Device Management Control (DMC)
Effective Out-Of-Band Device Management System Architecture

Bumjun (Bjay) Kim,
Principal Engineer, Samsung Electronics

Changho Choi
Sr. Principal Engineer, Samsung Electronics
Background: Out-Of-Band (OOB) Management

**Board Management Control (BMC)**
- Management subsystem to monitor and manage system hardware
- Work without relying on server CPUs, BIOS and operating system

**OOB Management**
- No dependency on CPUs, operating systems, BIOS, network, in-band management and device status
Limitation: Current Storage Device Management

Storage Device provides many In-band Telemetry Data. In-band management can’t work when device fails or system error occurs.
DMC Architecture - Proposal

Management Control Unit (MCU) is directly connected to the BMC. DMC Protocol to retrieve device status / log and get system status from BMC.
DMC : Hardware Requirements

• MCU connects to BMC directly
  Even if device is in abnormal stage, BMC can still monitor device status.

• **MCU can store and deliver device log data**
  Sensor Data(Temperature, Power, etc.), Device Status(PCle link state, Power state, etc.),
  Health Data(Lifetime-WAF, CECC/UECC count/address, PCIe CRC error count, etc.)

• **Get system status from BMC**
  Device can take protective action for system errors including FAN and/or PSU error.

• Additional Features
  Firmware Update via OOB, Device Controller Reset, etc.
DMC: Implementation in PMCI

Need to standardize Data Model and Message Protocol for Storage OOB Management

<table>
<thead>
<tr>
<th>PLDM</th>
<th>NC-SI Control</th>
<th>Ethernet (NC-SI Passthru)</th>
<th>MCTP Control</th>
<th>NVMe-MI</th>
<th>SPDM</th>
<th>Secured Message</th>
<th>CXL</th>
<th>DMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLDM over MCTP</td>
<td>NC-SI over MCTP</td>
<td>Ethernet over MCTP</td>
<td>MCTP over MCTP</td>
<td>NVMe over MCTP</td>
<td>SPDM over MCTP</td>
<td>SPDM over MCTP</td>
<td>CXL over MCTP</td>
<td>DMC over MCTP</td>
</tr>
</tbody>
</table>

Management Component Transport Protocol (MCTP)

- MCTP over PCIe VDM
- MCTP over SMBus/I2C
- MCTP over I3C
- MCTP over Serial
- MCTP over KCS

- PCIe
- I2C/SMBus
- I3C
- Serial
- KCS

Physical layer | Binding | Transport | Host Interface | Data model/Message | DMC

PMCI* Protocol Stack

* Platform Management Communications Infrastructure (PMCI) WG of the DMTF
DMC : PoC collaboration with Inspur

Implementation of DMC Solution on Poseidon system and SSD with Inspur
Expect to collaborate with OCP H/W Management Project and DMTF

OpenBMC in Poseidon System
- Poseidon V2 E3.X Reference System
- OpenBMC on DC-SCM
  + DMC Command, MCTP, SMBus, ARP

DMC Implementation in SSD
- DMC-SSD
  + DMC Command, MCTP, SMBus, ARP
  + Device Info., Sensor, etc.

DMC protocol over MCTP over SMBus
Call to action

- We want to collaborate …
  - To define data-sets and features for DMC
  - To standardize protocol including command format for DMC
- Interested Group
  - OCP H/W Management Project, OpenBMC and DMTF
Demo on OCP Global Summit

- Visit Samsung Booth for Demo