



# Redfish Release History

DMTF Redfish Forum  
August 2018

## Releases

- 2018.2 – August 2018
- 2018.1 – April 2018
- 2017.3 – December 2017
- 2017.2 – September 2017
- 2017.1 – May 2017
- 2016.3 – December 2016
- 2016.2 – September 2016
- 2016.1 – May 2016
- 1.0 – August 2015



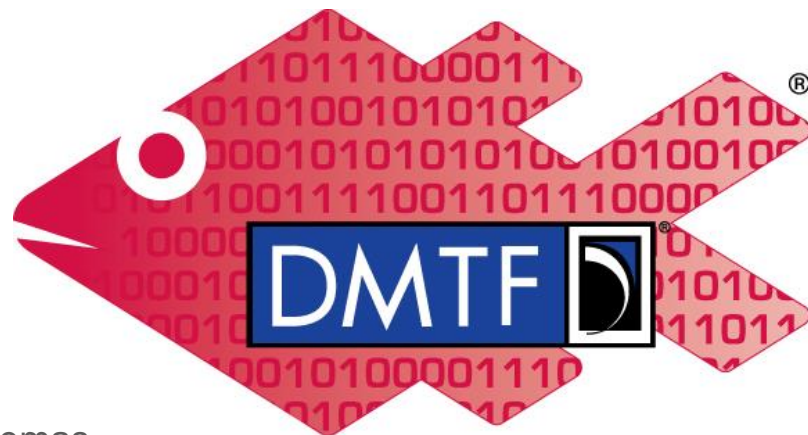
# Redfish 2018 Release 2

DMTF Redfish Forum  
August 2018



# Redfish 2018 Release 2

- Redfish Specification v1.6.0
  - **NEW** OpenAPI v3.0 Support
  - **NEW** Telemetry Streaming & Eventing
  - Improved Event Subscription methods
- Redfish Specification v1.5.1
  - Errata release with numerous clarifications
- Redfish Schema Bundle 2018.2
  - **DSP8010\_2018.2.ZIP** - contains all Redfish schemas
- Redfish Registries 2018.1
  - **NEW** 'Task', 'Resource' registries
  - Updated 'Base', 'Privilege' registries
- **13 NEW Schemas v1.0.0**
  - TelemetryService, MetricDefinition, MetricReportDefinition, MetricReport, Triggers
  - JobService, Job, PCIeSlots, (plus 5 Resource Collections)
- **29 Updated Schemas (highlights)**
  - Schedule v1.2.0 – Contribution from SNIA.org with minor additions
  - EventDestination v1.4.0, Event v1.3.0, MessageRegistry v1.2.0 – Improved subscriptions
  - Resource v1.7.0 – Added 'ContactInfo' array to commonly-used Location object



## Redfish

## Redfish for OpenAPI™ Specification v3.0

- OpenAPI Specification
  - A community-driven open specification from the OpenAPI Initiative (OAI), The Linux Foundation® Collaborative Project
  - Describes API services in a YAML-format definition document
  - Rich ecosystem of tools for developers and end users
- Supported by Redfish Specification v1.6.0
  - Added support for OpenAPI schema files (YAML)
  - Requires use of standardized URIs
    - Fixed URIs for all Redfish resources
    - Construct path to Collection member using “Id”
- Redfish Schema (DSP8010) bundle 2018.2
  - Now includes OpenAPI YAML files
  - Along with JSON Schema and CSDL files



**OPENAPI**  
INITIATIVE

## Redfish Specification v1.6.0

- Fixed or constructed URIs now specified
  - Required for OpenAPI v3.0 support
  - Previous Redfish versions allowed “hypermedia” URI structure, with each URI discovered via links in parent resources
  - Resource Collection members must use “Id” property as URI segment
  - All non-Collection resources must use URIs defined by schema
- Use *RedfishVersion* in *ServiceRoot* to check protocol version
  - Values of “1.6.0” or higher support OpenAPI and fixed URI definitions
  - For values below “1.6.0”, URI tree structure is not specified, clients continue to discover path from ServiceRoot
  - Examples:
    - “1.6.0”, “1.6.1”, “1.7.5”, “1.10.2” : supports OpenAPI
    - “1.5.1” : does not support OpenAPI – URI structure cannot be guaranteed

## Redfish Message and Event Enhancements

- More flexible subscription modes
  - Subscribe to specific Registries or Resource Types instead of loosely defined classes
  - Added *SubordinateResources* which can be used in conjunction with *ResourceOrigin*
- Grouping **NEW**
  - *EventGroupId* property indicates that multiple messages share a root cause
- Telemetry support **NEW**
  - *EventFormatType* allows event delivery in either *Event* or *MetricReport* format
- SSE filtering **NEW**
  - Added support of *\$filter* for SSE event subscriptions
- New Message Registries
  - Added *Task* and *Resource* Message Registries
  - Expect more in the future that are more device/service specific.
- New Registry properties
  - Added *ClearingLogic* allowing a message to indicate that it resolves a previous situation
- OEM Registries
  - Clarified rules allowing OEMs to extend messages in the standard registries



## Redfish Registries

- Released as **DSP8011\_2018.1.ZIP**
- ResourceEvent Message Registry **NEW**
  - Defines messages for Resource-related events
- TaskEvent Message Registry **NEW**
  - Defines messages to use for Task-related events
- Base Message Registry v1.4.0
  - Added *NoOperation* message
- Base Message Registry v1.3.1
  - Errata release. Clarified description and message text for *GeneralError*
- Redfish Privilege Registry v1.0.3
  - Errata release correcting plurality of *ConfigureComponents* and correcting the JSON structure throughout
- Base Message Registry v1.3.0
  - Added *PropertyValueOutOfRange* and *SessionTerminated* messages
  - Previously approved for release but not posted publicly



## **NEW** Redfish Schemas for 2018.2

- **TelemetryService** – Monitoring and reporting for Redfish
  - MetricDefinition – Defines a measurement point and its metadata
  - MetricReport – Output of the Telemetry Service
  - MetricReportDefinition – Defines the contents of a Report
  - Triggers – Methods for triggering output from the Telemetry Service
- **JobService** – Scheduled and complex tasks for Redfish
  - Job – Describes a single Job with scheduling and JSON payload
- **PCleSlots**
  - Physical PCIe slot information for each Chassis
- **Five Resource Collection schemas to support Telemetry and Jobs**

## Redfish Schema Minor Revisions (1 of 6)

- ActionInfo v1.1.0
  - Added *MinimumValue* and *MaximumValue* properties
- Assembly v1.2.0
  - Added *SerialNumber* and *PhysicalContext* to *AssemblyData*
- Chassis v1.8.0
  - Added *PCleSlots* resource link
- CollectionCapabilities v1.1.0
  - Added *ComputerSystemConstrainedComposition* enumeration
- CompositionService v1.1.0
  - Added *AllowOverprovisioning* and *AllowZoneAffinity* properties
- Drive v1.5.0
  - Added *HotspareReplacementMode* property

## Redfish Schema Minor Revisions (2 of 6)

- Endpoint v1.2.0
  - Deprecated *PciFunctionNumber* and *PciClassCode* in favor of *FunctionNumber* and *ClassCode* inside *Pcild*
- Event v1.3.0
  - Deprecated *EventType* in favor of new subscription properties
  - Added *EventGroupId* to *EventRecord*
- EventDestination v1.4.0
  - Added *RegistryPrefixes*, *ResourceTypes*, *SubordinateResources* and *EventFormatType* properties
- EventService v1.2.0
  - Added *RegistryPrefixes*, *ResourceTypes*, *SubordinateResourcesSupported* and *EventFormatType* properties
  - Added *SSEFilterPropertiesSupported* object

## Redfish Schema Minor Revisions (3 of 6)

- **HostInterface v1.2.0**
  - Added *AuthNoneRoleId* and *AuthNoneRole* properties
- **LogEntry v1.4.0**
  - Deprecated *EventType*, added *EventGroupId* properties
- **Manager v1.5.0**
  - Added *RemoteRedfishServiceUri* property
  - Added *RemoteAccountService* resource link
- **ManagerNetworkProtocol v1.3.0**
  - Added *DHCPv6*, *DRP* and *RFB* objects
- **Memory v1.6.0**
  - Added *OverwriteUnit* Action
  - Added *IntelOptane* to the *MemoryType* enumerations

## Redfish Schema Minor Revisions (4 of 6)

- **MessageRegistry v1.2.0**
  - Added *ClearingLogic* property
- **NetworkAdapter v1.2.0**
  - Added *PCIeInterface* object, *NPAR* property to control NIC partitioning
- **NetworkDeviceFunction v1.3.0**
  - Added *VLAN* and *VLANs* properties to *Ethernet* object
  - Added *FibreChannelId* to *FibreChannel* object.
  - Deprecated *PhysicalPortAssignment* at root in favor of property within *Links*
- **NetworkPort v1.2.0**
  - Added properties to support Fibre Channel devices
  - Deprecated *LinkSpeedMbps* in favor of *CapableLinkSpeedMbps*
- **PCIeDevice v1.3.0**
  - Added *PCIeInterface* object and definition for external referencing



## Redfish Schema Minor Revisions (5 of 6)

- Protocol (unversioned)
  - Added *I2C* protocol type
- Resource v1.7.0
  - Deprecated *Location* string within *PostalAddress* in favor of *AdditionalInfo*
  - Added *AdditionalInfo* in *Placement*
  - Added *Contacts* object array in *Location*
- ResourceBlock v1.2.0
  - Added *Expansion* to *ResourceBlockType* enumerations
  - Added *Unavailable* to *CompositionState* enumerations
- Schedule v1.2.0
  - Transitioned from SNIA to DMTF ownership
  - Added enumeration *Every* to *DayOfWeek* and *MonthOfYear*
  - Updated several properties to use *Duration* and *DateTimeOffset* types

## Redfish Schema Minor Revisions (6 of 6)

- ServiceRoot v1.4.0
  - Added *ExcerptQuery* and *OnlyMemberQuery* to *ProtocolFeaturesSupported*
  - Added *JobService* and *TelemetryService* resource links
- Storage v1.5.0
  - Added *CacheSummary* and *PCleInterface* objects to *StorageController*
- Task v1.3.0
  - Added *Payload* object and *HidePayload* property
- Thermal v1.5.0
  - Added *SensorNumber* to *Fan* object
- UpdateService v1.3.0
  - Deprecated *NSF* enumeration in *TransferProtocolType* in favor of *NFS*



## Errata Schema Revisions (1 of 2)

- All schemas
  - Numerous clarification in *Descriptions* and *LongDescriptions*
  - Corrected some cases in JSON Schema where the type *integer* should have been used instead of *number*
  - Added *@odata.id*, *@odata.type*, and *@odata.context* as required properties in JSON Schema.
  - Added *Description* and *LongDescription* terms to all schema elements where missing.
  - Added *Capabilities* and *Uris* annotations on all resources.
- Resource Collection schemas
  - Added missing *Required* annotation on *Members* properties
  - Added missing *Members @odata.nextLink* property
- Complete errata details shown in the Change Log within DSP8010

## Errata Schema Revisions (2 of 2)

- Assembly v1.x.x
  - Added guidance for reporting timestamps for *ProductionDate*
- AttributeRegistry v1.x.x
  - Relaxed regex patterns for *ValueName*, *MenuName*, and *MenuPath*
- EthernetInterface v1.0.7
  - Fixed type definition of *IPv6StaticDefaultGateways* to not require *PrefixLength*
- EventService v1.x.x
  - Added clarification to *OriginOfCondition* parameter for *SubmitTestEvent* to highlight that it's a string and not a reference object
- Resource v1.6.1
  - Fixed permissions of *Longitude*, *Latitude*, and *AltitudeMeters* properties
- SoftwareInventory v1.x.x
  - Added guidance for reporting timestamps for *ReleaseDate*

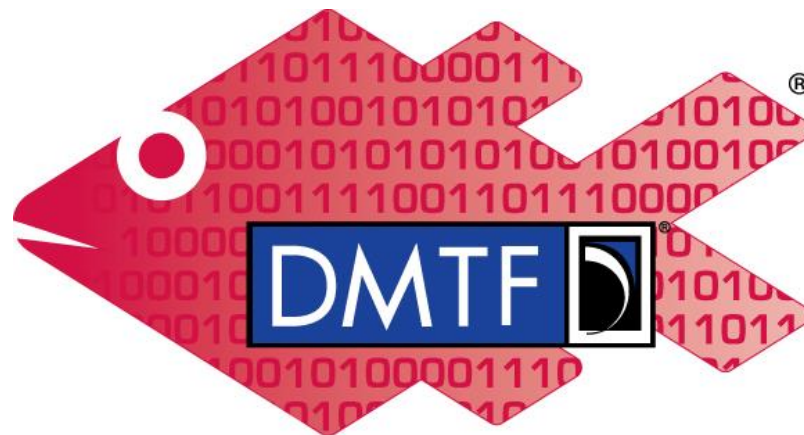


# Redfish 2018 Release 1

DMTF Redfish Forum  
April 2018

# Redfish 2018 Release 1

- Redfish Specification v1.5.0
  - **NEW** Server-sent Eventing (SSE) Support
  - OperationApplyTime annotation
    - Behavior of Create, Delete or Action (POST) operations
- Redfish Specification v1.4.1
  - Errata release with numerous clarifications
- Redfish Schema Bundle 2018.1
  - **DSP8010\_2018.1.ZIP** - contains current versions
- **NEW** Schemas v1.0.0
  - ExternalAccountProvider – LDAP / ActiveDirectory support
- Updated schemas (highlights)
  - AccountService – LDAP / ActiveDirectory support for Redfish
  - EventService & EventDestination – Server-sent Eventing support
  - Processor – Added “SubProcessor” information for Cores and Threads
  - Settings – Added “OperationApplyTime” and “MaintenanceWindow” support



## Redfish

## Redfish Specification v1.5.0 and v1.4.1

- Minor release of the Redfish Specification (DSP0266) v1.5.0
  - Adds support for Server Sent-Eventing (SSE)
    - Enables streaming events to web-based GUIs and other clients
  - OperationApplyTime annotation
    - Provides mechanism for specifying deterministic behavior for the application of Create, Delete or Action (POST) operations
  - Includes all errata from v1.4.1
- Errata release of the Specification (DSP0266) v1.4.1
  - Numerous clarifications and corrections, detailed in the Change Log

## New Redfish Schemas for 2018.1

- ExternalAccountProvider v1.0.0
  - Single LDAP or ActiveDirectory instances are supported within updated AccountService resource
  - A Collection of “ExternalAccountProviders” describes additional providers, or allows for multiple LDAP/AD trees if Service supports their usage
    - Uses same properties and definitions as the single-instance LDAP and ActiveDirectory objects within AccountService

## Redfish Schema Minor Revisions (1 of 3)

- AccountService v1.3.0
  - Added support for LDAP and Active Directory external account providers.
    - Provide configuration parameters to enable Redfish Services to utilize network-based authentication instead of requiring individual (local) accounts
    - Removes need to maintain separate credentials for each Redfish Service
  - Added link to additional *ExternalAccountProviders*
- Assembly v1.1.0
  - Added *Status* to *AssemblyData*
- AttributeRegistry v1.2.0
  - Added *ResetRequired*, *UefiDevicePath*, *UefiKeywordName*, and *UefiNamespaceld* attributes to registry entries.
- Chassis v1.7.0
  - Added *UUID* property
  - Added *Switches* resource link



## Redfish Schema Minor Revisions (2 of 3)

- Drive v1.4.0
  - Deprecated *Location* array in favor of singular *PhysicalLocation*
- EventDestination v1.3.0
  - Added *SubscriptionType* to allow for Server-Sent Eventing support
- EventService v1.1.0
  - Added *ServerSentEventUri* to support Server-Sent Eventing (SSE)
- Manager v1.4.0
  - Added *AutoDSTEnabled* property
  - Added *Switches* resource link
- Memory v1.5.0
  - Deprecated poorly-named *PassphraseState* in *Regions* object and added *PassphraseEnabled* to replace it.

## Redfish Schema Minor Revisions (3 of 3)

- **PCleFunction v1.2.0**
  - Added *NetworkDeviceFunction* resource link
- **Processor v1.4.0**
  - Added *SubProcessors* collection to provide details on 'cores' and 'threads'
  - Added 'Core' and 'Thread' to *ProcessorType*
- **ResourceBlock v1.1.0**
  - Added properties to support sharing capabilities
- **Settings v1.2.0**
  - Added *OperationApplyTimeSupport* and *MaintenanceWindow* objects to provide deterministic behavior for the application of Settings-based data
- **SoftwareInventory v1.2.0**
  - Added *Manufacturer* and *ReleaseDate* properties
- **Task v1.2.0**
  - Added *TaskMonitor* property

## Errata Schema Revisions

- Description clarifications in numerous schemas
- AttributeRegistry v1.x.x
  - Corrected *regex patterns for various properties*
- EventService v1.0.7
  - Fixed permissions on *DeliveryRetryAttempts* and *DeliveryRetryIntervalSeconds* properties.
- ManagerAccount v1.x.x
  - Clarified the *RoleId* property description by stating its relation to *RoleId* in the Role resource.
- UpdateService v1.x.x
  - Regenerated JSON schema to pick up action parameters added in previous release
- Complete errata details shown in the Change Log within DSP8010

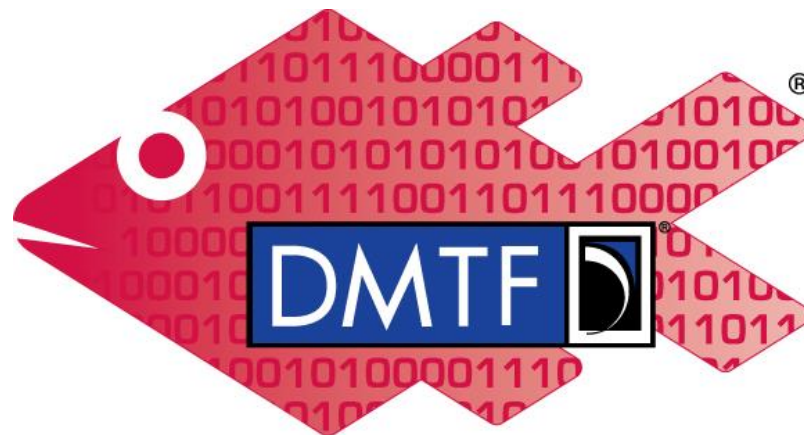


# Redfish 2017 Release 3

DMTF Scalable Platforms Management Forum  
December 2017

# Redfish 2017 Release 3

- Redfish Specification v1.4.0
  - **NEW** query parameters: \$expand, \$filter, \$select
  - Clarified usage of HTTP response codes
  - Clarified HTTP header usage and requirements
  - Numerous other clarifications
- **NEW** Redfish Interoperability Profiles
  - New specification DSP0272 v1.0.0
  - New profile bundle DSP8013 v2017.1
  - Allows creation of property-level support checklist
- Redfish Schema Bundle 2017.3
  - **DSP8010\_2017.3.ZIP** - contains current versions of all Redfish schema
- **NEW** Schemas v1.0.0
  - Assembly (manufacturing details), Boot Option (configure boot order)
- Updated schemas
  - Added multiple objects to EthernetInterface allowing complete DHCP configuration
  - Added properties to Power and Thermal to address feedback from ASHRAE and TGG
  - Numerous minor additions, errata and description clarifications throughout the schema



## Redfish

## Redfish Specification v1.4.0

- Minor release of the Specification (DSP0266)
  - Numerous clarifications and corrections, detailed in the Change Log
- Adds support for query parameters on GET requests
  - \$expand – Includes data from subordinate resources (especially collections) to allow highly-efficient data retrieval
  - \$select – Include only specified properties
  - \$filter – Include only members of a collection that match an expression
- Clarifications to HTTP header requirements and Status Code usage
  - Clarified HTTP status and payload responses after successful processing of data modification (POST, PATCH or PUT) requests
  - Added HTTP status code entries for 428 and 507 to clarify the proper response to certain error conditions
  - Detailed client's and service's HTTP header requirements and usage



## Redfish Interoperability Profile Specification v1.0.0

- An “Interoperability Profile” provides a common ground for Service implementers, client software developers, and users
  - A profile applies to a particular category or class of product (e.g. “Front-end web server”, “NAS”, “Enterprise-class database server”)
  - It specifies Redfish implementation requirements, but **is not** intended to mandate underlying hardware/software features of a product
  - Provides a target for implementers to meet customer requirements and a baseline of schema and property-level support for software developers utilizing Redfish
  - Enable customers to easily specify Redfish functionality / conformance in RFQs
- Specification (DSP0272) defines a machine-readable Profile definition
  - JSON document designed to be human-readable and easy to create
- Profiles will be created by DMTF, partner organizations, and others
  - DMTF will provide re-publication via the Redfish Developer Hub
  - Published profiles will be included in a bundle for download (DSP8013)
- DMTF open source utility available to test conformance to a Profile
  - <https://github.com/DMTF/Redfish-Interop-Validator>



## New Redfish Schemas

- **BootOption v1.0.0**
  - Describes a single, bootable target device for a Computer System
  - The BootOption Collection allows for configuration of boot order
  - Does not replace the temporary *BootSourceOverride* function
    - Boot Option describes the permanent boot order
    - Override is used for temporary (usually one-time) changes to the boot order
- **Assembly v1.0.0**
  - Describes manufacturing data useful for service personnel
  - Data usually stored in EEPROMs and heavily binary-encoded
  - Does not replace product identification properties (part #, serial #, etc.)
  - Single resource allows for multiple assembly descriptions
  - Adds mechanism to extract a binary image for service/support analysis
- **Protocol**
  - Supporting schema file to contain the common *Protocol* property

## Redfish Schema Minor Revisions (1 of 6)

- Chassis v1.6.0
  - Added *Assembly* resource link
  - Added *StorageEnclosure* enumeration to *ChassisType*
- ComputerSystem v1.5.0
  - Added *BootOrder* and *Assembly* resource links
  - New *SetDefaultBootOrder* Action
  - Added links to *ConsumingComputerSystems* and *SupplyingComputerSystems* for describing aggregated systems
  - Added *SubModel* to describe product model variations
  - Added *LogicalProcessorCount* to *ProcessorSummary*
- Drive v1.3.0
  - Added *Assembly* resource link
- Endpoint v1.1.0
  - Added *IPTransportDetails* object

## Redfish Schema Minor Revisions (2 of 6)

- EthernetInterface v1.4.0
  - New objects to allow for full configuration of DHCP and SLAAC support
    - Configuration objects to support both *DHCPv4* and *DHCPv6* added
    - Separate *StatelessAddressAutoConfig* object added
  - New objects create a consistent configuration pattern
    - Separate objects or properties for the desired configuration vs. actual “in use”
    - New *IPv4StaticAddresses* allows for Static IP address configuration regardless of DHCP configuration or usage
    - New *IPv6StaticDefaultGateways* and *StaticNameServers* arrays
- LogEntry v1.3.0
  - Added *OemLogEntryCode* and *OemSensorType* properties to allow for legacy IPMI OEM definitions
- LogService v1.1.0
  - Added *LogEntryType* to describe the content type of a log

## Redfish Schema Minor Revisions (3 of 6)

- **Memory v1.4.0**
  - Added *VolatileSizeMiB*, *NonVolatileSizeMiB*, *CacheSizeMiB*, *LogicalSizeMiB* properties to provide discrete memory size for each type
  - Added *Location* object
- **MemoryChunks v1.2.0**
  - Added *Status* object
- **NetworkAdapter v1.1.0**
  - Added *Assembly* resource link
  - Added *Location* object to *Controllers* object
- **NetworkDeviceFunction v1.2.0**
  - Added *Endpoints* resource link
- **PCIeDevice v1.2.0**
  - Added *Assembly* resource link

## Redfish Schema Minor Revisions (4 of 6)

- PhysicalContext v1.3.0
  - Added additional enumerations to *PhysicalContext*
- Port v1.1.0
  - Added *Location* object
- Power v1.5.0
  - Several additions to *PowerSupplies* object array
    - Based on feedback from **ASHRAE** and **The Green Grid** industry groups
    - *PowerInputWatts*, *PowerOutputWatts*, and *EfficiencyPercent* properties
    - *Assembly* resource link
    - *Location* object
- Processor v1.2.0
  - Added *Assembly* resource link
- Redundancy v1.3.0
  - Added *NotRedundant* enumeration to *Mode* (now a read-write property)

## Redfish Schema Minor Revisions (5 of 6)

- Resource v1.6.0
  - Added *Latitude*, *Longitude* and *AltitudeMeters* to *Location* object
- ServiceRoot v1.3.0
  - Added *Product* property for general product identification
  - Added *ProtocolFeaturesSupported* object to allow for discovery of supported optional Redfish protocol features
- Storage v1.4.0
  - Added *Assembly* resource link
- Switch v1.1.0
  - Added *Location* object

## Redfish Schema Minor Revisions (6 of 6)

- Thermal v1.4.0
  - Added *Assembly* resource link to *Fan* object
  - Several additions to *Temperatures* object array
    - Based on feedback from **ASHRAE** and **The Green Grid** industry groups
    - *DeltaReadingCelsius* and *DeltaPhysicalContext* for describing a temperature change rather than an absolute temperature reading
    - *MaxAllowableOperatingValue*, *MinAllowableOperatingValue*, *AdjustedMaxAllowableOperatingValue*, and *AdjustedMinAllowableOperatingValue* for reporting the range of allowable operating temperatures for a given piece of equipment
- VirtualMedia v1.2.0
  - New *InsertMedia* and *EjectMedia* Actions to control virtual media usage
  - *Image*, *Inserted* and *WriteProtected* are now read-write properties
- Zone v1.2.0
  - Added *Identifiers* property



## Errata Schema Revisions

- Added or corrected parameter descriptions in Action definitions throughout the schema
- Action Parameters are now described in JSON schema
- Changed internal schema location several properties to allow those commonly-defined properties to be referenced externally
- IPAddresses v1.0.6
  - Corrected *PrefixLength* in *IPv6StaticAddresses* to be a read-write property
- Memory v1.x.x
  - Corrected description of *OperatingSpeedMHz* to reflect changes in memory device reporting (value may be in MHz or MT/s, but will match published specifications in either case)
- Complete errata details shown in the Change Log within DSP8010



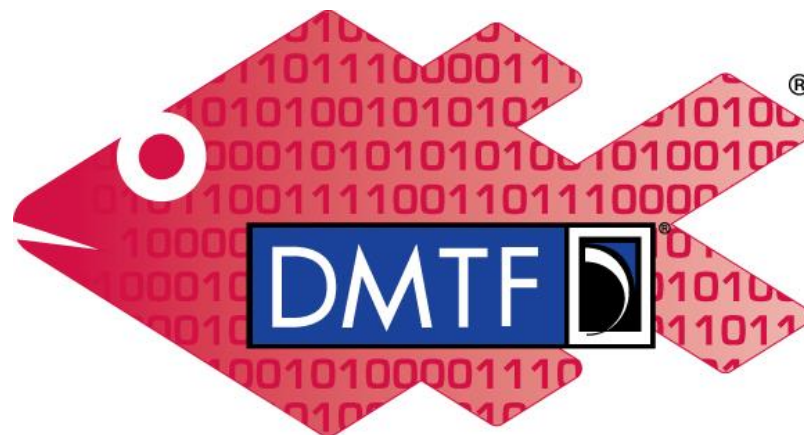
# Redfish 2017 Release 2

DMTF Scalable Platforms Management Forum  
September 2017



## Redfish 2017 Release 2

- Redfish Specification v1.3.0
  - Adds “Apply Time” concept to Settings objects
  - Improves ETag support to avoid race conditions
  - Numerous clarifications
  - Also releasing v1.2.1 errata release
- Redfish Schema Bundle 2017.2
  - **DSP8010\_2017.2.ZIP**
  - Contains current versions of all Redfish schema
- Schema minor updates
  - Expanded “Location” object definition to include physical locations at the building, room and intra-chassis levels.
  - Added "SupportedApplyTimes" to allow control over the application of Settings to a resource. This includes support for specifying maintenance windows.
  - Numerous errata and description clarifications throughout the schema
- Base Message Registry v1.2.0
  - Added new 'ResourceNotFound', 'ResourceExhaustion', 'StringValueTooLong' and 'EmptyJSON' messages.



# Redfish

## Redfish Specification v1.3.0

- Minor release of the Specification (DSP0266)
  - Service may optionally reject a PATCH or PUT operation if the If-Match or If-Match-None HTTP header is required
    - Allows Service to avoid race conditions from multiple clients performing PATCH or PUT operations, or clients using stale data from previous GETs
    - Returns HTTP 428 response code
  - Added support for a Service to describe the “Apply Time” for Settings
    - “SupportedApplyTimes” array in the “@Redfish.Settings” annotation
      - Reports available options for applying settings to that resource
      - Maintenance Window parameters available to schedule Settings
    - Clients use “@Redfish.PreferredApplyTime” annotation in request body
      - “ApplyTime” parameter describes options to apply settings
        - “Immediate”, “OnReset”, and several Maintenance Window options
    - Numerous clarifications and corrections, detailed in the Change Log
- Errata release v1.2.1 includes same clarifications and corrections

## Redfish Schema Minor Revisions (1 of 2)

- **Memory v1.3.0**
  - Added memory module-centric identification properties:
    - "ModuleManufacturerID", "ModuleProductID",  
"MemorySubsystemControllerManufacturerID", "MemorySubsystemControllerProductID"
  - Deprecated "FunctionClasses"
    - Duplicative, unstructured string data
  - Deprecated the PCIe-centric identification properties:
    - "VendorID", "DeviceID", "SubsystemVendorID", and "SubsystemDeviceID"
- **PhysicalContext v1.2.0**
  - Added "Chassis" and "Fan" as enumerations
- **Power v1.4.0**
  - Added "PhysicalContext" to "PowerControl" object



## Redfish Schema Minor Revisions (2 of 2)

- **Resource v1.5.0**
  - Expanded the “Location” object with new sub-objects to cover in-room and intra-chassis location identification
  - Deprecated “Info” and “InfoFormat” properties in favor of these sub-objects
- **Role v1.2.0**
  - Added "RoleId" property to enable references from ManagerAccount
- **Settings v1.1.0**
  - Added "SupportedApplyTimes" to allow control over the application of Settings to a resource. This includes support for specifying maintenance windows.
- **Storage v1.2.0**
  - Added common "Name" property to "StorageController" object

## Errata Schema Revisions

- Clarified usage of the “IndicatorLED” and “ServiceEnabled” enumerations throughout the data model
- Removed errant auto-expand annotations within “Redundancy”
- EventDestination v1.x.x
  - Added clarifications to "OriginResources" and "MessageId" usage
- EventService v1.x.x
  - Added clarifications to "DeliveryRetryAttempts" usage
- Manager v1.x.x
  - Corrected enumeration descriptions for "CommandShell"
- ManagerAccount v1.x.x
  - Added clarifications to "RoleId" usage.
- SerialInterface v1.x.x
  - Removed errant periods in enumeration strings



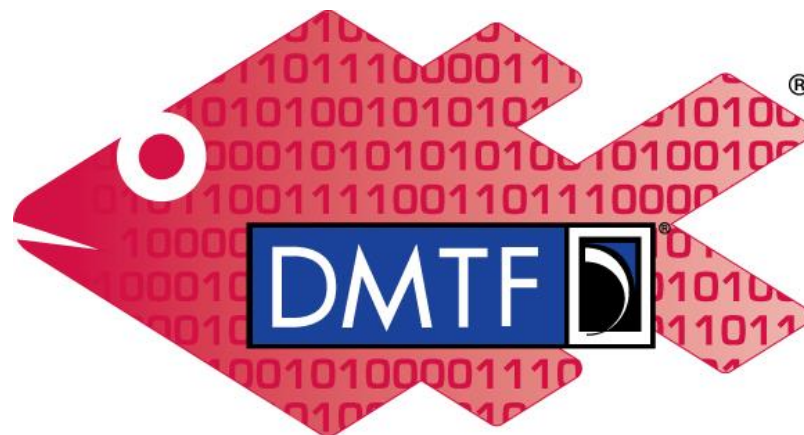


# Redfish 2017 Release 1

DMTF Scalable Platforms Management Forum  
May 2017

# Redfish 2017 Release 1

- Redfish Specification v1.2.0
  - Adds Composability support
- Redfish Schema Bundle 2017.1
  - **DSP8010\_2017.1.ZIP**
  - Contains current versions of all Redfish schema
- **NEW Schemas v1.0.0**
  - Composition Service
  - Resource Blocks for system composition
- Schema minor updates
  - Updates to provide support for system composition with new links between resources
  - Additions to UpdateService to support multiple targets for updates
  - Enhanced support for allocating memory regions
  - Numerous errata and description clarifications throughout the schema
- Base Message Registry Update v1.1.0
  - Added new “ResourceInStandby” message
- New mockups
  - Composability (perhaps two examples)



## Redfish

## Redfish Specification v1.2.0

- Minor release of the Specification (DSP0266)
  - Adds Composability to the standard
  - Numerous clarifications and corrections, detailed in the Change Log
- Composability support
  - Standardizes how services implement the Composition Service
  - Defines the types of composition requests a service is allowed to support
  - Defines the supporting resources required for each type of composition request
  - Defines baseline expectations a client can make when using the different composition requests



## New Redfish v1.0.0 Schemas

- **CollectionCapabilities**
  - Allows for a service to provide an inline annotation for what a client is allowed to provide in the POST request for a Resource Collection
  - The underlying object is of the same type as the members of the collection and contains annotations for each property in terms of what's allowed in the POST request
- **CompositionService**
  - Entry point for the composition service
  - Contains sets of Resource Blocks and Resource Zones to express what's available to a client to compose
- **ResourceBlock**
  - Container object to express the building blocks available for compositions
  - Contains the composition status of the block in addition to the inventory of components that are within the block

## Redfish Schema Minor Revisions (1 of 2)

- Most schemas were updated to add Actions and OemActions objects to allow for OEM extensions
- Chassis v1.5.0
  - Links entry for new ResourceBlock resources
- ComputerSystem v1.4.0
  - Links entry for new ResourceBlock resources
  - Added TotalSystemPersistentMemoryGiB to MemorySummary
- Drive v1.2.0, EthernetInterface v1.3.0
  - Links entry for Chassis resource
- Memory v1.2.0
  - Added properties for describing and allocating memory regions
- PhysicalContext v1.1.0
  - Added “Memory” as an enumeration value

## Redfish Schema Minor Revisions (2 of 2)

- Resource v1.4.0
  - Added “PowerCycle” as an enumeration value for ResetType
  - Modified descriptions of ResetType to remove system-centric text
- ServiceRoot v1.2.0
  - Added CompositionService link
- Storage v1.2.0
  - Added “FCP” and “FICON” as enumeration values for Protocol
- UpdateService v1.2.0
  - Added HttpPushUriTargets and HttpPushUriTargetsBusy properties
  - Added Targets optional parameter for SimpleUpdate action

## Errata Schema Revisions

- Corrected integer type properties in CSDL schemas to Int64 (from Int16 or Int32) for consistency in many schemas
- Added missing descriptions in Complex Type definitions in many schemas
- Corrected Links and Members properties (Collection schemas) in all schemas to be non-nullable in many schemas
- Removed unreferenced inclusions in many schema files
- Endpoint v1.0.2, PCIeFunction v1.0.2
  - Corrected validation pattern on PCI ID-related properties
- EventDestination v1.1.3, v1.0.4
  - Marked Context property as Required instead of RequiredOnCreate
    - Service is required to provide the Context (may be NULL), but clients are not required to specify a context when creating a new Event Destination



## New Mockups

- New mockups to support Composability
- Composability
  - Shows a service with various sets of disaggregated hardware as resources
  - Provides an example composed system utilizing some of the disaggregated hardware
  - Shows how Resource Zones can provide information about binding restrictions
- Bladed Partitions
  - Shows a service with a set of ComputerSystems as their own resource blocks
  - Contains example composed systems that are created from other ComputerSystems



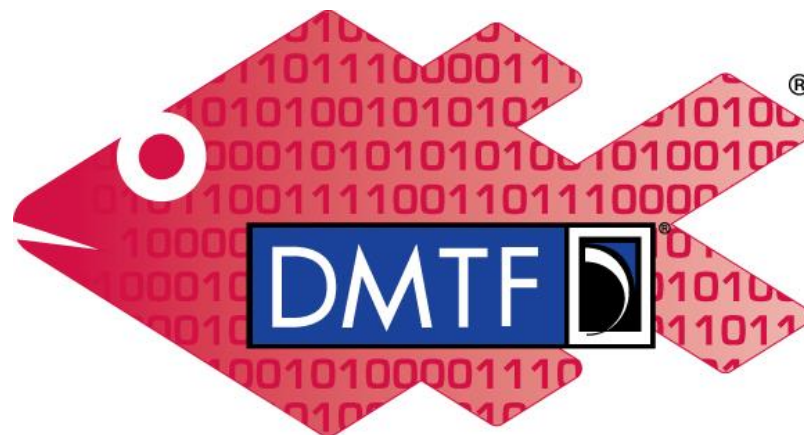
# Redfish 2016 Release 3

DMTF Scalable Platforms Management Forum  
December 2016



# Redfish 2016 Release 3

- Redfish Specification v1.0.5
  - Errata release with numerous clarifications
- Redfish Specification v1.1.0
  - Adds Privilege Mapping
  - Adds Host Interface
- **NEW** Redfish Host Interface Specification
  - Describes IP / NIC-based host (OS) interface
- **NEW** Schemas v1.0.0
  - HostInterface, NetworkAdapter, NetworkInterface, NetworkDeviceFunction, NetworkPort, (collections of all the above), PrivilegeRegistry
- Schema minor updates
  - AccountService, Chassis, ComputerSystem, EthernetInterface, Manager, ManagerNetworkProtocol, Memory, MemoryDomain, Resource, SoftwareInventory, Thermal, UpdateService.
  - Numerous errata and description clarifications throughout the schema
- New mockups
  - Storage related mockups: Local Storage and SAS Fabric



## Redfish

## Redfish Specification v1.0.5

- Errata release of the Specification (DSP0266)
  - No new features or functionality in this release (errata only)
  - Numerous clarifications and corrections, detailed in the Change Log
- Various terminology clarifications for “Resource Collection” and “Members” so that the specification is consistent in their usage
  - Helps differentiate the general OData Collection from the Redfish Resource Collection

## Redfish Specification v1.1.0

- Minor release of the Specification (DSP0266)
  - Adds Privilege Mapping to the standard
  - Adds the Host Interface to the standard
- Privilege Mapping
  - Defines a registry format for describing privileges for each type of entity, such as ComputerSystem
  - For each entity type, it maps the different roles for the different HTTP methods
  - Each entity type can also have override conditions for when to apply special sets of privileges, such as for a particular URI
- Host Interface
  - References new Host Interface specification for details

## Redfish Host Interface Specification v1.0.0

- New specification (DSP0270)
- Defines an interface between a Host and its Redfish Service
  - This is to allow for local management operations similar to how a Host could collect information via IPMI over KCS
- Currently defines a network based interface
  - Extensions can be added later for different protocols as needs arise in the industry
- SMBIOS Type 42 (Management Controller Host Interface) has been expanded to add a new Interface Type (Network Host Interface)
  - The expanded type definition provides a way for the Host to find the address and credentials for its Redfish Service

## New Redfish v1.0.0 Schemas

- **HostInterface**
  - Contains properties for describing and configuring a Redfish Host Interface
- **NetworkAdapter**
  - Describes general-purpose network adapters
- **NetworkInterface**
  - Provides linkages between NetworkAdapter, NetworkPort, and NetworkDeviceFunction instances
- **NetworkDeviceFunction**
  - Describes a logical interface exposed by a NetworkAdapter
- **NetworkPort**
  - Describes a discrete physical port capable of connecting to a network
- **PrivilegeRegistry**
  - Schema for definition of HTTP Operation to Privilege mapping



## Redfish Schema Minor Revisions (1 of 3)

- **Chassis v1.4.0**
  - Added “RackGroup” to ChassisType enumeration
  - Added links to NetworkAdapters and PCleDevices
  - Added HeightMm, WidthMm, DepthMm, and WeightKg properties
- **ComputerSystem v1.3.0**
  - Added link to NetworkDevices
  - Added FirmwareVersion2 and InterfaceTypeSelection to TrustedModules
- **EthernetInterface v1.2.0**
  - Added link to HostInterface to support Redfish Host Interface specification
- **Manager v1.3.0**
  - Added link to HostInterfaces resource collection
- **ManagerNetworkProtocol v1.1.0**
  - Added DHCP protocol object

## Redfish Schema Minor Revisions (2 of 3)

- Memory v1.1.0
  - Added Status object
- MemoryDomain v1.1.0
  - Added AllowsMirroring and AllowsSparing properties
- Resource v1.3.0
  - Added PostalAddress and Placement objects to Location, each containing numerous properties for detailed location information
- SoftwareInventory v1.1.0
  - Added SoftwareId, LowestSupportedVersion, UefiDevicePaths, and RelatedItem properties
- Thermal v1.2.0
  - Added Manufacturer, Model, SerialNumber, PartNumber, SparePartNumber, and IndicatorLED to Fan object

## Redfish Schema Minor Revisions (3 of 3)

- UpdateService v1.1.0
  - Added HttpPushUri property

## Errata Schema Revisions (1 of 2)

- Added explicit permissions annotations to all properties to clearly show which properties are read-write vs. read-only
- Corrected Permission annotation with invalid enumeration references
- Removed permissions annotation from embedded objects (permissions now on every property)
- Removed permission annotations from CSDL Type definitions to avoid conflicts with property definitions
- Corrected all property descriptions to always end with a period
- Corrected Reference URI links to OData v4 (errata 3)
- Added Capabilities annotations to CSDL files
- ComputerSystem v1.0.4, v1.1.2, v1.2.1
  - Corrected CSDL Type of TotalSystemMemoryGiB from Int64 to Decimal

## Errata Schema Revisions (2 of 2)

- Port v1.0.1
  - Corrected CSDL Type of CurrentSpeedGbps and MaxSpeedGbps from Int64 to Decimal
- Power v1.0.3, v1.1.1, v1.2.1
  - Corrected descriptions for voltage-related properties and changed sensor descriptions to avoid use of term “current”, instead referring to “present value”
- ServiceRoot v1.1.1
  - Added missing EntityContainer for ServiceContainer in CSDL schema



## New Mockups

- New mockups to show storage models
- Local Storage
  - Shows a typical 1U or 2U server with local RAID Storage
  - Uses the new “Storage” model rather than “SimpleStorage”
  - Shows a set of Drives and Volumes behind on a single Storage sub-system
- SAS Fabric
  - Represents a drive array without a ComputerSystem
  - Shows a managed SAS fabric with redundant switches
  - Shows how Switches, Ports, and Endpoints map together



# Redfish 2016 Release 2

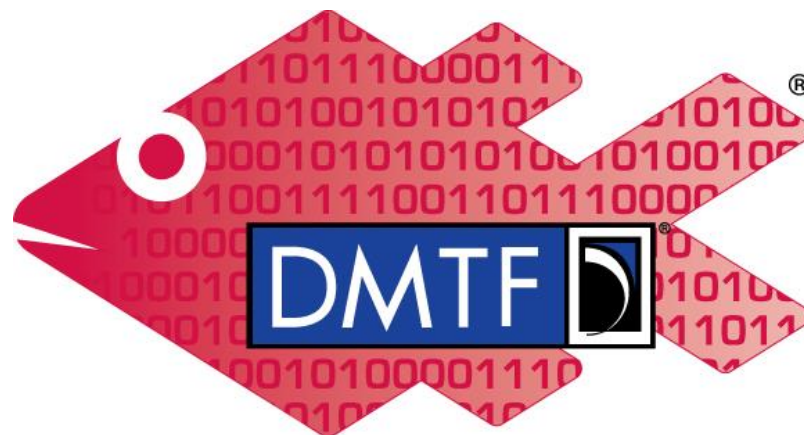
DMTF Scalable Platforms Management Forum  
September 2016





## Redfish 2016 Release 2

- Redfish Specification v1.0.3 and v1.0.4 (errata)
- **NEW** Schemas v1.0.0
  - ActionInfo, Endpoint, Fabric, MemoryChunks, MemoryDomain, PCIeDevice, PCIeFunction, Port, SoftwareInventory, Switch, UpdateService, Zone
- Schema minor updates
  - Chassis, ComputerSystem, Drive, EthernetInterface, EventDestination, LogEntry, Manager, MemoryMetrics, Power, Redundancy, Resource, ServiceRoot, SessionService, Storage
- New mockups
  - Bladed System and Proposed OCP Profile



# Redfish

## Redfish Specification v1.0.3 and v1.0.4

- Errata release of the Specification (DSP0266)
  - No new features or functionality in this release (errata only)
  - Numerous clarifications and corrections, detailed in the Change Log

## New Redfish v1.0.0 Schemas (1 of 3)

- **ActionInfo**
  - Describes the parameters and other information necessary to perform a Redfish Action to a particular Action target
- **Endpoint**
  - An entity that sends or receives protocol defined messages over a transport
- **Fabric**
  - Consists of one or more Switches and may include Endpoints and Zones
  - Used to describe topologies
- **MemoryChunks**
  - Describes a chunk of memory and its associated interleave sets

## New Redfish v1.0.0 Schemas (2 of 3)

- **MemoryDomain**
  - Used to indicate to the client which Memory (DIMMs) can be grouped together in Memory Chunks to form interleave sets or otherwise grouped together
- **PCleDevice**
  - Describes a PCI-e Device attached to a system
- **PCleFunction**
  - Describes a PCI-e Function
- **Port**
  - Describes a Port of a Switch
  - Connects to Switches, Endpoints, or other Ports
- **SoftwareInventory**
  - Describes an inventory of software components

## New Redfish v1.0.0 Schemas (3 of 3)

- Switch
  - Describes a simple fabric Switch
  - Contains a set of Ports
- UpdateService
  - Describes the Redfish Update Service
  - Contains update actions and sets of Software Inventory entities
- Zone
  - Describes a simple fabric Zone
  - Used to map associated Endpoints and Switches into different partitions

## Redfish Schema Minor Revisions (1 of 3)

- Chassis v1.3.0
  - Added “IPBasedDrive” to ChassisType enumerations
- ComputerSystem v1.2.0
  - Added HostedServices and HostingRoles properties
  - Added MemoryDomains, PCleDevices, PCleFunctions, and Endpoints links
  - Added “RemoteDrive” enumeration to BootSourceOverrideTarget
- Drive v1.1.0
  - Added Operations property and Endpoints link
- EthernetInterface v1.1.0
  - Added LinkStatus property and Endpoints link
- EventDestination v1.1.0
  - Added OriginResources and MessageIds properties

## Redfish Schema Minor Revisions (2 of 3)

- **LogEntry v1.1.0**
  - Added EventType, EventId, and EventTimeStamp properties
- **Manager v1.2.0**
  - Added PowerState property
- **MemoryMetrics v1.1.0**
  - Added PredictedMediaLifeLeftPercent property to the HealthData object
- **Power v1.2.0**
  - Added IndicatorLED property to PowerSupply object
- **Redundancy v1.1.0**
  - Added RedundancyEnabled property
- **Resource v1.2.0**
  - Added “Deferring”, “Quiesced”, and “Updating” to State enumerations



## Redfish Schema Minor Revisions (3 of 3)

- **ServiceRoot v1.1.0**
  - Added links to Fabrics, StorageSystems, StorageServices and UpdateService
- **SessionService v1.1.0**
  - Added OEM Action capabilities
- **Storage v1.1.0**
  - Added Links object and Endpoints link

## Errata Schema Revisions (1 of 2)

- **ComputerSystem v1.1.1, v1.0.3**
  - Clarified description of ComputerSystem and the UUID property
- **Drive v1.0.1**
  - Added “Unencrypted” enumeration to EncryptionStatus and deprecated misspelled enumeration
- **Event v1.1.1, v1.0.3**
  - Deprecated Context property in favor of the Event-specific Context contained within each Event
- **IPAddresses v1.0.3**
  - Corrected validation patterns for IPv4Address and SubnetMask
  - Added validation pattern for Gateway
- **Message v1.0.3**
  - Corrected MessageId to mark it as a required property

## Errata Schema Revisions (2 of 2)

- Resource v1.1.1
  - Removed errant ReferenceableMember entity type
- ServiceRoot v1.0.3
  - Corrected validation pattern annotation for RedfishVersion
- Storage v1.0.1
  - Corrected type definition of the Volumes link
- Volume v1.0.1
  - Corrected description of VolumeType

## New Mockups

- New mockups to a bladed system and a proposed OCP profile definition
- Bladed System
  - Shows an enclosure that contains a set of four blades
  - Shows how a Chassis instance can contain subordinate Chassis instances with the Contains/ContainedBy relationship
  - Each Chassis instance that represents a blade has its own ComputerSystem
- Proposed OCP Profile
  - An example that shows how Redfish can be adapted to meet the Open Compute Project's Hardware Management requirements
  - Contains a single system instance with a minimal set of properties required to support OCP



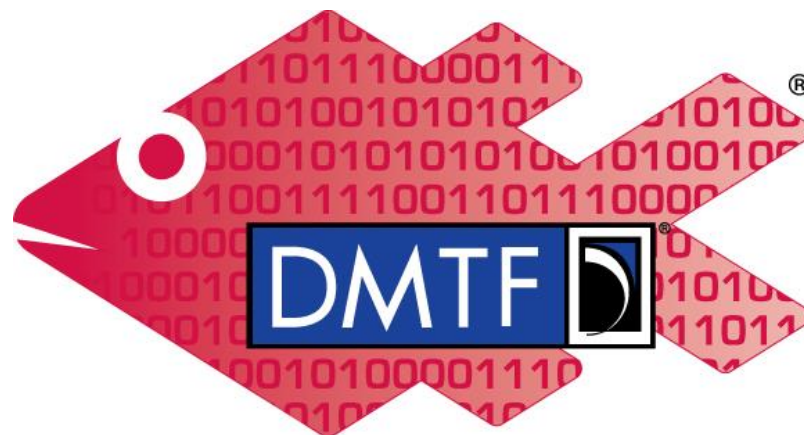
# Redfish 2016 Release 1

DMTF Scalable Platforms Management Forum  
May 2016



# Redfish 2016 Release 1

- Redfish Specification v1.0.2 (errata)
- **NEW** Schemas v1.0.0
  - AttributeRegistry, Bios, Drive, Memory, MemoryCollection, MemoryMetrics, SecureBoot, Storage, StorageCollection, Volume
- Schemas v1.1.0 or v1.2.0 (minor revs)
  - Chassis, ComputerSystem, Event, Manager, Power, Resource, SimpleStorage, Thermal
- Schemas v1.x.2 (errata)



## Redfish

Schema Release Bundles (posted at <http://www.dmtf.org/standards/redfish>)

**DSP8010\_2016.1:** All new, minor, and errata 2016.1 schemas

Individual file contents also posted on <http://redfish.dmtf.org/schemas>

**DSP8010\_2016.0.9a:** Work in Progress

New schemas under development within SPMF

## Redfish Specification v1.0.2

- Errata release of the Specification (DSP0266)
  - No new features or functionality in this release (errata only)
  - Numerous clarifications and corrections, detailed in the Change Log
- Schema namespace rules were corrected
  - Schema versioning method conflicted with OData namespace definitions
  - Old: <schema name>.<major>.<minor>.<errata>
  - New: <schema name>.v<major>\_<minor>\_<errata>
  - Example: Chassis.v1\_0\_2 instead of Chassis.1.0.2
- OEM company-level property naming corrected
  - Use of colon ':' in JSON property names is problematic for some languages
  - Dot '.' separator also creates additional work for Javascript
  - Solution is to use underscore "\_" instead for both of these cases
    - For compatibility, the colon and dot are allowed (but future use is discouraged)

## New Redfish v1.0.0 Schemas (1 of 2)

- **Bios**
  - Allows viewing and changing System BIOS settings
  - Uses an AttributeRegistry to perform these functions
- **AttributeRegistry**
  - Adds ability to describe a large quantity of platform/vendor-specific properties (“attributes”)
  - Can describe usage and menu structures for user interface displays
- **SecureBoot**
  - Properties for managing the UEFI Secure Boot functionality of a system
- **Memory / MemoryCollection**
  - Adds detailed DIMM Inventory and status
- **Memory Metrics**
  - Statistics and performance metrics for individual memory modules



## New Redfish v1.0.0 Schemas (2 of 2)

- **Storage / StorageCollection**
  - This schema defines a storage subsystem and its respective properties
  - Includes storage controller / subsystem properties and links to the resources such as volumes that can be accessed from that subsystem
- **Drive**
  - Detailed hard drive and SSD inventory and status
- **Volume**
  - Contains properties used to describe a volume, virtual disk, LUN, or other logical storage entity for any system

## Redfish Schema Minor Revisions (1 of 3)

- **Chassis v1.2.0**

- Links entries for new Drive and Storage resources
- Links entry for ManagersInChassis
  - Provides reference to the Manager(s) physically located in the chassis

- **ComputerSystem v1.1.0**

- Links entries for new Bios, Memory, Storage and SecureBoot resources
- MemoryMirroring in MemorySummary object
  - Reports system-level “memory mirroring” functionality
- TrustedModule object
  - Reports status and configuration of a Trusted Platform Module (TPM)
- BootSourceOverrideMode in Boot object
  - Allows switching between UEFI and “legacy” BIOS boot modes
- New “*SDCard*” and “*UefiHttp*” enumerations to BootSourceOverrideTarget
  - Boot from SD Memory Card or use the UEFI boot from HTTP function

## Redfish Schema Minor Revisions (2 of 3)

- **Event v1.1.0**

- Context property
  - Information provided by the subscriber to be included with Event payloads

- **Manager v1.1.0**

- Links entry for ManagerInChassis
  - Provides reference to the Chassis which physically contains the Manager

- **Power v1.1.0**

- InputRanges, Manufacturer in PowerSupplies
  - Describes the range of input voltage(s) supported by the power supply
  - Manufacturer of the power supply
- Improved enumerations in LineInputVoltageType in PowerSupplies
  - New values describe 'generic' input voltage ranges in place of terminology which was used inconsistently among vendors.
  - Enumerations with inconsistently-used terminology have been deprecated

## Redfish Schema Minor Revisions (3 of 3)

- **Resource v1.1.0**

- Identifier, Location, and IndicatorLED objects
  - Common functionality to apply across the data model
  - Allows specifying a standards-based device identification method
  - Provides structure for reporting physical location
  - Common functionality for a simple LED indicator light
- “UnavailableOffline” enumeration added to State in Status
  - Shows a device in an invalid or incompatible configuration

- **SimpleStorage v1.1.0**

- CapacityBytes added to Device
  - Reports the capacity of a storage device - missing from the v1.0.0 release

- **Thermal v1.1.0**

- Name replaces FanName in Fan
  - Made usage of the “Name” property consistent with the data model

## Errata Schema releases (1 of 2)

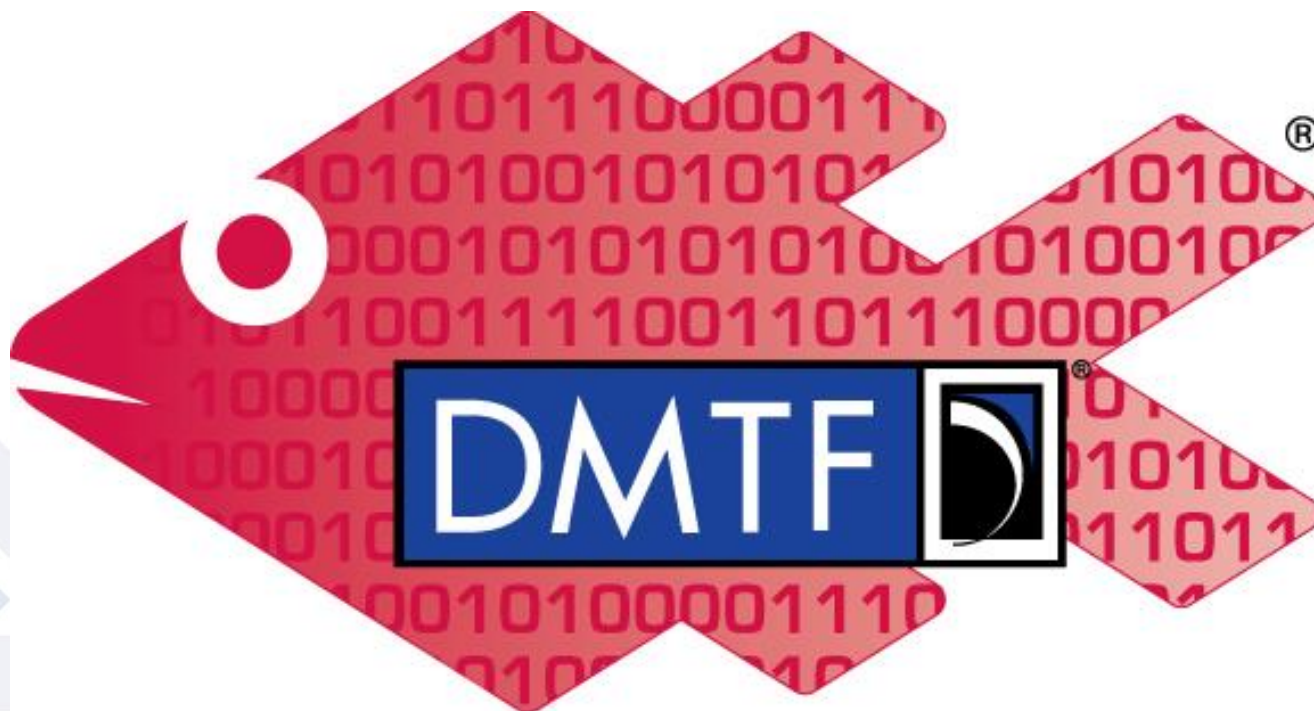
- All schemas revised to v1.x.2 for namespace convention corrections
  - CSDL (XML) files now follow <schema>\_v1.xml filename format
  - json-schema files now follow <schema>.v1\_x\_x.json filename format
- All existing v1.x.x schemas were also re-published using the new json-schema filename structure. *Previously released schemas remain available and valid.*
- **Chassis v1.1.2**
  - Deprecates the “Unknown” value for IndicatorLED
- **ComputerSystem v1.0.2**
  - Deprecates the “Unknown” value for IndicatorLED
- **EventService v1.0.2**
  - Corrected Unit annotation(s) to match UCUM unit definitions
- **Manager v1.0.2**
  - Corrected description for ServiceEntryPointUUID to match intent

## Errata Schema releases (2 of 2)

- **ManagerNetworkProtocol v1.0.2**
  - Corrected (confusing) read-write permissions on embedded objects
  - Corrected Unit annotation(s) to match UCUM unit definitions
- **Power v1.0.2**
  - Corrected (confusing) read-write permissions on embedded objects
  - Corrected Unit annotation(s) to match UCUM unit definitions
- **Resource v1.0.2**
  - Corrected missing Required annotation on 'Id' property.
  - Added 'Pattern' Redfish annotation for 'Oem' property names.
- **SessionService v1.0.2**
  - Added missing Unit annotation(s) to match UCUM unit definitions
- **SimpleStorage v1.0.2**
  - Corrected Unit annotation(s) to match UCUM unit definitions
- **Thermal v1.0.2**
  - Corrected (confusing) read-write permissions on embedded objects
  - Corrected Unit annotation(s) to match UCUM unit definitions



## Q&A & Discussion



# Redfish