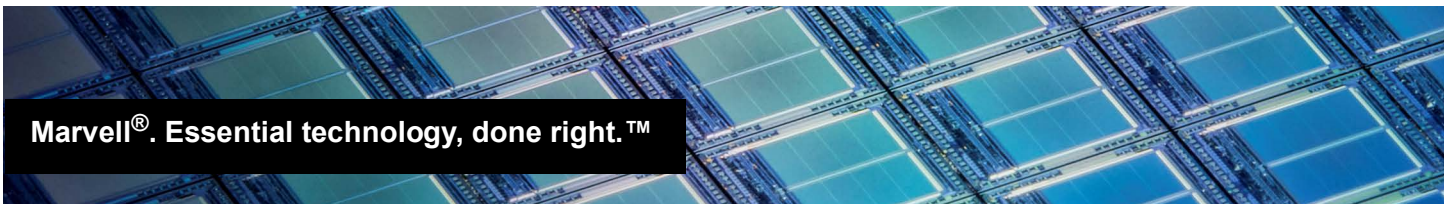

PLDM Support in Marvell QLogic Fibre Channel Adapters

Table of Contents

1 Scope

This application note describes the support of Platform Level Data Model (PLDM) protocol over MCTP with Marvell Qlogic Fibre Channel (FC) adapters.

1.1 Products Affected

The following Marvell QLogic Fibre Channel adapters support PLDM:

Single Port	Dual Port	Quad Port
QLE2690	QLE2692	QLE2694
QLE2740	QLE2742	QLE2764
QLE2770	QLE2772	QLE2774
QLE2870	QLE2872	QLE2874

1.2 Document Conventions

Throughout this applications note, the Marvell QLogic Fibre Channel Adapter is referred to as *adapter*. The ASIC on the adapter is referred to as the *controller*.

1.3 Acronyms

Table 1-1 lists many of the acronyms used in this applications note.

Table 1-1. Acronyms

Acronym	Meaning
DMTF	Distributed Management Task Force
MCTP	Management Component Transport Protocol
PDR	Platform Descriptor Record
PLDM	Platform Level Data Model
VDM	Vendor Defined Message

2 Overview

Marvell QLogic Fibre Channel adapter management supports the following distributed management task force (DMTF) management protocols:

- Management Component Transport Protocol (MCTP) (see Section 3.1)
- Platform Level Database Management (PLDM) (see Section 3.2)

These standards provide agent-less methods to configure and monitor subsystems over sideband interfaces such as SMBus or PCIe®-vendor defined message (VDM). See support table Table 2-1 below.

Table 2-1. Support Table

Model	PCIe VDM	SMbus
Mach-SP / QLE2770	Yes	Yes
Mach-DP / QLE2772	Yes	Yes
Mach-QP / QLE2774	Yes	Yes
Qlipper-SP / QLE2740	Yes	No
Qlipper-DP / QLE2742	Yes	No
Qlipper-QP / QLE2764	Yes	Yes

Each available interface presents an endpoint with a unique Endpoint ID (EID). Both paths can be used simultaneously, with each response being returned on the path used by the request.

3 Reference Documents

The user should be familiar with the documents listed in the following sections.

3.1 MCTP Specifications

The Marvell QLogic FC adapter supports features from the following MCTP specifications:

- *Management Component Transport Protocol (MCTP) Base Specification*, document number DSP0236
- *Management Component Transport Protocol (MCTP) SMBus/I2C Transport Binding Specification*, document number DSP0237
- *Management Component Transport Protocol (MCTP) PCIe VDM Transport Binding Specification*, document number DSP0238
- *Management Component Transport Protocol (MCTP) IDs and Codes*, document number DSP0239

3.2 PLDM Specifications

The Marvell QLogic FC adapter supports features from the following PLDM documents:

- *Platform Level Data Model (PLDM) Base Specification*, document number DSP0240
- *Platform Level Data Model (PLDM) for Monitoring and Control*, document number DSP0248
- *Platform Level Data Model (PLDM) for FRU Data Specification*, document number DSP0257
- *Platform Level Data Model (PLDM) for Firmware Update*, document number DSP0267
- *Platform Level Data Model (PLDM) NIC Modeling*, document number DSP2054

3.3 SFP Specifications

The Marvell QLogic FC adapter supports features from the following SFP specifications:

- *SFF-8472 Specification for Management Interface for SFP+* (Rev 12.2 November 21, 2014)

4 PLDM Support

This section contains:

4.1 PLDM Base

The adapter supports the PLDM Base commands in Table 4-1. For more information about the commands, see the *Platform Level Data Model (PLDM) Base Specification*.

Table 4-1. PLDM Base Commands Supported

Command Code (h)	Command Name
01	Set TID
02	Get TID
03	Get PLDM Version
04	Get PLDM Types
05	Get PLDM Commands

4.2 PLDM Monitoring and Control

The adapter supports the *Platform Level Data Model (PLDM) Monitoring and Control Specification*. This functionality allows the host to monitor sensors for:

- Adapter health
- Adapter ambient temperature (available for temperature sensor enabled adapters)
- Port health
- Port temperature
- Fibre Channel port link state
- Fibre Channel port link speed
- SFP presence
- Firmware version change.
- SFP temperature, voltage, and alarms (only available for adapters with SFP Polling enabled. Refer section SFP Polling for more details).

4.2.1 SFP Polling

SFP polling refers to the process of periodically checking the status of SFP modules connected to the storage network adapters. The monitoring frequency is configured for 5 seconds for Channel Adapters. This provides information about the SFP temperature, voltage, and alarms which allows the system to track the health and stability of the network.

For details on verifying if SFP Polling is supported on your Adapter, see the respective Adapter User's Guide:

- *User's Guide—Fibre Channel Adapter (2600 Series)*, part number FC0054609
- *User's Guide—Fibre Channel Adapter (2700 Series)*, part number 83270-546
- *User's Guide—Fibre Channel Adapter (2800 Series)*, part number MA2854601

4.2.2 Supported Monitoring and Control Commands

The commands in Table 4-2 allow the adapter to monitor the features listed in Section 4.2.

Table 4-2. Supported PLDM Monitoring and Control Commands

Command Code (h)	Command
01	Set TID
02	Get TID
03	Get Terminus UID
04	Set Event Receiver
05	Get Event Receiver
0A	Platform Event Message
0C	Event Message Supported
0D	Event Message Buffer Size
10	Set Numeric Sensor Enable
11	Get Sensor Reading
12	Get Sensor Thresholds
13	Set Sensor Thresholds
15	Get Sensor Hysteresis
16	Set Sensor Hysteresis
17	Init Numeric Sensor
20	Set State Sensor Enables
21	Get State Sensor Readings

Table 4-2. Supported PLDM Monitoring and Control Commands (Continued)

Command Code (h)	Command
22	Init State Sensor
50	Get PDR Repository
51	Get PDR
52	Get PDR Repository Signature

4.2.3 Sensors

The content and layout of the adapter's sensors depends on the hardware (single port or dual port) as well as the enabled features (for example, SFP polling). Each sensor provides a Platform Descriptor Record (PDR) that defines its functionality and capabilities.

Numeric sensors support thresholding with hysteresis and can be configured to generate events for conditions that exceed the threshold limits.

State sensors can be configured to generate events when the sensor's state or operational state changes.

The adapter follows the convention for sensor IDs and handles as described in the document *DMTF PLDM NIC Modeling*.

Figure 4-1 illustrates a high-level overview of the sensors and the components to which they connect.

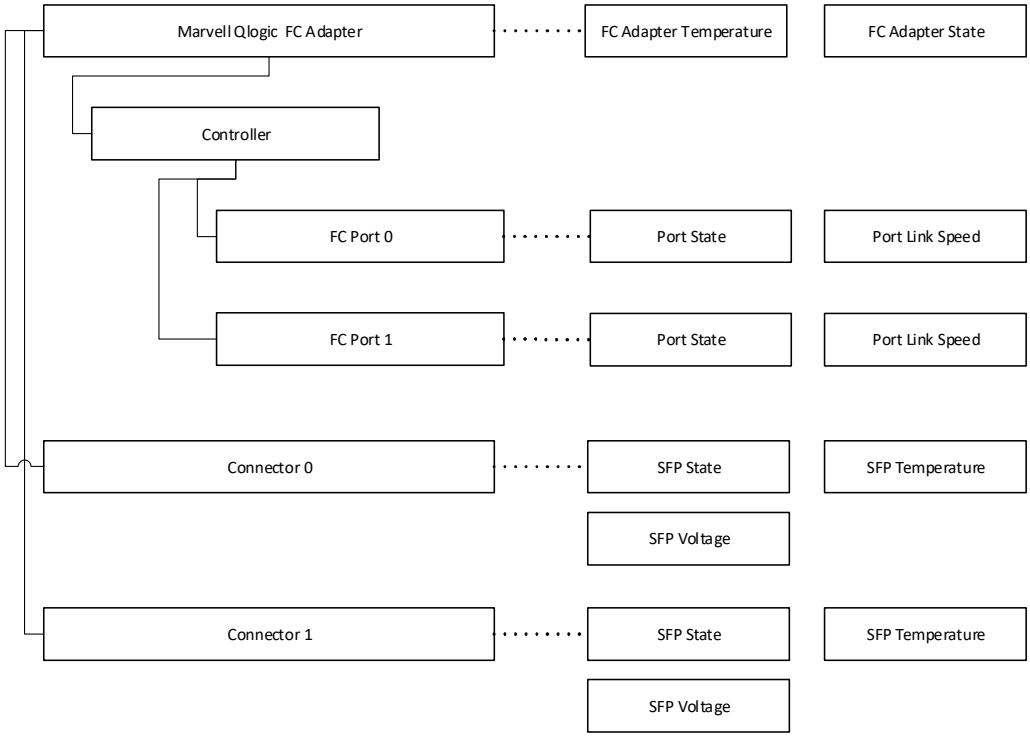

Figure 4-1. Sensor Block Diagram

4.2.3.1 Adapter Composite State

The top-level adapter composite state sensor provides the overall status of the adapter and all of its contents. The sub-sensors reflect the most critical status of the controller and all the connectors. The format for this sensor is shown in Figure 4-2 and described in the following paragraphs.

Handle	Sensor ID	Container	Type	Instance	State Set
1101	5	0 (System)	68 (NIC)	1	—
Health					01h
Configuration Valid					15h
Configuration Changed					16h
Firmware Version Changed					18h

Figure 4-2. Adapter Composite State Sensor Format

- **Health.** Reflects the health status of the controller and all connectors.
- **Configuration Valid.** Indicates if the configuration of the controller and connectors is valid.
- **Configuration Changed.** Indicates if the configuration of the controller or connectors has changed since startup.
- **Firmware Version Changed.** Indicates if the firmware version of the controller has changed since initialization.

4.2.3.2 Adapter Ambient Temperature

For adapters that have one (or more) board ambient temperature sensors, there is a PDR for each sensor. The Container and Type fields indicate that this sensor is tied to the adapter rather than to the controller or to an SFP. The format for this sensor is shown in Figure 4-3.

Handle	Sensor ID	Container	Type	Instance	Base Unit
1130–1139	20–29	0 (System)	68 (NIC)	1–9	02h

Figure 4-3. Adapter Ambient Temperature Sensor Format

4.2.3.3 Controller Composite State

The controller composite state sensor provides the combined status of all the Fibre Channel processors on the adapter. The format for this sensor is shown in Figure 4-4 and described in the following paragraphs.

Handle	Sensor ID	Container	Type	Instance	State Set
1101	5	0 (System)	68 (NIC)	1	—
Health					01h
Configuration Valid					15h
Configuration Changed					16h
Firmware Version Changed					18h

Figure 4-4. Controller Composite State Sensor Format

- **Health.** Reflects the health status of the controller and all Fibre Channel processors.
- **Configuration Valid.** Indicates if the controller's configuration is valid.
- **Configuration Changed.** Indicates if the controller's configuration has changed since startup.
- **Firmware Version.** Indicates if the firmware version of the controller has changed since initialization.

4.2.3.4 Controller Temperature

The controller temperature sensor provides the internal (junction) temperature of the controller processor (see Figure 4-5).

Handle	Sensor ID	Container	Type	Instance	Base Unit
1500	300	100 (NIC)	144 (NetCtlr)	1	02h

Figure 4-5. Controller Temperature Sensor Format

4.2.3.5 Fibre Channel Port Composite State

The adapter provides one Fibre Channel port composite state sensor for each Fibre Channel port on the adapter.

The port health and configuration sensors reflect the current state of each Fibre Channel port.

The format for these sensors is shown in Figure 4-4 and described in the following paragraphs.

Handle	Sensor ID	Container	Type	Instance	State Set
1400 (Port 0) 1401 (Port 1) 1402 (Port 2) 1403 (Port 3)	200 201 202 203	100 (NIC)	302 (FC)	1 2 3 4	—
Link Connection State					33
Health					1
Configuration Valid					15
Configuration Changes					16

Figure 4-6. Fibre Channel Port Composite State Sensor Format

- **Link Connection.** Indicates if the Fibre Channel link is connected.
- **Health.** Provides the health of this Fibre Channel port processor. Indicates if the processor has experienced a failure or if the management controller has lost communication with the processor.
- **Configuration Valid.** Indicates if the Fibre Channel port processor's configuration is valid.
- **Configuration Changed.** Indicates if the Fibre Channel port processor's configuration has changed.

4.2.3.6 Fibre Channel Port Link Speed

The Fibre Channel port link speed sensor provides the current speed of the Fibre Channel link for the port in units of Gbps. A value of zero indicates that the link is down. The format for these sensors is shown in Figure 4-7.

Handle	Sensor ID	Container	Type	Instance	Base Unit
1300 1301 1302 1303	100 101 102 103	1000 (NetCtlr)	302 (FC)	1 2 3 4	60

Figure 4-7. Fibre Channel Port Link Speed Sensor Format

4.2.3.7 SFP Composite State

The SFP composite state sensor provides information about the inserted SFPs. The format for these sensors is shown in Figure 4-8 and described in the following paragraphs.

Handle	Sensor ID	Container	Type	Instance	State Set
2000 2001 2002 2003	700 701 702 703	1040 (Conn)	—	1 2 3 4	
Presence					13
Health					1

Figure 4-8. SFP Composite State Sensor Format

- **Presence.** Indicates if an SFP is detected in the corresponding port's cage.
- **Health.** Provides the health of the SFP.

4.2.3.8 SFP Temperature Sensors

The SFP temperature sensors provide the last read value of the sensors. The format for these sensors is shown in Figure 4-9.

Handle	Sensor ID	Container	Type	Instance	Base Unit
1800	500	1040 (Conn)	—	1	2
1801	501			2	
1802	502			3	
1803	503			4	

Figure 4-9. SFP Temperature Sensors Format (if SFP Polling is Enabled)

4.2.3.9 SFP Voltage Sensors

The SFP voltage sensors provide the last read value of the sensors. The format for these sensors is shown in Figure 4-10.

Handle	Sensor ID	Container	Type	Instance	Base Unit
1700	400	1040 (Conn)	—	1	5
1701	401			2	
1702	402			3	
1703	403			4	

Figure 4-10. Port 0 SFP Voltage Sensors Format (if SFP Polling is Enabled)

4.2.3.10 SFP Alarms

The SFP alarm sensors provide the last read value of the sensors. This is a 32-bit value and each bit represents an alarm set or clear condition. Refer Section 3.3 for more details.

4.2.4 Entity Association PDRs

Per the *DMTF PLDM NIC Modeling* specification, the adapter has Entity Association platform descriptor records (PDRs) to define the relationship hierarchy between sensors.

4.2.5 Terminus Locator PDR

The first PDR is for the system the Terminus Locator PDR. The PDR type is 01h.

4.2.6 Event Messages

PLDM asynchronous events can be programmed to send events to the event receiver designated in the Set Event Receiver command. Events are disabled for each sensor by default, but can be enabled and disabled by the Set Numeric Sensor Enable and Set State Sensor Enables commands.

4.3 PLDM FRU Support

This section describes how the adapters support the *Platform Level Data Model (PLDM) for FRU Data Specification*, which allows the caller to retrieve and configure information and parameters related to the adapter.

4.3.1 Commands Supported

The adapter supports the PLDM FRU commands shown in Table 4-3.

Table 4-3. PLDM FRU Commands

Command Code (h)	Command
01	GetFRURecordTableMetadata
02	GetFRURecordTable
03	SetFRURecordTable [a]
04	GetFRURecordByOption

[a] This command writes the new parameters to the flash. The changes do not take effect until the adapter is restarted.

All commands are part of the *Platform Level Data Model (PLDM) for FRU Data Specification*. For details about the command structure and responses, see the specification.

4.3.2 Limitations

The adapter firmware does not support multi-part transfers. All data must be sent and retrieved in a single packet. The packet length cannot exceed 1,024 bytes.

4.3.3 FRU Record Set

The adapter supports a single FRU record set with an ID of 1077h. The FRU record set contains a General FRU record (see Section 4.3.3.1) and an OEM FRU record (see Section 4.3.3.2).

4.3.3.1 General FRU Record

The General FRU record has a RecordType of 01h. The fields are shown in Table 4-4.

Table 4-4. General FRU Fields

Field Type Number	Field Type Description	Format	Access
2	Model	ASCII	Read Only
3	Part number	ASCII	Read Only
4	Serial number	ASCII	Read Only

Table 4-4. General FRU Fields (Continued)

Field Type Number	Field Type Description	Format	Access
5	Manufacturer	ASCII	Read Only
7	Vendor	ASCII	Read Only
8	Name	ASCII	Read Only
13	Vendor IANA	UINT32	Read Only

4.3.3.2 OEM FRU Record

The OEM FRU record has a RecordType of FEh.

The first part of the OEM FRU record consists of system data, which is closely associated with system-wide characteristics of the adapter (for example, the PCIe® device ID or firmware version).

The second part of the OEM FRU record consists of port-related data such as the world-wide name (WWN), port speed, and boot parameters. There are multiple copies of port related data, one for each port. Each instance of port data has a unique Field Type Number.

The OEM FRU record fields are shown in Table 4-5.

Table 4-5. OEM FRU Fields

Field Type Number	Field Type Description	Format	Access	Notes
1	Vendor IANA	UINT32	Read Only	—
2	PCIe vendor ID	UINT16	Read Only	—
3	PCIe device ID	UINT16	Read Only	—
4	PCIe subsystem vendor ID	UINT16	Read Only	—
5	PCIe subsystem device ID	UINT16	Read Only	—
6	Firmware version	UINT32	Read Only	Major.Minor.Subminor.0
7	Firmware release date	Char[8]	Read Only	“YYYYMMDD”

OEM FRU Record Port Data

The FRU record port data contains data for all the adapter ports. Each port is allocated a range of Field Type Numbers, as follows:

80h–9Fh	Port 0
A0h–BFh	Port 1
C0h–DFh	Port 2
E0h–FFh	Port 3

For example, to access port 0's world-wide port name (WWPN), the Field Type Number is 80h. To access port 0's boot mode, the Field Type Number is 98h. To access port 1's WWPN, the Field Type Number is A0h. To access port 1's boot mode, the Field Type Number is B8h.

Because there are a small number of available Field Type Numbers, boot target information WWN/logical unit number (LUN) is combined into a single field as shown in Table 4-6.

Table 4-6. OEM FRU Port Fields

<table>
<tr><th>Field Type Number (h)</th><th>Field Type Description</th><th>Format</th><th>Access</th></tr>
<tr><td>80, A0, C0, E0</td><td>WWPN</td><td>UINT8[8]</td><td>R/W</td></tr>
<tr><td>81, A1, C1, E1</td><td>WWNN</td><td>UINT8[8]</td><td>R/W</td></tr>
<tr><td>82, A2, C2, E2</td><td>Manufacturing WWPN</td><td>UINT8[8]</td><td>R/O</td></tr>
<tr><td>83, A3, C3,xE3</td><td>Manufacturing WWNN</td><td>UINT8[8]</td><td>R/O</td></tr>
<tr><td>84, A4, C4, E4</td><td>Port speed configuration</td><td>Valid values are:
<table><tr><th>Value</th><th>Meaning</th></tr><tr><td>0</td><td>Auto configure</td></tr><tr><td>4</td><td>4Gbps</td></tr><tr><td>8</td><td>8Gbps</td></tr><tr><td>16</td><td>16Gbps</td></tr><tr><td>32</td><td>32Gbps</td></tr></table></td><td>R/W</td></tr>
<tr><td>85, A5, C5,E5</td><td>Port connection configura-tion</td><td>Valid values are:
<table><tr><th>Value</th><th>Meaning</th></tr><tr><td>0</td><td>Loop only</td></tr><tr><td>1</td><td>Point-to-point only</td></tr><tr><td>2</td><td>Loop preferred, otherwise point-to-Point</td></tr></table></td><td>R/W</td></tr>
<tr><td>86, A6, C6, E6</td><td>Port login timeout</td><td>Int</td><td>R/W</td></tr>
</table>

Table 4-6. OEM FRU Port Fields (Continued)

<table>
<tr><th>Field Type Number (h)</th><th>Field Type Description</th><th>Format</th><th>Access</th></tr>
<tr><td>87, A7, C7, E7</td><td>Port login retry count</td><td>Int</td><td>R/W</td></tr>
<tr><td>88, A8, C8, E8</td><td>Link down timeout</td><td>Int</td><td>R/W</td></tr>
<tr><td>89, A9, C9, E9</td><td>Port down retry count</td><td>Int</td><td>R/W</td></tr>
<tr><td>8A, AA, CA, EA</td><td>Payload size</td><td>Int</td><td>R/W</td></tr>
<tr><td>8B, AB,CB, EB</td><td>Loop reset delay</td><td>Int</td><td>R/W</td></tr>
<tr><td>Boot Params</td><td></td><td></td><td></td></tr>
<tr><td>98, B8, D8, F8</td><td>Boot mode</td><td>Valid values are:
<table><tr><th>Value</th><th>Meaning</th></tr><tr><td>0</td><td>Disabled</td></tr><tr><td>1</td><td>Specified LUN</td></tr><tr><td>2</td><td>First LUN</td></tr><tr><td>3</td><td>First LUN 0</td></tr><tr><td>4</td><td>First LUN Not 0</td></tr><tr><td>5</td><td>Fabric assigned</td></tr></table></td><td>R/W</td></tr>
<tr><td>99, B9, D9, F9</td><td>Boot target info 0</td><td rowspan="4">Valid values are:
<table><tr><th>Bytes</th><th colspan="2">Meaning</th></tr><tr><td>0–7</td><td>WWPN</td><td>UINT8[8]</td></tr><tr><td>8–9</td><td>LUN</td><td>UINT16</td></tr></table></td><td>R/W</td></tr>
<tr><td>9A, BA, DA, FA</td><td>Boot target info 1</td><td>R/W</td></tr>
<tr><td>9B, BB, DB, FB</td><td>Boot target info 2</td><td>R/W</td></tr>
<tr><td>9C, BC,DC, FC</td><td>Boot target info 3</td><td>R/W</td></tr>
</table>

5 PLDM Firmware Update Support

This section describes the support for the *Platform Level Data Model (PLDM) for Firmware Update*. Firmware updates are supported only over the PCIe/VDM interface.

NOTE

The Adapter supports PLDM Firmware update, however the scope of invoking the PLDM firmware update functionality lies with the end user.

Table 5-1 lists the PLDM commands supported by the adapter.

Table 5-1. PLDM Firmware Update Commands

Command Code (h)	Name
01	Query Device Identifiers
02	Get Firmware Parameters
10	Request Update
13	Pass Component Table
14	Update Component
15	Request Firmware Data
16	Transfer Complete
17h	Verify Complete
18h	Apply Complete
1Ah	Activate Firmware
1Bh	Get Status
1Ch	Cancel Update Component
1Dh	Cancel Update

6 Revision History

Document Revision History	
Revision 1, August 10, 2021	
Revision 2, June 10, 2025	
Revision 3, December 02, 2025	
Changes	**Sections Affected**
Added support table Table 2-1	"Overview" on page 3