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## Hardware Error Reporting Standardization for cloud-scale and Edge Infrastructure



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HW Mgmt

# Hardware Error Reporting Standardization

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# Problem statement

Cloud and Edge hardware consists of heterogenous hardware with custom error reporting solutions

## Impact:

- Tools for analyzing log contents cannot work across vendor implementations
- Difficulty in ML based error patterns analytics
- Contribute to long lead times for identifying mitigations and Solutions

A modern standard solution is needed for hardware error reporting, storing and transporting to increase the effectiveness of fleet management

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# Requirements

- Autonomous and near real time *FRU Isolation* for all types of Hardware Failures.
- Need *structured data* that describes hardware errors
- Support *filtering* and *categorization*
- Allow entries to contain an *unbounded* amount of data for deep dive
- Work with *existing* diagnostic tools and APIs
- *Extendable* to include future hardware error types and expanding scope of error coverage

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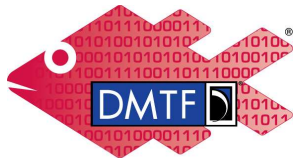


# CPER/Redfish recap



## CPER -> UEFI's Common Error Record Format ([link](#))

- Current Industry standard which provides extensive hardware error information
- Encapsulate MCA, AER , CXL and other hardware errors
- Firmware implementations and tools support is available
- It is a highly structured, binary format
- Does not define a network transport for delivering this data to clients



Redfish

## Redfish -> DMTF's standard management protocol ([link](#))

- Defines a data model for event logs
- Easily extendable to include CPER data within the log model
- Provides a publish/subscribe model for event delivery
- Widely adopted for fleet management solutions

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# How Redfish encapsulates CPER

Any Redfish log entry allows an “Additional Data” URI that can contain a CPER record

Example:

```
"@odata.type": "#LogEntry.v1_10_0.LogEntry",  
"Id": "1",  
"EntryType": "Event",  
"Severity": "Critical",  
"Created": "2022-03-07T14:44:00Z",  
"Message": "A Machine Check Exception (MCE) error has occurred."  
"MessageId": "Platform.1.0.MachineCheckException",  
"GeneratorId": "UEFI-BIOS",  
"DiagnosticDataType": "CPER",  
"AdditionalDataURI": "/logs/236912.bin",  
"AdditionalDataSizeBytes": 4592,
```

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# New Redfish Message Registry

- Redfish defines log and event messages in a machine-readable “Message Registry”
- Creating a new registry for “Platform” errors covered by CPER or other common sources of fault reporting (e.g. Machine Check Exception)
- Message registry can be expanded to cover new hardware error types (backwards compatible)

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# Example message registry (one message)

```
"CableInserted": {
  "Description": "Indicates that a network cable has been inserted.",
  "LongDescription": "This message shall be used to indicate that a network cable has been inserted.",
  "Message": "A network cable has been inserted into network adapter '%1' port '%2'.",
  "Severity": "OK",
  "NumberOfArgs": 2,
  "ParamTypes": [ "string", "string" ],
  "ArgDescriptions": [
    "The `Id` of the network adapter.",
    "The `Id` of the network port." ],
  "ArgLongDescriptions": [
    "The value of this argument shall be a string containing ...",
    "The value of this argument shall be a string containing ..." ],
  "Resolution": "Refresh your cached version of the network port ...",
  "ClearingLogic": {
    "ClearsIf": "SameOriginOfCondition",
    "ClearsMessage": [ "CableRemoved" ]
  }
},
```

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# Join the group discussion [here!](#)

- Requirement document has been contributed (v0.5)
  - Link: [here](#)
- Provide feedback on error messages to standardize in the Message Registry
  - Link: <https://www.dmtf.org/standards/redfish>
- Implement the Redfish “Diagnostic Data” logging support to provide the CPER data to client software in a standard format
- Join the mailing list
  - Link: <https://ocp-all.groups.io/g/OCP-HWFaultMgt>

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Thank you!

