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# PMCI Standards for Hardware Management

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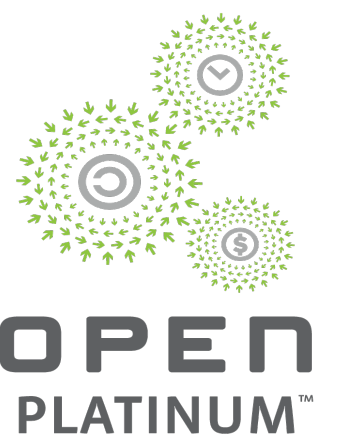
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# PMCI Standards and OCP Community



MANAGEMENT

## Workshop Goal:

Inform community on how OCP Projects can adopt existing and emerging PMCI standards

## Benefits:

Provide interoperable management interfaces and data models for “inside the box” communication

## Current Projects:

OCP NIC 3.0 – Design Specification lists required PMCI standards for key management features



Workshops  
Summits

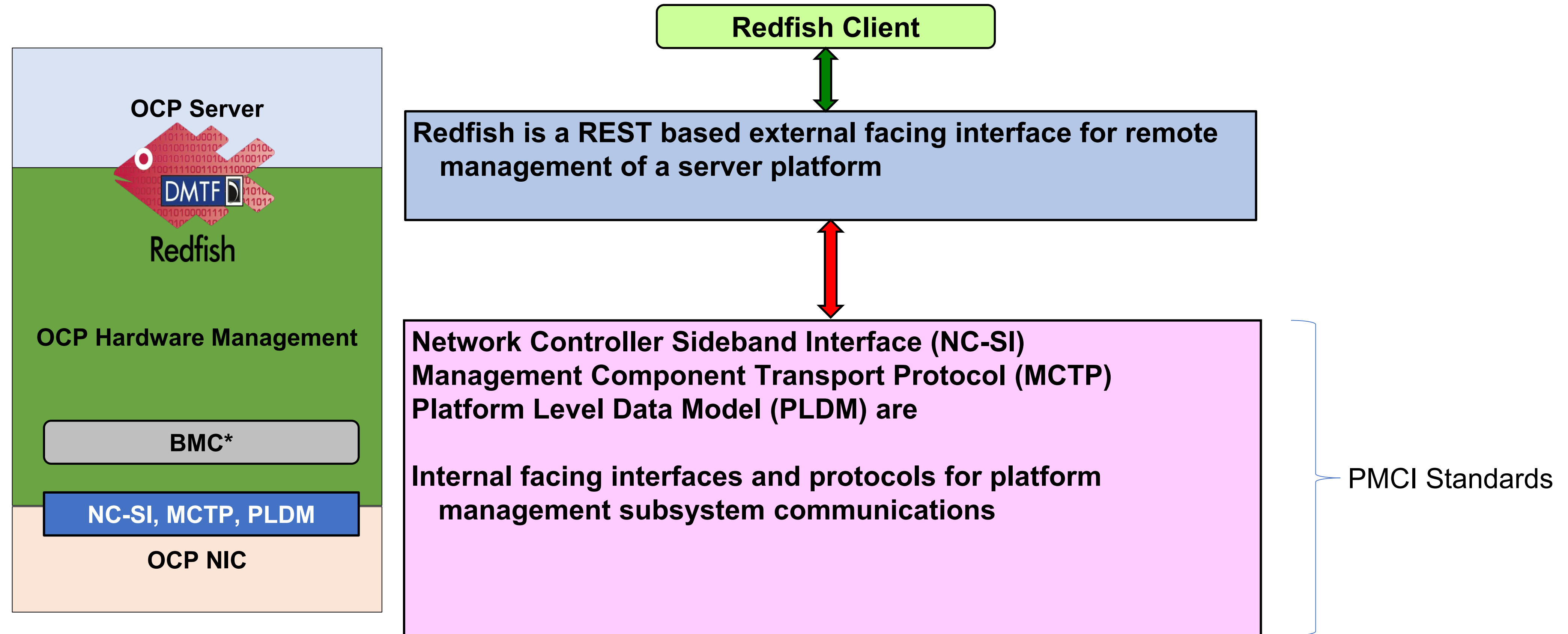


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# DMTF Standards Applicable to OCP Platforms

The DMTF organization develops open manageability standards spanning diverse emerging and traditional IT infrastructures



\*OpenBMC (from The Linux Foundation) -- initial MCTP/PLDM implementation proposals submitted Dec 2018

# PMCI Working Group of the DMTF

Platform Management Component Intercommunications (PMCI)

Group formed in 2005, initial specifications released in 2007

Over a decade of implementations within server and desktop products

PMCI suite of standards provide “Inside the box” communication and functional interfaces between components within the platform management subsystem

Creates specifications for MCTP, PLDM, and NC-SI

Applicability to OCP

OCP NIC 3.0 Design Specification ver 0.85b leverages multiple PMCI standards including;

DSP0236 - MCTP Base Specification

DSP0222 - Network Controller Sideband Interface (NC-SI) Specification

DSP0267 - Platform Level Data Model (PLDM) for Firmware Update Specification

DSP0248 - Platform Level Data Model (PLDM) for Platform Monitoring and Control Specification

PMCI Standards can be complimentary to OCP Redfish Profiles adopted by Hardware Management Project

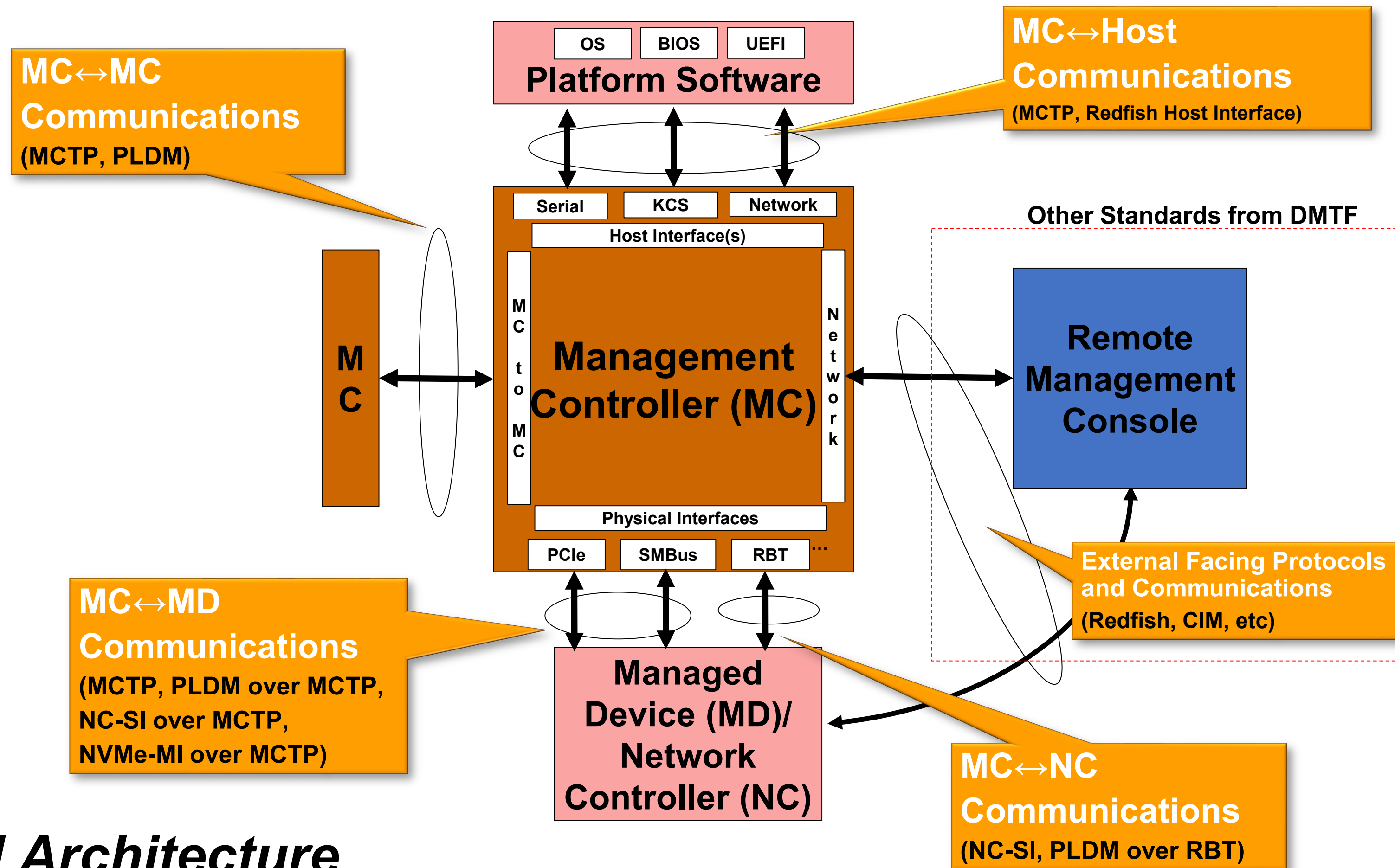
DSP0218 -- PLDM for Redfish Device Enablement (WIP)

As well as DSP0248, DSP0267, DSP0236, DSP0222 and others



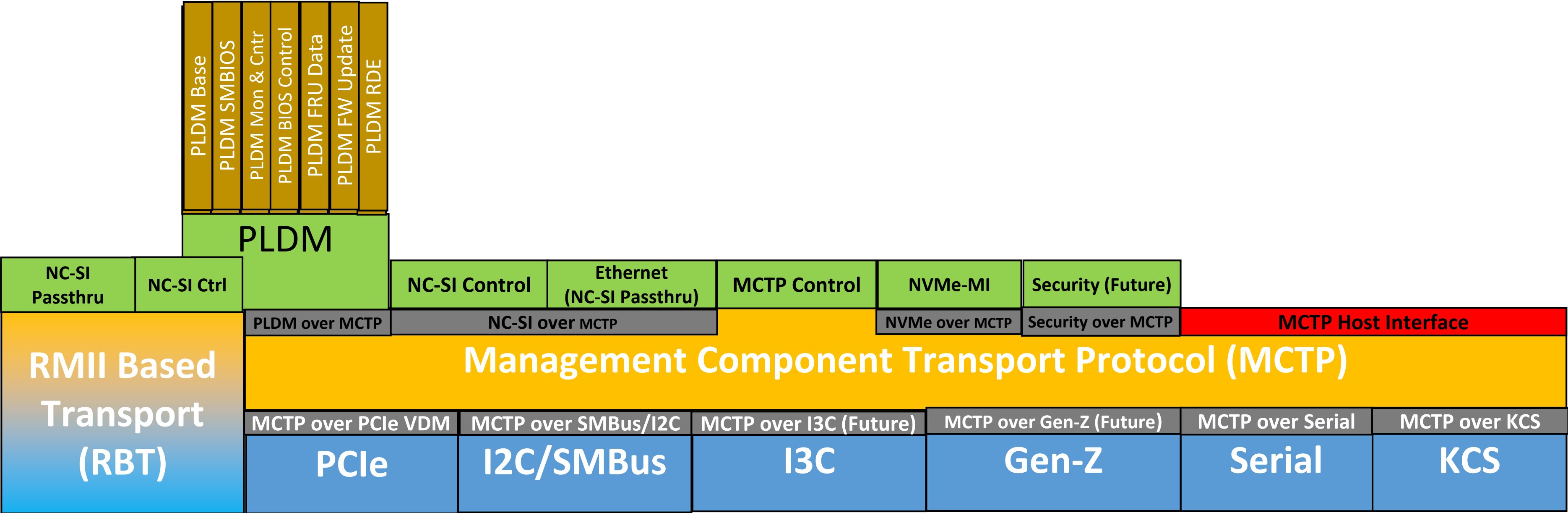
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# Platform Management Subsystem





# PMCI Protocol Stack



- = Physical Layer
- = Data Model / Message
- = Binding
- = PLDM Message
- = Transport
- = Host Interface

# Management Component Transport Protocol (MCTP)

Base transport for “inside-the-box” communication.

Suitable for use with multiple media: SMBus, PCIe, etc.

Suitable for all computer platform types

Supports logical addressing based on Endpoint IDs

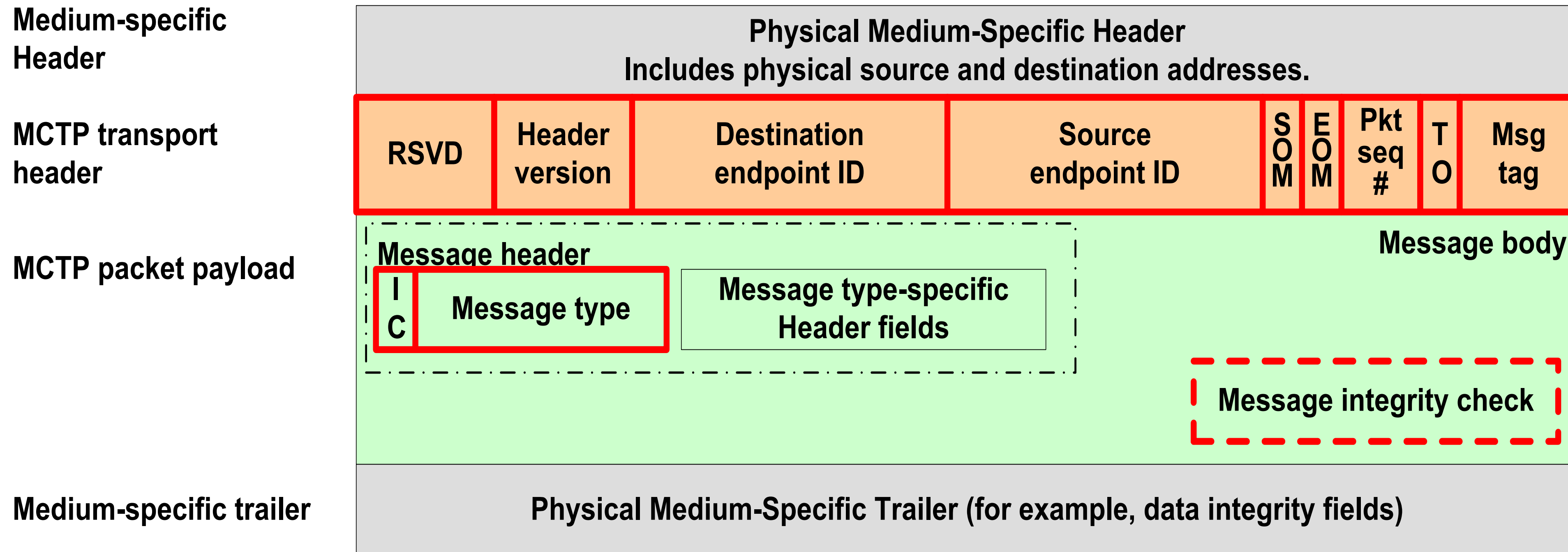
Provides simple message fragmentation/reassembly

Built-in capability discovery and supports path transmission unit discovery

Carries multiple message types: MCTP Control, PLDM, NC-SI, NVMe



# MCTP Packet Fields



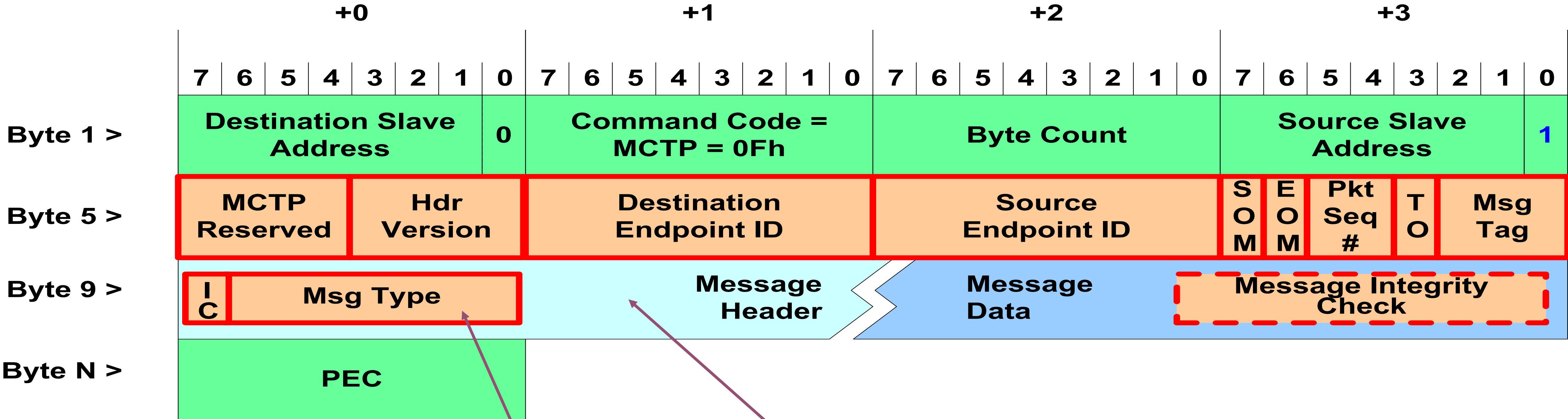
# MCTP Transport Bindings

Bindings for four physical mediums defined

- SMBus
- PCIe VDM
- KCS
- Serial

Bindings for I3C and Gen-Z are work-in-progress

# MCTP over SMBus Packet Format



MCTP Message Header  
(Varies based on Message Type)

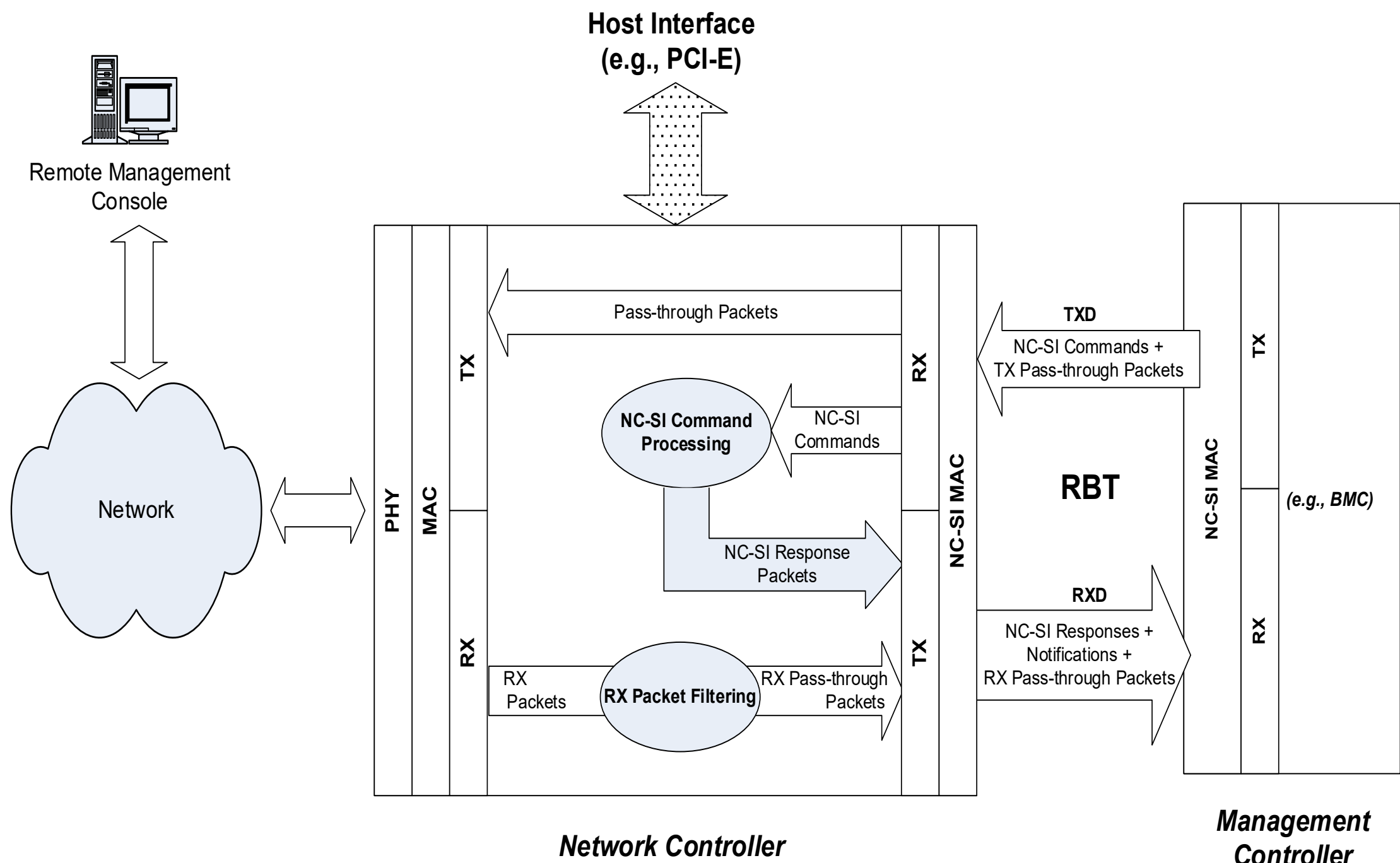
Message Type byte  
(only required in first packet header of message.)



= common fields for all MCTP messages



# Out-Of-Band Management and NC-SI



A common interoperable sideband interface and protocol to transfer management traffic between a management controller (MC) & network controller (NC)

Supports Multiple Types of Management Traffic

Pass-Thru Management Traffic

- Enable MC-Network communication via NC
- NC-SI Command/Response Packets
- Command (Response) sent by MC (NC) to NC (MC)
- Request/Response Semantics
- Functions: Control, Configuration, Status, Statistics,...
- NC-SI Notification Packets
- Generated and sent by NC to MC
- Functions: OS/Link Status Change; NC Soft Reset

# NC-SI Transport Bindings

## NC-SI Over RMII Based Transport (RBT)

- Defines NC-SI Binding over Reduced Media Independent Interface™ (RMII)
- Physical-level interface is based on RMII
- Media-level interface is based on Ethernet
- Defines hardware arbitration scheme to share single RMII based NC-SI bus

## NC-SI over Management Component Transport Protocol (MCTP)

- Enables NC-SI communications over an MCTP network
- Enables communication between an MC/NCs over MCTP-capable interconnects like PCIe/SMBus
- Supports the ability to migrate the NC-SI and pass-through traffic seamlessly from PCIe to SMBus
- 3 levels of addresses: Physical, MCTP – Endpoint ID (EID), NC-SI – Package ID per device, Channel ID per port
- Hardware based arbitration is not required as NC-SI over MCTP assumes a switched media

# Platform Level Data Model (PLDM)

An effective interface & data model for efficient access to:  
Low-level platform inventory, BIOS, and config data  
Platform monitoring/control, alerting, event log, etc.

Defines low level data representations and commands

Provides transport independent Request/Response Model

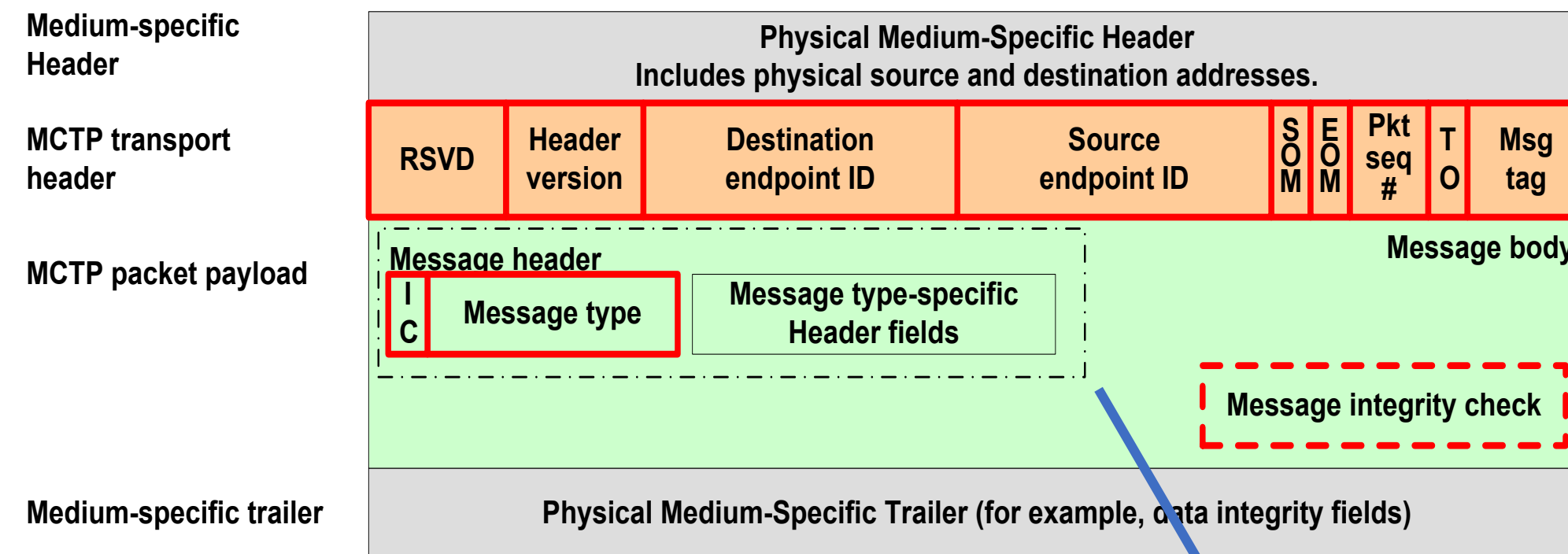
Supports a subtype to distinguish types of PLDM Msgs  
Allows messages to be grouped based on the functions  
Allows the discovery of the functionality supported

PLDM specs: Base, IDs & Codes, SMBIOS data transfer, BIOS control and configuration, Platform Monitoring and Control, FRU, Firmware Update, and Redfish Device Enablement (RDE)

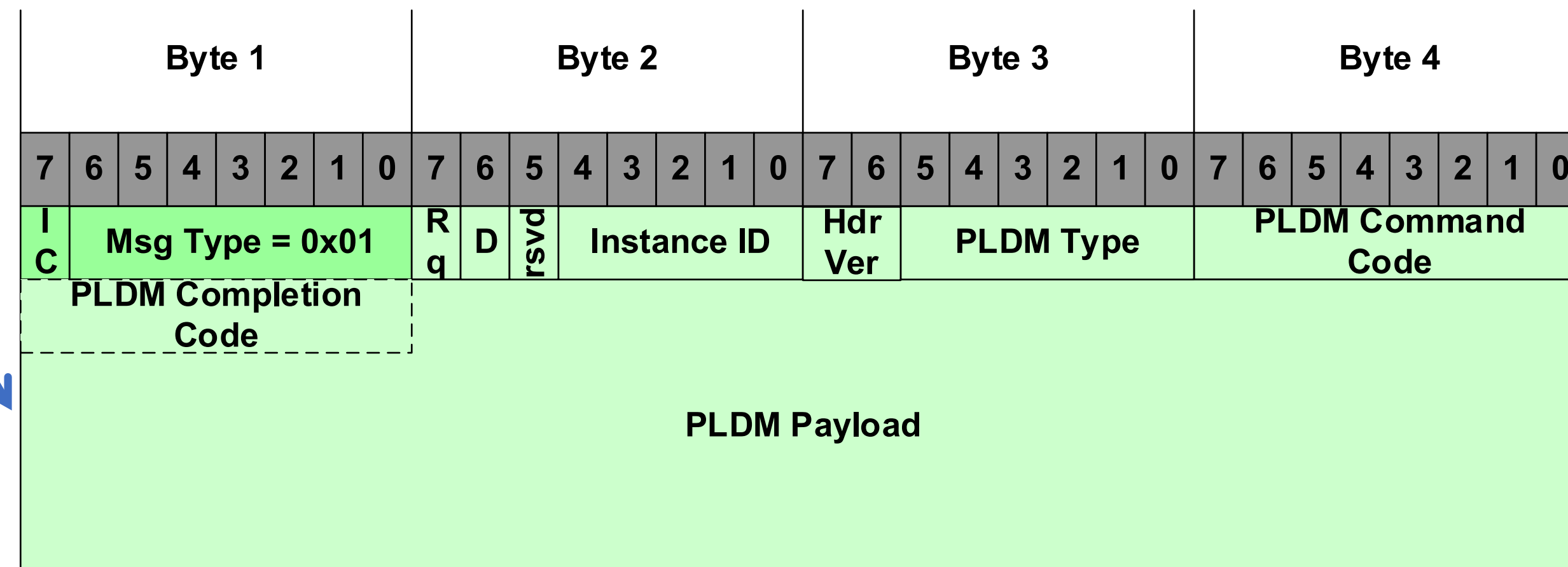


# PLDM Messages and PLDM over MCTP Binding

## PLDM Message Fields



Field Name	Field Size	Description
Rq	1 bit	Request bit.
D	1 bit	Datagram bit.
rsvd	1 bit	Reserved
Instance ID	5 bits	Used to identify the instances of a PLDM request.
Hdr Ver	2 bits	Identifies the header format of PLDM messages.
PLDM Type	6 bits	The PLDM Type field identifies the type of PLDM that is being used.
PLDM Command Code	8 bits	Identifies the type of operation the message (per PLDM type) is requesting.
PLDM Completion Code	8 bits	The PLDM Completion Code field provides the status of the operation
PLDM Message Payload	Variable	Zero or more bytes of PLDM message payload that is specific to a particular payload type, PLDM type, command code, and/or completion code.



# PLDM Types

PLDM Type	Description
PLDM Base	PLDM Messages used to support <u>control and discovery operations for PLDM.</u>
PLDM for SMBIOS	PLDM Messages used to support <u>SMBIOS data Transfer.</u> Supports both pull/push models of SMBIOS data transfer.
PLDM for Platform Monitoring and Control	Provides a model for monitoring <u>Numeric Sensors</u> (e.g. temperature) and <u>State Sensors</u> (e.g. link state) Provides a model for control via PLDM <u>Effecters</u> (e.g. fan control) Provides a model for <u>platform events</u> for asynchronous reporting of state changes from sensors and defines an <u>event log Model</u>
PLDM for BIOS Control and Configuration	Provides internal model to exchange the <u>BIOS config/control data</u> Defines the PLDM data structures/messages for communicating BIOS settings, BIOS attributes, Boot configurations, and Boot order settings
PLDM for FRU Data	PLDM Messages used to support <u>FRU data transfer</u>
PLDM for Firmware Update	Defines messages and data structures for updating firmware or other code objects maintained within the firmware devices of a platform
PLDM for RDE	Defines messages and data structures to communicate Redfish operations and events using binary coded JSON and PLDM.
OEM Specific	Reserved for OEM-specific PLDM Commands

# PMCI Security

New Task Force created within PMCI Working Group

Goals:

Create specification(s) to provide security for PMCI standards and protocols.

Align component authentication and integrity objects across the industry

Specification should be implementable on existing hardware designs.

Do not require changes to existing hardware/silicon.

Can be referenced by other industry standards organizations.

e.g: Security Project of Open Compute Project (OCP)



# Call to Action

## Join

PMCI Standards are being incorporated in the Design Specification for OCP NIC 3.0

Join the Server Mezzanine Card Subgroup - <http://www.opencompute.org/wiki/Server/Mezz> to learn more and participate

## Learn more about the DMTF & the PMCI suite of standards

Visit the PMCI website - <https://www.dmtf.org/standards/pmci>

Consider bringing work into the DMTF

## Alliance Partners (e.g. OCP)

DMTF Originated Work

From the DMTF: Work In Progress Release capability, Informational Specifications

Input to the DMTF: Alliance Liaison, Joint Members, DMTF Technology Adoption, DMTF Feedback Portal

Alliance Partner Originated Work

Similar mechanisms would speed things along if you wish DMTF input



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