

OPEN

Compute Project

OCP Baseline Hardware Management (Redfish Profile) v0.2.0

Author: John Leung (Intel Corporation)

1. Scope

This document defines the baseline hardware management Redfish model to remotely manage platforms and devices in Open Compute Project.

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3. Overview

Scalability in today's data center is increasingly achieved with horizontal, scale-out solutions, which often include large quantities of simple servers. The usage model of scale-out hardware is drastically different than that of traditional enterprise platforms, and requires a new approach to management.

Designed to meet the expectations of end users for simple and secure management of modern scalable platform hardware, DMTF's Redfish® is an open industry standard specification and schema that specifies a RESTful interface and utilizes JSON and OData to help customers integrate solutions within their existing tool chains. An aggressive development schedule is quickly advancing Redfish toward its goal of addressing all the components in the data center with a consistent API. (dmtf.org/redfish)

1.1 License

As of January 19, 2018, the following persons or entities have made this Specification available under the Open Web Foundation Final Specification Agreement (OWFa 1.0), which is available at <http://www.openwebfoundation.org/legal/the-owf-1-0-agreements/owfa-1-0>:

Intel Corporation

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4. Introduction

1.2 Reference Documents

Redfish Whitepaper ([DSP2044 v1.0.2](#), June 2017)

Redfish Scalable Platforms API Specification ([DSP0266 v1.4.0](#), Dec 2017).

Redfish Schema ([DSP8010 v2017.3](#), Dec 2017)

Redfish Interoperability Profiles Specification ([DSP0272 v0.99.0a](#), Dec 2017, Work-in-Progress)

1.3 Redfish

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

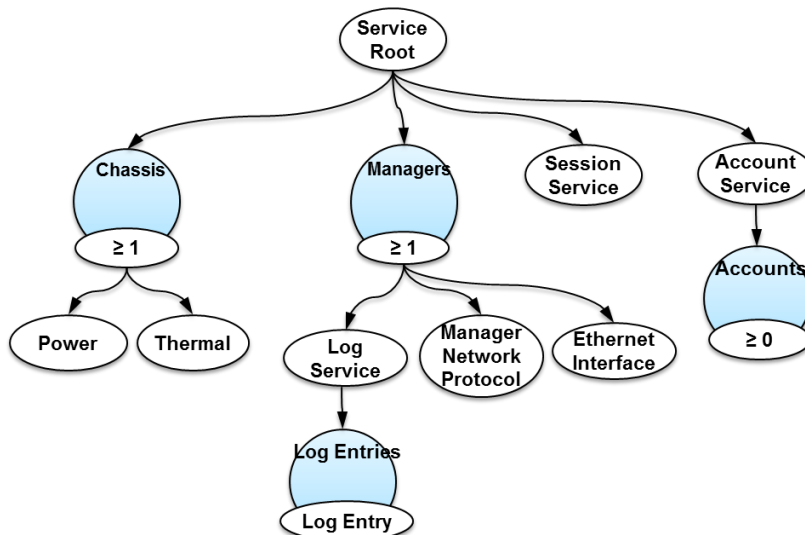
1.4 Redfish Profile Format

The Redfish Interoperability Profile is a JSON document which contains Schema-level, Property-level, and Registry-level requirements. A Redfish Profile file provides a machine readable file for prescriptive requirements on an implementation.

5. Redfish Profile for OCP Hardware Management Baseline

The OCP Hardware Management Baseline is specified in this document.

The figure below shows the resources for which the OCP Hardware Management Baseline imposes requirements.



The subsequent sections specifies the requirements per resource. Each section has a mockup, which shows the properties of the resource and the properties that have requirements, which are specified in a subsequent table.

(The mockups include a superset of properties for a resource. The properties which have a requirement in this document are bold-faced. This provides context, during of this document, for decisions on whether additional (or fewer) requirements should be stated in this document.)

The Redfish Profile file which expresses these same requirements can be found in section 6.

1.5 Service Root resource

The ServiceRoot resource shall exist.

Figure 1 shows a mockup of the ServiceRoot resource. The properties in bold have requirements, which are specified in Table 1.

```
{
  "@odata.context": "/redfish/v1/$metadata#ServiceRoot.ServiceRoot",
  "@odata.id": "/redfish/v1/",
  "@odata.type": "#ServiceRoot.v1_3_0.ServiceRoot",
  "Id": "RootService",
  "Name": "Root Service",
  "Product": "Contoso WidgetDeluxe 8744",
  "RedfishVersion": "1.0.0",
  "UUID": "92384634-2938-2342-8820-489239905423",

  "Chassis": { ... },
  "Managers": { ... },
  "SessionService": { ... },
  "AccountService": { ... },
  "Systems": { ... },
  "Fabrics": { ... },
  "Tasks": { ... },
  "EventService": { ... },
  "UpdateService": { ... },
  "CompositionService": { ... },
  "Registries": { ... },
  "JsonSchemas": { ... },
  "Links": {
    "Sessions": { ... }
  }
}
```

Figure 1 – Mockup of ServiceRoot resource

Table 1 - Requirement for ServiceRoot resource properties

Property	Requirement	Value
UUID	Mandatory	
RedfishVersion	Mandatory	
AccountService	Mandatory	
SessionService	Mandatory	
Chassis	Mandatory	
Managers	Mandatory	

1.6 AccountService resource

Figure 2 shows a mockup of the AccountService resource. The properties in bold have requirements, which are specified in Table 3.

```
{
```

```

"@odata.context": "/redfish/v1/$metadata#AccountService.AccountService",
"@odata.id": "/redfish/v1/AccountService",
"@odata.type": "#AccountService.v1_0_0.AccountService",
"Id": "AccountService",
"Name": "Account Service",
>Description": "Account Service",
>Status": {
  "State": "Enabled",
  "Health": "OK"
},
"ServiceEnabled": true,
"AuthFailureLoggingThreshold": 3,
"MinPasswordLength": 8,
"AccountLockoutThreshold": 5,
"AccountLockoutDuration": 30,
"AccountLockoutCounterResetAfter": 30,
"Accounts": {
  "@odata.id": "/redfish/v1/AccountService/Accounts"
},
"Roles": {
  "@odata.id": "/redfish/v1/AccountService/Roles"
}
}

```

Figure 2 – Mockup of AccountService resource

Table 2 - Requirement for AccountService resource properties

Property	Requirement	Value
Accounts	Mandatory	

1.7 Chassis collection resource

Figure 3 shows a mockup of the Chassis collection resource. The properties in bold have requirements, which are specified in Table 3.

```

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

```

Figure 3 – Mockup of Chassis collection resource

Table 3 - Requirement for Chassis collection resource properties

Property	Requirement	Value
Members@odata.count	Mandatory	≥1
Members	Mandatory	≥ <one item>

1.8 Chassis resource

Figure 4 shows a mockup of the Chassis resource. The properties in bold have requirements, which are specified in Table 4.

```

{
  "@odata.context": "/redfish/v1/$metadata#Chassis.Chassis",
  "@odata.id": "/redfish/v1/Chassis/1",

```

```

"@odata.type": "#Chassis.v1_5_0.Chassis",
"Id": "1",
"Name": "Computer System Chassis",
"ChassisType": "RackMount",
"Manufacturer": "ManufacturerName",
"Model": "ProductModelName",
"SKU": "",
"SerialNumber": "2M220100SL",
"PartNumber": "",
"AssetTag": "CustomerWritableThingy",
"IndicatorLED": "Lit",
"PowerState": "On",
"Status": {
  "State": "Enabled",
  "Health": "OK"
},
"HeightMm": 44.45,
"WidthMm": 431.8,
"DepthMm": 711,
"WeightKg": 15.31,
"Thermal": {
  "@odata.id": "/redfish/v1/Chassis/1/Thermal"
},
"Power": {
  "@odata.id": "/redfish/v1/Chassis/1/Power"
},
"NetworkAdapters": {
  "@odata.id": "/redfish/v1/Chassis/1/NetworkAdapters"
},
"Assembly": {
  "@odata.id": "/redfish/v1/Chassis/1/Assembly"
},
"Links": {
  "ManagedBy": [ { ... } ],
  "ComputerSystems": [ { ... } ],
  "ContainedBy": { ... },
  "ManagersInChassis": [ { ... } ],
  "PCIeDevices": [ { ... } ]
}
}

```

Figure 4 – Mockup of Chassis resource

Table 4 - Requirement for Chassis resource properties

Property	Requirement	Value
AssetTag	Recommended, Read/write	
ChassisType	Mandatory	
IndicatorLED	Recommended, Read/write	
Manufacturer	Mandatory	
Model	Mandatory	
SerialNumber	Mandatory	
SKU	Recommended, Read only	
PartNumber	Recommended, Read only	
PowerState	Mandatory	
Status	Mandatory	
Status/State	Mandatory	
Status/Health	Mandatory	
Thermal	Recommended, Read only	
Power	Recommended, Read only	
Links	Mandatory	



Links/ManagedBy	Mandatory	
-----------------	-----------	--

1.9 Chassis/{id}/Power resource

Figure 5 shows a mockup of the Power resource. The properties in bold have requirements, which are specified in Table 5.

```
{
  "@odata.context": "/redfish/v1/$metadata#Power.Power",
  "@odata.id": "/redfish/v1/Chassis/1/Power",
  "@odata.type": "#Power.v1_5_0.Power",
  "Id": "Power",
  "Name": "Power",
  "PowerControl": [
    {
      "@odata.id": "/redfish/v1/Chassis/1/Power#/PowerControl/0",
      "MemberId": "0",
      "Name": "System Power Control",
      "PhysicalContext": "Chassis",
      "PowerConsumedWatts": 8000,
      "PowerRequestedWatts": 8500,
      "PowerAvailableWatts": 8500,
      "PowerCapacityWatts": 10000,
      "PowerAllocatedWatts": 8500,
      "PowerMetrics": {
        "IntervalInMin": 30,
        "MinConsumedWatts": 7500,
        "MaxConsumedWatts": 8200,
        "AverageConsumedWatts": 8000
      },
      "PowerLimit": {
        "LimitInWatts": 9000,
        "LimitException": "LogEventOnly",
        "CorrectionInMs": 42
      },
      "RelatedItem": [ { ... } ],
      "Status": {
        "State": "Enabled",
        "Health": "OK"
      },
      "Oem": {}
    }
  ],
  "Voltages": [ { .. } ],
  "PowerSupplies": [ { ... } ],
  "Redundancy": [ { ... } ]
}
```

Figure 5 – Mockup of Power resource

Table 5 - Requirement for Power resource properties

Property	Requirement	Value
PowerControl	Mandatory	
PowerControl/PowerConsumedWatts	Recommended, Read only	
PowerControl/PowerCapacityWatts	Recommended, Read only	
PowerControl/PowerLimit	Recommended, Read only	
PowerControl/PowerLimits/LimitInWatts	Mandatory	
PowerControl/PowerLimits/LimitException	Mandatory	

1.10 Chassis/{id}/Thermal resource

Figure 6 shows a mockup of the Thermal resource. The properties in bold have requirements, which are specified in Table 6.

The Thermal resource version shall be "1.1.0".

```
{
  "@odata.context": "/redfish/v1/$metadata#Thermal.Thermal",
  "@odata.id": "/redfish/v1/Chassis/1/Thermal",
  "@odata.type": "#Thermal.v1_1_0.Thermal",
  "Id": "Thermal",
  "Name": "Thermal",

  "Temperatures": [
    {
      "@odata.id": "/redfish/v1/Chassis/1/Thermal#/Temperatures/0",
      "MemberId": "0",
      "Name": "CPU1 Temp",
      "SensorNumber": 42,
      "Status": {
        "State": "Enabled",
        "Health": "OK"
      },
      "ReadingCelsius": 21,
      "UpperThresholdNonCritical": 42,
      "UpperThresholdCritical": 42,
      "UpperThresholdFatal": 42,
      "LowerThresholdNonCritical": 42,
      "LowerThresholdCritical": 5,
      "LowerThresholdFatal": 42,
      "MinReadingRangeTemp": 0,
      "MaxReadingRangeTemp": 200,
      "PhysicalContext": "CPU",
      "RelatedItem": [
        { "@odata.id": "/redfish/v1/Systems/1/Processors/1" }
      ]
    }
  ],
  "Fans": [
    {
      "@odata.id": "/redfish/v1/Chassis/1/Thermal#/Fans/0",
      "MemberId": "0",
      "Name": "BaseBoard System Fan",
      "PhysicalContext": "Backplane",
      "Status": {
        "State": "Enabled",
        "Health": "OK"
      },
      "Reading": 2100,
      "ReadingUnits": "RPM",
      "IndicatorLED": "Off",
      "HotPluggable": true,
      "Model": "694843-Z91",
      "Manufacturer": "Contoso FanCo",
      "SerialNumber": "2016334576",
      "PartNumber": "1z0000001A3a",
      "SparePartNumber": "0000001A3a",
      "UpperThresholdNonCritical": 42,
      "UpperThresholdCritical": 4200,
      "UpperThresholdFatal": 42,
      "LowerThresholdNonCritical": 42,
      "LowerThresholdCritical": 5,
      "LowerThresholdFatal": 42,
      "MinReadingRange": 0,
      "MaxReadingRange": 5000,
      "Redundancy": [
        { "@odata.id": "/redfish/v1/Chassis/1/Thermal#/Redundancy/0" }
      ],
      "RelatedItem": [
        { "@odata.id": "/redfish/v1/Systems/1" },
        { "@odata.id": "/redfish/v1/Chassis/1" }
      ]
    }
  ]
}
```

```

    }
  ],
  "Redundancy": [
    {
      "@odata.id": "/redfish/v1/Chassis/1/Thermal#/Redundancy/0",
      "MemberId": "0",
      "Name": "BaseBoard System Fans",
      "RedundancyEnabled": false,
      "RedundancySet": [ { ... } ],
      "Mode": "N+m",
      "Status": { ... },
      "MinNumNeeded": 1,
      "MaxNumSupported": 2
    }
  ]
}

```

Figure 6 – Mockup of Thermal resource

Table 6 - Requirement for Thermal resource properties

Property	Requirement	Value
Fans	If Implemented	
Fans/{id}/Status	Mandatory	
Fans/{id}/Name	Recommended, Read only	
Fans/{id}/Reading	Recommended, Read only	
Fans/{id}/ReadingUnit	Recommended, Read only	
Temperatures	If Implemented	
Temperatures/{#}/ReadingCelsius	Mandatory	
Temperatures/{#}/UpperThresholdFatal	Recommended, Read only	
Temperatures/{#}/UpperThresholdCritical	Recommended, Read only	
Temperatures/{#}/UpperThresholdNonCritical	Recommended, Read only	
Redundancy	If Implemented	
Redundancy/{id}/MemberID	Mandatory	
Redundancy/{id}/RedundancySet	Mandatory	
Redundancy/{id}/Node	Mandatory	
Redundancy/{id}/Status	Mandatory	
Redundancy/{id}/MinNumNeeded	Mandatory	
Redundancy/{id}/MaxNumSupported	Recommended, Read only	

1.11 Managers collection resource

Figure 3 shows a mockup of the Managers collection resource. The properties in bold have requirements, which are specified in Table 3.

```

{
  "@odata.context": "/redfish/v1/$metadata#ManagerCollection.ManagerCollection",
  "@odata.id": "/redfish/v1/Managers",
  "@odata.type": "#ManagerCollection.ManagerCollection",
  "Name": "Manager Collection",
  "Members@odata.count": 1,
  "Members": [ { ... } ]
}

```

Figure 7 – Mockup of Managers collection resource

Table 7 - Requirement for Managers collection resource properties

Property	Requirement	Value
Members@odata.count	Mandatory	≥1
Members	Mandatory	≥ <one item>

1.12 Managers/{id} resource

Figure 8 shows a mockup of the Manager resource. The properties in bold have requirements, which are specified in Table 8.

```
{
  "@odata.context": "/redfish/v1/$metadata#Manager.Manager",
  "@odata.id": "/redfish/v1/Managers/1",
  "@odata.type": "#Manager.v1_1_0.Manager",
  "Id": "1",
  "Name": "Manager",
  "ManagerType": "BMC",
  "Description": "BMC",
  "ServiceEntryPointUUID": "92384634-2938-2342-8820-489239905423",
  "UUID": "00000000-0000-0000-0000-000000000000",
  "Model": "Joo Janta 200",
  "DateTime": "2015-03-13T04:14:33+06:00",
  "DateTimeLocalOffset": "+06:00",
  "Status": {
    "State": "Enabled",
    "Health": "OK"
  },
  "GraphicalConsole": { ... },
  "SerialConsole": { ... },
  "CommandShell": { ... },
  "FirmwareVersion": "1.00",
  "NetworkProtocol": { ... },
  "EthernetInterfaces": { ... },
  "SerialInterfaces": { ... },
  "LogServices": { ... },
  "VirtualMedia": { ... },
  "Links": {
    "ManagerForServers": [ { ... } ],
    "ManagerForChassis": [ ( ... ) ],
    "ManagerInChassis": { ... }
  },
  "Actions": {
    "#Manager.Reset": {
      "target": "/redfish/v1/Managers/1/Actions/Manager.Reset",
      "ResetType@Redfish.AllowableValues": [
        "ForceRestart",
        "GracefulRestart"
      ]
    }
  }
}
```

Figure 8 – Mockup of Manager resource

Table 8 - Requirement for Manager resource properties

Property	Requirement	Value
ManagerType	Mandatory	
UUID	Mandatory	
Status	Mandatory	
FirmwareVersion	Mandatory	

NetworkProtocol	Mandatory	
EthernetInterfaces	Mandatory	
LogService	Mandatory	
Links	Mandatory	
Links/ManagedForService	If implemented, Read only	
Links/ManagerForChassis	If implemented, Read only	
Action	Mandatory	
Action/#Manager.Reset	Mandatory	
Action/#Manager.Reset/ResetType@AllowableValues	Mandatory	ForceRestart

1.13 Managers/{id}/EthernetInterfaces/{id} resource

Figure 9 shows a mockup of the EthernetInterface resource when it is a subordinate resource of Manager. The properties in bold have requirements, which are specified in Table 9.

```
{
  "@odata.context": "/redfish/v1/$metadata#EthernetInterface.EthernetInterface",
  "@odata.id": "/redfish/v1/Managers/1/EthernetInterfaces/1",
  "@odata.type": "#EthernetInterface.v1_4_0.EthernetInterface",
  "Id": "1",
  "Name": "Manager Ethernet Interface",
  "Description": "Management Network Interface",
  "Status": {
    "State": "Enabled",
    "Health": "OK"
  },
  "InterfaceEnabled": true,
  "PermanentMACAddress": "1E:C3:DE:6F:1E:24",
  "MACAddress": "1E:C3:DE:6F:1E:24",
  "SpeedMbps": 100,
  "AutoNeg": true,
  "FullDuplex": true,
  "MTUSize": 1500,
  "HostName": "MyHostName",
  "FQDN": "MyHostName.MyDomainName.com",
  "MaxIPv6StaticAddresses": 1,
  "VLAN": {
    "VLANEnable": true,
    "VLANId": 101
  },
  "DHCPv4": { ... },
  "IPv4Addresses": [ { ... } ],
  "IPv4StaticAddresses": [ { ... } ],

  "DHCPv6": { ... },
  "IPv6Addresses": [ { ... } ],
  "IPv6StaticAddresses": [ { ... } ],
  "IPv6AddressPolicyTable": [ { ... } ],
  "IPv6StaticDefaultGateways": [ { ... } ],
  "IPv6DefaultGateway": "fe80::214:c1ff:fe4c:5c4d",
  "StatelessAddressAutoConfig": {
    "IPv4AutoConfigEnabled": false,
    "IPv6AutoConfigEnabled": true
  },
  "NameServers": [ ... ],
  "StaticNameServers": [ ... ],

  "@Redfish.Settings": {
    "@odata.type": "#Settings.v1_0_0.Settings",
    "SettingsObject": {
      "@odata.id": "/redfish/v1/Managers/1/EthernetInterfaces/1/SD"
    },
    "Time": "2012-03-07T14:44.30-05:00",
    "ETag": "someetag",
  }
}
```

```

    "Messages": [
      {
        "MessageId": "Base.1.0.SettingsFailed",
        "RelatedProperties": [
          "#/IPv6Addresses/PrefixLength"
        ]
      }
    ]
  }
}

```

Figure 9 – Mockup of EthernetInterface resource

Table 9 - Requirement for EthernetInterface resource properties

Property	Requirement	Value
InterfaceEnabled	Mandatory	
MACAddress	Mandatory	
SpeedMbps	Mandatory	
HostName	Mandatory, Read/write	
FQDN	Mandatory, Read/write	
DHCPv4	Recommended, Read only	
IPv4Addresses	Mandatory, Read/write	
IPv4Addresses/Address	Mandatory	
IPv4Addresses/SubnetMask	Mandatory	
IPv4Addresses/AddressOrigin	Mandatory	
IPv4Addresses/Gateway	Mandatory	
IPv4StaticAddresses	Recommended, Read only	
DHCPv6	Recommended, Read only	
IPv6Addresses	If implemented, Read only	
IPv6Addresses/Address	Mandatory	
IPv6Addresses/PrefixLength	Mandatory	
IPv6Addresses/AddressOrigin	Mandatory	
IPv6Addresses/AddressState	Mandatory	
IPv6StaticAddresses	Recommended, Read only	
IPv6AddressPolicyTable	Recommended, Read only	
IPv6StaticDefaultGateways	Recommended, Read only	
StaticNameServers	Recommended, Read only	

1.14 Managers/{id}/ManagerNetworkProtocol

Figure 10 shows a mockup of the ManagerNetworkProtocol resource. The properties in bold have requirements, which are specified in Table 10.

```

{
  "@odata.context":
"/redfish/v1/$metadata#ManagerNetworkProtocol.ManagerNetworkProtocol",
  "@odata.id": "/redfish/v1/Managers/1/NetworkProtocol",
  "@odata.type": "#ManagerNetworkProtocol.v1_2_0.ManagerNetworkProtocol",
  "Id": "NetworkProtocol",
  "Name": "Manager Network Protocol",
  "Description": "Manager Network Service Status",

```

```

"Status": { ... },
"HostName": "mymanager",
"FQDN": "mymanager.mydomain.com",
"HTTP": { ... },
"HTTPS": { ... },
"SSH": { ... },
"SSDP": { ... },
"IPMI": {
  "ProtocolEnabled": true,
  "Port": 623
},
"SNMP": {
  "ProtocolEnabled": true,
  "Port": 161
},
"VirtualMedia": {
  "ProtocolEnabled": true,
  "Port": 17988
},
"Telnet": {
  "ProtocolEnabled": true,
  "Port": 23
},
"KVMIP": {
  "ProtocolEnabled": true,
  "Port": 5288
},
"NTP": {
  "ProtocolEnabled": true,
  "NTPServers": [
    "0.pool.ntp.org",
    "1.pool.ntp.org",
    "time-a.nist.gov"
  ]
}
}
}

```

Figure 10 – Mockup of ManagerNetworkProtocol resource

Table 10 - Requirement for ManagerNetworkProtocol resource properties

Property	Requirement	Value
HostName	Mandatory	
FQDN	Mandatory	
Status	Mandatory	
HTTP	Mandatory	
ProtocolEnabled	Mandatory	
Port	Mandatory	
HTTPS	Mandatory	
ProtocolEnabled	Mandatory	
Port	Mandatory	
SSH	Recommended, Read only	
ProtocolEnabled	Mandatory	
Port	Mandatory	
SSDP	Recommended, Read only	
ProtocolEnabled	Mandatory	
Port	Mandatory	
NotifyMulticastIntervalSecond	Mandatory	
NotifyIPv6Scope	Mandatory	



NotifyTTL	Mandatory	
-----------	-----------	--

6. OCPHardwareManagementBaseline.v0.1.json

Redfish specifies that format of a 'profile' file which express the prescriptive requirements of Redfish resources. The profile file can be read by the Redfish Interoperability Tool, with will run a series of conformance tests against an implementation. This can be used to verify the conformance of the implementation to the profile.

Figure 11 shows the content of the file, OCPHardwareManagementBaseline.v0.1.json, which express the preceding requirements.

Figure 11 – OCPHardwareManagementBaseline.v0.1.json

To be added