



Redfish[®]
Reference Guide

Revision 2.0a

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1 Introduction

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

Redfish is a management standard which uses data model representation inside of a hypermedia RESTful interface. It is based on REST, which is why Redfish is easier to use and implement than many other solutions. Since it is model oriented, it is capable of expressing the relationships between components in modern systems as well as the semantics of the services and components within them. It is also easily extensible. By using a hypermedia approach to REST, Redfish can express a large variety of systems from multiple vendors. Utilizing JSON (JavaScript Object Notation) data format, which is in plain text, allows many types of parameters to be available such that it enables scalability, human readability, and flexibility for most programming environments by easily interpreting payload.

The model is displayed in terms of an interoperable OData Schema with the payload of the messages being expressed in JSON following OData JSON conventions. The schema (available in both XML and JSON formats) includes annotations to facilitate the automatic translation of the schema to JSON Schema. The ability to externally host the schema definition of the resources in a machine-readable format allows the metadata to be associated with the data without encumbering Redfish services with the metadata, thus enabling more advanced client scenarios as found in many data center and cloud environments.

Supermicro enables Redfish feature sets on their X10/X11 platforms with 3.xx and 1.xx BMC firmware respectively. These features are covered under SFT-OOB-LIC and SFT-DCMS-SINGLE license. This document will provide you with an overview of Restful API services and describe how to receive Redfish API responses directly from a Supermicro BMC (Baseboard Management Controller).

2 HTTP Request Methods

The following HTTP methods are used to implement different actions, as described below.

- Read Requests (GET):

The GET method is used to request a representation of a specified resource. The representation can be either a single resource or a collection.

- Update (PATCH):

The PATCH method is used to apply partial modifications to a resource.

- Replace (PUT):

The PUT method is used to completely replace a resource. Any properties omitted from the body of the request are reset to their default value.

-
- Create (POST):

The POST method is used to create a new resource. This request is submitted to the resource collection in which the new resource is meant to belong.

- Actions (POST):

The POST method may also be used to initiate operations on the object (Actions). The POST operation may not be idempotent.

- Delete (DELETE):

The DELETE method is used to remove a resource.

2.1 Responses

Four types of responses are supported, as defined below.

- Metadata Responses:

These describe the resources and types exposed by the service to generic clients.

- Resource Responses:

JSON representation of an individual resource.

- Resource Collection Responses:

JSON representation of a collection of resources.

- Error Responses:

Top-level JSON response providing additional information in the case of an HTTP error.

2.2 HTTP Status Code Description

Status Code	Description
200	OK
201	Created
202	Accepted
204	No Content
301	Moved Permanently
302	Found
304	Not Modified
400	Bad Request
401	Unauthorized
403	Forbidden
404	Not Found
405	Method Not Allowed
406	Not Acceptable
409	Conflict
410	Gone
411	Length Required
412	Precondition Failed
415	Unsupported Media Type
500	Internal Server Error

501	Not Implemented
503	Service Unavailable

2.3 List of Available APIs

API List	Notes:
/redfish/v1	Service root
/redfish/v1/SessionService	
/redfish/v1/Chassis	
/redfish/v1/AccountService	
/redfish/v1/Managers	
/redfish/v1/Systems	
/redfish/v1/EventService	
/redfish/v1/UpdateService	
/redfish/v1/Registries	
/redfish/v1/JsonSchemas	
/redfish/v1/SessionService/Sessions	
/redfish/v1/SessionService/Sessions/[session_num]	
/redfish/v1/Chassis/1	
/redfish/v1/Chassis/1/Thermal	
/redfish/v1/Chassis/1/Power	
/redfish/v1/Chassis/HA-RAID.[contoller_num].StorageEnclosure.[enclosure_num]	For LSI 3108
/redfish/v1/Chassis/HA-RAID.[contoller_num].StorageEnclosure.[enclosure_num]/Drives/Disk.Bay.[disk_num]	For LSI 3108
/redfish/v1/Chassis/HA-RAID.[contoller_num].StorageEnclosure.[enclosure_num]/Drives/Disk.Bay.[disk_num]/Actions/Oem/Drive.Indicate	Light on physical drive indication LED: "Active": "true"
/redfish/v1/Chassis/HBA.[contoller_num].StorageEnclosure.[enclosure_num]	For LSI 3008
/redfish/v1/Chassis/HBA.[contoller_num].StorageEnclosure.[enclosure_num]/Drives/Disk.Bay.[disk_num]	For LSI 3008
/redfish/v1/Chassis/HBA.[contoller_num].StorageEnclosure.[enclosure_num]/Drives/Disk.Bay.[disk_num]/Actions/Oem/Drive.Indicate	Light on physical drive indication LED: "Active": "true"
/redfish/v1/Chassis/StorageBackplane	For PCH SATA or RSTe, TAS must be running
/redfish/v1/Chassis/StorageBackplane/Drives/Disk.Bay.[disk_num]	For PCH SATA or RSTe, TAS must be running
/redfish/v1/Chassis/NVMeSSD.[pcie_controller_num].Group.[group_num].StorageBackplane	For NVMe
/redfish/v1/Chassis/NVMeSSD.[pcie_controller_num].Group.[group_num].StorageBackplane/Drives/Disk.Bay.[disk_num]	For NVMe

/redfish/v1/AccountService/Roles	
/redfish/v1/AccountService/Roles/Administrator	
/redfish/v1/AccountService/Roles/Operator	
/redfish/v1/AccountService/Roles/ReadOnly	
/redfish/v1/AccountService/Roles/Custom1	
/redfish/v1/AccountService/Accounts	
/redfish/v1/AccountService/Accounts/[account_num]	
/redfish/v1/Managers/1	
/redfish/v1/Managers/1/Actions/Manager.Reset	BMC cold reset
/redfish/v1/Managers/1/Actions/Oem/ManagerConfig.Reset	BMC factory default
/redfish/v1/Managers/1/SerialInterfaces	
/redfish/v1/Managers/1/NetworkProtocol	
/redfish/v1/Managers/1/LogServices	
/redfish/v1/Managers/1/LogServices/Log1	
/redfish/v1/Managers/1/LogServices/Log1/Actions/LogService.Reset	Clear event logs
/redfish/v1/Managers/1/LogServices/Log1/Entries	
/redfish/v1/Managers/1/LogServices/Log1/Entries/[log_num]	
/redfish/v1/Managers/1/VM1	
/redfish/v1/Managers/1/VM1/CfgCD	Configure ISO image settings: host, path, username/pass
/redfish/v1/Managers/1/VM1/CfgCD/Actions/IsoConfig.Mount	Mount ISO image
/redfish/v1/Managers/1/VM1/CfgCD/Actions/IsoConfig.UnMount	Unmount ISO image
/redfish/v1/Managers/1/VM1/CD[mounted_dev_num]	User must first mount image
/redfish/v1/Managers/1/VM1/Floppy[mounted_dev_num]	User must first mount image
/redfish/v1/Managers/1/VM1/USB[mounted_dev_num]	User must first mount image
/redfish/v1/Managers/1/EthernetInterfaces	
/redfish/v1/Managers/1/EthernetInterfaces/[eth_num]	
<Managers OEM APIs>	
/redfish/v1/Managers/1/SNMP	
/redfish/v1/Managers/1/SNMP/SNMPv2	
/redfish/v1/Managers/1/SNMP/SNMPv3	
/redfish/v1/Managers/1/FanMode	
/redfish/v1/Managers/1/MouseMode	
/redfish/v1/Managers/1/Snooping	

/redfish/v1/Managers/1/ActiveDirectory	
/redfish/v1/Managers/1/ActiveDirectory/RoleGroups	
/redfish/v1/Managers/1/ActiveDirectory/RoleGroups/[role_group]	
/redfish/v1/Managers/1/SMTP	
/redfish/v1/Managers/1/Syslog	
/redfish/v1/Managers/1/RADIUS	
/redfish/v1/Managers/1/LDAP	
/redfish/v1/Managers/1/SMCRACKP	
/redfish/v1/Managers/1/IPAccessControl	
/redfish/v1/Managers/1/IPAccessControl/FilterRule	
/redfish/v1/Managers/1/IPAccessControl/FilterRule/[rule_num]	
/redfish/v1/Managers/1/NTP	
/redfish/v1/Managers/1/iKVM	Get a URL link to launch iKVM/HTML5
/redfish/v1/Systems/1	
/redfish/v1/Systems/1/Actions/ComputerSystem.Reset	System reset
/redfish/v1/Systems/1/Processors	
/redfish/v1/Systems/1/Processors/[processor_num]	
/redfish/v1/Systems/1/Memory	
/redfish/v1/Systems/1/Memory/[memory_num]	
/redfish/v1/Systems/1/EthernetInterfaces	
/redfish/v1/Systems/1/EthernetInterfaces/[eth_num]	Data from BIOS and TAS
/redfish/v1/Systems/1/SimpleStorage	
/redfish/v1/Systems/1/SimpleStorage/[controller_num]	
/redfish/v1/Systems/1/Storage	
/redfish/v1/Systems/1/Storage/HA-RAID	For LSI 3108
/redfish/v1/Systems/1/Storage/HA-RAID/Volumes	For LSI 3108
/redfish/v1/Systems/1/Storage/HA-RAID/Volumes/Controller.[controller_num].Volume.[volume_num]	For LSI 3108
/redfish/v1/Systems/1/Storage/HA-RAID/Volumes/Controller.[controller_num].Volume.[volume_num]/Actions/Oem/Volume.Indicate	For LSI 3108; light on virtual drive indication LED: "Active": "true"
/redfish/v1/Systems/1/Storage/HA-RAID/Volumes/Controller.[controller_num].Volume.[volume_num]/Actions/Oem/Volume.Delete	For LSI 3108; in logical view to delete specific virtual drive
/redfish/v1/Systems/1/Storage/HA-RAID/Actions/Oem/Storage.CreateVolume	For LSI 3108; create virtual drives

/redfish/v1/Systems/1/Storage/HA-RAID/Actions/Oem/Storage.ClearVolumes	For LSI 3108; in logical view to clear all configurations
/redfish/v1/Systems/1/Storage/HA-RAID/Actions/Oem/HARAIDController.Save	For LSI 3108; save controller's "BIOS Boot Mode"
/redfish/v1/Systems/1/Storage/HBA	For LSI 3008
/redfish/v1/Systems/1/Storage/RAIDIntegrated	For RSTe, TAS must be running
/redfish/v1/Systems/1/Storage/RAIDIntegrated/Volumes	For RSTe, TAS must be running
/redfish/v1/Systems/1/Storage/RAIDIntegrated/Volumes/[volume_num]	For RSTe, TAS must be running
/redfish/v1/Systems/1/Storage/SATAEmbedded	For PCH SATA, TAS must be running
/redfish/v1/Systems/1/Storage/SATAEmbedded/Volumes	For PCH SATA, TAS must be running
/redfish/v1/Systems/1/Storage/SATAEmbedded/Volumes/[volume_num]	For PCH SATA, TAS must be running
/redfish/v1/Systems/1/Bios	BIOS current settings; only X11DP supports
/redfish/v1/Systems/1/Bios/SD	BIOS pending settings; only X11DP supports
/redfish/v1/Systems/1/Bios/Actions/Bios.ResetBios	Reset BIOS settings to default; only X11DP supports
/redfish/v1/Systems/1/Bios/Actions/Bios.ChangePassword	Change BIOS booting password; only X11DP supports
/redfish/v1/Systems/1/SmcNodeManager	View SMC node manager policies
/redfish/v1/Systems/1/SmcNodeManager/Actions/SmcNodeManager.ClearAllPolicies	Clear SMC node manager policies
/redfish/v1/Systems/1/LogServices	System logs
/redfish/v1/Systems/1/LogServices/Log1	System logs
/redfish/v1/Systems/1/LogServices/Log1/Actions/LogService.ClearLog	Clear system management logs
/redfish/v1/Systems/1/LogServices/Log1/Actions/Oem/LogService.ClearAcknowledgements	Clear system log acknowledgements
/redfish/v1/Systems/1/LogServices/Log1/Entries	View system log entries
/redfish/v1/Systems/1/LogServices/Log1/Entries/[log_num]	Log entry details Patch to acknowledge
/redfish/v1/Systems/1/PCleDevices/NIC[aoc_card_num]	Asset information of AOC NIC cards
/redfish/v1/Systems/1/PCleDevices/NIC[aoc_card_num]/Functions/[port_num]	Asset information of each AOC's NIC chip

/redfish/v1/Systems/1/PCleDevices/GPU[gpu_card_num]	Asset information of GPU cards
/redfish/v1/Systems/1/PCleDevices/GPU[gpu_card_num]/Functions/[gpu_instance_num]	Detail information of GPU cards
/redfish/v1/EventService/Subscriptions	
/redfish/v1/EventService/Subscriptions/[destination_num]	
/redfish/v1/UpdateService/Actions/UpdateService.SimpleUpdate	Only X11DP supports
/redfish/v1/UpdateService/SimpleUpdateActionInfo	Only X11DP supports
/redfish/v1/UpdateService/IPMIConfig	
/redfish/v1/UpdateService/IPMIConfig/Actions/IPMIConfig.Upload	Upload new IPMI configuration file to set BMC
/redfish/v1/UpdateService/IPMIConfig/Actions/IPMIConfig.Download	Download IPMI configuration as a file
/redfish/v1/UpdateService/SSLCert	View current SSL certification info
/redfish/v1/UpdateService/SSLCert/Actions/SSLCert.Upload	Used to upload new SSL certification file
/redfish/v1/UpdateService/SmcFirmwareInventory	Supported on X11 platforms
/redfish/v1/UpdateService/SmcFirmwareInventory/BMC	
/redfish/v1/UpdateService/SmcFirmwareInventory/BMC/Actions/SmcFirmwareInventory.EnterUpdateMode	
/redfish/v1/UpdateService/SmcFirmwareInventory/BMC/Actions/SmcFirmwareInventory.Upload	
/redfish/v1/UpdateService/SmcFirmwareInventory/BMC/Actions/SmcFirmwareInventory.Update	"PreserveCfg":"true", "PreserveSdr":"true", "PreserveSsl":"true"
/redfish/v1/UpdateService/SmcFirmwareInventory/BMC/Actions/SmcFirmwareInventory.Cancel	
/redfish/v1/UpdateService/SmcFirmwareInventory/BIOS	
/redfish/v1/UpdateService/SmcFirmwareInventory/BIOS/Actions/SmcFirmwareInventory.EnterUpdateMode	
/redfish/v1/UpdateService/SmcFirmwareInventory/BIOS/Actions/SmcFirmwareInventory.Upload	
/redfish/v1/UpdateService/SmcFirmwareInventory/BIOS/Actions/SmcFirmwareInventory.Update	"PreserveME":"true", "PreserveNVRAM":"true", "PreserveSMBIOS":"true"
/redfish/v1/UpdateService/SmcFirmwareInventory/BIOS/Actions/SmcFirmwareInventory.Cancel	Only X11DP supports
/redfish/v1/Registries/Base.v1_4_0	
/redfish/v1/Registries/BiosAttributeRegistry.v1_0_0.json	
/redfish/v1/JsonSchemas/[variety_of_services]	

3 Using RESTful APIs

The user can receive API responses through programming by installing Postman or any other Rest API client application(s).

3.1 Authentication

Redfish supports both "Basic Authentication" and "Redfish Session Login Authentication" (as described below under Session Management). Service does not require a client to create a session when Basic Authentication is used.

3.1.1 Basic Authentication

HTTP BASIC authentication uses compliant TLS connections to transport the data between any third party authentication service and clients.

Note: Always check the status code once you get a response from the Redfish URL. You can refer to the status code table mentioned above. (All URLs/commands are case sensitive.)

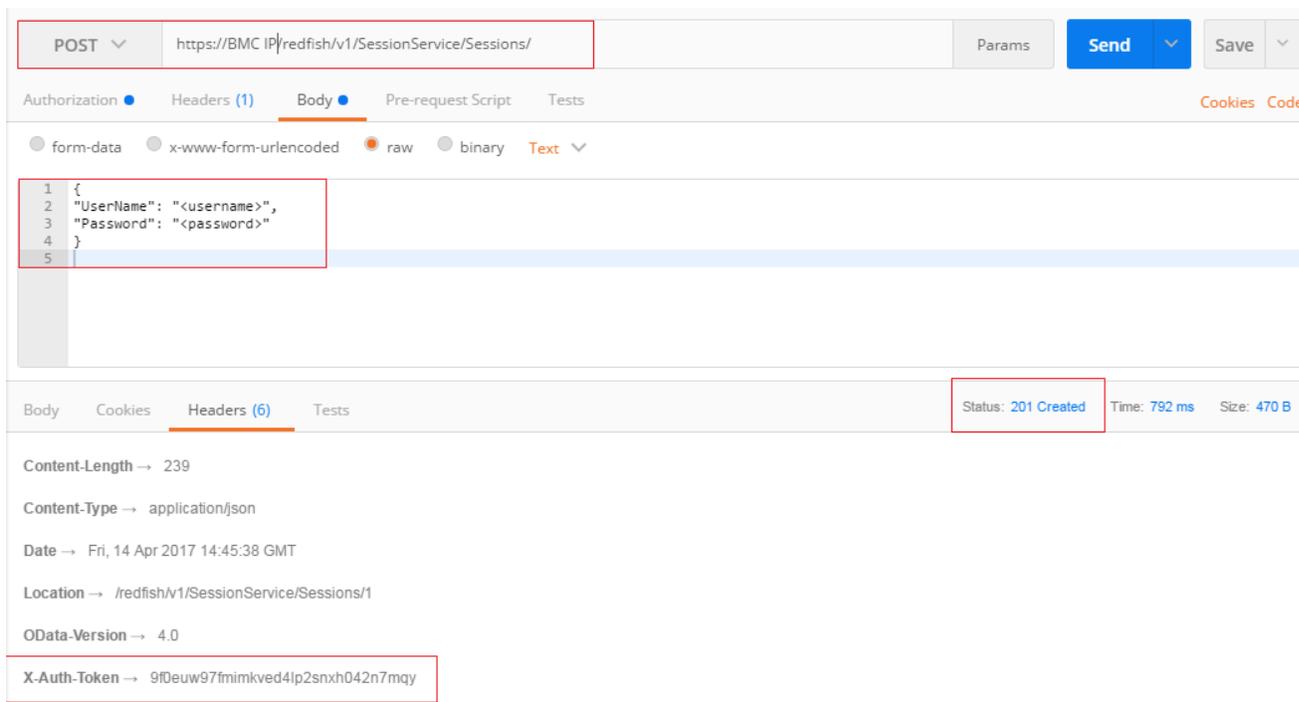
3.1.2 Session Management

Redfish Service uses session management to implement authentication. This includes orphaned session timeouts and a number of simultaneous open sessions.

Step 1: The user can post the following username/password information in the payload field, which will create a new session.

```
{  
  "UserName": "<username>",  
  "Password": "<password>"  
}
```

Example of applying for Authentication using a Chrome-based app (Advanced Rest Client): The user will receive 201 message code with X-AUTH token created.



- Users can create a maximum of 16 sessions.
- **Session lifetime:** For Redfish sessions, as long as a client sends requests for the session within the session timeout period, the session will remain open and the session authentication token will remain valid. If the session times out, the session will be automatically terminated.
- **According to Redfish specification, a user can define session time from 30s to 86400s.** If a user is not active in the defined time frame, then the token will be rendered invalid. Users can always patch "SessionTimeout" value if needed.
Example: [PATCH] <https://BMC IP/redfish/v1/SessionService> Payload: {"SessionTimeout": 50}
- **Session termination or logout:** A Redfish session is terminated when the client logs out. This is accomplished by performing a DELETE to the session resource identified by the link returned in the location header either when the session was created or if the Session ID is returned in the response data. The ability to DELETE a session by specifying the session resource ID allows an administrator with sufficient privilege to terminate other users' sessions from a different session.
Example: [DELETE] [https://IP/redfish/v1/SessionService/Sessions/2\(num\)](https://IP/redfish/v1/SessionService/Sessions/2(num)) ->Send->Status Code: 200 OK

Log in	Log out
Operation: POST	Operation: DELETE
URI: redfish/v1/SessionService/Sessions/	URI: redfish/v1/SessionService/Sessions/(num)
Request headers: Content-Type: application/json	Request headers: Content-Type: application/json
Request body: {"UserName":"UserName","Password":"Password"}	Requestbody: NONE

Response: 201 created	Response: 200 OK
X-Auth Token header displays Location and session ID ex: Location: /redfish/v1/SessionService/Sessions/5	

Step 2: The response will include an X-Auth-token header with a session token and a location header. Parse X-Auth token value to get an API response.
Note: The user can apply basic authentication as well.

3.2 Account Service

The user can perform the following operations under /redfish/v1/AccountService.

Method supported: Get/Post/Patch/Delete

The user can create a new account using the following API and payload. The user can also delete respective accounts.

[POST] redfish/v1/AccountService/Accounts/

Payload:

```
{
  "UserName": "User_Name",
  "Password": "User_Password",
  "RoleId": "role_id",    *// Admin, Operator, ReadOnlyUser
  "Enabled": true
}
```

The user can also verify assigned privileges for different roles (ADMIN/Operator/Readonlyuser) under redfish/v1/AccountService/Roles.

3.3 Event Service

The event service is a new alert mechanism for Redfish. This alert will be sent out through http to the web server that is subscribed to by the users.

First, the user needs to add a subscription to inform Redfish who will receive this event.

After the user adds subscriptions, he can execute "SendTestEvent" to send a testing event.

Alternatively, the user can generate an event in the BMC and Redfish will automatically send an event alert to the destination(s) in the subscriptions. For this reason, you need to implement the event listener, which is like a web server that can receive https POST data that describes the Redfish event format.

For the current stage, the user can launch Wireshark on the destination to sniff the packet to learn the user to receive the Redfish event.

Method supported: Get/Post/Delete

To add a subscription:

[POST]: <https://IP/redfish/v1/EventService/Subscriptions/>

```
{"Destination": "http://www.dnsname.com/Destination1", "Context": "user1_test", "EventTypes": ["Alert", "StatusChange"], "Protocol": "Redfish"}
```

The user can subscribe to a maximum number of events.

To see all subscriptions:

[GET]: <https://IP/redfish/v1/EventService/Subscriptions/>

To send a testing event:

[POST]: <https://IP/redfish/v1/EventService/Actions/EventService.SendTestEvent> {"EventType": "Alert"}

The user can delete events using the Delete service.

[DELETE]: [https://IP/redfish/v1/EventService/Subscriptions/1 \(num\)](https://IP/redfish/v1/EventService/Subscriptions/1 (num))

3.4 Registries

/redfish/v1/Registries/Base.v1_4_0

Registry defines the base messages for Redfish. It represents properties for the registries themselves.

The Message ID is formed per the Redfish specification. It consists of the RegistryPrefix concatenated with the version concatenated with the unique identifier for the message registry entry.

3.5 Jsonschema

</redfish/v1/JsonSchemas>

The JSON Schema File resource describes the location (URI) of a particular Redfish schema definition being implemented or referenced by a Redfish service.

4 UpdateService

4.1 Update SSL certificate and key

Description: Update SSL certificate and key for secure web server connection.

[POST]: https://{BMC_IP}/redfish/v1/UpdateService/SSLCert/Actions/SSLCert.Upload

1. Change the type to "form-data".
2. Select cert_file and key_file as keys and browse respective files to upload-> send.

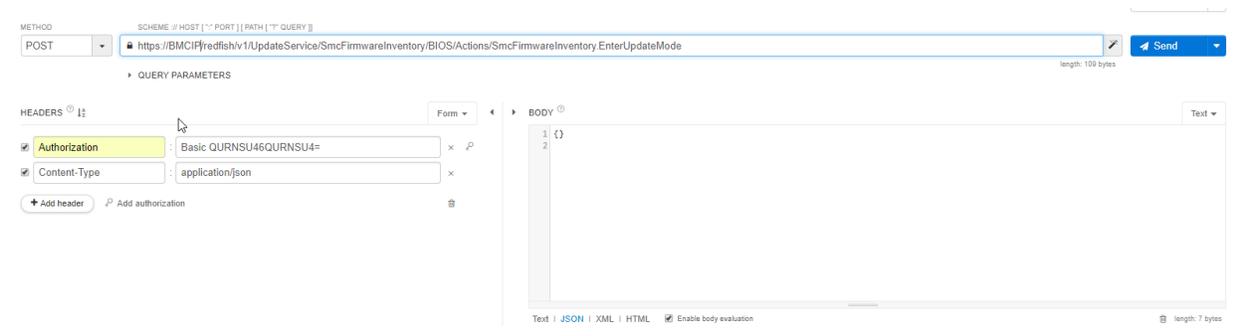
4.2 BIOS Update

Description: Update BIOS through Redfish API. In the current implementation, the content type must be "multipart/form-data" while uploading the BIOS image.

4.2.1 Enter BIOS update mode by posting the following request and expect to receive a "Successfully Completed Request" response.

<https://<IP>/redfish/v1/UpdateService/SmcFirmwareInventory/BIOS/Actions/SmcFirmwareInventory.EnterUpdateMode>

Note: The following screenshots are from the Restlet Chrome-based app.



4.2.2 Upload the BIOS image by posting the following request and expect to receive a “Successfully Completed Request” response. The content type must be “multipart/form-data”.

<https://<IP>/redfish/v1/UpdateService/SmcFirmwareInventory/BIOS/Actions/SmcFirmwareInventory.Upload>



4.2.3 Update BIOS by posting the following request with the following payload and expect to receive a “Successfully Completed Request” response.

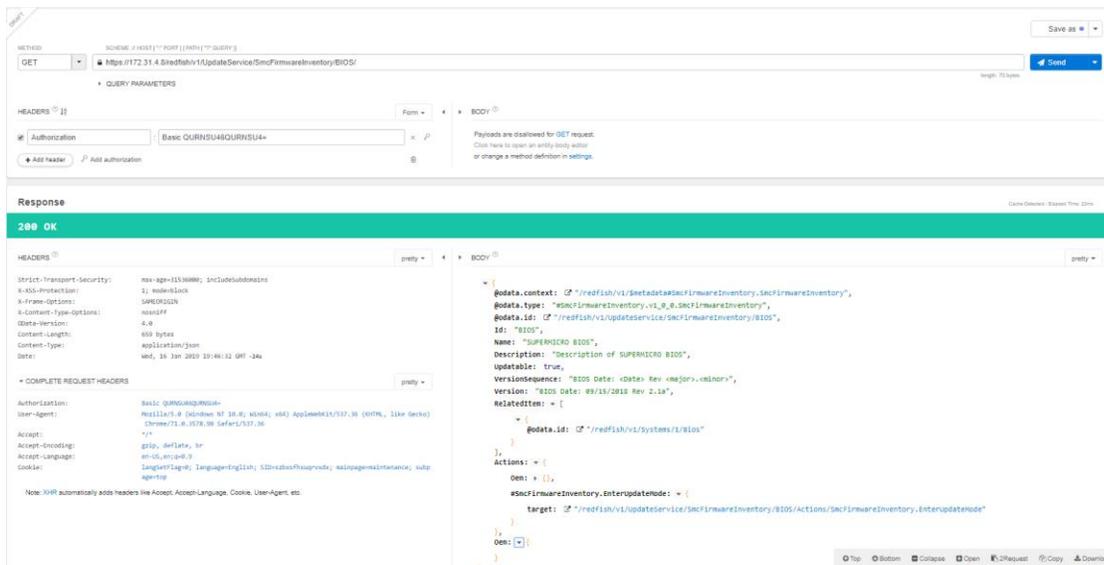
Payload: PreserveME, PreserveNVRAM, and PreserveSMBIOS are required in the request body.

<https://<IP>/redfish/v1/UpdateService/SmcFirmwareInventory/BIOS/Actions/SmcFirmwareInventory.Update>



Check the BIOS update status by issuing the following request with the GET method and expect to receive a response with the BIOS information.

<https://<IP>/redfish/v1/UpdateService/SmcFirmwareInventory/BIOS/>

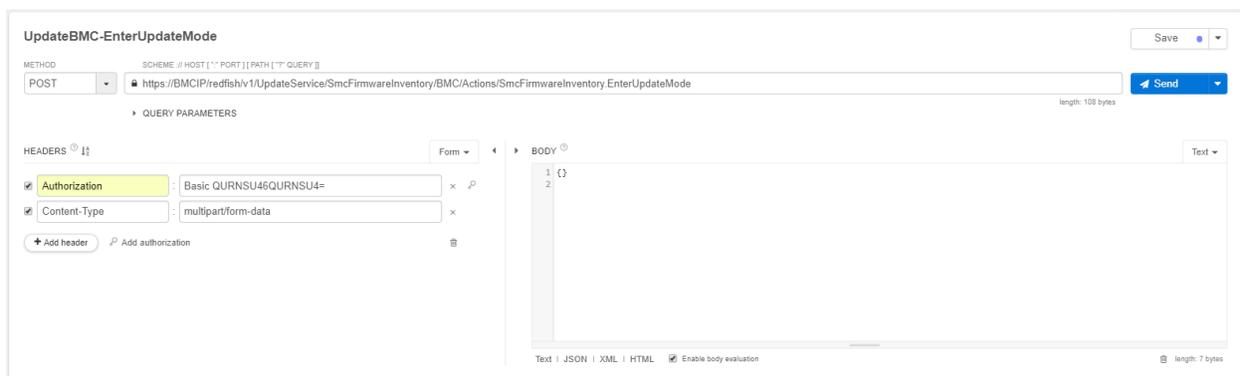


4.3 BMC Firmware Update

Description: Update BMC firmware through the Redfish API. In the current implementation, the content type must be “multipart/form-data” while uploading the BMC image.

4.3.1 Enter BMC update mode by posting the following request and expect to receive a “Successfully Completed Request” response.

<https://<IP>/redfish/v1/UpdateService/SmcFirmwareInventory/BMC/Actions/SmcFirmwareInventory.EnterUpdateMode>



4.3.2 Upload the BMC image by issuing the following request with the POST method and expect to receive a “Successfully Completed Request” response. The content type must be “multipart/form-data”.

<https://<IP>/redfish/v1/UpdateService/SmcFirmwareInventory/BMC/Actions/SmcFirmwareInventory.Upload>

UpdateBMC-EnterUpdateMode

METHOD: POST

SCHEME | HOST | PORT | PATH | QUERY

https://BMCIP/redfish/v1/UpdateService/SmcFirmwareInventory/BMC/Actions/SmcFirmwareInventory.Upload

length: 99 bytes

QUERY PARAMETERS

HEADERS

- Authorization: Basic QURNSU46QURNSU4=
- Content-Type: multipart/form-data

BODY

- bmc [File] = SMT_X11AST2500_194.bin (type: "application/octet-stream", size: 33554432 bytes)

4.3.2 Update the BMC image by issuing the following request with the POST method and expect to receive a “Successfully Completed Request” response. The content type must be “multipart/form-data”.
<https://<IP>/redfish/v1/UpdateService/SmcFirmwareInventory/BMC/Actions/SmcFirmwareInventory.Update>

UpdateBMC-EnterUpdateMode

METHOD: POST

SCHEME | HOST | PORT | PATH | QUERY

https://BMCIP/redfish/v1/UpdateService/SmcFirmwareInventory/BMC/Actions/SmcFirmwareInventory.Update

length: 99 bytes

QUERY PARAMETERS

HEADERS

- Authorization: Basic QURNSU46QURNSU4=
- Content-Type: multipart/form-data

BODY

```

1 {
2   "PreserveCfg": true,
3   "PreserveSdr": true,
4   "PreserveSsl": true
5 }
6
7

```

Text | JSON | XML | HTML

length: 73 bytes

4.4 Simple Update

This action shall perform an update of installed software component(s) as contained within a software image file located at a URI referenced by the ImageURI parameter.

1. Prepare FTP, HTTP, or HTTPS file server, and put BMC or BIOS firmware inside for downloading.
2. POST /redfish/v1/UpdateService/Actions/UpdateService.SimpleUpdate with the following parameter example in JSON format:

```

{
  "ImageURI" : "<file ip>/<path and image file name>",
  "TransferProtocol" : "FTP",
  "Targets" : ["/redfish/v1/Managers/1"]
}

```

SimpleUpdate

METHOD: POST
 SCHEME # HOST [":" PORT] [PATH] [?" QUERY #]
 https://BMC/IP/redfish/v1/UpdateService/Actions/UpdateService.SimpleUpdate

HEADERS: Authorization: Basic QURNSU46QURNSU4=, Content-Type: application/json

BODY: {
 1: "ImageURI": "i...supernicro.com/SMI_X11A5T2500_164.bin",
 2: "Username": "
 3: "Password": "
 4: "TransferProtocol": "FTP",
 5: "Targets": ["/redfish/v1/Managers/1"]
 6: }
 7:
 8: }

Response

202 Accepted

HEADERS: Strict-Transport-Security, X-KSS-Protection, X-Frame-Options, X-Content-Type-Options, OData-Version, Location, Retry-After, Content-Length, Content-Type, Date

BODY: {
 Accepted: {
 code: "Base.v1_4_0.Accepted",
 Message: "Successfully Accepted Request. Please see the location header and ExtendedInfo for more information.",
 @Message.ExtendedInfo: {
 MessageId: "SMC.v1_0_0.OemSimpleUpdateAcceptedMessage",
 Severity: "Ok",
 Resolution: "No resolution was required.",
 Message: "Please also check Task Resource /redfish/v1/TaskService/Tasks/2 to see more information.",
 MessageArgs: ["/redfish/v1/TaskService/Tasks/2"],
 RelatedProperties: ["SimpleUpdateAccepted"]
 }
 }
 }
 }

5 Examples

Users can integrate current APIs into their software and applications in order to receive all services provided by Redfish APIs.

5.1 System reset

<https://<IP>/redfish/v1/Systems/1/Actions/ComputerSystem.Reset>

Possible actions:

ResetType: AllowableValues

```
:[  
"On",  
"ForceOff",  
"GracefulShutdown",  
"GracefulRestart",  
"ForceRestart",  
"Nmi",  
"ForceOn"  
]
```

The screenshot displays a REST client interface. At the top, the method is set to POST and the URL is `https://BMCIP/redfish/v1/Systems/1/Actions/ComputerSystem.Reset`. The request body is a JSON object: `{ "ResetType": "On" }`. The response is a 200 OK status with a JSON body: `{ "Success": { "code": "Base.v1_4_0.Success", "Message": "Successfully Completed Request." } }`. The response headers include `Strict-Transport-Security`, `X-XSS-Protection`, `X-Frame-Options`, `X-Content-Type-Options`, `OData-Version`, `Content-Length`, `Content-Type`, and `Date`.

5.2 Configure the Boot Order in System BIOS

Description: Change system boot order using Redfish.

It is implemented under `redfish/v1/Systems/1`.

Method supported: Get/Patch

- Change `BootSourceOverrideTarget` to `BiosSetup`.

```
[PATCH]:
{
  "Boot":{
    "BootSourceOverrideEnabled":"Once",
    "BootSourceOverrideTarget": "BiosSetup"
  }
}
```

`BootSourceOverrideTarget@Redfish.AllowableValues`:

`["None", "Pxe", "Hdd", "Diags", "CD/DVD", "BiosSetup", "FloppyRemovableMedia", "UsbKey", "UefiCd", "UefiHdd", "UefiUsbHdd", "UefiUsbCd"]`

5.3 BIOS Configurations: Configure BIOS over Redfish

BIOS registry will show Menu of Key (Menus), Keys (Attributes), and Keys' dependencies (Dependencies).

[https://\\$BMC_IP/redfish/v1/Registries/BiosAttributeRegistry.v1_0_0](https://$BMC_IP/redfish/v1/Registries/BiosAttributeRegistry.v1_0_0)

```

1 | {
2 |   "@Redfish.Copyright": "Copyright 2016 Distributed Management Task Force, Inc. (DMTF). All rights reserved.",
3 |   "@odata.type": "#AttributeRegistry.v1_0_0.AttributeRegistry",
4 |   "Description": "This registry defines a representation of BIOS Attribute instances",
5 |   "Id": "BiosAttributeRegistry.1_0_0",
6 |   "Language": "en",
7 |   "Name": "BIOS Attribute Registry",
8 |   "OwningEntity": "SMCI",
9 |   "RegistryVersion": "1.0.0",
10 |   "SupportedSystems": [
11 |     {
12 |       "ProductName": "SuperMicroServer"
13 |     }
14 |   ],
15 |   "RegistryEntries": {
16 |     "Attributes": [{}],
17 |     "Menus": [{}],
18 |     "Dependencies": [{}],
19 |   }
20 | }

```

Attributes: containing the attributes and their possible values.

```

{
  "CurrentValue": "Force BIOS",
  "DisplayName": "Option ROM Messages",
  "HelpText": "Set display mode for Option ROM",
  "MenuPath": "./Advanced/BootFeature",
  "AttributeName": "OptionROMMessages",
  "IsFunCallBack": false,
  "ReadOnly": false,
  "GrayOut": false,
  "Hidden": false,
  "Type": "Enumeration",
  "Value": [
    {
      "ValueDisplayName": "Force BIOS"
    },
    {
      "ValueDisplayName": "Keep Current"
    }
  ]
},

```

Menu: containing the attributes menus and their hierarchy.

```

{
  "DisplayName": "PCIe|PCI|PnP Configuration",
  "DisplayOrder": 26,
  "MenuPath": "./Advanced/PCIe|PCI|PnPConfiguration",
  "MenuName": "PCIe|PCI|PnPConfiguration",
  "Hidden": false,
  "ReadOnly": false
},

```

Dependencies: a list of dependencies of attributes on this component.

```

{
  "Dependency": {
    "MapFrom": [{
      "MapFromAttribute": "PowerTechnology",
      "MapFromCondition": "NEQ",
      "MapFromProperty": "CurrentValue",
      "MapFromValue": "Custom",
      "MapTerms": "AND"
    },
    {
      "MapFromAttribute": "PowerPerformanceTuning",
      "MapFromCondition": "EQU",
      "MapFromProperty": "CurrentValue",
      "MapFromValue": "OS Controls EPB"
    }
  ],
  "MapToAttribute": "ENERGY_PERF_BIAS_CFGmode",
  "MapToProperty": "GrayOut",
  "MapToValue": true
},
"DependencyFor": "ENERGY_PERF_BIAS_CFGmode",
"Type": "Map"
},

```

Example: If (PowerTechnology's CurrentValue != "Custom" **AND** PowerPerformanceTuning's CurrentValue == "OS Controls EPB") ENERGY_PERF_BIAS_CFGmode's GrayOut = true

Modify attributes:

[https://\\$BMC_IP/redfish/v1/Systems/1/Bios](https://$BMC_IP/redfish/v1/Systems/1/Bios)

→The user can GET current setting and PATCH/PUT desired settings.

```

{
  @odata.context : "/redfish/v1/$metadata#Bios.Bios",
  @odata.type : "#Bios.v1_0_0.Bios",
  @odata.id : "/redfish/v1/Systems/1/Bios",
  Id : "Bios",
  Name : "BIOS Configuration Current Settings",
  AttributeRegistry : "BiosAttributeRegistry.v1_0_0",
  Description : "BIOS Configuration Current Settings",
  @Redfish.Settings : { @odata.type : "#Settings.v1_0_0.Settings", ETag : "SMC_TAG", Time : "Thu Feb 5 22:37:03 2015",...},
  Actions : { #Bios.ResetBios : { target : "/redfish/v1/Systems/1/Bios/Actions/Bios.ResetBios"...},
  Attributes : {
    A7Mode : "Enable",
    ACPI-States : "Enable",
    AES-NI : "Enable",
    AOMCPU1PCI-E3.0X16OPROM : "Legacy",
    ASPMSupport : "Disabled",
    Above4GDecoding : "Disabled",
    AddOnROMDisplayMode : "Force BIOS",
    AddOnROMDisplayMode$2 : "Force BIOS",
    AdjacentCachePrefetch : "Enable",
    Azalia : "Auto",
    AzaliaPMEEnable : "Disabled",

```

View pending settings:

[https://\\$BMC_IP/redfish/v1/Systems/1/Bios/SD](https://$BMC_IP/redfish/v1/Systems/1/Bios/SD)

→The user can view any pending setting after PATCH/PUT.
After PATCH/PUT, please reset system to set values to BIOS.

```

1  {
2  @odata.context : "/redfish/v1/$metadata#Bios.Bios",
3  @odata.type : "#Bios.v1_0_0.Bios",
4  @odata.id : "/redfish/v1/Systems/1/Bios/SD",
5  Id : "SD",
6  Name : "BIOS Configuration Pending Settings",
7  AttributeRegistry : "BiosAttributeRegistry.v1_0_0",
8  Description : "BIOS Configuration Pending Settings. These settings will be applied on next system reboot.",
9  Attributes : {
10     ASPMSupport : "Auto"
11  }
12 }

```

BIOS Reset:

[https://\\$BMC_IP/redfish/v1/Systems/1/Bios/Actions/Bios.ResetBios](https://$BMC_IP/redfish/v1/Systems/1/Bios/Actions/Bios.ResetBios)

→POST a reset of the BIOS attributes to default values.

After POST, please reset system to set values to BIOS.

Change BIOS booting Password:

[https://\\$BMC_IP/redfish/v1/Systems/1/Bios/Actions/Bios.ChangePassword](https://$BMC_IP/redfish/v1/Systems/1/Bios/Actions/Bios.ChangePassword)

→POST with "PasswordName", "OldPassword", "NewPassword" to change password.

After POST, please reset system to set values to BIOS.

5.4 RAID Management Reference Examples

Create LSI3108 Volume	<p>URL: {\$BMC_IP}/redfish/v1/Systems/1/Storage/HA-RAID/Actions/Oem/Storage.CreateVolume</p> <p>Method: post</p> <p>Example Body: { "ControllerId":0, "Raid": "RAID0", "Span": 1, "PhysicalDrives":["HA-RAID.0.Disk.0", "HA-RAID.0.Disk.1"], "UsePercentage":100, "LogicalDriveCount":1, "StripSizePerDDF":"256K", "LdReadPolicy":"NoReadAhead", "LdWritePolicy":"WriteBack", "LdIOPolicy":"DirectIO", "AccessPolicy":"ReadWrite", "DiskCachePolicy":"Unchanged", "InitState":"NoInit" }</p>
Locate physical HDD	<p>URL: {\$BMC_IP}/redfish/v1/Chassis/HA-RAID.[contoller_num].StorageEnclosure.[enclosure_num]/Drives/Disk.Bay.[disk_num]/Volume.Indicate</p> <p>Method: post</p> <p>Example Body: { "Active":"true" }</p>

Locate logical volume HDD	<p><u>URL: \${BMC_IP}/redfish/v1/Systems/1/Storage/HA-RAID/HA-RAID.[contoller num].Volumes/[volume num]/Actions/OEM/Volume.Indicate</u></p> <p>Method: post</p> <p>Example Body: { "Active": "true" }</p>
Delete logical volume	<p><u>URL: \${BMC_IP}/redfish/v1/Systems/1/Storage/HA-RAID/HA-RAID.[contoller num].Volumes/[volume num]/Actions/OEM/Volume.Delete</u></p> <p>Method: post</p> <p>Example Body: { }</p>
Clear all logical volumes	<p><u>URL: \${BMC_IP}/redfish/v1/Systems/1/Storage/HA-RAID/Storage.ClearVolumes</u></p> <p>Method: post</p> <p>Example Body: { "ControllerId": 0 }</p>
Save HA-Raid controller config	<p><u>URL: \${BMC_IP}/redfish/v1/Systems/1/Storage/HA-RAID/Actions/Oem/HARAIDController.Save</u></p> <p>Method: patch</p> <p>Example Body: { "ControllerId": 0, "BIOSBootMode": "PauseOnError", "JBODMode": "Enable" }</p>

5.5 SMTP

SMTP is implemented under redfish/v1/Managers/1/SMTP.

Method supported: Get/Patch

[PATCH]:

A: SMTP SSL authentication Disabled:

```
{
"SmtpServer": "mailserver_ip or mailserver_name",
"SmtpPortNumber": "server_port",
"SmtpUserName": "",
"SmtpPassword": "",
"SmtpSenderAddress": "sender_email_address"
}
```

B: SMTP SSL authentication Enabled:

```
{
"SmtpSSEnabled": true,
"SmtpServer": "mailserver_ip or mailserver_name",
"SmtpPortNumber": "server_port",
"SmtpUserName": "user_name",
"SmtpPassword": "user_password",
"SmtpSenderAddress": "sender_email_address"
}
```

After applying the configurations, generate any system event to check if an email alert is received.

5.6 FanMode

It is implemented under `/redfish/v1/Managers/1/FanMode`.

Allowable PATCH values: {"Standard", "FullSpeed", "PUE2", "HeavyIO"}

Example: Use the PATCH operation and parse the following payload for your system.

```
{
  "Oem": {
    "OemFan": {
      "FanMode": "PUE2"} } }
```

5.7 Active Directory

AD is implemented under `redfish/v1/Managers/1/ActiveDirectory`.

Method supported: Get/Patch/Post/Delete

- You can patch the following properties in order to configure ActiveDirectory.

```
- "@odata.context": "/redfish/v1/$metadata#ActiveDirectory.ActiveDirectory",
  "@odata.type": "#ActiveDirectory.ActiveDirectory",
  "@odata.id": "/redfish/v1/Managers/1/ActiveDirectory",
  "Id": "Active Directory",
  "Name": "Active Directory",
  "AuthenticationEnabled": false,
  "AuthenticationOverSSEnabled": false,
  "PortNumber": 389,
  "UserDomainName": "",
  "Timeout": 0,
  "DCSAddress1": "0.0.0.0",
  "DCSAddress2": "0.0.0.0",
  "DCSAddress3": "0.0.0.0",
  "RoleGroups": {
    "@odata.id": "/redfish/v1/Managers/1/ActiveDirectory/RoleGroups"
  }
}
```

- [GET]/[POST]: "redfish/v1/Managers/1/ActiveDirectory/RoleGroups"
You can perform POST operation with the following payload:
{"RoleGroupName":"xxx", "RoleGroupDomain":"xxx", "RoleGroupPrivilege":"Operator"}
- [GET]/[PATCH]/[DELETE]: "redfish/v1/Managers/1/ActiveDirectory/RoleGroups/ [number]"

5.8 Get/Set iKVM Mouse Mode

It is implemented under `redfish/v1/Managers/1/MouseMode`.

Method supported: Get/Patch

Allowable values: "Absolute", "Relative", "Single"

5.9 NTP

It is implemented under `redfish/v1/Managers/1/NTP`.

Method supported: Get/Patch

[PATCH]: "NTPEnable", "PrimaryNTPServer", "SecondaryNTPServer", "DaylightSavingTime"

5.10 RADIUS

It is implemented under `redfish/v1/Managers/1/RADIUS`.

Method supported: Get/Patch

[PATCH]: "RadiusEnabled", "RadiusServerIP", "RadiusPortNumber", "RadiusSecret"

5.11 LDAP

It is implemented under redfish/v1/Managers/1/LDAP.

Method supported: Get/Patch

[PATCH]: "LDAPEnabled", "LDAPAuthOverSSL", "LDAPPortNumber", "LDAPServerIP", "LDAPPassword", "LDAPDN", "LDAPSearchbase"

5.12 Snooping

[GET]: [https://\\$BMC_IP/redfish/v1/Managers/1/Snooping](https://$BMC_IP/redfish/v1/Managers/1/Snooping)

5.13 IP Access Control

It is implemented under redfish/v1/Managers/1/IPAccessControl.

Method supported: Get/Patch/Post

<https://x.x.x.x/redfish/v1/Managers/1/IPAccessControl>

[PATCH]: {"ServiceEnabled": true}

<https://x.x.x.x/redfish/v1/Managers/1/IPAccessControl/FilterRule>

[POST]: {"Address": "10.136.176.0", "PrefixLength": 24, "Policy": "Accept"}

<https://x.x.x.x/redfish/v1/Managers/1/IPAccessControl/FilterRule/1>

[PATCH]: {"Address": "10.136.176.0", "PrefixLength": 24, "Policy": "Drop"}

5.14 SMCRAKP

It is implemented under redfish/v1/Managers/1/SMCRAKP.

Method supported: Get/Patch

Example: PATCH - Raw data: {"Mode": "Enabled"}

5.15 SNMP

It is implemented under redfish/v1/Managers/1/SNMP.

Method supported: Get/Patch

[GET]: <https://x.x.x.x/redfish/v1/Managers/1/SNMP>

[PATCH]:

{"SnmEnabled": true}

{"SnmEnabled": false}

[GET]: <https://x.x.x.x/redfish/v1/Managers/1/SNMP/SNMPv2>

[PATCH]: {"Snmv2Enabled": true, "ROCommunity": "rtest", "RWCommunity": "wtest"}

[GET]: <https://x.x.x.x/redfish/v1/Managers/1/SNMP/SNMPv3>

[PATCH]: {"Snmv3Enabled": true, "UserName": "administrator", "AuthProtocol": "SHA1", "PrivateProtocol": "DES", "AuthKey": "Test1234", "PrivateKey": "Test1234"}

5.16 Syslog

It is implemented under `redfish/v1/Managers/1/Syslog`.

Method supported: Get/Patch

Enable

```
[PATCH]: {"Enable Syslog": true, "Syslog PortNumber": 514, "Syslog ServerIP": "10.136.176.16"}
```

Disable

```
[PATCH]: {"Enable Syslog": false, "Syslog PortNumber": 514, "Syslog ServerIP": "10.136.176.16"}
```

5.17 Chassis Intrusion

It is implemented under `/redfish/v1/Chassis/1`.

Method supported: Get/Patch

- Clear Chassis Intrusion - [PATCH]: {"PhysicalSecurity":{"IntrusionSensor": "Normal"}}

5.18 iKVM

Description: Launch HTML5 iKVM using Redfish.

1. [GET] URL: `/${BMC_IP}/redfish/v1/Managers/1/iKVM`
2. Use the replied property, "URI", above to prepend "[https://\\${BMC_IP}](https://${BMC_IP})" and paste this complete URL in browser to render HTML5 iKVM.

Example of launching URL: https://{BMC_IP}/redfish/Kk1D4UVATDja0Jw.iKVM

5.19 Acknowledge event

Description: Acknowledge event using Redfish.

It is implemented under `redfish/v1/Systems/1/LogServices`.

Method supported: Get/Patch

- View events

https://{BMC_IP}/redfish/v1/Systems/1/LogServices/Log1/Entries

```

{
  @odata.context: "/redfish/v1/$metadata#LogEntryCollection.LogEntryCollection",
  @odata.type: "#LogEntryCollection.LogEntryCollection",
  @odata.id: "/redfish/v1/Systems/1/LogServices/Log1/Entries",
  Name: "Health Event Log Service Collection",
  Description: "Collection of Health Event Logs",
  Members@odata.count: 4,
  Members: [
    {
      @odata.id: "/redfish/v1/Systems/1/LogServices/Log1/Entries/1",
      @odata.type: "#LogEntry.v1_3_0.LogEntry",
      Id: "1",
      Name: "Health Event Log Entry 1",
      EntryType: "Event",
      Severity: "Warning",
      Created: "2019-01-29T20:08:53+00:00",
      EntryCode: "Assert",
      OemSensorType: "ACPowerOn",
      SensorNumber: 255,
      Message: "[ OEM ] First AC Power on",
      MessageArgs: ["ArrayOfMessageArgs"],
      Links: {Oem: {}},
      Oem: {Supermicro: {MarkAsAcknowledged: false, @odata.type: "#SmcLogEntryExtensions.v1_0_0.LogEntry", RawEventData: {EventDirAndType: "0x6F",...}}},
    },
    {@odata.id: "/redfish/v1/Systems/1/LogServices/Log1/Entries/2", @odata.type: "#LogEntry.v1_3_0.LogEntry",...},
    {@odata.id: "/redfish/v1/Systems/1/LogServices/Log1/Entries/3", @odata.type: "#LogEntry.v1_3_0.LogEntry",...},
    {@odata.id: "/redfish/v1/Systems/1/LogServices/Log1/Entries/4", @odata.type: "#LogEntry.v1_3_0.LogEntry",...}
  ]
}

```

- Acknowledge event: https://{BMC_IP}/redfish/v1/Systems/1/LogServices/Log1/Entries/1/ [PATCH]:

```

{
  "Oem":{
    "Supermicro":{
      "MarkAsAcknowledged": true
    }
  }
}

```

5.20 Getting MAC address from system NICs

https://{BMC_IP}/redfish/v1/Systems/1/EthernetInterfaces/1

METHOD: GET
 SCHEME // HOST [: PORT] [PATH [? QUERY]]
 https://BMCIP/redfish/v1/Systems/1/EthernetInterfaces/1
 length: 83 bytes

HEADERS: Authorization: Basic QURNSU46QURNSU4=

Response: 200 OK
 Cache Detected - Elapsed Time: 71ms

HEADERS: Strict-Transport-Security: max-age=31536000; includeSubdomains
 X-XSS-Protection: 1; mode=block
 X-Frame-Options: SAMEORIGIN
 X-Content-Type-Options: nosniff
 OData-Version: 4.0
 Content-Length: 355 bytes
 Content-Type: application/json
 Date: Thu, 31 Jan 2019 23:42:01 GMT +23s

BODY: {
 "@odata.context": "/redfish/v1/\$metadata#EthernetInterface.EthernetInterface",
 "@odata.type": "#EthernetInterface.v1_0_0.EthernetInterface",
 "@odata.id": "/redfish/v1/Systems/1/EthernetInterfaces/1",
 Id: "1",
 Name: "OnBoard LAN 1",
 Description: "OnBoard #1",
 Status: {
 State: "Disabled",
 Health: "OK"
 },
 MACAddress: "ac:1f:6b:07:ab:c8",
 SpeedMbps: 0,
 FQDN: ""
 }

5.21 Python Code for Redfish API Response

```
base_url = 'https://IP/redfish/v1/Managers/1/SerialInterfaces/1'
dict_host = requests.get(base_url).json()
print(ison.dumps(dict_host, indent=2))
```

Output:

```
{
  "@odata.type": "#SerialInterface.1.0.0.SerialInterface",
  "Parity": "None",
  "Name": "SerialInterfaces",
  "DataBits": "8",
  "@odata.id": "/redfish/v1/Managers/1/SerialInterfaces/1",
  "@odata.context":
  "/redfish/v1/Managers/1/SerialInterfaces/1/$metadata#Managers/Links/Members/1/Links/SerialInterfaces/$Entity",
  "FlowControl": "None",
  "SignalType": "Rs232",
  "StopBits": "8",
```

6 Reference Links

Supermicro Redfish:

<https://www.supermicro.com/solutions/Redfish.cfm>

Supermicro YouTube:

<https://www.youtube.com/watch?v=anppU663kUs>

DMTF Redfish:

<http://www.dmtf.org/standards/redfish>

<http://redfish.dmtf.org/>

Mockups:

<http://redfish.dmtf.org/redfish/v1>

Contact:

Supermicro Technical Support