Platform Management Communications Infrastructure (PMCI):

Technology Overview

Patrick Caporale, Lenovo
PMCI Co-Chair, DMTF
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- This information is a summary of the information that will appear in the specifications. See the specifications for further details.
Agenda

- PMCI Working Group
- Platform Management Subsystem
- PMCI Protocol Stack
- Management Component Transport Protocol (MCTP)
- Network Controller Sideband Interface (NC-SI)
- Platform Level Data Model (PLDM)
- PMCI Test Tools

Goals of this Presentation

- Provide an overview of PMCI technologies and standards
- Discuss management challenges addressed by PMCI technologies
PMCI Working Group

- Platform Management Communications Infrastructure

- PMCI suite of standards provide ‘inside-the-box’ communication and function interfaces between components within the platform management subsystem
  - Management Controller (MC) to Management Controller
  - Management Controller to Network Device (NC)
  - Management Controller to Managed Device (MD)
  - Host Interface to Management Controller

- Formed in 2005, initial standards released in 2007
  - Creates specifications for MCTP, PLDM, and NC-SI

- Over a decade of implementations within server and desktop provides

PMCI technologies and interfaces are complementary and enabling to DMTF external facing data models/remote management protocols

*Provides a Scalable Architecture for Modern Platforms*
Platform Management Subsystem

MC↔MC Communications (MCTP, PLDM, SPDM)

MC↔Host Communications (MCTP, PLDM, NC-SI, SPDM)

Redfish Host Interface (Redfish)

Remote Management Console

External Facing Protocols and Communications (Redfish, CIM, etc)

Other Standards from DMTF

PMCI Test Tools Interface & Design

Test Client

Test Service

Platform Subsystem

MC↔MD Communications (MCTP, PLDM, NC-SI, NVMe-MI®, SPDM, CXL™)

MC↔NC Communications (NC-SI, PLDM)

Platform Software

OS

BIOS

UEFI

Management Controller (MC)

Managed Device (MD) / Network Controller (NC)

Host Interface(s)

Serial

KCS

Network

Physical Interfaces

PCIe–SMBus/I²C–I3C

External Facing Protocols and Communications

PMCI Architecture – October 2022

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PMCI Stack

Management Component Transport Protocol (MCTP)

**Upper Layer**
- Messaging Control & Discovery (Type 0)
- SMBIOS Data Transfer (Type 1)
- Monitoring & Control (Type 2)
- BIOS Control & Configuration (Type 3)
- FRU Data (Type 4)
- Firmware Update (Type 5)
- Redfish Device Enablement (Type 6)
- OEM Specific (Type 7E/7F)

**Transport Layer**
- PLDM (Type = 0)
- NC-SI (Type = 1)
- NC-SI Passthru (Type = 2)
- Ethernet (Type = 3)
- NVMe-MI™ (Type = 4)
- SPDM (Type = 5)
- Sec’d Mgs over MCTP (Type = 6)
- CXL™ FM API over MCTP (Type = 7)
- CXL™ Type 3 CCI over MCTP (Type = 8)
- Vendor Defined Messages (Type = 7E/7F)

**Physical Layer**
- RMII Based Transport (RBT)
- MCTP over PCIe VDM
- MCTP over SMBus/I2C
- MCTP over I3C
- MCTP over Serial
- MCTP over KCS

**Encapsulation**
- Physical Layer
- Data Model/Message
- Host Interface

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Management Component Transport Protocol (MCTP)

- Base transport for “inside-the-box” communication
- Suitable for use with multiple media: SMBus/I2C, PCIe, I3C, 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-MI™, SPDM, CXL™ FM API/CCI Type 3

MCTP Base Specification = DSP0236
Additional MCTP specifications at www.dmtf.org/standards/pmci
Network Controller Sideband Interface (NC-SI)

- A common interoperable sideband interface and protocol:
  - Used to transfer management traffic between a management controller (MC) and network controller (NC).
  - Can be transported via MCTP or RBT

- NC-SI Communications
  - Pass-through Management Traffic
  - NC-SI Command/Response Packets
    - Command (Response) sent by MC (NC) to NC (MC).
    - Request/Response Semantics.
    - Functions: Control, Configuration, Status, Statistics, etc.
  - NC-SI Notification Packets
    - Generated and sent by NC to MC.
    - Functions: OS/Link Status Change, NC Soft Reset.

NC-SI Base Specification = DSP0222
Additional NC-SI specifications at www.dmtf.org/standards/pmci
RMII-Based Transport (RBT)

- 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
  - Enables sharing a single RMII-based NC-SI bus
  - Prevents two or more NC-SI packages from transmitting at the same time

RBT defined within NC-SI Specification = DSP0222
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, firmware update, etc.
  - Redfish enablement for managed devices (RDE)

- Defines low level data representations and commands

- Provides transport independent Request/Response Model

- NIC Model Reference available

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

PLDM Base Specification = DSP0240
Additional PLDM specifications at www.dmtf.org/standards/pmci
PMCI Test Tools

- Defines messages, data objects, and sequences for testing implementations
  - Data can be used to assess conformance of a device vendor firmware

- Defines roles for a Test Service and Test Client
  - Test Service runs in the platform subsystem’s control plane
  - Test Client runs external to the platform subsystem
  - Test Client connects securely to the Test Service via TLS

PMCI Test Tools Interface & Design Specification = DSP0280
Summary

• Platform Management Communications Infrastructure (PMCI) WG defines:
  • “Inside the box” communication/functional interfaces between components

• PMCI interfaces complementary/enabling to external facing data models and protocols

• Management Component Transport Protocol (MCTP):
  • Transport for internal communications & carry multiple message types

• Network Controller Sideband Interface (NC-SI)
  • An interface to transfer management traffic between MC & NC

• Platform-Level Data Model (PLDM)
  • An interface/data model for low-level management data/functions
  • Extensible request/response style transport independent messaging

• PMCI Test Tools
  • Ability to assess PMCI conformance of a device vendor firmware

PMCI specifications at www.dmtf.org/standards/pmci
Acknowledgement

Thanks to all the contributors and participants of the PMCI Working Group!
For more information, visit dmtf.org

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

Thank you!