Platform Management Communications Infrastructure (PMCI):

FRU Format and Access Proposal

August 2024

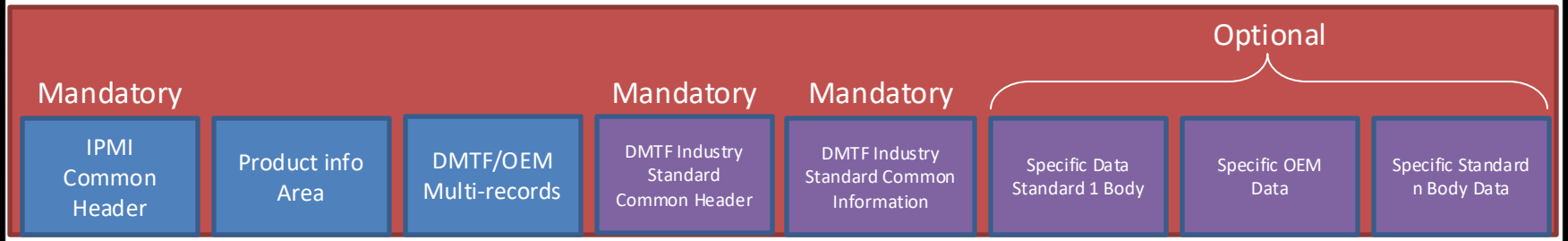
Disclaimer

- The information in this presentation represents a snapshot of work in progress within the DMTF.
- This information is subject to change without notice. The standard specifications remain the normative reference for all information.
- This information is a summary of the information that will appear in the specifications. See the specifications for further details
- For additional information, see the DMTF website.
- Feedback may be submitted via the DMTF Feedback and Technology Submission portal. Click (or go to) www.dmtf.org/standards/feedback for details

Reasons to push a common industry standard

- With multiple industry standard (specification) consortiums working in diverse technologies and all seeking a method to provide device data to a consumer, there is a need for the industry to consolidate on a modern method that may last another 10 – 20 years.
- Innovation / OEM differentiation added complexity and divergence
  - Different industry standards bodies implementing similar data features in different formats
  - Many industry standards added multi-records in a variety of formats
    - Power Capabilities, NVMe Parameters, Vendor Specific Data have extended the purpose.
  - While the raw data access method (with a simple data integrity check) is well known, the parsing of the data diverged, which put a heavy burden on the data consumer, typically the Baseboard Management Controller (BMC)
  - Tool chain typically takes text/JSON data, translates to binary, stores it in EEPROM, only to reverse the process to retrieve the data into a usable format.
- Leverage modern data formats like JSON which are easier to extend and consume
- Move away from the IPMI limitations such as 6-bit ASCII & 255-byte structure limits
- Field updates with IPMI format are challenging
- IPMI specs are no longer maintained and will not longer publish any new updates

Proposed Industry Standard Minimum Common FRU Format



Section / Area	Comments
Common Header	Industry Standard Common FRU shall implement the IPMI Common Header for backward compatibility
Product Info Area	Industry Standard Common FRU shall implement the IPMI Common Header for backward compatibility. This is designated for an Add-In Option Adapter or Customer Facing Marketing Information. Small duplication with Common Information. NOTE: OCP 3.0 NIC requires Board Info Area plus an OCP 3.0 NIC specific Multi-Record
Multi-Records	This is a DMTF and/or OEM defined Multi-Record that is the offset (pointer) to the Industry Standard Common Header
Industry Standard Common Header	New Record to assist the consumer, typically the BMC, with identifying standards body data present in the EEPROM (or other device) as well as common information
Industry Standard Common Information	This will the be place to hold common information such as manufacturer, Manufacturer Part Number, Vendor Part Number, Manufacturer Product Name, Vendor Product Name, Serial Number, Build Date, and other data elements to be determined / donated by DMTF / PCIe / CXL Partners
Specific Standard Body Data	This will be the place to hold a specific Standards (Consortium) Body content which would be unique. This would be data that is not considered to be even slightly common to all Industry Standards. Example would be Power Consumption. This is common, not unique. PCIe Lanes / Bifurcation could be common but may be specific. Need Industry Input to help

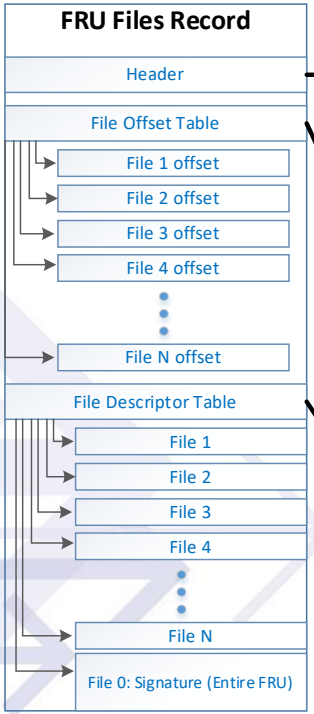
Upcoming PMCI Specifications

- DSP0220 v1.0 ("FRU data format")
  - Defines layout of FRU data at rest (in storage)
  - Defines semantics & structure of a simple file directory to support multiple aggregate blobs of FRU data into a FRU bundle
  - Defines two formats for storing the FRU data content:
    - The default and recommended format for the FRU data content uses a FRU Files Record data structure. The FRU Files Record contains metadata that points to a FRU File that contains the properties and values that describe the FRU. Data within the FRU File can be stored any format.
    - For compatibility with the IPMI Platform Management FRU Information Storage Definition, an IPMI FRU MultiRecord format is also defined in this specification. The MultiRecord contains an offset that points to the FRU Files Record.
- DSP0257 v2.0 ("FRU data access")
  - Aims to provide a streamlined, intuitive mechanism for read/write access to a single FRU data item per request message
  - Defines FRU-specific details to read (NOT write) aggregate blobs of FRU data via DSP0242 (PLDM for File Transfer)
  - Reference DSP0220 as appropriate

DSP0220 V1.0

- DMTF MultiRecord (IPMI style) for backward compatibility
  - IPMI record with DMTF IANA contains offset to the FRU Files record
- Same MultiRecord format for native, non-IPMI style format
  - Without IPMI specific fields
  - Need FRU identifier at start of data (before header) to indicate native DMTF FRU
- GUID identifies file owner/content (Redfish schema, PCI-SIG, OCP, CXL, etc.) and encoding format (JSON, Msgpack, binary, etc.)
  - Different GUIDs for JSON format and Msgpack format of same content (i.e. Redfish Assembly schema)

FRU Files Record



Header

Identifier = 0x1AB4 (2B)	Version (1B)	File Count (1B)	Reserved (4B)

File Offset Table

ID	Offset
1	0x100
2	0x200
N	0x1500

File Descriptor Table

ID	GUID (16B)	Ver (4B)	Size (4B)	Offset (4B)	CERT ID (2B)	Flags (2B)	Ctxt(4B)	Hash Len (4B)	Hash (32B)
1	06baa22a-0e87-48fe-87f6-941fd9d2225f	0xf1f0f000	0x20000	0x10000	1	0	0	32	0x414fa339
2	9f593409-a649-4cd1-8164-1ff45a3bc2e9	0xf1f1f000	0x20000	0x30000	1	0	0	512	0xbeb318e7
N	a22bdbb6-236c-47c4-b7a9-3049af803d65	0xf1f0f100	0x40000	0x80000	1	0	0	1024	0x60d254bf

File Offset Table

- A list of pointers to the beginning of each entry in the File Descriptor Table

Component	Field Name	Size	Description
Header	Identifier	2	DMTF Vendor Identifier that indicates the DMTF FRU is present. **0x1AB4**
	Version	1	Version of the FRU content structure **0x01**
	File Count	1	The number of files defined in the File Descriptor Table
	Reserved	4	Length in bytes of file
File Offset Table	Offset	4	Offset of a given file descriptor within the File Descriptor Table
	The offset field repeats based on file count value in the header.		

File Descriptor Table

- Located after File Offset Table

Name	Size	Description
GUID	16	Identifier of the entity or organization that has defined the FRU file properties. The GUID that represents the DMTF FRU File is: a4f59e2cb8a94fadb09241332c90e65b
Version	4	Version of the FRU file definition. This value is formatted in ver32 encoding. e.g. 0xF1F0F000
Size	4	Size in the bytes of the FRU file
Offset	4	Pointer to the start of the FRU file
Cert ID	2	
Flags	2	
Context	4	
Hash Length	4	Length in bytes of the Hash field
Hash	variable	Integrity check or validation signature for the FRU file
FRU Files (s)		Data content that describes the Field Replaceable Unit.

DMTF FRU Content

- The data content of DSP0257 can be formatted into a JSON response that can be used as a FRU File.
- The PLDM FRU general FRU record field types shall be structured in order such that the it matches the order defined in the DSP0257.
- For compatibility with the PLDM FRU (DSP0257) specification, the FRU Record Fields from DSP0257, Table 5 are reused and known as Property Names.

JSON Formatted Content

- The following is an example DMTF FRU File in expanded format.


```
{
    "ChassisType": "https://redfish.dmtf.org/schemas/v1/Assembly.v1_5_0.json",
    "Model": "NO1",
    "PartNumber": "1234",
    "SerialNumber": "SN12345",
    "Manufacturer": "DMTF",
    "ManufactureDate": "2017-04-01T14:55:33+03:00",
    "Vendor": "DMTF",
    "Name": "New One NO1",
    "SKU": "XYZ-123",
    "Version": "A1",
    "AssetTag": "ABC1234",
    "Description": "New One Adapter",
    "EngineeringChangeLevel": "2017-04-01T14:55:33+03:00",
    "OtherInformation": "",
    "VendorIANA": "3704",
    "SMBusAddress": "0x36",
    "SMBusClock": "100k",
    "FRUType": "NIC"
}
```

DSP0257 v2.0: ReadFruDataItem

- New Code Value 0x10
- Request fields:

Name	Size	Description
RecordSetIdentifier	2	Possible values: {Default record set=0x0000, Specific record set=0x0001 — 0xffff}
ItemName	2	A structured, 2-byte field that identifies a single FRU data item (e.g. Part Number, Version, Asset Tag

- Response fields:

Name	Size	Description
CompletionCode	1	PLDM Defined Completion Codes
ItemLength	1	The length, in bytes, of the ItemValue field within this PLDM message response.
ItemValue	Variable	The current value of the single FRU data item being read, encoded in UTF8 format.

DSP0257 v2.0: WriteFruDataItem

- New Code Value 0x11

- Request fields:

Name	Size	Description
RecordSetIdentifier	2	Possible values: {Default record set=0x0000, Specific record set=0x0001 — 0xffff}
ItemName	2	A structured, 2-byte field that identifies a single FRU data item (e.g. Part Number, Version, Asset Tag
ItemLength	1	The length, in bytes, of the ItemValue field within this PLDM message request.
ItemValue	Variable	The update value of the single FRU data item being written, encoded in UTF8 format.

- Response fields:

Name	Size	Description
CompletionCode	1	PLDM Defined Completion Codes

Request for Industry Feedback

Please provide feedback to your PMCI WG representative or the DMTF Feedback Portal at https://www.dmtf.org/standards/feedback by Sept 2024

For more information,
visit dmtf.org

Learn about the PMCI working group at
dmtf.org/standards/pmci

Thank you!