpoint.v1_0_0.PciId	True	The value of the property is the PCI ID of the connected PCIe entity.
`PciFunctionNumber`	Edm.Int64	True	The value of the property is the PCI Function Number of the connected PCIe entity.
`PciClassCode`	Edm.String	True	The value of the property is the PCI Class Code, Subclass code, and Programming Interface Code of the PCIe device function.
`Identifiers`	Collection(Resource.v1_1_0.Identifier)	True	Identifiers for the remote entity shall be unique in the context of other resources that can be reached over the connected network.
`Oem`	Resource.Oem	True	This property is a reference to OEM extensions.
`EntityLink`	Resource.Resource	True	This property is a reference to an entity of the type specified by the description of the value of the `EntityType` property.

Table 65. IPTransportDetails Attributes

Attribute	Type	Nullable	Description
`TransportProtocol`	Protocol.Protocol	False	The value is the protocol used by the connection entity.
`IPv4Address`	IPAddresses.IPv4Address	False	The value of the property specifies the IPv4Address.
`IPv6Address`	IPAddresses.IPv6Address	False	The value of the property specifies the IPv6Address.
`Port`	Edm.Decimal	False	The value of the property specifies the UDP or TCP port number used for communication with the endpoint.

Table 66. EntityRole Links Attributes

Attribute	Type	Nullable	Description
`NetworkDeviceFunction`	Collection(NetworkDeviceFunction.NetworkDeviceFunction)	True	The value of the property is a reference to a `NetworkDeviceFunction` resource associated with the endpoint.

Table 67. EntityRole Attributes

Member	Description
`Initiator`	This entity acts as an initiator.
`Target`	This entity acts as a target.
`Both`	The entity acts as both an initiator and a target.

Table 68. Endpoint Protocol Attributes

Member	Description
AHCI	This value shall mean that the device conforms to the *Intel Advanced Host Controller Interface Specification.*
FC	This value shall mean that the device conforms to the *T11 Fibre Channel Physical and Signaling Interface Specification.*
FCoE	This value shall mean that the device conforms to the *T11 FC-BB-5 Specification.*
FCP	This enumeration literal shall indicate the INCITS 481: Information Technology—Fibre Channel Protocol for SCSI.
FICON	This enumeration literal shall indicate the ANSI FC-SB-3 Single-Byte Command Code Sets-3 Mapping Protocol for the Fibre Channel (FC) protocol. FICON* (FIbre CONnection) is the IBM* proprietary name for this protocol.
FTP	This value shall mean that the device conforms to the File Transfer Protocol as defined by RFC114 (refer to Table 2).
HTTP	This value shall mean that the device conforms to the Hypertext Transfer Protocol as defined by RFC2068 or RFC2616 (refer to Table 2).
HTTPS	This value shall mean that the device conforms to the Hypertext Transfer Protocol as defined by RFC2068 or RFC2616 using Transport Layer Security as specified by RFC5246 or RFC6176 (refer to Table 2).
iSCSI	This value shall mean that the device conforms to the *IETF* Internet Small Computer Systems Interface (iSCSI) Specification* (refer to Table 2).
iWARP	This value shall mean that the device conforms to the iWARP protocol as defined by RFC5042 using the Transport Layer mechanisms as specified by RFC5043 or RFC5044 (refer to Table 2).
NFSv3	This value shall mean that the device conforms to the Network File System protocol as defined by RFC1813 (refer to Table 2).
NFSv4	This value shall mean that the device conforms to the Network File System protocol as defined by RFC3010 or RFC5661.
NVMe	This value shall mean that the device conforms to the *Non-Volatile Memory Host Controller Interface Specification.*
NVMeOverFabrics	This value shall mean that the device conforms to the *NVM Express* over Fabrics Specification* (refer to Table 2).

Member	Description
PCIe	This value shall mean that the device conforms to the *PCI-SIG PCI Express Base Specification* only. Beyond that, it uses a vendor proprietary mechanism to communicate.
RoCE	This value shall mean that the device conforms to the RDMA over Converged Ethernet protocol as defined by the *Infiniband* Architecture Specification*.
RoCEv2	This value shall mean that the device conforms to the RDMA over Converged Ethernet version 2 protocol as defined by the *Infiniband Architecture Specification*.
SAS	This value shall mean that the device conforms to the *T10 SAS Protocol Layer Specification*.
SATA	This value shall mean that the device conforms to the *Serial ATA International Organization* Serial ATA Specification*.
SFTP	This value shall mean that the device conforms to the File Transfer Protocol as defined by RFC114 using Transport Layer Security as specified by RFC5246 or RFC6176 (refer to Table 2).
SMB	This value shall mean that the device conforms to the Microsoft* Server Message Block Protocol.
UHCI	This value shall mean that the device conforms to the *Intel Universal Host Controller Interface Specification*, *Intel Enhanced Host Controller Interface Specification*, or the *Intel Extensible Host Controller Interface Specification*.
USB	This value shall mean that the device conforms to the *USB Implementers Forum* Universal Serial Bus Specification*.

Intel® RSD OEM extensions:

Table 69. Endpoint Attribute (OEM Extensions)

Attribute	Type	Nullable	Description
`Authentication`	Intel.Oem.EndpointAuthentication	True	This property provides information about endpoint authentication required credentials.

Table 70. EndpointAuthentication Attributes (OEM Extensions)

Attribute	Type	Nullable	Description
`Username`	Edm.String	True	This property provides an endpoint username used to authenticate it on the other side of a communication channel.
`Password`	Edm.String	True	This property is used to provide an endpoint password. It provides write only access. On read, it shall return null value.

Table 71. EndpointLinks Attributes (OEM Extensions)

Attribute	Type	Nullable	Description
`Zones`	Collection(Zone.Zone)	True	The value of the property is a reference to the resources that the endpoint is associated with and references a resource of type `Zone`.
`Interface`	Resource.Resource	True	This property is an array of references to resources representing interface where this endpoint is available.

4.24.1 Operations

4.24.1.1 GET

4.24.1.1.1 Target Endpoint

Request:

```
GET /redfish/v1/Fabrics/NVMeoE/Endpoints/1
Content-Type: application/json
```

Response:


```
{
  "@odata.context": "/redfish/v1/$metadata#Endpoint.Endpoint",
  "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Endpoints/1",
  "@odata.type": "#Endpoint.v1_1_0.Endpoint",
  "ConnectedEntities": [
    {
      "EntityLink": {
        "@odata.id": "/redfish/v1/StorageServices/1/Volumes/1"
      },
      "EntityRole": "Target"
    }
  ],
  "Description": "Fabric Endpoint",
  "EndpointProtocol": "NVMeOverFabrics",
  "Id": "1",
  "Identifiers": [
    {
      "DurableName": "nqn.2014-08.org.nvmexpress:NVMf:uuid:397f9b78-7e94-11e7-9ea4-
001e67dfa170",
      "DurableNameFormat": "NQN"
    },
    {
      "DurableName": "397f9b78-7e94-11e7-9ea4-001e67dfa170",
      "DurableNameFormat": "UUID"
    }
  ],
  "Links": {
    "Ports": [],
    "Endpoints": [],
    "Oem": {
      "Intel_RackScale": {
        "@odata.type": "#Intel.Oem.EndpointLinks",
        "Zones": [
          {
            "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Zones/1"
          }
        ],
        "Interface": {
          "odata.id": "/redfish/v1/Systems/Target/EthernetInterfaces/1"
        }
      }
    }
  },
  "Name": "Fabric Endpoint",
  "IPTransportDetails": [
    {
```

```
      "TransportProtocol": "RoCEv2",
      "IPv4Address": {
        "Address": "192.168.0.10"
      },
      "IPv6Address": {},
      "Port": 1023
    }
  ],
  "Status": {
    "Health": "OK",
    "HealthRollup": "OK",
    "State": "Enabled"
  },
  "Oem": {
    "Intel_RackScale": {
      "@odata.type": "#Intel.Oem.Endpoint",
      "Authentication": null
    }
  }
}
```

4.24.1.1.2 Initiator Endpoint

Request:

```
GET /redfish/v1/Fabrics/NVMeoE/Endpoints/2
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#Endpoint.Endpoint",
  "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Endpoints/2",
  "@odata.type": "#Endpoint.v1_1_0.Endpoint",
  "Name": "Fabric Endpoint",
  "Id": "1",
  "Description": "Fabric Initiator Endpoint",
  "ConnectedEntities": [
    {
      "EntityLink": null,
      "EntityRole": "Initiator"
    }
  ],
  "EndpointProtocol": "NVMeOverFabrics",
  "Identifiers": [
    {
      "DurableName": "nqn.2014-08.org.nvmexpress:NVMf:uuid:12345678-90ab-cdef-0000-
000000000000",
      "DurableNameFormat": "NQN"
    },
    {
      "DurableName": "12345678-90ab-cdef-0000-000000000000",
      "DurableNameFormat": "UUID"
    }
  ],
  "Links": {
    "Ports": [],
    "Endpoints": [],
    "Oem": {
      "Intel_RackScale": {
        "@odata.type": "#Intel.Oem.EndpointLinks",
```

```
        "Zones": [
          {
            "@odata.id": "/redfish/v1/Fabrics/NVMeoE/Zones/1"
          }
        ],
        "Interface": null
      }
    }
  },
  "IPTransportDetails": [
    {
      "TransportProtocol": "RoCEv2",
      "IPv4Address": {
        "Address": "192.168.0.10"
      },
      "IPv6Address": {},
      "Port": 4791
    }
  ],
  "Status": {
    "Health": null,
    "HealthRollup": null,
    "State": null
  },
  "Oem": {
    "Intel_RackScale": {
      "@odata.type": "#Intel.Oem.Endpoint",
      "Authentication": null
    }
  }
}
```


4.24.1.2 PUT

The PUT operation is not allowed on the endpoint resource.

4.24.1.3 PATCH

Table 72 shows the property that can be updated by the PATCH operation. Table 73 shows the `EndpointAuthentication` attributes.

Table 72. PATCH Endpoint Attributes

Attribute	Type	Nullable	Description
`Authentication`	Intel.Oem.EndpointAuthentication	True	This property provides information about endpoint authentication required credentials.

Table 73. EndpointAuthentication Attributes

Attribute	Type	Nullable	Description
`Username`	Edm.String	True	This property provides an endpoint username used to authenticate it on the other side of a communication channel.
`Password`	Edm.String	True	This property is used to provide an endpoint password. It provides write only access. On read, it shall return null value.

Request:

```
PATCH /redfish/v1/Fabrics/iSCSI/Endpoints/1
Content-Type: application/json
{
  "Oem": {
    "Intel_RackScale": {
      "@odata.type": "#Intel.Oem.Endpoint",
      "Authentication": {
        "Username": "user1",
        "Password": "mysecret"
      }
    }
  }
}
```

Response:

```
HTTP/1.1 204 No Content
```

Or:

```
HTTP/1.1 200 OK
((updated resource body))
```

Or (when a task is created):

```
HTTP/1.1 202 Accepted
Location: http://<ip:port>/redfish/v1/TaskService/Tasks/1/TaskMonitor
{
  "@odata.context": "/redfish/v1/$metadata#Task.Task",
  "@odata.id": "/redfish/v1/TaskService/Tasks/1",
  "@odata.type": "#Task.v1_0_0.Task",
  "Id": "1",
  "Name": "Task 1",
  "TaskState": "New",
  "StartTime": "2016-09-01T04:45+01:00",
  "TaskStatus": "OK",
  "Messages": []
}
```

4.25 Computer System Collection

Table 74 shows the `ComputerSystemCollection` attribute.

Table 74. ComputerSystemCollection Attributes

Attribute	Type	Nullable	Description
`Members`	Collection(ComputerSystem.ComputerSystem)	False	Collection of ComputerSystems.

4.25.1 Operations

4.25.1.1 GET

Request:

```
GET /redfish/v1/Systems
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#Systems",
  "@odata.id": "/redfish/v1/Systems",
  "@odata.type": "#ComputerSystemCollection.ComputerSystemCollection",
  "Name": "Computer System Collection",
  "Description": "description-as-string",
  "Members@odata.count": 1,
  "Members": [
    {
      "@odata.id": "/redfish/v1/Systems/Target"
    }
  ]
}
```

4.25.1.2 PUT

The PUT operation is not allowed on the computer system collection of resources.

4.25.1.3 PATCH

The PATCH operation is not allowed on the computer system collection of resources.

4.25.1.4 POST

The POST operation is not allowed on the computer system collection of resources.

4.25.1.5 DELETE

The DELETE operation is not allowed on the computer system collection of resources.

4.26 Computer System

This schema defines a computer system and its respective properties. A computer system represents a machine (physical or virtual) and the local resources, such as memory, CPU, and other devices that can be accessed from the machine.

Details of this resource are described in the `ComputerSystem.xml` metadata file. OEM extensions details are available in `IntelRackScaleOem.xml`. Table 75 shows the `ComputerSystem` attributes.

Table 75. ComputerSystem Attributes

Attribute	Type	Nullable	Description
`SystemType`	ComputerSystem.v1_0_0.SystemType	False	An enumeration that indicates the kind of system the resource represents.
`Links`	ComputerSystem.v1_0_0.Links	False	The `Links` property, as described by the Redfish Specification, contains references to resources related to, but not contained by (subordinate to), the resource.
`AssetTag`	Edm.String	True	The value of the property contains the value of the asset tag of the system.
`Manufacturer`	Edm.String	True	The value of the property contains a value that represents the manufacturer of the system.
`Model`	Edm.String	True	The value of the property contains the information about how the manufacturer references the system.

Attribute	Type	Nullable	Description
SKU	Edm.String	True	The value of the property contains the SKU for the system.
SerialNumber	Edm.String	True	The value of the property contains the serial number for the system.
PartNumber	Edm.String	True	The value of the property contains the part number for the system as defined by the manufacturer.
UUID	Resource.UUID	True	The value of the property is used to contain a universal unique identifier number for the system. RFC4122 describes methods that can be used to create the value. The value should be considered opaque. Client software should only treat the overall value as a universally unique identifier and should not interpret any subfields in the UUID. If the system supports SMBIOS, the value of the property should be formed by following the SMBIOS 2.6+ recommendation for converting the SMBIOS 16-byte UUID structure into the Redfish canonical xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx string format so the property value matches the byte order presented by current OS APIs, such as WMI and dmidecode.
HostName	Edm.String	True	The value of the property shall be the host name for the system, as reported by the operating system or hypervisor. The value is typically provided to the Manager by a service running in the host operating system.
IndicatorLED	Resource.v1_1_0.IndicatorLED	True	The value of the property shall contain the indicator light state for the indicator light associated with the system.
PowerState	ComputerSystem.v1_0_0.PowerState	True	The value of the property shall contain the power state of the system.
Boot	ComputerSystem.v1_0_0.Boot	False	This object shall contain properties that describe boot information for the current resource. Changes to this object do not alter the BIOS-persistent boot order configuration.
BiosVersion	Edm.String	True	The value of the property shall be the version string of the currently installed and running BIOS (for x86 systems). For other systems, the value may contain a version string representing the primary system firmware.
ProcessorSummary	ComputerSystem.v1_0_0.ProcessorSummary	False	This object shall contain properties that describe the central processors for the current resource.
MemorySummary	ComputerSystem.v1_0_0.MemorySummary	False	This object shall contain properties that describe the central memory for the current resource.
Actions	ComputerSystem.v1_0_0.Actions	False	The Actions property shall contain the available actions for the resource.
Status	Resource.Status	False	Resource status.
Processors	ProcessorCollection.ProcessorCollection	False	The value of the property shall be a link to a collection of type ProcessorCollection.
EthernetInterfaces	EthernetInterfaceCollection.EthernetInterfaceCollection	False	The value of the property shall be a link to a collection of type EthernetInterfaceCollection.
SimpleStorage	SimpleStorageCollection.SimpleStorageCollection	False	The value of the property shall be a link to a collection of type SimpleStorageCollection.
LogServices	LogServiceCollection.LogServiceCollection	False	The value of the property shall be a link to a collection of type LogServiceCollection.
TrustedModules	Collection(ComputerSystem.v1_1_0.TrustedModules)	False	This object shall contain an array of objects with properties that describe the trusted modules for the current resource.

Attribute	Type	Nullable	Description
Memory	MemoryCollection.MemoryCollection	False	The value of the property shall be a link to a collection of type MemoryCollection.
Storage	StorageCollection.StorageCollection	False	The value of the property shall be a link to a collection of type StorageCollection.
HostingRoles	Collection(ComputerSystem.v1_2_0.HostingRole)	False	The values of the collection shall be the hosting roles supported by the computer system.
HostedServices	ComputerSystem.v1_2_0.HostedServices	False	The values of the collection shall describe services supported by the computer system.
PCIeDevices	Collection(PCIeDevice.PCIeDevice)	True	The value of the property shall be an array of references of type PCIeDevice.
PCIeFunctions	Collection(PCIeFunction.PCIeFunction)	False	The value of the property shall be an array of references of type PCIeFunction.
NetworkInterfaces	NetworkInterfaceCollection.NetworkInterfaceCollection	False	The value of the property shall be a link to a collection of type NetworkInterfaceCollection.

4.26.1 Operations

4.26.1.1 GET

Request:

```
GET /redfish/v1/Systems/Target
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#ComputerSystem.ComputerSystem",
  "@odata.id": "/redfish/v1/Systems/Target",
  "@odata.type": "#ComputerSystem.v1_3_0.ComputerSystem",
  "Id": "Target",
  "Name": "Computer System",
  "SystemType": "Virtual",
  "Description": "NVMe over Fabric target system",
  "Actions": {},
  "AssetTag": null,
  "BiosVersion": null,
  "Boot": {
    "@odata.type": "#ComputerSystem.v1_1_0.Boot",
    "BootSourceOverrideEnabled": null,
    "BootSourceOverrideMode": null,
    "BootSourceOverrideMode@Redfish.AllowableValues": [],
    "BootSourceOverrideTarget": null,
    "BootSourceOverrideTarget@Redfish.AllowableValues": []
  },
  "EthernetInterfaces": {
    "@odata.id": "/redfish/v1/Systems/Target/EthernetInterfaces"
  },
  "HostName": null,
  "IndicatorLED": null,
  "Links": {
    "@odata.type": "#ComputerSystem.v1_2_0.Links",
    "Chassis": [
      {
```

```
        "@odata.id": "/redfish/v1/Chassis/1"
      }
    ],
    "Endpoints": [],
    "ManagedBy": [
      {
        "@odata.id": "/redfish/v1/Managers/1"
      }
    ],
    "Oem": {}
  },
  "Manufacturer": "Intel Corporation",
  "Memory": {
    "@odata.id": "/redfish/v1/Systems/1/Memory"
  },
  "MemorySummary": {
    "Status": {
      "Health": null,
      "HealthRollup": null,
      "State": null
    },
    "TotalSystemMemoryGiB": null
  },
  "Model": "E323",
  "Oem": {
    "Intel_RackScale": {
      "@odata.type": "#Intel.Oem.ComputerSystem",
      "DiscoveryState": null,
      "MemorySockets": null,
      "PCIeConnectionId": [],
      "PciDevices": [],
      "ProcessorSockets": null
    }
  },
  "PCIeDevices": [],
  "PCIeFunctions": [],
  "PartNumber": "29ee2220939",
  "PowerState": "On",
  "ProcessorSummary": {
    "Count": null,
    "Model": null,
    "Status": {
      "Health": null,
      "HealthRollup": null,
      "State": null
    }
  },
  "Processors": {
    "@odata.id": "/redfish/v1/Systems/Target/Processors"
  },
  "SKU": "SKU",
  "SerialNumber": "123fed3029c-b23394-12",
  "Status": {
    "Health": "OK",
    "HealthRollup": "OK",
    "State": "Enabled"
  },
  "Storage": {
    "@odata.id": "/redfish/v1/Systems/Target/Storage"
  },
```

```
  "UUID": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
  "HostedServices": {
    "StorageServices": [
      {
        "@odata.id": "/redfish/v1/StorageServices/NVMeoE1"
      }
    ]
  },
  "HostingRoles": [
    "StorageServer"
  ]
}
```

4.26.1.2 PUT

The PUT operation is not allowed on computer system resource.

4.26.1.3 PATCH

The PATCH operation is not allowed on computer system resource.

4.26.1.4 POST

The POST operation is not allowed on the computer system resource.

4.26.1.5 DELETE

The DELETE operation is not allowed on the computer system resource.

4.27 Network Interface

The Ethernet Network Interface resource contains the properties needed to describe and configure a single, logical Ethernet interface. Details of this resource are described in the `EthernetInterface.xml` metadata file. OEM extensions details are available in `IntelRackScaleOem.xml`. Table 76 describes the `EthernetInterface` attributes. Table 77 describes the Intel® RSD OEM extensions for the `EthernetInterface` attributes.

Table 76. EthernetInterface Attributes

Attribute	Type	Nullable	Description
`UefiDevicePath`	Edm.String	True	The value of the property shall be the UEFI device path to the device that implements the interface (port).
`Status`	Resource.Status	True	Resource status.
`InterfaceEnabled`	Edm.Boolean	True	The value of the property shall be a Boolean indicating whether the interface is enabled.
`PermanentMACAddress`	EthernetInterface.v1_0_0.MACAddress	True	The value of the property shall be the Permanent MAC Address of the interface (port). This value is typically programmed during manufacturing. This address is not assignable.
`MACAddress`	EthernetInterface.v1_0_0.MACAddress	True	The value of the property shall be the effective current MAC Address of the interface. If an assignable MAC address is not supported, this is a read only alias of the `PermanentMACAddress`.
`SpeedMbps`	Edm.Int64	True	The value of the property shall be the link speed of the interface in Mbps.

Attribute	Type	Nullable	Description
AutoNeg	Edm.Boolean	True	The value of the property shall be true if auto negotiation of speed and duplex is enabled on the interface and false if it is disabled.
FullDuplex	Edm.Boolean	True	The value of the property shall represent the duplex status of the Ethernet connection on the interface.
MTUSize	Edm.Int64	True	The value of the property shall be the size in bytes of largest Protocol Data Unit (PDU) that can be passed in an Ethernet (MAC) frame on the interface.
HostName	Edm.String	True	The value of the property shall be the host name for the interface.
FQDN	Edm.String	True	The value of the property shall be the fully qualified domain name for the interface.
MaxIPv6StaticAddresses	Edm.Int64	True	The value of the property shall indicate the number of array items supported by IPv6StaticAddresses.
VLAN	VLanNetworkInterface.v1_0_0.VLAN	True	The value of the property shall be the VLAN for the interface. If the interface supports more than one VLAN, the VLAN property shall not be present, and the VLANS collection link shall be present instead.
IPv4Addresses	Collection(IPAddresses.v1_0_0.IPv4Address)	False	The value of the property shall be an array of objects used to represent the IPv4 connection characteristics for the interface.
IPv6AddressPolicyTable	Collection(EthernetInterface.v1_0_0.IPv6AddressPolicyEntry)	False	The value of the property shall be an array of objects used to represent the Address Selection Policy Table, as defined in RFC6724.
IPv6Addresses	Collection(IPAddresses.v1_0_0.IPv6Address)	False	The value of the property shall be an array of objects used to represent the IPv6 connection characteristics for the interface.
IPv6StaticAddresses	Collection(IPAddresses.v1_0_0.IPv6StaticAddress)	False	The value of the property shall be an array of objects used to represent the IPv6 static connection characteristics for the interface.
IPv6DefaultGateway	Edm.String	True	The value of the property shall be the current IPv6 default gateway address in use on the interface.
NameServers	Collection(Edm.String)	False	The value of the property shall be the DNS name servers used on the interface.
VLANs	VLanNetworkInterfaceCollection.VLanNetworkInterfaceCollection	False	The value of the property shall reference a collection of VLAN resources. If this property is used, the VLANEnabled and VLANId property shall not be used.
LinkStatus	EthernetInterface.v1_1_0.LinkStatus	True	The value of the property shall be the link status of the interface (port).
Links	EthernetInterface.v1_1_0.Links	False	The Links property, as described by the Redfish Specification, shall contain references to resources that are related to, but not contained by (subordinate to), the resource.

Table 77. EthernetInterface Attributes (OEM Extensions)

Attribute	Type	Nullable	Description
SupportedProtocols	Collection(Protocol.Protocol)	True	This property shall represent an array of supported protocol types by the Ethernet interface.
NeighborPort	EthernetSwitchPort.EthernetSwitchPort	True	This property shall represent the URI of the Ethernet port connected to the interface.

4.27.1 Operations

4.27.1.1 GET

Request:

```
GET /redfish/v1/Systems/Target/EthernetInterfaces/1
Content-Type: application/json
```

Response:


```
{
  "@odata.context": "/redfish/v1/$metadata#EthernetInterface.EthernetInterface",
  "@odata.id": "/redfish/v1/Systems/Target/EthernetInterfaces/1",
  "@odata.type": "#EthernetInterface.v1_1_0.EthernetInterface",
  "AutoNeg": true,
  "Description": "Ethernet Interface description",
  "FQDN": null,
  "FullDuplex": true,
  "HostName": null,
  "IPv4Addresses": [
    {
      "Address": "1.1.1.1",
      "AddressOrigin": "DHCP",
      "Gateway": "10.6.0.1",
      "SubnetMask": "255.255.255.0"
    }
  ],
  "IPv6AddressPolicyTable": [],
  "IPv6Addresses": [
    {
      "Address": "fe80::268a:7ff:fe4a:4b10",
      "AddressOrigin": "DHCPv6",
      "AddressState": "Preferred",
      "PrefixLength": 16
    }
  ],
  "IPv6DefaultGateway": "fe80::268a:7ff:fe4a:4b10",
  "IPv6StaticAddresses": [],
  "Id": "1",
  "InterfaceEnabled": true,
  "LinkStatus": null,
  "Links": {
    "AssociatedEndpoints": [],
    "Oem": {
      "Intel_RackScale": {
        "@odata.type": "#Intel.Oem.EthernetInterface",
        "NeighborPort": null
      }
    }
  },
  "MACAddress": "35:8a:07:12:4b:70",
  "MTUSize": null,
  "MaxIPv6StaticAddresses": 1,
  "Name": "Ethernet Interface",
  "NameServers": [],
  "Oem": {},
  "PermanentMACAddress": "35:8a:07:12:4b:70",
  "SpeedMbps": 25600,
  "Status": {
```

```
    "Health": "OK",
    "HealthRollup": "OK",
    "State": "Enabled"
  },
"VLANs": null
}
```

4.27.1.2 PUT

The PUT operation is not allowed on the Ethernet network interface resource.

4.27.1.3 PATCH

The PATCH operation is not allowed on the Ethernet network interface resource.

4.27.1.4 POST

The POST operation is not allowed on the Ethernet network interface resource.

4.27.1.5 DELETE

The DELETE operation is not allowed on the Ethernet network interface resource.

4.28 Manager Collection

The manager collection resource provides a collection of all managers available in a drawer. Detailed information about these resource properties can be obtained from the `Manager.xml` metadata file. OEM extensions details are available in `IntelRackScaleOem.xml`. Table 78 shows the `ManagerCollection` attribute.

Table 78. ManagerCollection Attributes

Attribute	Type	Nullable	Description
`Members`	Collection(Manager.Manager)	False	Collection of managers.

4.28.1 Operations

4.28.1.1 GET

Request:

```
GET /redfish/v1/Managers
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#ManagerCollection.ManagerCollection",
  "@odata.id": "/redfish/v1/Managers",
  "@odata.type": "#ManagerCollection.ManagerCollection",
  "Name": "Manager Collection",
  "Description": "description-as-string",
  "Members@odata.count": 1,
  "Members": [
    {
```

```
      "@odata.id": "/redfish/v1/Managers/1"
    }
  ]
}
```

4.28.1.2 PUT

The PUT operation is not allowed on the manager collection of resources.

4.28.1.3 PATCH

The PATCH operation is not allowed on the manager collection of resources.

4.28.1.4 POST

The POST operation is not allowed on the manager collection of resources.

4.28.1.5 DELETE

The DELETE operation is not allowed on the manager collection of resources.

4.29 Manager

In Redfish*, a *manager* is a systems management entity that can implement or provide access to a Redfish service. Examples of managers are Baseboard Management Controllers (BMCs), Enclosure Managers, Management Controllers, and other subsystems assigned manageability functions. Multiple Managers can be in an implementation, and they may or may not be directly accessible via a Redfish-defined interface. Details of this resource are described in the `Manager.xml` metadata file. Table 79 describes the `Manager` attributes.

Table 79. Manager Attributes

Attribute	Type	Nullable	Description
`ManagerType`	Manager.v1_0_0.ManagerType	False	The value of the property shall describe the function of the manager. The value `EnclosureManager` shall be used if the manager controls one or more services through aggregation. The value BMC shall be used if the manager represents a traditional server management controller. The value `ManagementController` shall be used if none of the other enumerations apply.
`Links`	Manager.v1_0_0.Links	False	The `Links` property, as described by the Redfish Specification, shall contain references to resources related to, but not contained by (subordinate to), the resource.
`ServiceEntryPointUUID`	Resource.UUID	False	This property shall contain the UUID of the Redfish Service provided by the manager. Each `Manager` providing an entry point to the same Redfish Service shall report the same UUID value (even though the name of the property may imply otherwise). This property shall not be present if the manager does not provide a Redfish Service entry point.
`UUID`	Resource.UUID	True	The value of the property shall contain the universal unique identifier number for the manager.
`Model`	Edm.String	True	The value of the property shall contain the information about how the manufacturer references the manager.

Attribute	Type	Nullable	Description
DateTime	Edm.DateTimeOffset	True	The value of the property shall represent the current DateTime value for the manager, with offset from UTC, in the Redfish Timestamp format.
DateTimeLocalOffset	Edm.String	True	The value of the property shall represent the offset from UTC time that the current value of the DataTime property contains.
FirmwareVersion	Edm.String	True	This property shall contain the firmware version as defined by the manufacturer for the associated manager.
SerialConsole	Manager.v1_0_0.SerialConsole	False	The value of the property shall contain information about the Serial Console service of the manager.
CommandShell	Manager.v1_0_0.CommandShell	False	The value of the property shall contain information about the Command Shell service of the manager.
GraphicalConsole	Manager.v1_0_0.GraphicalConsole	False	The value of the property shall contain the information about the Graphical Console (KVM-IP) service of the manager.
Actions	Manager.v1_0_0.Actions	False	The Actions property shall contain the available actions for the resource.
Status	Resource.Status	False	Resource status.
EthernetInterfaces	EthernetInterfaceCollection.EthernetInterfaceCollection	False	The value of the property shall be a link to a collection of type EthernetInterfaceCollection.
SerialInterfaces	SerialInterfaceCollection.SerialInterfaceCollection	False	The value of the property shall be a link to a collection of type SerialInterfaceCollection, which is for the use of the manager.
NetworkProtocol	ManagerNetworkProtocol.ManagerNetworkProtocol	False	The value of the property shall contain a reference to a resource of type ManagerNetworkProtocol, which represents the network services for the manager.
LogServices	LogServiceCollection.LogServiceCollection	False	The value of the property shall contain a reference to a collection of type LogServiceCollection, which is for the use of the manager.
VirtualMedia	VirtualMediaCollection.VirtualMediaCollection	False	The value of the property shall contain a reference to a collection of type VirtualMediaCollection that is for the use of the manager.
Redundancy	Collection(Redundancy.Redundancy)	False	The value of the property shall contain redundancy information for the managers of the system.
PowerState	Resource.v1_2_0.PowerState	True	The value of the property shall contain the power state of the manager.

4.29.1 Operations

4.29.1.1 GET

Request:

```
GET /redfish/v1/Managers/1
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#Manager.Manager",
  "@odata.id": "/redfish/v1/Managers/1",
  "@odata.type": "#Manager.v1_2_0.Manager",
  "DateTime": null,
  "DateTimeLocalOffset": null,
```

```
  "Description": "Manager description",
  "EthernetInterfaces": {
    "@odata.id": "/redfish/v1/Managers/1/EthernetInterfaces"
  },
  "FirmwareVersion": "2.58",
  "Id": "1",
  "Links": {
    "@odata.type": "#Manager.v1_1_0.Links",
    "ManagerForChassis": [
      {
        "@odata.id": "/redfish/v1/Chassis/1"
      }
    ],
    "ManagerForServers": [
      {
        "@odata.id": "/redfish/v1/Systems/Target"
      }
    ],
    "ManagerInChassis": {
      "@odata.id": "/redfish/v1/Chassis/1"
    },
    "Oem": {
      "Intel_RackScale": {
        "@odata.type": "#Intel.Oem.ManagerLinks",
        "ManagerForServices": [
          {
            "@odata.id": "/redfish/v1/StorageServices/NVMeoE1"
          }
        ],
        "ManagerForSwitches": []
      }
    }
  },
  "ManagerType": "ManagementController",
  "Model": null,
  "Name": "Manager",
  "NetworkProtocol": {
    "@odata.id": "/redfish/v1/Managers/1/NetworkProtocol"
  },
  "Oem": {},
  "PowerState": "On",
  "Status": {
    "Health": "OK",
    "HealthRollup": "OK",
    "State": "Enabled"
  },
  "UUID": "123e4567-e89b-ffff-a456-426655440000"
}
```


4.29.1.2 PUT

The PUT operation is not allowed on the manager resource.

4.29.1.3 PATCH

The PATCH operation is not allowed on the manager resource.

4.29.1.4 POST

The POST operation is not allowed on the manager resource.

4.29.1.5 DELETE

The DELETE operation is not allowed on the manager resource.

4.30 Manger Network Protocol

This resource is used to obtain or modify the network services managed by a given manager. Details of this resource are described in the `ManagerNetworkProtocol.xml` metadata file. Table 80 describes the `ManagerNetworkProtocol` attributes.

Table 80. ManagerNetworkProtocol Attributes

Attribute	Type	Nullable	Description
`HostName`	Edm.String	True	The value of the property shall contain the host name without any domain information.
`FQDN`	Edm.String	True	The value of the property shall contain the fully qualified domain name for the manager.
`HTTP`	ManagerNetworkProtocol.v1_0_0.Protocol	False	This object shall contain information for the HTTP protocol settings for the manager. The default value of the `Port` property should be 80 for compatibility with established client implementations.
`HTTPS`	ManagerNetworkProtocol.v1_0_0.Protocol	False	This object shall contain information for the HTTPS/SSL protocol settings for the manager. The default value of the `Port` property should be 443 for compatibility with established client implementations.
`SNMP`	ManagerNetworkProtocol.v1_0_0.Protocol	False	This object shall contain information for the SNMP protocol settings for the manager. The default value of the `Port` property should be 161 for compatibility with established client implementations.
`VirtualMedia`	ManagerNetworkProtocol.v1_0_0.Protocol	False	This object shall contain information for the Virtual Media protocol settings for the manager. The value of the `Port` property shall contain the TCP port assigned for virtual media usage.
`Telnet`	ManagerNetworkProtocol.v1_0_0.Protocol	False	This object shall contain information for the Telnet protocol settings for the manager. The default value of the `Port` property should be 23 for compatibility with established client implementations.
`SSDP`	ManagerNetworkProtocol.v1_0_0.SSDProtocol	False	This object shall contain information for the SSDP settings for the manager. SSDP is for network discovery of devices supporting the Redfish service. The default value of the `Port` property should be 1900 for compatibility with established client implementations.
`IPMI`	ManagerNetworkProtocol.v1_0_0.Protocol	False	This object shall contain information for the IPMI over LAN protocol settings for the manager. The default value of the `Port` property should be 623 for compatibility with established client implementations.
`SSH`	ManagerNetworkProtocol.v1_0_0.Protocol	False	This object shall contain information for the SSH protocol settings for the manager. The default value of the `Port` property should be 22 for compatibility with established client implementations.

Attribute	Type	Nullable	Description
KVMIP	ManagerNetworkProtocol.v1_0_0.Protocol	False	This object contains information for the KVM-IP (Keyboard, Video, Mouse) protocol settings for the manager.
Status	Resource.Status	False	Resource status.

4.30.1 Operations

4.30.1.1 GET

Request:

```
GET /redfish/v1/Managers/1/NetworkProtocol
Content-Type: application/json
```

Response:

```
{
  "@odata.context":
"/redfish/v1/$metadata#ManagerNetworkProtocol.ManagerNetworkProtocol",
  "@odata.id": "/redfish/v1/Managers/1/NetworkProtocol",
  "@odata.type": "#ManagerNetworkProtocol.v1_0_2.ManagerNetworkProtocol",
  "Description": "Manager Network Protocol description",
  "FQDN": null,
  "HTTP": {
    "Port": null,
    "ProtocolEnabled": null
  },
  "HTTPS": {
    "Port": null,
    "ProtocolEnabled": null
  },
  "HostName": null,
  "IPMI": {
    "Port": 0,
    "ProtocolEnabled": false
  },
  "Id": "NetworkProtocol",
  "KVMIP": {
    "Port": null,
    "ProtocolEnabled": null
  },
  "Name": "Manager Network Protocol",
  "Oem": {},
  "SNMP": {
    "Port": null,
    "ProtocolEnabled": null
  },
  "SSDP": {
    "NotifyIPv6Scope": null,
    "NotifyMulticastIntervalSeconds": null,
    "NotifyTTL": 2,
    "Port": 1900,
    "ProtocolEnabled": true
  },
```

```
  "SSH": {
    "Port": 0,
    "ProtocolEnabled": false
  },
  "Status": {
    "Health": null,
    "HealthRollup": null,
    "State": null
  },
  "Telnet": {
    "Port": 0,
    "ProtocolEnabled": false
  },

  "VirtualMedia": {
    "Port": null,
    "ProtocolEnabled": null
  }
}
```

4.30.1.2 PUT

The PUT operation is not allowed on the manager network protocol resource.

4.30.1.3 PATCH

The PATCH operation is not allowed on the manager network protocol resource.

4.30.1.4 POST

The POST operation is not allowed on the manager network protocol resource.

4.30.1.5 DELETE

The DELETE Operation is not allowed on the manager network protocol resource.

4.31 Ethernet Interface Collection

The Ethernet interface collection resource provides a collection of all Ethernet interfaces supported by a manager. Table 81 shows the `EthernetInterfaceCollection` attribute.

Table 81. EthernetInterfaceCollection Attribute

Attribute	Type	Nullable	Description
`Members`	Collection(EthernetInterface.EthernetInterface)	False	Collection of `EthernetInterfaces`.

4.31.1 Operations

4.31.1.1 GET

Request:

```
GET /redfish/v1/Managers/1/EthernetInterfaces
Content-Type: application/json
```

Response:

```
{
  "@odata.context":
"/redfish/v1/$metadata#EthernetInterfaceCollection.EthernetInterfaceCollection",
  "@odata.id": "/redfish/v1/Managers/1/EthernetInterfaces",
  "@odata.type": "#EthernetInterfaceCollection.EthernetInterfaceCollection",
  "Name": "Ethernet Network Interface Collection",
  "Description": "Collection of EthernetInterfaces for this Manager",
  "Members@odata.count": 0,
  "Members": [],
  "Oem": {}
}
```

4.31.1.2 PUT

The PUT operation is not allowed on the Ethernet interface collection of resources.

4.31.1.3 PATCH

The PATCH operation is not allowed on the Ethernet interface collection of resources.

4.31.1.4 POST

The POST operation is not allowed on the Ethernet interface collection of resources.

4.31.1.5 DELETE

The DELETE operation is not allowed on the Ethernet interface collection of resources.

4.32 Event Service

The event service resource is responsible for sending events to subscribers. Table 82 shows the `EventService` attributes.

Table 82. EventService Attributes

Attribute	Type	Nullable	Description
`ServiceEnabled`	Edm.Boolean	True	The value of the property shall be a Boolean indicating whether the service is enabled.
`DeliveryRetryAttempts`	Edm.Int64	False	The value of the property shall be the number of retries attempted for any given event to the subscription destination before the subscription is terminated.
`DeliveryRetryIntervalSeconds`	Edm.Int64	False	The value of the property shall be the interval in seconds between the retry attempts for any given event to the subscription destination.
`EventTypesForSubscription`	Collection(Event.v1_0_0.EventType)	False	The value of the property shall be the types of events that subscriptions can subscribe to. The semantics associated with the enumerations values are defined in the Redfish specification.
`Actions`	EventService.v1_0_0.Actions	False	The `Actions` property shall contain the available actions for the resource.
`Status`	Resource.Status	False	Resource status.

Attribute	Type	Nullable	Description
Subscriptions	EventDestinationCollection.EventDestinationCollection	False	The value of the property shall contain the link to a collection of type EventDestinationCollection.

4.32.1 Operations

4.32.1.1 GET

Request:

```
GET /redfish/v1/EventService
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#EventService.EventService",
  "@odata.id": "/redfish/v1/EventService",
  "@odata.type": "#EventService.v1_0_0.EventService",
  "Id": "EventService",
  "Name": "Event Service",
  "Description": "Event Service",
  "Status": {
    "State": "Enabled",
    "Health": "OK",
    "HealthRollup": null
  },
  "ServiceEnabled": true,
  "DeliveryRetryAttempts": 3,
  "DeliveryRetryIntervalSeconds": 60,
  "EventTypesForSubscription": [
    "StatusChange",
    "ResourceUpdated",
    "ResourceAdded",
    "ResourceRemoved",
    "Alert"
  ],
  "Subscriptions": {
    "@odata.id": "/redfish/v1/EventService/Subscriptions"
  },
  "Actions": {
    "#EventService.SendTestEvent": {
      "target": "/redfish/v1/EventService/Actions/EventService.SendTestEvent",
      "EventType@Redfish.AllowableValues": [
        "StatusChange",
        "ResourceUpdated",
        "ResourceAdded",
        "ResourceRemoved",
        "Alert"
      ]
    },
    "Oem": {}
  },
  "Oem": {}
}
```

4.32.1.2 PATCH

The PATCH operation is not allowed on the event service resource.

4.32.1.3 POST

The POST operation is not allowed on the event service resource.

4.32.1.4 DELETE

The DELETE operation is not allowed on the event service resource.

4.33 Event Subscription Collection

The event subscription collection is a collection of event destination resources. Table 83 shows the `EventDestinationCollection` attribute.

Table 83. EventDestinationCollection Attributes

Attribute	Type	Nullable	Description
`Members`	Collection(EventDestination.v1_0_0.EventDestination)	False	Collection of `EventDestinations`.

4.33.1 Metadata

The definition of the resource is available in the `EventDestinationCollection.xml` metadata file.

4.33.2 Operations

4.33.2.1 GET

Request:

```
GET /redfish/v1/EventService/Subscriptions
Content-Type: application/json
```

Response:

```
{
  "@odata.context":
"/redfish/v1/$metadata#EventDestinationCollection.EventDestinationCollection",
  "@odata.type": "#EventDestinationCollection.EventDestinationCollection",
  "@odata.id": "/redfish/v1/EventService/Subscriptions",
  "Name": "Event Subscriptions Collection",
  "Description": "description-as-string",
  "Members@odata.count": 1,
  "Members": [
    {
      "@odata.id": "/redfish/v1/EventService/Subscriptions/1"
    }
  ]
}
```

4.33.2.2 PUT

The PUT operation is not allowed on the event subscription collection of resources.

4.33.2.3 PATCH

The PATCH operation is not allowed on the event subscription collection of resources.

4.33.2.4 POST

Request:

```
POST /redfish/v1/EventService/Subscriptions
Content-Type: application/json
{
  "Name": "EventSubscription 2",
  "Destination": "http://10.0.0.1/Destination1",
  "EventTypes": [
    "ResourceAdded",
    "ResourceRemoved"
  ],
  "Context": "HotSwap events",
  "Protocol": "Redfish"
}
```

Response:

```
HTTP/1.1 201 Created
Location: http://<IP>:<PORT/redfish/v1/EventService/Subscriptions/2
```

4.33.2.5 DELETE

The DELETE operation is not allowed on the event subscription collection of resources.

4.34 Event Subscription

The event subscription contains information about the types of events a user subscribed for and should be sent. Table 84 describes the `EventDestination` attributes.

Table 84. EventDestination Attributes

Attribute	Type	Nullable	Description
`Destination`	Edm.String	False	This property shall contain a URI to the destination where the events are sent.
`EventTypes`	Collection(Event.v1_0_0.EventType)	False	This property shall contain the types of events that shall be sent to the destination.
`Context`	Edm.String	False	This property shall contain a client-supplied context that remains with the connection through the connection's lifetime.
`Protocol`	EventDestination.v1_0_0.EventDestinationProtocol	False	This property shall contain the protocol type that the event uses for sending the event to the destination. A value of Redfish shall be used to indicate that the event type shall adhere to that defined in the Redfish specification.

Attribute	Type	Nullable	Description
HttpHeaders	Collection(EventDestination.v1_0_0.HttpHeaderProperty)	False	This property shall contain an object consisting of the names and values of the HTTP header to be included with every event POST to the Event Destination. This property shall be null on a GET.
MessageIds	Collection(Edm.String)	True	The value of the property shall specify an array of MessageIds that are the only allowable values for the MessageIds property in an EventRecord sent to the subscriber. Events with MessageIds not contained in this array shall not be sent to the subscriber.
OriginResources	Collection(Resource.Item)	True	The value of the property shall specify an array of referenceable members that are the only allowable values for the OriginOfCondition property in an EventRecord sent to the subscriber. Events originating from referenceable members not contained in this array shall not be sent to the subscriber.

4.34.1 Metadata

The resource definition is available in the EventDestination.xml metadata file.

4.34.2 Operations

4.34.2.1 GET

Request:

```
GET /redfish/v1/EventService/Subscriptions/1
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#EventDestination.EventDestination",
  "@odata.id": "/redfish/v1/EventService/Subscriptions/1",
  "@odata.type": "#EventDestination.v1_0_0.EventDestination",
  "Id": "1",
  "Name": "EventSubscription 1",
  "Description": "description-as-string",
  "Destination": "http://www.dnsname.com/Destination1",
  "EventTypes": [
    "Alert"
  ],
  "Context": "ABCDEFGHJLKJ",
"Protocol": "Redfish"
}
```

4.34.2.2 PUT

The PUT operation is not allowed on the event subscription resource.

4.34.2.3 PATCH

The PATCH operation is not allowed on the event subscription resource.

4.34.2.4 POST

The POST operation is not allowed on the event subscription resource.

4.34.2.5 DELETE

Request:

```
DELETE redfish/v1/EventService/Subscriptions/1
```

Response:

```
HTTP/1.1 204 No Content
```

Or (when a task is created):

```
HTTP/1.1 202 Accepted
Location: http://<ip:port>/redfish/v1/TaskService/Tasks/1/TaskMonitor
{
  "@odata.context": "/redfish/v1/$metadata#Task.Task",
  "@odata.id": "/redfish/v1/TaskService/Tasks/1",
  "@odata.type": "#Task.v1_0_0.Task",
  "Id": "1",
  "Name": "Task 1",
  "TaskState": "New",
  "StartTime": "2017-12-06T04:45+01:00",
  "TaskStatus": "OK",
  "Messages": []
}
```

4.35 Event Array

This resource represents the collection of events that are sent by the Event Service to active subscribers. It represents the properties for the events themselves and not subscriptions or other resources. Each event in the array has a set of properties that describe the event. Because this is an array, more than one event ca n be sent simultaneously. Table 85 describes the `Event` attributes.

Table 85. Event Attributes

Attribute	Type	Nullable	Description
`Events`	Collection(Event.v1_0_0.EventRecord)	False	The value of the resource shall be an array of Event objects used to represent the occurrence of one or more events.
`Context`	Edm.String	False	This property shall contain a client-supplied context for the event destination to which the event is being sent.

4.35.1 Metadata

The resource definition is available in the `Event.xml` metadata file.

4.35.2 Operations

4.35.2.1 GET

The GET operation is not allowed on the event array resource.

4.35.2.2 PUT

The PUT operation is not allowed on the event array resource.

4.35.2.3 PATCH

The PATCH operation is not allowed on the event array resource.

4.35.2.4 POST

Request:

```
POST http://192.168.1.1/Destination1
Content-Type: application/json
{
    „@odata.context”: „/redfish/v1/$metadata#EventService/Members/Events/1”,
    „@odata.id”: „/redfish/v1/EventService/Events/1”,
    „@odata.type”: „#Event.v1_2_0.Event”,
    „Id”: „1”,
    „Name”: „Event Array”,
    „Description”: „Events”,
    „Events”: [
        {
            „EventType”: „ResourceRemoved”,
            „EventId”: „ABC132489713478812346”,
            „Severity”: „Ok”,
            „EventTimestamp”: „2015-02-23T14:44:44+00:00”,
            „Message”: „The Blade was removed”,
            „MessageId”: „Base.1.0.Success”,
            „MessageArgs”: [],
            „OriginOfCondition”: {
                „@odata.id”: „/redfish/v1/Systems/System1”
            },


            „Context”: „HotSwap event”
        }
    ]
}
```

Response:

```
HTTP/1.1 204 No Content
```

4.35.2.5 DELETE

The DELETE operation is not allowed on the event array resource.

4.36 Task Service

The task service resource represents task services that contains all actual tasks created by a service. This resource is required to be supported by services supporting asynchronous operations (refer to section 4.2 Asynchronous Operations).

The properties details are available in the `TaskService.xml` metadata file. Table 86 describes the `TaskService` attributes.

Table 86. TaskService Attributes

Attribute	Type	Nullable	Description
CompletedTaskOverWritePolicy	TaskService.v1_0_0.OverWritePolicy	False	The value of the property shall indicate how completed tasks are handled should the task service need to track more tasks.
DateTime	Edm.DateTimeOffset	True	The value of the property shall represent the current DateTime value for the TaskService, with offset from UTC, in the Redfish Timestamp format.
LifeCycleEventOnTaskStateChange	Edm.Boolean	False	The value of the property, if set to true, shall indicate that the service shall send a Lifecycle event to ListenerDestinations registered for such events on change of task state.
ServiceEnabled	Edm.Boolean	True	The value of the property shall be a Boolean indicating whether the service is enabled.
Status	Resource.Status	False	Resource status.
Tasks	TaskCollection.TaskCollection	False	The value of the property shall be a link to a resource of type TaskCollection.

4.36.1 Operations

4.36.1.1 GET

Request:

```
GET /redfish/v1/TaskService
Content-Type: application/json
```

Response:

```
{
  "@Redfish.Copyright": "Copyright 2014-2016 Distributed Management Task Force, Inc.
(DMTF). All rights reserved.",
  "@odata.context": "/redfish/v1/$metadata/TaskService.TaskService",
  "@odata.id": "/redfish/v1/TaskService",
  "@odata.type": "#TaskService.v1_0_0.TaskService",
  "Id": "TaskService",
  "Name": "Tasks Service",
  "DateTime": "2015-03-13T04:14:33+06:00",
  "OverWritePolicy": "Never",
  "LifeCycleEventOnTaskStateChange": true,
  "Status": {
    "State": "Enabled",
    "Health": "OK"
  },
  "ServiceEnabled": true,
  "Tasks": {
    "@odata.id": "/redfish/v1/TaskService/Tasks"
  },
  "Oem": {}
}
```

4.36.1.2 PUT

The PUT operation is not allowed on the task service resource.

4.36.1.3 PATCH

The PATCH operation is not allowed on the task service resource.

4.36.1.4 POST

The POST operation is not allowed on the task service resource.

4.36.1.5 DELETE

The DELETE operation is not allowed on the task service resource.

4.37 Task Collection

The task collection resource represents a collection of resources of Task type. The properties details are available in the `TaskCollection.xml` metadata file. Table 87 shows the `TaskCollection` attribute.

Table 87. TaskCollection Attribute

Attribute	Type	Nullable	Description
`Members`	Collection(Task.Task)	False	Collection of tasks.

4.37.1 Operations

4.37.1.1 GET

Request:

```
GET /redfish/v1/TaskService/Tasks
Content-Type: application/json
```

Response:

```
{
  "@Redfish.Copyright": "Copyright 2014-2016 Distributed Management Task Force, Inc.
(DMTF). All rights reserved.",
  "@odata.context": "/redfish/v1/$metadata#TasksCollection.TaskCollection",
  "@odata.type": "#TasksCollection.TaskCollection",
  "Name": "Task Collection",
  "Members@odata.count": 1,
  "Members": [
    {
      "@odata.id": "/redfish/v1/TaskService/Tasks/1"
    }
  ]
}
```

4.37.1.2 PUT

The PUT operation is not allowed on the task collection of resources.

4.37.1.3 PATCH

The PATCH operation is not allowed on the task collection of resources.

4.37.1.4 POST

The POST operation is not allowed on the task collection of resources.

4.37.1.5 DELETE

The DELETE operation is not allowed on the task collection of resources.

4.38 Task

The task resource contains information about a specific task scheduled by or being executed by a Redfish service's task service. The properties details are available in the `Task.xml` metadata file. Table 88 describes the `Task` attributes.

Table 88. Task Attributes

Attribute	Type	Nullable	Description
`TaskState`	Task.v1_0_0.TaskState	False	The value of the property shall indicate the state of the task: • `New` shall be used to indicate that the task is a new task that has just been instantiated and is in the initial state, and indicates it has never been started. • `Starting` shall be used to indicate that the task is moving from the `New`, `Suspended`, or `Service` state into the `Running` state. • `Running` shall be used to indicate that the Task is running. • `Suspended` shall be used to indicate that the task is stopped (for example, by a user), but can be restarted in a seamless manner. • `Interrupted` shall be used to indicate that the task was interrupted (for example, by a server crash) in the middle of processing, and the user should rerun or restart the task. • `Pending` shall be used to indicate that the task has been queued and will be scheduled for processing as soon as resources are available to handle the request. • `Stopping` shall be used to indicate that the task is in the process of moving to a `Completed`, `Killed`, or `Exception` state. • `Completed` shall be used to indicate that the task has completed normally. • `Killed` shall be used to indicate that the task has been stopped by a Kill state change request (non-graceful shutdown). • `Exception` shall be used to indicate that the task is in an abnormal state that might be indicative of an error condition. • `Service` shall be used to indicate that the task is in a state that supports problem discovery, resolution, or both. This state is used when a corrective action is possible.
`StartTime`	Edm.DateTimeOffset	False	The value of the property shall indicate the time the task started.
`EndTime`	Edm.DateTimeOffset	False	The value of the property shall indicate the time the task completed.

Attribute	Type	Nullable	Description
TaskStatus	Resource.Health	False	The value of the property shall be the completion status of the task, as defined in the Status section of the Redfish specification, and shall not be set until the task is completed.
Messages	Collection(Message.Message)	False	The value of the property shall be an array of messages associated with the task.

4.38.1 Operations

4.38.1.1 GET

Request:

```
GET /redfish/v1/TaskService/Tasks/1
Content-Type: application/json
```

Response:

```
{
  "@odata.context": "/redfish/v1/$metadata#Task.Task",
  "@odata.id": "/redfish/v1/TaskService/Tasks/1",
  "@odata.type": "#Task.v1_0_0.Task",
  "Id": "1",
  "Name": "Task 1",
  "TaskState": "Completed",
  "StartTime": "2016-08-18T12:00+01:00",
  "EndTime": "2016-08-18T13:13+01:00",
  "TaskStatus": "OK",
  "Messages": [
    {
      "MessageId": "Base.1.0.Created",
      "RelatedProperties": [],
      "Message": "The resource has been created successfully",
      "MessageArgs": [],
      "Severity": "OK"
    }
  ]
}
```

4.38.1.2 PUT

The PUT operation is not allowed on the task resource.

4.38.1.3 PATCH

The PATCH operation is not allowed on the task resource.

4.38.1.4 POST

The POST operation is not allowed on the task resource.

4.38.1.5 DELETE

Request:

```
DELETE redfish/v1/TaskService/Tasks/1
```

Response:

```
HTTP/1.1 204 No Content
```

Or (when a task is created):

```
HTTP/1.1 202 Accepted
Location: http://<ip:port>/redfish/v1/TaskService/Tasks/1/TaskMonitor
{
  "@odata.context": "/redfish/v1/$metadata#Task.Task",
  "@odata.id": "/redfish/v1/TaskService/Tasks/1",
  "@odata.type": "#Task.v1_0_0.Task",
  "Id": "1",
  "Name": "Task 1",
  "TaskState": "New",
  "StartTime": "2017-12-06T04:45+01:00",
  "TaskStatus": "OK",
  "Messages": []
}
```

4.39 Message Registry File Collection

The registries resource represents collection of the Schema File locator resources. The properties details are available in the `MessageRegistryFileCollection.xml` metadata file. Table 89 shows the `MessageRegistryFileCollection` attribute.

Table 89. MessageRegistryFileCollection Attribute

Attribute	Type	Nullable	Description
`Members`	Collection(MessageRegistryFile.MessageRegistryFile)	False	Collection of `MessageRegistryFiles`.

4.39.1 Operations

4.39.1.1 GET

Request:

```
GET /redfish/v1/Registries
Content-Type: application/json
```

Response:

```
{
  "@odata.context":
"/redfish/v1/$metadata#MessageRegistryFileCollection.MessageRegistryFileCollection",
  "@odata.id": "/redfish/v1/Registries",
  "@odata.type": "#MessageRegistryFileCollection.MessageRegistryFileCollection",
  "Name": "Registry File Collection",
  "Description": "Registry Repository",
  "Members@odata.count": 1,
  "Members": [
    {
      "@odata.id": "/redfish/v1/Registries/Base"
    }
  ]
```

```
}
```

4.39.1.2 PUT

The PUT operation is not allowed on the registries resource.

4.39.1.3 PATCH

The PATCH operation is not allowed on the registries resource.

4.39.1.4 POST

The POST operation is not allowed on the registries resource.

4.39.1.5 DELETE

The DELETE operation is not allowed on the registries resource.

§

5.0 Common Property Descriptions

5.1 Status—State

The supported values for the `State` parameter are:

- `Absent`: The function or resource is not installed.
- `Deferring`: The element will not process any commands but will queue new requests.
- `Disabled`: The function or resource is disabled.
- `Enabled`: The function or resource is enabled.
- `InTest`: The function or resource is undergoing testing.
- `Quiesced`: The element is enabled but only processes a restricted set of commands.
- `StandbyOffline`: The function or resource is enabled, but awaiting an external action to activate it.
- `StandbySpare`: The function or resource is part of a redundancy set and is awaiting a failover or other external action to activate it.
- `Starting`: The function or resource is starting.
- `UnavailableOffline`: The function or resource is present but cannot be used.
- `Updating`: The element is updating and may be unavailable or degraded.

5.2 Status—Health

The available values for the `Health` parameter are:

- `OK`: Normal
- `Warning`: A condition exists that requires attention
- `Critical`: A critical condition exists that requires immediate attention

5.3 ComputerSystem.Reset

The available values for the `Reset` parameter are:

- `ForceOff`: Turn the system off immediately (nongraceful) shutdown
- `ForceOn`: Turn the system on immediately
- `ForceRestart`: Perform an immediate (non-graceful) shutdown, followed by a system restart
- `GracefulRestart`: Perform a graceful system shutdown followed by a system restart
- `GracefulShutdown`: Perform a graceful system shutdown and power off
- `Nmi`: Generate a nonmaskable interrupt to cause an immediate system halt
- `On`: Turn the system on
- `PushPowerButton`: Simulate the pressing of the physical power button on the system

5.4 BootSourceOverrideTarget/Supported

The supported values for the `BootSourceOverrideTarget` and `BootSourceOverridSupported` parameters are:

- `BiosSetup`: Boot to the BIOS Setup Utility

- `Cd`: Boot from the CD/DVD disc
- `Diags`: Boot the manufacturer's Diagnostics program
- `Floppy`: Boot from the floppy disk drive
- `Hdd`: Boot from a hard drive
- `None`: Boot from the normal boot device
- `Pxe`: Boot from the preboot execution (PXE) environment
- `RemoteDrive`: Boot from a remote drive (for example, iSCSI)
- `SDCard`: Boot from an SD Card
- `UefiHttp`: Boot from a UEFI HTTP network location
- `UefiShell`: Boot to the UEFI Shell
- `UefiTarget`: Boot to the UEFI device specified in the `UefiTargetBootSourceOverride` property
- `Usb`: Boot from a USB device as specified by the system BIOS
- `Utilities`: Boot the manufacturer's Utilities programs

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