

**PD692x0  
BT Serial Communication Protocol  
User Guide**



**BT S.C.P Revision 3.29  
Document version 1.0  
Supports up to Firmware 3.52**

**PD-000397875**

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## 1 General

This document describes the communication protocol developed by Microsemi™ for its Power over Ethernet (PoE) integrated solution, serving modules and PoE devices. This protocol facilitates serial communications between a Host CPU (meaning a PoE-enabled, Layer 2 Ethernet switch or power source equipment/PSE) and the PoE controller. By using the communication protocol, the programmer can write control commands to power ports, read their status and manage PoE parameters. The protocol supports systems having up to 48 logical ports (2-Pair and 4-Pair).

Supported PoE devices:

- **IEEE802.3BT / D3.2 standard:** PD692x0\_BT Firmware - single signature PDs, classes 0 to 8, Future dual signature PDs classes 1 to 5.
- **Out of IEEE802.3BT / D3.2 standard:** PD692x0\_BT Firmware - class4, 60w PDs or class4 POH PDs (90w limitation).
- **Non IEEE compliant PDs:** PD692x0\_BT Firmware – Legacy detection class0, 15.4w and 30w PDs.

## 2 Basic Communication Information

The communication protocol is a bi-directional Master/Slave protocol type. The Master is the Ethernet PSE Host CPU and the Slave is the PoE unit controller (see Figure 1). Figure 2 illustrates a simplified representation of the protocol. The Host CPU can utilize a TTL-levelled asynchronous serial communication (UART) or I<sup>2</sup>C protocol. The PoE controller communicates with PoE devices via an SPI bus. The slave will reply with 15-byte message to any 15-byte transaction from the host or when it is out of reset. In all other cases the slave will not generate communication messages.

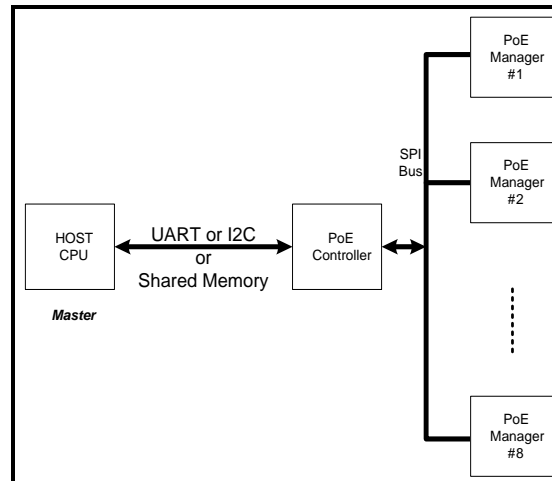


Figure 1: Basic Communication Diagram

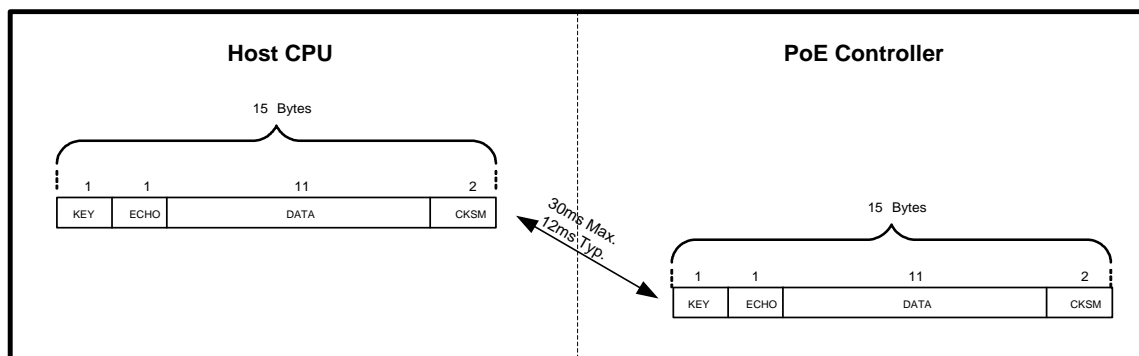


Figure 2: Protocol Representation

Communication parameters are transferred in Big-endian format (MSB is transmitted first). Table 1 lists the communication options.

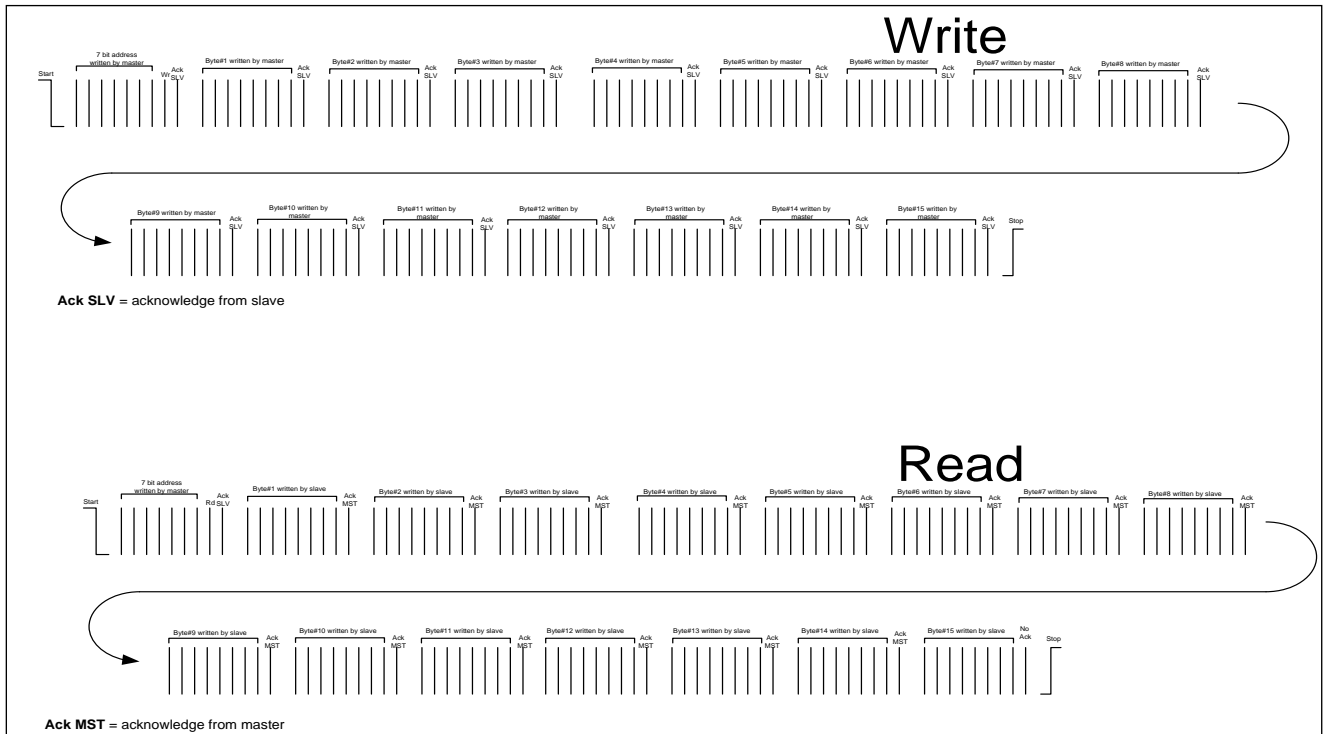
Table 1: Communication Options

RS-232/UART	I <sup>2</sup> C	Shared Memory
Bits per second: 19,200 bps	Speed: 400 kHz (max)	Special memory based physical layer, which can share full message structure between the Host and the PoE controller. Used in PD69200M
Data bits: 8	7-bit address	
Parity: None	I <sup>2</sup> C Address range is defined in AN-211	
Stop bits: 1		
Flow control: None		
	Clock Stretching : Yes	

**Note:**

1. When I<sup>2</sup>C is being used, clock stretching must be supported by the Host CPU.
2. Shared memory physical layer requires special host device.  
Refer to PD69200M documentation explaining the architecture and the physical layer message transfer.
3. All protocol commands are supported by shared memory architecture except **“Save System Settings”** (section 4.1.3), **“Restore Factory Default”** (section 4.1.2) and **“Software Download”** (section 5).  
For more details refer to PD69200M documentation.

Time Criteria	Description	Value
Read back time	Minimum waiting time since last 15-bytes transmission and before reading back the telemetry/report from the PoE controller	30ms  <u>Exceptions:</u> Save = 50mSec Restore = 100mSec
Read back time using message ready I/O.	When using I <sup>2</sup> C it is recommended to use the “Message_Ready” I/O for faster response time. The Host should poll this I/O, before reading back the telemetry, instead of waiting 30mSec. To activate message ready I/O see mask 0x1E at section 0.	11ms to 30ms  Average = 12mSec
Time between commands (Key = 0x00)	Minimum waiting time since last command report and before sending a new command to the PoE controller.	30ms
I <sup>2</sup> C buffer clear timeout	Time limit for clearing the PoE controller's internal I <sup>2</sup> C receive buffer, if it doesn't contain 15 bytes.	500ms
Shared memory messages	<ol style="list-style-type: none"> <li>1. Message transport timing between command and reply.</li> <li>2. Time between commands.</li> </ol>	11ms to 30ms Average = 12mSec



**Note:** The 15 byte message in I<sup>2</sup>C can be sent as (15 x single) data bytes transactions.



### 3 Messages Structure

The following sections detail the message structure. The message length is constant 15-Byte using 1-Byte key header and 2 Bytes of message checksum at the end.

#### 3.1 Definitions

The message key types are:

- **Command and Program:** Transmitted by the Host to configure the PoE unit. No data is required in response, except a success/failure report.
- **Report:** Transmitted back from the PoE controller in response to commands and programs.
- **Request:** Transmitted by the Host as a request for information from the PoE unit. Telemetry is sent back in response. In case of message error, detected by the PoE controller, a failure report will be sent back instead of telemetry.
- **Telemetry:** Transmitted back from the controller in response to Host requests or when PoE unit is out of reset.

##### Note:

1. **Numeric Base:** Unless otherwise specified, all numeric parameters are in HEX-base format. If a decimal value is expected (for example power level), the user should convert bases before or after sending/retrieving data.

Table 2 shows the packet structure for messages **sent** from the Host CPU to the PoE controller.

**Table 2: Example of packet structure of messages sent from the Host**

[0] KEY	[1] ECHO	[2] Subject	[3] Subject1	[4] Subject2	[5] DATA	[6] DATA	[7] DATA
Command/ Program/ Request							
[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA	[13] CSumH	[14] CSumL	

Table 3 shows the packet structure for messages **received** by the Host CPU from the PoE controller.

**Table 3: Example of packet structure of messages received by the Host**

[0] KEY	[1] ECHO	[2] Subject	[3] Subject1	[4] Subject2	[5] DATA	[6] DATA	[7] DATA
Telemetry/ Report							
[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA	[13] CSumH	[14] CSumL	

### 3.1.1 Byte 1: KEY

The KEY field defines the type of message sent or received. When the Host CPU transmits a message, the PoE controller acknowledges it by sending a response or telemetry, according to the sent KEY type or detected error.

KEY (hex)	Description	Traffic Flow
0x00	Command	Host CPU → PoE controller
0x01	Program	Host CPU → PoE controller
0x02	Request	Host CPU → PoE controller
0x03	Telemetry	Host CPU ← PoE controller
0x04	Test	Host CPU → PoE controller
0x52	Report	Host CPU ← PoE controller

**Note:** Upon any PoE out of reset, the Host CPU receives a System Status *Telemetry* Packet, sent by the PoE controller. When using I<sup>2</sup>C interface, a read transaction message must be performed by the Host.

### 3.1.2 Byte 2: ECHO

The ECHO field should be used by the Host to synchronize the sent and received messages. The Host inserts a number between 0x00 to 0xFE and the corresponding response echoes this number. The Host can use any sequence, as long as two consecutive messages do not use the same ECHO number.

**Note:** Using the same ECHO number for two consecutive messages can cause a communication loss.

### 3.1.3 Byte 3 to 5: SUBJECT, SUBJECT1, SUBJECT2

The SUBJECT fields are utilized to define the sent message character. The actual values are specific to each message and are detailed at each command.

**Note:** SUBJECT2 can sometimes serve as a DATA field.

### 3.1.4 Byte 6 to 13: DATA

The DATA fields hold the data transmitted / received by the Host. The actual values are specific to each message and are detailed at each command.

### 3.1.5 Byte 14 to 15: CHECKSUM

The CHECKSUM data confirms message integrity and it is part of each message, regardless of the message type. The CHECKSUM is a 16-bit word, containing the arithmetic sum of the first 13 message bytes (without checksum bytes). The Host CPU has to calculate this sum before sending it as part of the message. The PoE controller performs the same calculation for the data received and compares the result with the received checksum. If the received data does not match the CHECKSUM sent, the PoE controller will send a Report message containing a CHECKSUM error indication. It is the Host responsibility to decide how to act in case of an error.

**Note:** In the detailed protocol description the CHECKSUM fields will not be shown.

## 3.2 Port Number Identification

When creating messages, it is sometimes necessary to identify one or more port numbers. This is especially true when setting various parameters (**Set** commands) or when requesting a port status (**Get** or **Request** commands):

PoE Devices	System	Port Number
Up to 12 PoE devices	Up to 48 logical Ports. Up to 96 physical Ports.	<ul style="list-style-type: none"> <li>• [0x00 – 0x2F] for individual logical ports.</li> <li>• [0x00 – 0x5F] for physical matrix ports.</li> <li>• [0x80] for all ports</li> </ul>

### 3.3 Unused Fields “N”

Unused fields that are represented as character “N” with value of 0x4E (Yellow marked in the following examples), are **reserved for future use** by Microsemi.

**Note:**

1. When sending Commands, Requests, or Program keys, the Host must send 0x4E in the “N” fields. Other value that will be sent instead may be operational in future versions.
2. The Host or any user should ignore the Telemetry “N” fields.  
Telemetry “N” fields are subject to be modified by Microsemi without any notice.  
If any user will add any logic that checks the “N” field, Microsemi is not responsible for the result.

**Examples:** 0x4E and N are Yellow marked

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x3D	0x01 to 0xFF	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command		Global	SystemStatus	Private Label	N	N	N	N	N	N	N	N

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x0B	0x60	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	Supply	Total Power	N	N	N	N	N	N	N	N
0x03	##	Val		Val		Val		Val		Val	0x4E	0x4E
Telemetry		Power Consumption		Calculated Power		Available Power		Power Limit		Power Bank	N	N

## 4 Protocol messages description

The various protocol messages are described below:

### 4.1 System messages

#### 4.1.1 Reset Command

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x55	0x00	0x55	0x00	0x55	0x4E	0x4E	0x4E	0x4E	0x4E
Command		Global	Reset		Reset		Reset	N	N	N	N	N

This command resets the PoE Controller. Due to this reset, the PoE devices will reset themselves as well. All ports will shut down and the PoE controller will reboot.

As part of rebooting, a System Status Telemetry message will be transmitted back to the Host within \*T<sub>WAKEUP</sub> (refer to **Get System Status** command for more details). If communication between the PoE Controller and the Host CPU is I<sup>2</sup>C bus, then the Host CPU must read this status telemetry. The self-telemetry message echo number is 0xFF for easy Host recognition.

**Note:** The PoE controller performs reset only when all 15-byte response messages were transmitted out from the communication buffer.

\*T<sub>WAKEUP</sub> = 300msec typical depending on system architecture.

#### 4.1.2 Restore Factory Default

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x01	##	0x2D	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Program		RestoreFact	N	N	N	N	N	N	N	N	N	N

This command restores modified values to factory default values that are part of the firmware release version. Ports will shut down after sending this command.

**Note:**

1. After sending this command, the host must not access the MCU controller using I<sup>2</sup>C or UART for at least 100ms. After the 100mSec wait, the command response must be read back (when I<sup>2</sup>C is being used).
2. A restore action will be performed automatically if after reset, corrupted information is detected.
3. This command is not supported by PD69200M.

System status telemetry will not be sent back by the PoE MCU, after restore operation ends.

#### 4.1.3 Save System Settings

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x01	##	0x06	0x0F	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Program		E2	SaveConfig	N	N	N	N	N	N	N	N	N

This command saves the current user values into the non-volatile memory and these user values become the defaults after any reset.

To change the default back to the initial factory values, use the **Restore Factory Defaults** command.

**Example:** If the Host set the Power Limit to '400' and this value is to be a default value, then 'save' must be carried out.

**Note:**

1. After sending this command, the host must not access the MCU controller using I<sup>2</sup>C or UART for at least 50ms. After the 50mSec wait, the command response must be read back (When I<sup>2</sup>C is being used).
2. This command is not supported by PD69200M.

#### 4.1.4 Set User Byte to Save

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x01	##	0x41	0x00 to 0xFE	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Program		UserByte	NVM User Byte	N	N	N	N	N	N	N	N	N

This command assists in verifying that a restore factory default has occurred. The Host can set the User-Byte and then save this value as part of the new defaults, by using the **Save System Setting** command (refer to Save System Settings command, Section 4.1.3).

If the defaults were restored back to factory defaults for any reason, the User-Byte value will become 0xFF. To read the User-Byte value, refer to **Get BT System Status** Request (Section 4.1.6).

**NVM User Byte:** Use any value between 0x00 to 0xFE.

**Note:**

1. This command is not practical to use at PD69200M, since save operation is not supported by PD69200M.

#### 4.1.5 Set Private Label

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x3D	0x01 to 0xFF	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command		Global	SystemStatus	RAM Private Label	N	N	N	N	N	N	N	N

This command assists in verifying that a reset has occurred.

**RAM Private label:** The private label value is 0x00 after reset. It is recommended that any value higher than 0x00 will be used when host wants to use this field.

The Private Label value can be read by using **Get BT System Status** Request (Section 4.1.6).

#### 4.1.6 Get BT System Status

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xD0	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	BT System Status	N	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	Val	0x4E	0x4E	0x4E	Val
Telemetry		0x00	CPU Status2 Err Codes	Factory Default	0x00	RAM Private Label	NVM User Byte	Found Devices	N	N	N	Event Exist

This telemetry indicates the actual system status information of the PoE Controller.

This response is the only response initiated by the MCU, regardless of a request after start-up or after reset.

- **0x00 Fields** – When the 0x00 fields return different values it means Boot up Error (Refer to boot up error telemetry)
- **CPU status2 Err codes:**
  - 0x00** – No error
  - 0x01** – Reserved for future use
  - 0x02** – SPI bus timeout error. (When this value is set, only host communication will operate).
- **Factory default:**
  - Bit0** = '1' indicates that factory default parameters are currently set.
- **RAM Private Label:** Saved in the RAM. Equals 0x00 after reset. Refer to Set Private Label command (Section 4.1.5).
- **NVM User Byte:** Saved in nonvolatile memory. Equals 0xFF at factory default.
- **Found Devices:**
  - Bit[7..4]** – The number of active devices (Range from 0x0 to 0xB).
  - Bit[3..0]** – The number of found devices after boot up (Range from 0x0 to 0xB).

▪ **Event Exist**

**Bit[7..1]** – Reserved for future use (Need to be ignored by the Host).

**Bit[0]** – When set to 1 indicates that an event occurred. The Host must continue and read 4.1.7 Get BT Event Cause. This bit will be cleared when all events are cleared.

#### 4.1.6.1 Telemetry at Boot Up Error

When CPU\_Status1 reports on firmware error (bit 1 = '1'), the telemetry structure changes to the following:

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x03	0xFF	Val	0x4E	0x4E	Val	Val	Val	Val	0x4E	0x4E	0x4E	0x4E
Telemetry		CPU Status1 Err	N	N	Err Code	Err Info1	Err Info2	Download Type	N	N	N	N

Need Download is reported in case that Application CRC error was detected by the boot. To distinguish between KL15 boot that request an application or D21 that request and application, "Download Type" field was added with relevant numbering, described in the below table.

Following are the fields description table in case of an error:

Err Name	Err Code	Err Info1	Err Info2	Download Type KL15	Download Type D21
Need Download	0x4E	0x4E	0x4E	0x4E	0x33
HW error	0x02	CPU Type Boot	CPU Type App	0x4E	0x33
For Future Use	0x01				
Sys Type error from APP	0x03	Boot Sys Type	App Sys Type	0x4E	0x4E

HW\_error is reported when Boot CPU type (Internal parameter) and Application CPU type (Internal parameter), are not matched. The "Download Type" field was added to this message as well, to distinguish between KL15 and D21 MCUs.

Sys Type Error is reported when Boot Sys Type and Application Sys type, are not matched.

Sys Type values are:

System type	Product	Value
PD692x0	Enhanced PD69208	0x40

In case of boot-up error, the system will keep sending this message every second and will only enable initiation of software download protocol as described in Section 5.2.



#### 4.1.7 Get BT Event Cause

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xD1	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	BT Event	N	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	Val	0x4E	Val	Val	
Telemetry		Port Cause Event bits [7..0]	Port Cause Event bits [15..8]	Port Cause Event bits [23..16]	Port Cause Event bits [31..24]	Port Cause Event bits [39..32]	Port Cause Event bits [47..40]	System Event	N	System OkReg	Device event	

This command retrieves the following information:

- **Port cause event bits** – 48 per port event bits telemetry, indicating that an event happened on a port. An event on a port means that the port status was changed. To understand what the event type was, the host is required to read the relative port information, by reading port status. It is recommended to use “**Get BT Port Status**” telemetry information to analyze the exact port event.  
The event bits will be cleared when the correlated event register of the port will be read by the user.
- **System Event** – See below table (The events are clear on read)

System Event	Bit	Description
Reset or Restore	0	Reset or Restore occurred. The Reset sources are: POR, Reset pin, Reset command, PD692x0 Watch Dog.
Vmain Fault	1	When Vmain is out of range, this bit is set to '1'. This bit will return to be 1 after clear on read as long as Vmain remain out of range.
System spare events	2 to 7	Future use

- **SystemOkReg** – This register reflecting system OK bits for host usage, instead of using the xSystem OK Pin.
  - bit0 – Vmain is in range:
    - 1 = Vmain is in the defined PoE operational voltage range.
    - 0 = Vmain is outside from the defined PoE operational voltage range. (Ports status changes to 0x06,0x07)
  - bit1 – Over power indication in % (Based on 4.1.14 settings):
    - 1 = If the system power is above the % value that was defined in the “% Indication ON”, set in 4.1.14.
    - 0 = If the system power is below the % value that was defined in the “% Indication OFF”, set in 4.1.14 or if the indication is not operational.
  - bit2 – Over power indication in watts (Based on 4.1.14 settings):
    - 1 = If the system power is above the watt value that was defined in the “Indication ON”, set in 4.1.14.
    - 0 = If the system power is below the watt value that was defined in the “Indication OFF”, set in 4.1.14 or if the indication is not operational.
- **Device Event** – This field reflects a PD69208 Device error event (Bit per device, up to 12bits)
  - Bit 0** – ‘1’ means an event on device 0.
  - Bit 1** – ‘1’ means an event on device 1.
  - || ...
  - || ...
  - Bit 11** – ‘1’ means an event on device 11.
  - Bits[15..12]** – Reserved for future use.

The correlated event bit will be cleared when the device event register will be read by the user.

The actual device event reason can be read through “**Get BT PoE Device Status**”, by analyzing the device status field.

#### 4.1.8 Get System Status2

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x84	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	System Status2	N	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	0x00	0x00	0x00	0x00	0x00	Val	Val	
Telemetry		SRS	GIE1	Reset Info	GIE3	DB Recovery	Rsrvd	Rsrvd	Rsrvd	Save Command Counter	0x0000	

##### SRS – System Reset Status:

The byte is formatted from KL15 reset causes register to be protocol backwards compatible.

**Bit 0** – Always '0'

**Bit 1** – LVD – Low Voltage Detect – (Not supported at this point in time)

The CPU supply drops below the LVD trip voltage and LVD reset occurs.

1 = Reset caused by LVD trip or POR.

0 = Reset not caused by LVD trip or POR.

**Bit 2** – Reserved for internal use.

**Bit 3** – Lockup – Unrecoverable exception.

**Bit 4** – ILOP – Illegal Opcode

Reset was caused by an attempt to execute an unimplemented or illegal opcode.

1 = Reset caused by an illegal opcode.

0 = Reset not caused by an illegal opcode.

**Bit 5** – COP – Computer Operation Properly (COP) Watchdog

Reset was caused by the COP watchdog timer timing out.

1 = Reset caused by COP timeout.

0 = Reset not caused by COP timeout.

**Bit 6** – PIN – External Reset Pin

Reset was caused by an active-low level on the external reset pin.

1 = Reset caused from external reset pin.

0 = Reset not caused by external reset pin.

**Bit 7** – POR – Power On Reset

Reset was caused by the power-on detection logic because the internal supply voltage was ramping up at the time. If supported, the low-voltage reset (LVD) status bit is also set to indicate that the reset occurred while the internal supply was below the LVD threshold.

1 = POR caused reset.

0 = Reset not caused by POR.

**GIE1 – General Internal Error 1:**

When different than 0x00, it indicates a general internal error.

The flags are cleared after read or power up.

The flags will retain their status after a reset that is not caused by power-up.

Bit 0 – Clock Loss IRQ occurred.

Bit 1 – UART IRQ occurred at I<sup>2</sup>C mode.

Bit 2 – Unauthorized IRQ Occurred.

Bit 3 – I<sup>2</sup>C Arbitration loss occurred.

Bit 4 – External clock recovery failed (Not supported MCU runs on Internal clock only).

Bit 5 – POE Vmain out of range flag.

Bit 6 – CPU voltage warning flag. (Not supported CPU can operate from 2v).

Bit 7 – UART error IRQ Occurred.

**Reset Info**

This byte indicates information about the reason for software reset.

The flags are cleared after read or power up.

The flags will retain their status after reset that is not caused by power\_up.

Bit 0 – If '1', the software reset occurred due to communication reset command

Bit 1 – If '1', the software reset occurred due to clock recovery failure for more than 5 sec. (Not supported MCU runs on Internal clock only).

Bit 2 – If '1', the software reset occurred due to PoE Device failure.

Bit 3 – If '1', I<sup>2</sup>C module was restarted.

Bit 4 – If '1', the software reset occurred due to self-reset.

Bit 5-7 – Always '0'

**GIE3**

Reserved

**DB Recovery**

This field reports the system recovery flow results.

0 – Field Clear.

1 – No recovery activity was performed.

2 – System recovered successfully from valid structure.

3 – Recovery structure CRC error.

4 – Recovery structure version error

5 – Reserved for Internal usage.

6 – PoE manager was reset during crash event.

7 – Entered to recovery mode, wait for Host reset. (This value will stay till Reset).

8 – For Internal usage: Recovery structure is valid with correct timestamp.

9 – Reserved for Internal usage.

10 – The number of detected PoE managers lcs before crash is different from the number detected after crash.

11 – Recovery can't be executed because the recovery mask is disabled.

12 – Recovery CRC calculation is in reversed order than the expected value.

13 – Recovery structure is valid but has a mismatch with the age stamp stored in the PD69208 register

The reported value is clear on read.

**Save Command counter**

This byte indicates the number of times the **Save** command was used. It is a one-byte cyclic counter.

#### 4.1.9 Set BT Events Interrupt Mask

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x64	Val	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command		Global	BT IRQ Mask	System Events Mask Register	Device Events Mask Register	Port Events Mask Register	N	N	N	N	N	N

This command sets the interrupt mask which enables/disables interrupt function events.

Each **Event Mask register** bit defines whether an event, represented in its corresponding bit of the Event Register, is to be masked or unmasked. This masking affects the Interrupt pin output and does not affect the Event Register itself.

0= masked: Interrupt will not be generated when the event happens.

1 = unmasked: Interrupt will be generated when the event happens.

- **System Events Mask Register** – See the below table for events description.

System Event	Bit	Description
Reset or Restore	0	Reset or Restore occurred. The Reset sources are: POR, Reset pin, Reset command, PD692x0 Watch Dog.
Vmain Fault	1	When Vmain is out of range, this bit is set to '1'. This bit will return to be 1 after clear on read as long as Vmain remain out of range.
System spare events	2 to 7	Future use

- **Device Events Mask Register** - See the below table for events description.

Event	bit	Description
Disconnection temperature	0	When the PoE device exceeded the safe operation temperature (ports status changes to 0x36), this bit is set to '1'.
User defined temperature	1	When the PoE device exceeded the predefined user temperature limit, this bit is set to '1'.
PoE device fault	2	When the PoE device is faulty, this bit is set to '1'. (Device lost, refresh in progress).
PoE device refreshed	3	The PD692x0 managed to recover a lost device.
Reserved	4 to 7	

- **Port Events Mask Register** - See the below table for events description.

Event	Bit	Description
Port turned on	0	When any port turns on (its status changes to "0x80 up to 0x9F"), this bit is set to '1'.
Port turned off by user	1	When Port was delivering power and turn off by disabling the port (Status changed from delivering statuses "0x80 up to 0x9F " to 0x08 or 0x1A)
Counters Related Event	2	UDL -When port turns off due to under-load (its updated status is 0x1E), OVL - When port is overloaded (its updated status is 0x1F), SC - When port turns off due to short circuit (its updated status is 0x34), POWER DENIED - When port turns off due to power management (its updated status is 0x3C or 0x3D), INVALID SIG - When port failed in connection check or detection (its updated status is 0x1C or 0x25 or 0xA7) CLASS ERROR – When port failed in classification (its updated status is 0x43).
Open Event	3	Port status was changed from any status to 0xA8 (Port is not connected).
Port fault (other)	4	When Port was delivering power and turns off due to port thermal protection, external voltage injection, internal hardware fault or Vmain out of range Low/High (its status changes to 0x35, 0x24, 0x12, 0x07, 0x06 accordingly) this bit is set to '1'.

#### 4.1.10 Get BT Events Interrupt Mask

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x64	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	BT IRQ Mask	N	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry		System Events Mask Register	Device Events Mask Register	Port Events Mask Register	N	N	N	N	N	N	N	N

This command retrieves the registers mask value that was set and enables each event of the interrupt function.

0= masked: Interrupt will not be generated when the event happens.

1 = unmasked: Interrupt will be generated when the event happens.

#### 4.1.11 Set Individual Mask

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x56	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command		Global	Individual_Mask	Mask Key Number	En/Dis	N	N	N	N	N	N	N

This command sets the individual mask bits. Each mask determines different aspects of the PoE system behavior. The masks are ordered according to Mask Key Numbers from low to high. The list can be found in Appendix 0.

#### 4.1.12 Get Individual Mask

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x56	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	Individual_Mask	Mask Key Number	N	N	N	N	N	N	N	N
0x03	##	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry		En/Dis	N	N	N	N	N	N	N	N	N	N

Telemetry of "Individual\_Mask" value settings.  
Refer to section 0.

#### 4.1.15 Set BT Power Indication LED

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x08	Val	Val	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E
Command		Global	BT Power Indication	Indication Type	% / Watts Indication ON	% / Watts Indication OFF	Indication OFF Delay	N	N	N	N	N

This command sets the percentage levels or watt levels for indicating that the power consumption is getting closer to the limit.

**Indication Type:**

This field selects the type of information to be configured in the set command - % or watts.

0x00 = %

0x01 = watts

The entire command will be ignored if other values will be used in this field.

**Percentage use %:**

%IndicationOn – Any value from 10 to 100. If the system power consumption is greater than this ( $\% * \text{Budget}$ ), the LED indication will be on.

%IndicationOff – Any value from 10 to 100 ( $\leq \% \text{IndicationOn}$ ). If the system power consumption is below this ( $\% * \text{Budget}$ ), the LED indication will be off.

The difference between the %IndicationOn and the %IndicationOff will be used as hysteresis. This indication will be assigned to the System\_OK pin when individual mask 0x40 value = 2. (Appendix 0)

**Limitations for %:**

Any value below 10 will be considered as 10% and any value greater than 100 will be considered as 100%

The command assumes that  $\text{On}\% \geq \text{Off}\%$ . Otherwise the new settings will be ignored.

**Watts use:**

IndicationOn – Any value between 0x00 to 0xFF, in watts. If the system available power is lower than this value, the LED indication will be on.

IndicationOff – Any value between 0x00 to 0xFF, in watts ( $\geq \text{IndicationOn}$ ). If the system available power is higher than this value, the LED indication will be off.

The difference between the IndicationOn and the IndicationOff will be used as hysteresis. This indication will be assigned to the System\_OK pin when individual mask 0x40 value = 4 (Appendix 0).

**Limitations for watts:**

1. The command assumes that  $\text{On}[w] \leq \text{Off}[w]$ . Otherwise the new settings will be ignored.
2. When On value = Off value, there is an inherent gap of 1w between on and off due to the resolution steps of 1w.

**Indication OFF Delay (Can be used for % or Watts):**

When the value is set above 0x00, if the indication was on, and indication off conditions are met, the indication will start blinking during the delay and will turn off only after the defined delay ends. The delay steps are 5sec per LSB, up to 0x1F. Any value above 0x1F will be ignored (0x00 = No delay). The led blinks in 1Hz (0.5sec ON, 0.5sec OFF).



#### 4.1.16 Get BT Power Indication LED

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x08	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	BT Power Indication	N	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry		% Indication ON	% Indication OFF	Watts Indication ON	Watts Indication OFF	Indication OFF Delay	N	N	N	N	N	N

Telemetry for power indication LED settings, Refer to 4.1.15 for fields explanation.

#### 4.1.17 Set BT Class Additional Power

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0xD2	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command		Global	BT Class Power	Class Type	Added Class Power Value	N	N	N	N	N	N	N

This command sets the class power according to user definition, overrides the default value. The new values settings will be added to the initial system defaults and can be saved when using save command.

##### Class Type:

- 1 – Select Class1
- 2 – Select Class2
- 3 – Select Class3
- 4 – Select Class4
- 5 – Select Class5
- 6 – Select Class6
- 7 – Select Class7
- 8 – Select Class8

**Note:** Other Class Type values are not allowed and will be replied with communication error.

##### Added Class Power Value:

The field is used to set the new Class power value. The LSB step is 0.1w.

Example: To set class 4 power from default of 30w to 32w the require Add Class Power Value = 20 decimal (0x14).

##### Note:

1. It is recommended to use this command as part of system initialization.
2. The maximum values that can be set through the protocol is predefined, and guarantee that the class power order value will be from low to high. 1<2<3<4<5<6<7<8.  
Added class power values above the predefined maximum will be clamped.

#### 4.1.18 Get BT Class Power

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xD2	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	BT Class Power	Class Type	N	N	N	N	N	N	N	N
0x03	##	Val		Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry		Class Power Value		Added Class Power Value	Max Added Class Power	N	N	N	N	N	N	N

This command reads the class power with the added power (If added power different from 0) of a specific class.

##### Class Type:

- 1 – Select Class1
- 2 – Select Class2
- 3 – Select Class3
- 4 – Select Class4
- 5 – Select Class5
- 6 – Select Class6
- 7 – Select Class7
- 8 – Select Class8

**Note:** Class Type value above 8 will be replied with communication error.

##### Class Power Value (in 0.1w per bit):

Class Power Value = Initial Class Power Value + Added Class Power Value.

For example: Class power value of 32w will return 0x140 (320 decimal).

##### Added Class Power Value (in 0.1w per bit):

The field represents the added class power value that was configured by the user.

##### Max Added Class Power (in 0.1w per bit):

The field represents the maximum possible added class power that can be configured.

An attempt to configure added class power above this value will be clamped to this value.

#### 4.1.19 Get Software Version

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x1E	0x21	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	Versionz	SW Version	N	N	N	N	N	N	N	N
0x03	##	Val	0x4E	Val	Val		Val	Val	Val		Val	
Telemetry		HW Version	N	Prod#	SW_Version		Param#	Build#	Internal SW#		0x0000	

This command is used to retrieve the PoE controller hardware and software versions.

- **H.W. Version:** Identifies the PCB version according to Microsemi's internal conversion table (usually 0x00 is return).
- **Prod #:** Product Number representing the product that this firmware is aimed for. 22d for PD69200 PoE Controller.
- **S.W. Version:** Identifies the software version by a decimal representation value and extracting the digits as follows: **Ma** (4,3 Digits) **Mi** (2<sup>nd</sup> Digit) **Pa** (1<sup>st</sup> Digit).

**Ma** = SW\_Version / 100

**Mi** = (SW\_Version / 10) Modulu 10

**Pa** = (SW\_Version) Modulu 10

- **Ma:** Major revision, **Mi:** Minor revision, **Pa:** Patch revision.
- **Param #:** Parameters code number. 0x00 means that the default factory parameters are as published in this document. Any other number represents other factory defaults.

**Available:**

- 00 = Resistor and Legacy.
- 01 = Reserved. (Old Products).
- 02 = Reserved. (Old Products).
- 03 = Resistor detection, no Legacy.
- 04 = Reserved. (Old Products).
- 05 and up = customized.

- **Build Num:** Incremental number.
- **Internal SW #:** Operation number used for production line.
- **Note:** The Internal\_SW# and the Build# together are unique.
- **Example:** SW Ver = 0410d -> Ma =04, Mi =1, Pa =0

Software version = 04.1.0

Full Software version is: Prod#. SW Version. Build#. Param#

Example: 22.0410.03

#### 4.1.20 Recovery Command (Reserved for future use)

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x04	##	0x07	0xC2	Val		0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Test		Global	Recovery	Code		N	N	N	N	N	N	N

This command initiate a recovery activity, correlated to “Host recovery functionality for Dragonite”.

##### Code:

##### 0x909B – Recovery request

This code enable host crash without POE information loss. By receiving this code, the KL15 firmware will prepare a recovery structure. The Reply for the command will be used as Ack for entering recovery mode (MCU will enter to communication loop).

After receiving the ACK, the host can pull the MCU reset pin once. When reset is released, all POE ports information will be recovered.

Note: After KL15 recovery the recovery DB CRC will be deliberately damaged so it will be used only once.

#### 4.1.21 Log Sector Clear and Stamp

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x01	##	0x07	0x01	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Test		Sector	Clear_Log	N	N	N	N	N	N	N	N	N

This command clears the log sector and stamps it to be valid for future logs.

The command should be used when replacing faulty logged devices in the system.

The command can be executed up to 1000 times and the execution counter will be logged as well.

Any attempt to execute the command more than 1000 will be ignored (Relevant sector error can be read by 4.2.5).

##### Note:

1. After sending this command, the host must not access the MCU controller using I<sup>2</sup>C or UART for at least 50ms. After the 50mSec wait, the command response must be read back (When I<sup>2</sup>C is being used). If the PD692x0 is not ready, the host should wait another 100mSec and retry.
2. In PD69200M this command clears the RAM structure.

#### 4.1.22 UART2 Tunneling Command (Midspan Only)

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0xAB	##	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val
Command Tunnel		Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data

This command is proprietary for the usage of Microsemi Midspans NMS card. Other customer hosts or GUI implementers should not use this command.

Data contain the information that is transmitted to the other Microsemi Midspans NMS card via UART2.

A Reply will be transmitted back to the Microsemi Midspans NMS card after the message was sent on UART2.

#### 4.1.23 UART2 to UART1 Telemetry Tunneling (Midspan Only)

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0xAC	##	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val
Telemetry Tunnel	0xFF	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data

This telemetry is proprietary for the usage of Microsemi Midspans NMS card. Other customer hosts or GUI implementers should not use this command.

This message is received via UART2 from another midspan. It is sent, as is, via UART1, to the host. The echo number – 0xFF tells the host that this message is not an ordinary reply to one of the hosts' messages.

#### 4.1.24 Get Product Serial Number (Midspan Only)

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x13	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	Product Infoz	N	N	N	N	N	N	N	N	N
0x03	##	0x30	Val	Val	Val	Val	Val	Val	Val	Val	Val	0x4E
Telemetry		Maximum PD692x0_BT Logical Ports	Product serial number string									N

## 4.2 PoE Device messages

### 4.2.1 Set PoE Device Parameters

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x87	Val	0x4E	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command		Global	Device Params	CSNum	N	TSH [Celsius]	N	N	N	N	N	N

- **CS-Num:** PoE device address number can be 0x00 to 0x0B, according to PoE devices address settings.
- **TSH (Temperature Alarm):** The upper temperature alarm limit per PoE device.

Whenever the PoE device temperature exceeds the TSH limit, an event is indicated in the device event field, user defined temperature event (bit 1).

The possible configuration range is 0 to 150 in 1 degC step.

Out of range values will lead to communication error report.

### 4.2.2 Get BT PoE Device Status

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xD3	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	BT Device Info	CSNum	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	Val	Val	Val	Val	0x4E
Telemetry		CSNum	PoE Device – Version	Device Status	Device Event	Device Found	4.2.2 MSCC Use8	Temperature [Celsius]	TSH [Celsius]	Reset/POR Counters	N	N

The Auto PoE device detection procedure is executed during the system initialization stage, when the PoE Controller is reset or powered-up. The purpose of this procedure is to assign port numbers per PoE device without any interference from the Host side. It is essential to maintain port numbering even if one or more PoE devices do not operate or do not communicate.

- **CS-Num:** PoE device number can be 0x00 to 0x0B, according to PoE devices address settings.
- **PoE Device Version –** PoE device revision received from PoE device internal register. If the device does not respond 0xFFFF will be returned. The PoE Device Version fields are for internal usage.

- **Device Status:** The value is determined according to the following table:

Device Status	Status Description
0x00	No PoE device found
0x01	OK – Expected PoE device Found (Zone1)
0x02	Device is lost, trying to refresh
0x03	Reserved
0x04	Device lost
0x05	Device error 1 (Zone2)
0x06	Device error 2 (Zone2)
0x07	Device error 3 (Zone2)
0x08	Device Vmain Error
0x09	Device Vmain < System AVG Vmain by 2v or more. This error if exist take precedence over 0x05 to 0x08.
0x0A	OK – Expected PoE device Found (Zone3)

- **Device Event:** Device event clear on read bits.

Event Reason	bit	Description
Disconnection temperature	0	When the PoE device exceeded the safe operation temperature (ports status changes to 0x36), this bit is set to '1'.
User defined temperature	1	When the PoE device exceeded the predefined user temperature limit, this bit is set to '1'. <b>Note:</b> When this bit is being set, the host is recommended to increase POE ventilation.
PoE device fault	2	When the PoE device is faulty, this bit is set to '1'. (Device lost, refresh in progress).
PoE device refreshed	3	The PD692x0 managed to recover a lost device.
Reserved	4 to 7	

- **Device Found:** The device type that was found during system initialization scan function. (after reset or powered-up):  
Upper nibble [7..4]
  - Bits [7..5] are reserved for future use.
  - Bit 4 represent an M device or T4 device
    - 0 – T4
    - 1 – M
 Lower nibble [3..0]
  - **0** = Invalid/non-existing PoE device
  - **4** = 4-port PoE device.
  - **8** = 8-port PoE device.
- **4.2.2 MSCC Use8:** This field returns internal VCAL Counter. The counter is advanced every time that internal calibration voltage is out of the pre-defined tolerance. The counter is clear on read and will not wrap around when it reaches 0xFF value. When VCAL is out of spec its value will not be used for calibrating voltage measurements.

- **Temperature:** Temperature telemetry measured by the PoE device. If PoE device doesn't exist, the response is 0xFF. This field can return negative temperature down to -40DegC. If (Reported\_temperature\_value > 205) the real temperature is (256 – Reported\_temperature\_value). Units are in Celsius.
- **TSH (Temperature Alarm):** Temperature Switch High is the upper temperature limit per PoE device. (1 LSB = 1 DegC). Whenever the PoE device temperature exceeds the TSH limit, an event is indicated in the device event field, user defined temperature event (bit 1).
- **Reset / POR Counters**
  - Reset Count bits[7..4] –** This field counts the number of times that the PD69208 device was reset by command, external pin, or internal communication watch dog. The counter is clear on read and will not wrap around when it reaches 0xFF value.
  - POR Count bits[3..0] –** This field counts the amount of time that the any POE device got a POR condition while the PD692x0 manager continues to work without being reset. The counter is clear on read and will not wrap around when it reaches 0xFF value.

#### 4.2.3 Set PoE Device Register

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x04	##	0x04	0x53	Val		Val		Val	0x4E	0x4E	0x4E	0x4E
Test		Test	WriteAsicReg	Register Address		Register Data		Device #	N	N	N	N

This command writes a value to a specific register inside selected PoE device chip.

**Register Address** – A 16-bit register address based on PoE device register map.

**Register Data** – The data to be set for the selected register, based on register fields.

**Device #** - The device number to access, starts from 0x00 up to 0x0B, depending on the amount of devices in the system.

#### 4.2.4 Get PoE Device Register

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x04	0x52	Val		Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Test	ReadAsicReg	Register Address		Device #	N	N	N	N	N	N
0x03	##	Val		0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry		Register Data		N	N	N	N	N	N	N	N	N

This command returns a value from a specific register inside selected PoE device chip.

**Register Address** – A 16-bit register address based on PoE device register map.

**Device #** - The device number to access, starts from 0x00 up to 0x0B, depending on the amount of devices in the system.

**Register Data** – The data that is read from the register of the defined device.



#### 4.2.5 Get PoE Device Error Log

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xC3	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	Device Log	CS_Num	N	N	N	N	N	N	N	N
0x03	##	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry		VOP Severity Errors	Struct Error	N	N	N	N	N	N	N	N	N

This telemetry returns the Logged severities of a selected device and structure error information. The severity telemetry can be used only if the information structure does not contain any error.

##### VOP Severity Errors:

This field returns the information of all 3 severities related to a single device. Each severity is represented by 2 bits code as follows:

- 00 – Severity is not logged
- 01 – Severity is logged
- 10 – Reserved
- 11 – The logged data is not valid.

The field is structured as follows:

- Bits [7..6]: Reserved for future use, returning 00
- Bits [5..4]: Severity 3 log status
- Bits [3..2]: Severity 2 log status
- Bits [1..0]: Severity 1 log status

##### Struct Error:

This field returns information about the log structure validity. If the structure contains any error, the analyzed information that is being returned might be wrong.

The possible returned values are:

- 0x00 – structure OK
- 0x01 – Structure signature error
- 0x02 – Erase counter at limit
- 0x03 – Data error in one of the severity fields

#### 4.2.6 Get Log Sector Status

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xC4	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	Log Sector Status	N	N	N	N	N	N	N	N	N
0x03	##	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry		Sector Error	Erase Sector Counter	N	N	N	N	N	N	N	N	N

This command checks errors in the log structure and returns the result of this check.

**Sector Error:**

This field returns information about error found in the log sector.

The possible returned values are:

- 0x00 – Sector OK
- 0x01 – Sector signature error
- 0x02 – Erase counter at limit
- 0x03 – Data error in one of the VOP severity fields in the VOP struct

**Erase Sector Counter:**

Returns the number of times that the sector was erased according the user request. (16 bit value).

## 4.3 PoE Port messages

### 4.3.1 Set Temporary Matrix

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x05	0x43	Val	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command		Channel	TmpMatrix	CH Num	Physical Number A	Physical Number B	N	N	N	N	N	N

This command sets values in the port conversion matrix. Programming this matrix map the physical ports to the Host system logical port numbering.

This matrix feature gives the designer flexibility in laying out PCB traces.

The command supports up to 48 logical ports (0 to 47) and up to 96 physical ports (0 to 95).

The command supports a mix of 4-Pair / 2-Pair configurations.

#### For User Guide

Device numbering is based on SPI address settings. (The lowest address that responds to MCU messaging is treated as the 1<sup>st</sup> device). Automatic device search is performed after any MCU Reset.

Physical port numbering should be calculated based on the number of valid PoE device addressing and the number of supported ports on each device.

In a system that is structured from devices of 8 ports (Device ports 0 to 7),

Physical port#11 = 2<sup>nd</sup> device port #3 (Device port is counted from 0, n=3).

**Equation: Physical port # = ((Device – 1) x 8) + n**

For example, if Ethernet 4-Pair PSE port, logical number 5 is connected to 2<sup>nd</sup> PoE device port#0 (Alt-A) and port#1 (ALT-B), then CH Num 5 should be programmed to Physical Number A: 8, Physical Number B: 9.

If Ethernet 2-Pair PSE port, logical number 5 is connected to 3<sup>rd</sup> PoE device port#0, then CH Num 5 should be programmed to Physical Number A: 16, Physical Number B: 255.

When Physical Number B = 255 (0xFF). It means that port B is undefined.

Steps for configuring matrix:

1. Configure the temporary matrix using “**Set Temporary Matrix**” command.
2. Once all ports have been set on the temporary matrix, the “**Program Global Matrix**” command must be sent to activate the new Matrix. During the activation the new matrix is validated. Only the valid matrix will be activated. If validation fails an error message will be reported and the old matrix will be used. If validation passes, a successful message will be reported and the new matrix will be used.

Notes:

1. 4 Pair configured port can be activated as 2 Pair according to other commands settings (Future).

2. If port A is set to existing physical port and port B is undefined (0xFF), the logical port will be treated as 2-Pair port with no back-off activation.
  3. If port B is set to existing physical port and port A is undefined (0xFF), the logical port will be treated as 2-Pair port with automatic back-off activation.
  4. If port A or B are configured with non-existing physical port number (example: Physical port 36 in 3 devices system), the logical port status will return 0x11 (Port is yet undefined, refer to section 8.1).
- **CH Num:** The logical port number, as referred to by the Host CPU and shown on the PSE's front panel. Refer to Section 3.2.
  - **Physical Number A:** The 1<sup>st</sup> physical port number, according to the output pins of the integrated solution (e.g.: PD69208/PD69204 device), expected as ALT-A. Valid values 0x00 to 0x5F, 0xFF.
  - **Physical Number B:** The 2<sup>nd</sup> physical port number, according to the output pins of the integrated solution (e.g.: PD69208/PD69204 device), expected as ALT-B. Valid values 0x00 to 0x5F, 0xFF.

#### 4.3.2 Get Physical Port Number from Temporary Matrix

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0x43	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Channel	TmpMatrix	CH Num	N	N	N	N	N	N	N	N
0x03	##	Val	Val or 0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry		Physical Number A	Physical Number B OR 'N'	N	N	N	N	N	N	N	N	N

Telemetry for temporary matrix data.

- **CH Num:** The logical port number, as referred to by the Host CPU and shown on the PSE's front panel. Refer to Section 3.2.
- **Physical Number A:** The 1<sup>st</sup> physical port number, according to the output pins of the integrated solution (e.g.: PD69208/PD69204 device), Supporting 2-pair or 4-pair.
- **Physical Number B:** The 2<sup>nd</sup> physical port number, according to the output pins of the integrated solution (e.g.: PD69208/PD69204 device), Supporting 4-pair only.  
The configured value will be returned if individual mask 0x34 is set to '1'.  
0x4E will be returned if individual mask 0x34 is set to '0'.

#### 4.3.3 Program Global Matrix

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x43	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command		Global	TmpMatrix	N	N	N	N	N	N	N	N	N

This command causes temporary matrix values to be copied into the active working matrix.

Upon completion of this command, and successful matrix validation, the active matrix is updated, PD69200 software is restarted and the status of PoE ports is refreshed according to the new matrix. During this flow ports will be disconnected.

#### 4.3.4 Get Physical Port Number from Active Matrix

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0x44	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Channel	ChannelMatrix	CH Num	N	N	N	N	N	N	N	N
0x03	##	Val	Val or 0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry		Physical Number A	Physical Number B OR 'N'	N	N	N	N	N	N	N	N	N

Telemetry for active matrix data.

- **CH Num:** The logical port number, as referred to by the Host CPU and shown on the PSE's front panel. Refer to Section 3.2.
- **Physical Number A:** The 1<sup>st</sup> physical port number, according to the output pins of the integrated solution (e.g.: PD69208/PD69204 device), Supporting 2-pair or 4-pair.
- **Physical Number B:** The 2<sup>nd</sup> physical port number, according to the output pins of the integrated solution (e.g.: PD69208/PD69204 device), Supporting 4-pair only.  
The configured value will be returned if individual mask 0x34 is set to '1'.  
0x4E will be returned if individual mask 0x34 is set to '0'.

#### 4.3.5 Get All Ports delivering power state

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xC0	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	AllPorts Delivering	N	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry		Ports [7..0]	Ports[15..8]	Ports [23..16]	Ports [31..24]	Ports [39..32]	Ports [47..40]	N	N	N	N	N

The above commands retrieve bit value of '1' for each logical port that delivers power and the same bit value '0' for each logical port that is not delivering power. Each byte is structured from MSB (High port count) to LSB (Low port count). The command supports up to 48 logical ports.

#### 4.3.6 Set BT Port Parameters

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x05	0xC0	Val	Val	Val	Val	Val	0x4E	0x4E	0x4E	0x4E
Command		Channel	BT Port Config1	Port Num	Port Mode CFG1	Port Mode CFG2	Port Operation Mode	Add Power for Port Mode	Priority	N	N	N

This command can set various configuration parameters of a single port or apply the configuration to all system ports.

The command can enable/disable port operation, enable/disable legacy capacitor support, set the power limit, set the priority and set the PM mode of the BT port.

- **Port Num**

The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F, 'AllChannels'=0x80).

- **Port Mode CFG1**

This field is used to enable/disable the port, to Enable/Disable recovery feature per port or to enter force power mode.

Setting this field to 0xF will leave the port with the last configuration untouched.

Any other value is reserved for future use and will be ignored without generating an error.

**bits[3..0] – Port Enable Modes:**

0x0 – Port Disable

0x1 – Port Enable

0x2 – Port Enable with ignored inrush check

At the end of port power up flow, ILIM state is ignored and the port will continue to regular ON state.

0x3 – Port Force Power 4P-60w / 2P-30w

0x4 – Port Force Power 4P-90w / 2P-45w

0xF – Do not change settings

Changing **Port Mode CFG1** field will cause port shutdown and after the shutdown will continue to behave according to the new configuration.

**Note:** Force power has it's own pre-defined behavior, regardless of the selected "Port Operation Mode" field.

**bits[7..4] – are Reserved for future use**

- **Port Mode CFG2**

**bits[3..0] – BT port PM mode**

0x0 – The port power that will be used for power management purposes is dynamic (I<sub>port</sub> x V<sub>main</sub>).

0x1 – The port power that will be used for power management purposes is port TPPL\_BT.

0x2 – The port power that will be used for power management purposes is

dynamic for non LLDP/CDP/Autoclass ports and TPPL\_BT for LLDP/CDP/Autoclass ports.

0xF – Do not change settings.

**Note:** Other values are reserved for future use and will be ignored.

**bits[7..4] – Class Error Operation Select**

0x0 – class error configuration is disabled; class error handling is according to port operation mode description only.

0x1 – Request class: SSPD = 3, DSPD = 3

0x2 – Request class: SSPD = 4, DSPD = 3

0x3 – Request class: SSPD = 6, DSPD = 4

0x4 – Request class: SSPD = 8, DSPD = 5

0x5 to 0xE – Reserved for future usage

0xF – Do not change selection

**Note:**

In case this field is set to value 0x1 to 0x4 and special modes with defined class error are selected (like mode 0x21), The specific class error in the mode will take precedence and the rest of the classification errors will be according to the above field selection.

▪ **Port Operation Mode**

This parameter sets a combination of various port behaviors – Legacy detection, Port Power, Classification fingers and 4Pair operation.

**Note:**

1. Values that are not listed are reserved for future use, not recommended and will be ignored.
2. Changing operation mode will cause port disable and enable automatically with relevant event and status report.
3. A 4P port of SSPD type with assigned class 1 to 4 will be powered up as 2P primary.



<b>4Pair/2Pair BT Compliant Modes</b>		
<b>Value Set</b>	<b>Configuration Name</b>	<b>Port Operation Description</b>
0x00	4P BT 90w (4P Matrix)	This mode is Type4 BT compliant up to 90w. Maximum Logical port Power = 90w Legacy Detection = Disable
	2P BT 30w (2P Matrix)	This mode is Type3 BT compliant up to 30w. Maximum Logical port Power = 30w Legacy Detection = Disable
0x01	4P BT 60w (4P Matrix)	This mode is Type3 BT compliant up to 60w. Maximum Logical port Power = 60w Legacy Detection = Disable
	2P BT 30w (2P Matrix)	This mode is Type3 BT compliant up to 30w. Maximum Logical port Power = 30w Legacy Detection = Disable
0x02	4P BT 30w (4P Matrix)	This mode is Type3 BT compliant up to 30w. Maximum Logical port Power = 30w Legacy Detection = Disable
	2P BT 30w (2P Matrix)	This mode is Type3 BT compliant up to 30w. Maximum Logical port Power = 30w Legacy Detection = Disable
0x03	4P BT 15w (4P Matrix)	This mode is Type3 BT compliant up to 15w. Maximum Logical port Power = 15w Legacy Detection = Disable
	2P BT 15w (2P Matrix)	This mode is Type3 BT compliant up to 15w. Maximum Logical port Power = 15w Legacy Detection = Disable
Note: In all the above modes, port power allocation is class based.		

<b>4Pair/2Pair Non Compliant Modes</b>		
<b>Value Set</b>	<b>Configuration Name</b>	<b>Port Operation Description</b>
0x10	4P BT 90w + Legacy Detection (4P Matrix)	This mode is Type4 BT up to 90w. Maximum Logical port Power = 90w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD).
	2P BT 30w + Legacy Detection (2P Matrix)	This mode is Type3 BT up to 30w. Maximum Logical port Power = 30w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD).
0x11	4P BT 60w + Legacy Detection (4P Matrix)	This mode is Type3 BT up to 60w. Maximum Logical port Power = 60w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD).
	2P BT 30w + Legacy Detection (2P Matrix)	This mode is Type3 BT up to 30w. Maximum Logical port Power = 30w

		Legacy Detection = Enable (Legacy detected PD will be treated as SSPD).
0x12	4P BT 30w + Legacy Detection (4P Matrix)	This mode is Type3 BT up to 30w. Maximum Logical port Power = 30w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD).
	2P BT 30w + Legacy Detection (2P Matrix)	This mode is Type3 BT up to 30w. Maximum Logical port Power = 30w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD).
0x13	4P BT 15w + Legacy Detection (4P Matrix)	This mode is Type3 BT up to 15w. Maximum Logical port Power = 15w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD).
	2P BT 15w + Legacy Detection (2P Matrix)	This mode is Type3 BT up to 15w. Maximum Logical port Power = 30w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD).
0x14	4P BT 90w + Legacy Detection Special Class0 (4P Matrix)	This mode is Type4 BT up to 90w. Maximum Logical Port Power = 90w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD). Class0 = Class4 All treated as Class4 or detected class4, powers up as 4Pair simultaneously with 30w allocation.
	2P BT 30w + Legacy Detection Special Class0 (2P Matrix)	This mode is Type3 BT up to 30w. Maximum Logical Port Power = 30w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD). Class0 = Class4
0x15	4P BT 60w + Legacy Detection Special Class0 (4P Matrix)	This mode is Type3 BT up to 60w. Maximum Logical Port Power = 60w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD). Class0 = Class4 All treated as Class4 or detected Class4, powers up as 4Pair simultaneously with 30w allocation.
	2P BT 30w + Legacy Detection Special Class0 (2P Matrix)	This mode is Type3 BT up to 30w. Maximum Logical Port Power = 30w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD). Class0 = Class4
Note: In all the above modes, port power allocation is class based.		

<b>4Pair/2Pair Non Compliant Special Modes</b>		
<b>Value Set</b>	<b>Configuration Name</b>	<b>Port Operation Description</b>
0x20	4P 90w PoH_Like On all classes + IEEE Detection (4P Matrix)	This mode is 90w PoH like on all classes Maximum Logical port Power = 90w Legacy Detection = Disable
	2P 45w PoH_Like On all classes + IEEE Detection (2P Matrix)	This mode is 45w PoH like on all classes Maximum Logical port Power = 45w Legacy Detection = Disable
0x21	4P Pre-BT 60w (Like MSCC 4P AT 60w) + Legacy Detection (4P Matrix)	This mode is Type2 nonstandard BT up to 60w with special 4P AT behavior. Maximum Logical port Power = 60w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD). All measured classes will be assigned to class6 with power allocation of 60w.
	2P Pre-BT 30w + Legacy Detection (2P Matrix)	This mode is Type2 nonstandard BT up to 30w with special 2P AT behavior. Maximum Logical port Power = 30w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD). All measured classes will be assigned to class4 with power allocation of 30w.
0x22	Mode 4P 60w + Legacy Detection + Proprietary Power up sequence (4P Matrix)	This mode is Type3 nonstandard BT up to 60w with special 4P CDP power up flow. (Start as 2P 15w). Maximum Logical port Power = 60w Legacy Detection = Enable All detected PDs will be treated as SSPD. All measured classes will be assigned to class3 power at power up, with the ability to rise up the power up to class6.
	Mode 4P 30w + Legacy Detection + Proprietary Power up sequence (2P Matrix)	This mode is Type3 nonstandard BT up to 60w with special 2P CDP power up flow. (Start as 15w). Maximum Logical port Power = 30w Legacy Detection = Enable All detected PDs will be treated as SSPD. All measured classes will be assigned to class3 power at power up, with the ability to rise up the power up to class4.
0x23	4P Pre-BT 60w (Like MSCC 4P AT 60w) + IEEE Detection (4P Matrix)	This mode is Type2 nonstandard BT up to 60w with special 4P AT behavior on all classes. Maximum Logical port Power = 60w Legacy Detection = Disable.
	2P Pre-BT 30w + IEEE Detection (2P Matrix)	This mode is Type2 nonstandard BT up to 30w with special 2P AT behavior on all classes. Maximum Logical port Power = 30w Legacy Detection = Disable.
0x24	4P 4-finger 60w + Legacy Detection (4P Matrix)	This mode is Type3 nonstandard BT up to 60w with special 4P AT behavior on all classes. Maximum Logical port Power = 60w

		<p>Legacy Detection = Enable. (Legacy detected PD will be treated as SSPD).</p> <p>Demotion is not supported. If power is not available the port will not power up.</p>
	2P 3-finger 30w + Legacy Detection (2P Matrix)	<p>This mode is Type3 nonstandard BT up to 30w with special 2P AT behavior on all classes. Maximum Logical port Power = 30w Legacy Detection = Enable.</p> <p>Demotion is not supported. If power is not available the port will not power up.</p>
0x25	4P BT + PoH_Like 90w + Legacy Detection (4P Matrix)	<p>This mode is special Type4 BT up to 90w combined with POH type2. Maximum Logical Port Power = 90w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD).</p> <p>Class4 SSPD - 6 fingers (3A + shift + 3B), No demotion. Class 5 to 8 SSPD - as BT, with BT demotion. Class 4 to 5 DSPD (New codes) - as BT. Class4 DSPD old code 4,4,4 - (3 + 3 + parallel power up + 2x45w). Class 0 is treated as class3 (BT behavior). Class 1 to 3 behaves as BT. Any classification error will not powered up (BT behavior).</p>
	2P BT + PoH_Like 45w + Legacy Detection (2P Matrix)	<p>This mode is special Type3 BT up to 45w combined with POH type2. Maximum Logical Port Power = 45w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD).</p> <p>Class4 SSPD - 3fingers (45w), no demotion. Class 5 to 8 SSPD will be demoted to Class4 BT (30w).</p>
0x26	4P 90w PoH_Like On all classes + Legacy Detection (4P Matrix)	<p>This mode is 90w PoH like on all classes Maximum Logical port Power = 90w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD).</p>
	2P 45w PoH_Like On all classes + Legacy Detection (2P Matrix)	<p>This mode is 45w PoH like on all classes Maximum Logical port Power = 45w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD).</p>
0x27	4P BT 60w + Legacy Detection + Special Class4 60w (4P Matrix)	<p>This mode is Type3 BT up to 60w, with the exception that class4 SSPD will be treated as class6 to support class4 60w (4 fingers will be generated). Maximum Logical port Power = 60w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD).</p> <p>The special Class 4 SSPD will not be demoted (If power is not available the port will not power up). Classes 7,8 will be demoted to class6.</p>

		<p>Other BT classes will be demoted when power is not available, based on BT Behavior. (For example: Classes 5,6 will be demoted to BT class4 30w).</p> <p>Regular DSPD BT operation, No demotion at class4 old code – if we see class 4 old code on one pairset the entire logical port will not be demoted!,</p> <p>Any classification error will not be powered up (BT behavior). Class0 is treated as class3 (BT Behavior).</p>
	2P BT 30w + Legacy Detection + Special Class4 30w (2P Matrix)	<p>This mode is Type3 BT up to 30w, with no demotion at class4. Any classification error will not be powered up (BT behavior). Class0 is treated as class3 (BT Behavior).</p>
0x30	4P BT 90w + Legacy Detection (4P Matrix)	<p>This mode is Type4 BT up to 90w. Maximum Logical port Power = 90w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD).</p>
	2P BT-Special 45w (Up to SSPD Class5) + Legacy Detection (2P Matrix)	<p>This mode is Type3 BT up to 45w with special class5 behavior. Maximum Logical port Power = 45w Legacy Detection = Enable (Legacy detected PD will be treated as SSPD). Class5 will be allocated with power of 45w.</p>
0x50	4P 90w	Microchip midspan proprietary mode.
	2P 45w	Microchip midspan proprietary mode.
0xFF	No change	This value is used when modifying other fields in the command maintaining latest field configuration.

#### ▪ Add Power for Port Mode

This field enable the user to add more power for the selected operation mode (For example if 30w mode was selected and additional 6w is needed to get 36w). The values are in steps of 0.1w. To add 2w, the value = 20 decimal (0x14). The maximum allowed value for any mode is based on the single signature maximum allowed class power, correlated to the mode power.

15w is correlated to class3  
 30w is correlated to class4  
 45w is correlated to class5  
 60w is correlated to class6  
 90w is correlated to class8.

The maximum allowed power value can be read through **4.1.18 Get BT Class Power**, Field “Max Added Class Power”.  
 Added power values above the predefined maximum will be clamped.

The user must set this value every time that “Port Operation Mode” is different from 0xFF.

This field will automatically cleared to 0x00 when Matrix is configured using – 4.3.3 Program Global Matrix.

Matrix Change will lead to the following:		
Port Operation Mode	Add Power for Port Mode	Port Re-Init
Same Value	0x00	Yes

The port will behave according to the following table:

Port Operation Mode	Add Power for Port Mode	Port Re-Init
0xFF	Don't Care	No
Same Value	Same Value	No
New Value	Same Value	Yes
Same Value	New Value	Yes
New Value	New Value	Yes

#### ▪ **Priority**

0x01 – Critical.  
 0x02 – High.  
 0x03 – Low.  
 0xFF – Do not change settings.

For ports with the same priority, the PoE Controller sets the sub-priority according to the logic port number. (Lower number gets higher priority).

**Note:** Setting 0xFF or other values will be ignored, maintaining the latest configuration.

Port priority affects:

1. **Power-up order:** After a reset, the ports are powered up according to their priority, highest to lowest, highest priority will power up first.
2. **Shutdown order:** When exceeding the power budget, lowest priority ports will turn off first.

#### 4.3.7 Get BT Port Parameters

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0xC0	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Channel	BT Port Config1	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	0x4E	0x4E	0x4E	0x4E	Val
Telemetry		Port Status	Port Mode CFG1	Port Mode CFG2	Port Operation Mode	Add Power for Port Mode	Priority	N	N	N	Other	4.3.7 MSCC Use12

This request report telemetry of various BT port configurations from the “Set BT Port Parameters”

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).
- **Port Status:** Indicates the actual port status as defined in Table 4 (section 8.1).
- **Port Mode CFG1:** This field reflects the configuration value field.
- **Port Mode CFG2:** This field reflects the configuration value field.
- **Port Operation Mode:** This field reflects the configuration value field.
- **Add Power for Port Mode:** This field reflects the configuration value.
- **Priority:** This field reflects the configuration value field.
- **Other:** This field contains port related internal parameters that the user cannot configure and need to be reflected through communication.

##### bits[0] – M device limitation

- 0 - The port is allocated to a T4 device with maximum power capabilities.
- 1 – The port is allocated to an M device causing the port power to be limited to 4P-60w, 2P-30w.

##### bits[7..11] – are Reserved for future use

- **4.3.7 MSCC Use12:** This field returns port internal status values for customer care support purposes. The values are not explained in this document and can vary between firmware versions.

#### 4.3.8 Get BT Port Status

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0xC1	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Channel	BT Port Status	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val		0x4E	0x4E	Val	Val	Val	Val
Telemetry		Port Status	Port Mode CFG1	Assigned Class	Measured Port Power		N	N	Last Shutdown Error Status	Port Event	N	4.3.8 MSCC Use12

This request report telemetry of various BT port configurations.

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).
- **Port Status#:** Indicates the actual port status as defined in Table 4 (section 8.1).
- **Port Mode CFG1:** This field is representing the user configuration value that was set using “Set BT Port Parameters” command.  
The list of options are:

##### bits[3..0] – Port Enable Modes:

0x0 – Port Disable

0x1 – Port Enable

0x2 – Port Enable with ignored inrush check

At the end of port power up flow, ILIM state is ignored and the port will continue to regular ON state.

0x3 – Port Force Power 4P-60w / 2P-30w

0x4 – Port Force Power 4P-90w / 2P-45w

##### bits[7..4] – are Reserved for future use

Additional BT Statuses for BT delivering ports can be found on the appendix.

- **Assigned Class:** The assigned classification depends on the requested class and the available power.  
An 0xC value means that classification was not assigned and power was not allocated to this port.  
Requested class 0 is converted to Requested class 3 (IEEE BT compliant modes) or Requested class 4 to 8 (Non IEEE and Pre-BT) when allocated.

Bits[7..4] The allocated class of the Primary alternative, range from 1 to 8.

If class was not assigned, this field returns 0xC.

Bits[3..0] The allocated class of the Secondary alternative, range from 1 to 5.

In case of SSPD or when class was not assigned, this field will return 0xC.



- **Measured port power:** The actual momentary measured port power consumption ( $I_{port} * V_{main}$ ) [0.1w]
- **Last Shutdown Error Status:** This field holds the last port status that was causing a delivering port to be shutdown with reported event (can be found in Appendix 8.1 Port Statuses table). If the "Port Event" field contains a value greater than 0x01, it means that the reported error was not yet read by the Host. If the "Port Event" field contains a value of 0x00 or 0x01, it means that the "Last Shutdown Error Status" was already read by the host and no new error occurred. At system initialization this field will return 0x1B (Port is off: Detection is in process).
- **Port Event:** This is a bit field describing and event or events that happened on a specific port. The field is clear on read.

Event	Bit	Description
Port turned on	0	When any port turns on (its status changes to "0x80 up to 0x9F"), this bit is set to '1'.
Port turned off by user	1	When Port was delivering power and turn off due to configuration change or by disable all ports pin. (Status changed from delivering statuses "0x80 up to 0x9F " to 0x08 or 0x22).
Counters Related Event	2	UDL -When port turns off due to under-load (its updated status is 0x1E), OVL - When port is overloaded (its updated status is 0x1F), SC - When port turns off due to short circuit (its updated status is 0x34), POWER DENIED - When port turns off due to power management or port was not turned on due to any power limit (its updated status is 0x3C, 0x3D or 0x41), INVALID SIG - When port failed in connection check or detection (its updated status is 0x1C or 0x25 or 0xA7) CLASS ERROR – When port failed in classification (its updated status is 0x43).
Open Event	3	Port status was changed from any status to 0xA8 (Port is not connected).
Port fault (other)	4	When Port was delivering power and turns off due to port thermal protection, external voltage injection, internal hardware fault or Vmain out of range Low/High (its status changes to 0x35, 0x24, 0x12, 0x07, 0x06 accordingly) this bit is set to '1'.

**Note:**

1. Based on new individual mask 0x46, the user will be able to request only single port event interrupt due to consecutive detection failure events at the same port.  
For example if port changed to "Detection Fail – 0x1C or 0x25" and from this point the port detection will continue failing, only single event will happen with single detection failure increment and interrupt will be generated only once.

- **4.3.8 MSCC Use12:** This field returns port internal status values for customer care support purposes. The values are not explained in this document and can vary between firmware versions.

#### 4.3.9 Get BT Port Counters

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0xC2	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Channel	BT Port Counters	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	0x4E	0x4E	0x4E	Val	Val
Telemetry		Port Status	UDL count	OVL count	SC count	Invalid Signature count	Power Denied count	N	N	N	4.3.9 MSCC Use11	4.3.9 MSCC Use12

- **Port Status:** Indicates the actual port status as defined in Table 4 (section 8.1).
- **Port Counters:** Five counters based on IEEE802.3at. Each counter can count up to 255 events. The counters are clear on read. The Host should advance its own internal counters with the reported values.
- **4.3.9 MSCC Use11:** This field returns internal classification error counter value for customer care support purposes. The value is not explained in this document and can vary between firmware versions.
- **4.3.9 MSCC Use12:** This field returns port internal status values for customer care support purposes. The values are not explained in this document and can vary between firmware versions.

#### 4.3.10 Set Temporary Power Limits for BT Port (Not supported)

This command is not supported and will not be supported.  
 To change TPPL, LLDP commands should be used.

**4.3.11 Get BT Port Class**

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0xC4	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Channel	BT Port Class	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val		Val	Val		Val	
Telemetry		Port Status#	Port PHY Info	Measured Class	Requested Class	Requested Power		Assigned Class	Assigned Power (TPPL_BT)		Auto Class Measurement + Support Result	

- **Port Status#:** Indicates the actual port status as defined in Table 4 (section 8.1).
- **Port PHY Info:** This field returns the connection check function results and the decided PD structure that the PoE manager will continue with.

**CC Result:** Bits[7..4] return the detected result value of the connection check function.

Return Value	Name	Return value conditions
0x0	Not yet performed	1. During system initialization. 2. 2Pair configured port. 3. 2P/4P Disabled port.
0x1	Open	Port is configured as 4Pair and detection result is open.
0x2	Other	1. Port is configured as 4Pair and detection result is IEEE on both pairsets and connection check error. 2. Port is configured as 4Pair and detection result is Legacy or Failure.
0x3	Single signature PD	IEEE detected on both pairsets and connection check function return "Single".
0x4	Dual signature PD	IEEE detected on both pairsets and connection check function return "Dual".
0x5	Unexpected	Unexpected logic error result (Should not be reported in regular conditions).
0x6 to 0xF	Reserved	Reserved for future use and should be ignored.

**Decided PD Structure:** Bits[3..0] Return the decided PD front end structure, based on the line detection result and connection check result and internal decision logic.

Return Value	Name	Return value conditions
0x0	Not performed	CC Result = 0x0
0x1	Open	Detection result = open
0x2	Invalid Signature	Detection result = Failure or connection check error
0x3	4P SSPD IEEE	1. Detection result = IEEE and connection check = Single signature PD (0x3). 2. Detection result = IEEE and Mode = 0x22
0x4	4P SSPD Legacy	1. Detection result = Legacy on one of the pairsets while the other is pass. 2. Detection result = Legacy on both pairsets.
0x5	4P DSPD IEEE	Detection result = IEEE on both pairsets.
0x6	2P DSPD 4P CANDIDATE FALSE	DSPD staggered power up or DSPD 4P candidate failure.
0x7	2P IEEE	2P Port configuration and detection result = IEEE.
0x8	2P Legacy	1. 4P Port configuration and Detection result = (IEEE or Legacy on ALT_A) and (Open or Res Fail Low on ALT_B). 2. 2P Port configuration and detection result = Legacy.
0x9 to 0xF	Reserved	Reserved for future use and should be ignored.

- **Measured Class:** The measured classification result of each pair set in a PSE logical port.  
 Bits[7..4] The measured class of the Primary alternative.  
 Classification values range from 0 to 8.  
 If class was not performed, this field returns 0xC.

Bits[3..0] The measured class of the Secondary alternative.  
 Classification values range from 0 to 5.  
 In case of SSPD or if class was not performed, this field will return 0xC.

3 classification errors can be returned on both fields:

0x9 – Class overcurrent  
 0xA – 2fingers mismatch  
 0xB – Invalid class code

- **Requested Class:** The requested port class value is determined by the measured class result and internal logic configuration of the port.

Bits[7..4] The requested class of the Primary alternative.  
 Classification values range from 0 to 8.  
 If class was not performed, this field returns 0xC.

Bits[3..0] The requested class of the Secondary alternative.  
 Classification values range from 0 to 5.  
 In case of SSPD or if class was not performed, this field will return 0xC.

- **Requested Power:** The requested Power of the logical port, related to the requested class.  
 In case of DSPD it will be the sum of the related class power for each pair-set.  
 The value is in steps of 0.1w.

- **Assigned Class:** The assigned classification depends on the requested class and the available power.  
An 0xC value means that classification was not assigned and power was not allocated to this port.

Bits[7..4] The allocated class of the Primary alternative, range from 1 to 8.

If class was not assigned, this field returns 0xC.

Bits[3..0] The allocated class of the Secondary alternative, range from 1 to 5.

In case of SSPD or when class was not assigned, this field will return 0xC.

In case of DSPD, primary delivering and secondary wait for 2<sup>nd</sup> cycle, this field will return 0xD.

- **Assigned Power (TPPL\_BT):** The power limit of a working port referring to a specific PD, during ongoing power delivery. If port power exceeds the Assigned Power level, the port will be disconnected.  
The value is in steps of 0.1w.  
In addition, the field value may be used for system power management function according to "BT Port PM Mode" settings (Section 4.3.6 **Port Mode CFG2 field**).
- **Auto Class Measurement + Support Result:** The power measurement results of the auto class function in steps of 0.1w, based on the IEEE802.3BT auto class measurement algorithm and the results of Auto class support function.

**Auto Class Measurement:** Bits[11..0] return the power measurement results of the auto class function in steps of 0.1w, based on the IEEE802.3BT auto class measurement algorithm.

**Auto class support:** Bits[15..12] return the PD identification result of auto class support. The BT PSE checks if the connected PD supports auto classification, as part of the 1<sup>st</sup> long classification finger analysis (Related to IEEE BT operation modes).  
Possible values are:

0x0 – Auto class check was not performed

0x1 – The PD **does not** support physical auto class

0x2 – The PD supports physical auto class

**Note:** If after port power up the Host reads value 0x2, the Host is required to read the entire 4.3.11 telemetry again after 3 seconds from the last read, for updated measurements of auto class power and TPPL.

## 4.4 Power Management Related Messages

### 4.4.1 Get Total Power

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x0B	0x60	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	Supply	Total Power	N	N	N	N	N	N	N	N
0x03	##	Val		Val		Val		Val		Val	Val	
Telemetry		Power Consumption		Calculated Power		Available Power		Power Limit		Power Bank	Vmain Voltage	

This telemetry indicates system power condition.

**Power Consumption** The sum of measured consumed power (I<sub>port</sub> x V<sub>main</sub>), from all logical ports that are delivering power.  
If the value will exceed Power Budget limit, ports will be disconnected.  
The units are in Watts.

**Calculated Power** The reflected power sum of all logical delivering power ports, based on the BT Port PM Mode settings. (Combination of TPPL\_BT values and measured port power).  
If the value will exceed Power Budget limit, ports will be disconnected.  
The units are in Watts.

**Available Power** How much calculated power is still available in the system till it will reach to the power limit.  
Available Power = (Power Limit – Calculated power consumption).  
The units are in Watts.

**Power Limit** The disconnection power level of a specific power bank. If system power consumption exceeds this value and the power bank is active, ports will be disconnected due to over power. The disconnection is priority based. These values are to be set from 0 to 6000 watts depending on the capability of the power supply. If power consumption exceeds this level, lowest priority ports will be disconnected. The power units in this field are in Watts.  
Example: 380 W = 380 = 0x17C

**Power Bank** The current active Power Bank that was read from the 1<sup>st</sup> PD69208 device.

**Vmain Voltage** Actual momentary measured system main voltage in 0.1v step.

### 4.4.2 Set Power Banks

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0x0B	0x57	0x00 to 0x0F	Val		Val		Val		Val
Command		Global	Supply	Power Budget	Bank	Power Limit		Max Shutdown Voltage		Min Shutdown Voltage		Guard Band

This command sets the power limits to be used by the Power Management function.  
The power budget value is the maximum total power consumption permitted before port disconnection due to system over power consumption.  
The power management function purpose is to protect the system main power supply from

reaching power levels that will cause it to crash.  
 Disconnection of ports due to overpower, starts from the lowest priority port.

<b>Bank</b>	<p>Specifies the power bank number to be configured (0x00 to 0x0F).</p> <ul style="list-style-type: none"> <li>▪ In case of configuring a temporary power bank, Bank = 0x80 + bank number.</li> <li>▪ In case of sending "Activate" command, Bank = 0xFF (other parameters in the command are ignored).</li> <li>• When using a single power supply, use the <b>Get Power Supply Parameters</b> command, Section 4.4.4, to identify the bank number and then set the required power limit for the relevant bank/s.</li> <li>• When utilizing more than a single power supply, verify which power supply corresponds to each bank and then utilize the Set Power Bank command to set the power limit per each bank.</li> </ul>
<b>Power Limit</b>	<p>The disconnection power level of a specific power bank. If system power consumption exceeds this value and the power bank is active, ports will be disconnected due to over power. The disconnection is priority based. These values are to be set from 0 to 6000 watts depending on the capability of the power supply. If power consumption exceeds this level, lowest priority ports will be disconnected. The power units in this field are in Watts.          Example: 380 W = 380 = 0x17C</p>
<b>Max Shutdown Voltage</b>	<p>Maximum voltage level: If Vmain is above this level, all PoE ports will shut down. The voltage units in this field are in 0.1v step.          Example: 58.5 v = 585 = 0x249</p> <p><b>Note:</b>          Max shutdown voltage value must be greater by 3v from Min shutdown voltage value, otherwise the command values are ignored and a communication error will be reported.  <b>(Max Shutdown Voltage &gt; Min Shutdown Voltage + 0x1E)</b></p> <p>Maximum configuration voltage is 58.5v (585, 0x249).          Out of range value will lead to communication error.</p>
<b>Min Shutdown Voltage</b>	<p>Minimum voltage level: If Vmain is below this level, all PoE ports will shut down. The voltage units in this field are in 0.1v step.          Example: 52.2 v = 522 = 0x20A</p> <p><b>Note:</b>          Max shutdown voltage value must be greater by 3v from Min shutdown voltage value, otherwise the command values are ignored and a communication error will be reported.  <b>(Max Shutdown Voltage &gt; Min Shutdown Voltage + 0x1E)</b></p> <p>Minimum configuration voltage is 50.0v (500, 0x1F4).          Out of range value will lead to communication error.</p>
<b>Guard Band</b>	<p>This parameter is ignored in BT and treated as Auto (0x0A = 1w)</p> <p>Note: Guard Band area is only compared to the Calculated Power value.</p>



**Selecting power banks:**

- The power good pins are selecting the Power Bank. There are four power good pins, located in the PD69208. The pins state of the 1<sup>st</sup> PD69208 device is being read through internal communication by the PD69200 software. The read value is used for Active bank definition and report.  
To have a proper power bank operation, all power good lines of the PD69208 devices in the system must be connected together or set by hardware with the same configuration. The four power good lines are utilized (PG3, PG2, PG1, PG0).

**Power Banks Definition – PD692x0 & PD69208**

Power Bank #	Power Good pins Settings at PD69208 devices				Power bank set values in PD692x0_BT			
	PG3	PG2	PG1	PG0	Power Limit	Max Shut down Voltage	Min Shut down Voltage	Guard Band
PB0	0	0	0	0				Auto
PB1	0	0	0	1				Auto
PB2	0	0	1	0				Auto
PB3	0	0	1	1				Auto
PB4	0	1	0	0				Auto
PB5	0	1	0	1				Auto
PB6	0	1	1	0				Auto
PB7	0	1	1	1				Auto
PB8	1	0	0	0				Auto
PB9	1	0	0	1				Auto
PB10	1	0	1	0				Auto
PB11	1	0	1	1				Auto
PB12	1	1	0	0				Auto
PB13	1	1	0	1				Auto
PB14	1	1	1	0				Auto
PB15	1	1	1	1				Auto

To make the above parameters as reset default, use **Save System Settings** command. (Refer to **Save System Settings** command, Section 4.1.3)

To read the power management parameters and status, refer to **Get Power Banks** command in the next section.

#### 4.4.3 Get Power Banks

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x0B	0x57	0x00 to 0x0F	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	Supply	Power Budget	Bank	N	N	N	N	N	N	N
0x03	##	Val		Val		Val		Val	Val	Val	0x4E	0x4E
Telemetry		Power Limit		Max Shutdown Voltage		Min Shutdown Voltage		Guard Band	Source Type	Rmode	N	N

This telemetry indicates power bank settings, to be used by power management functions.

- Bank** Specifies the power bank number to be configured (0x00 to 0x0F).
- In case of configuring a temporary power bank,  
Bank = 0x80 + bank number.
  - In case of sending "Activate" command,  
Bank = 0xFF  
(other parameters in the command are ignored).
  - When using a single power supply, use the **Get Power Supply Parameters** command, Section 4.4.4, to identify the bank number and then set the required power limit for the relevant banks.
  - When utilizing more than a single power supply, verify which power supply corresponds to each bank and then utilize the Set Power Bank command to set the power limit per each bank.

**Power Limit** The disconnection power level of a specific power bank. If system power consumption exceeds this value and the power bank is active, ports will be disconnected due to over power. The disconnection is priority based. These values are to be set from 0 to 6000 watts depending on the power supplies capability. If power consumption exceeds this level, lowest priority ports will be disconnected. The power units in this field are in watts.  
Example: 380 W = 380 = 0x17C

**Max Shutdown Voltage** Maximum voltage level: If Vmain is above this level, all PoE ports will shut down. The voltage units in this field are in 0.1v step.  
Example: 58.5 v = 585 = 0x249

**Note:**

Max shutdown voltage value must be greater by 3v from Min shutdown voltage value, otherwise the command values are ignored and a communication error will be reported.

(Max Shutdown Voltage > Min Shutdown Voltage + 0x1E)

<b>Min Shutdown Voltage</b>	<p>Minimum voltage level: If Vmain is below this level, all PoE ports will shut down. The voltage units in this field are in 0.1v step. Example: 52.2 v = 522 = 0x20A</p> <p><b>Note:</b> Max shutdown voltage value must be greater by 3v from Min shutdown voltage value, otherwise the command values are ignored and a communication error will be reported. <b>(Max Shutdown Voltage &gt; Min Shutdown Voltage + 0x1E)</b></p>
<b>Guard Band</b>	<p>This value is irrelevant in BT. The return value is constant 0x0A (Indication for Auto Guard band).</p>
<b>Source Type</b>	<p>Will return 0x00 in BT (Unknown source)</p>
<b>Rmode</b>	<p>Reserved for Microsemi internal use.</p>

#### 4.4.4 Get Power Supply Parameters

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x0B	0x17	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	Supply	Main	N	N	N	N	N	N	N	N
0x03	##	Val		Val		Val		0x4E	Val	0x4E	0x4E	0x4E
Telemetry		Power Consumption		Max Shutdown Voltage		Min Shutdown Voltage		N	Power Bank	Power Limit		N

Telemetry for main power supply parameters (within the active power budget):

**Power Consumption** The sum of measured consumed power, from all logical ports that are delivering power. (In watts).

**Max Shutdown Voltage** Maximum voltage level: If Vmain is above this level, all PoE ports will shut down. The voltage units in this field are in 0.1v step.  
Example: 58.5 v = 585 = 0x249

**Note:**

Max shutdown voltage value must be greater by 3v from Min shutdown voltage value, otherwise the command values are ignored and a communication error will be reported.

**(Max Shutdown Voltage > Min Shutdown Voltage + 0x1E)**

**Min Shutdown Voltage** Minimum voltage level: If Vmain is below this level, all PoE ports will shut down. The voltage units in this field are in 0.1v step.  
Example: 52.2 v = 522 = 0x20A

**Note:**

Max shutdown voltage value must be greater by 3v from Min shutdown voltage value, otherwise the command values are ignored and a communication error will be reported.

**(Max Shutdown Voltage > Min Shutdown Voltage + 0x1E)**

**Power Bank** The current active Power Bank that was read from the 1<sup>st</sup> PD69208 device.

**Power Limit** The disconnection power level of a specific power bank. If system power consumption exceeds this value and the power bank is active, ports will be disconnected due to over power. The disconnection is priority based. These values are to be set from 0 to 6000 watts depending on the power supplies capability. If power consumption exceeds this level, lowest priority ports will be disconnected. The power units in this field are in watts.  
Example: 380 W = 380 = 0x17C

#### 4.4.5 Get BT Port Measurements

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0xC5	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Channel	BT Port Mease	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val		Val		Val		0x4E	Val		0x4E	0x4E
Telemetry		Vmain Voltage		Calculated Current		Measured Port Power		N	Port Voltage		N	N

Telemetry for momentary port electrical parameters.

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).
- **Vmain Voltage:** Actual momentary measured system main voltage in 0.1v step.
- **Calculated Current:** Port momentary calculated current (in milliamps) =  
Port Power Consumption/Vmain.
- **Measured Port Power:** Actual momentary measured power consumption of a logical port, in 0.1w
- **Port Voltage:** Actual momentary voltage on the port, in 0.1v steps.

## 4.5 Power Derating, Related Messages (Midspan Only)

### Purpose:

The purpose of this feature is to add the capability to protect or warn the user when the air temperature enters to the power supply, reached to a level that can harm the power supply or may cause the power supply to shut down due to its internal protection.

This feature is operational only if mask 0x32 is set to '1' (See section 0).

### 4.5.1 Set Derating Data (Midspan Only)

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0xBA	0x57	Val	Val	Val	Val	Val	Val	Val	0x4E
Command		Global	Derating	Power Budget	Bank	Max PS Power	Tstart	Tshutdown	Derating Delta Power			N

This command sets the Power Derating parameters. The power derating function will reduce or enlarge the system power limits, based on power supply defined parameters and system temperature.

- **Max PS Power:** The maximum power supply capability, at normal temperature, according to the power supply datasheets (value in watts).
- **Tstart:** Temperature derating start point. This parameter is part of the derating curve definition. If the temperature is above this level, the actual available budget is changed according to the derating curve settings (DegC).
- **Tshutdown:** Temperature derating end point. This parameter is part of the derating curve definitions. (DegC).
- **Derating Delta Power:** This parameter defines how much power needs to be reduced between the two temperature points (Tstart, Tshutdown). The derating curve slope is calculated as  $dP/(Tstart-Tshutdown)$  (value in watts).
- **Bank:** Specifies the power bank number to be configured from 0 to 15.

When using a single power supply, use the **Get Power Supply Parameters** command, Section 4.4.4, to identify the bank number and then set the required power limit for the relevant bank(s).

When utilizing more than a single power supply, verify which power supply corresponds to each bank and then utilize the Set Power Bank command to set the power limit per each bank.

### 4.5.2 Get Derating Data (Midspan Only)

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xBA	0x57	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	Derating	Power Budget	Bank	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry		Max PS Power	Tstart	Tshutdown	Derating Delta Power	N	N	N	N	N	N	N

This request retrieves Power Derating Banks settings:

- **Max PS Power:** The maximum power supply power capability, at normal temperature conditions, according to the power supply datasheets (value in watts).

- **T<sub>start</sub>**: Temperature derating start point. This parameter is part of the derating curve definition. If the temperature is above this level, the actual available budget is changed according to the derating curve settings. (DegC)
- **T<sub>shutdown</sub>**: Temperature derating end point. This parameter is part of the derating curve definitions. (DegC)
- **Derating Delta Power**: This parameter defines how much power needs to be reduced between the two temperature points (T<sub>start</sub>, T<sub>shutdown</sub>). The derating curve slope is calculated as  $dP/(T_{start}-T_{shutdown})$  (value in watts).

#### 4.5.3 Set Derating User Temperature (Midspan Only)

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x07	0xBA	0x00	Val		0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command		Global	Derating	Derating User Temp	Temperature		N	N	N	N	N	N

This command enables the user to configure the derating temperature.

**Temperature**: Write the temperature in DeciCelsius (0.1 lsb), or write 0x7FFF to disable user temperature and enable reading from temperature sensor. (The temperature sensor type is NTC, for Microsemi internal use).

For example: To set 40 degree Celsius the set value should be 400 (0x190).

#### 4.5.4 Get Derating User Temperature (Midspan Only)

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0xBA	0x00	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	Derating	Derating User Temp	N	N	N	N	N	N	N	N
0x03	##	Val		0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry		User Temperature		N	N	N	N	N	N	N	N	N

This command returns the user temperature that was set by the Host. The value is in DeciCelsius units.



#### 4.5.5 Get Derating System Measurements (Midspan Only)

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x07	0x0B	0xAD	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Global	Supply	Actual System Data	N	N	N	N	N	N	N	N
0x03	##	Val	Val	Val	Val	Val	Val	Val	Val	0x4E	0x4E	0x4E
Telemetry		Power Budget Index	Power Budget	Actual Budget (After temperature derating delta calculation)	Temperature zone	Derating Temperature	N	N	N	N	N	N

This command Retrieves actual power derating information. The purpose of this request is to enable the host to read power information related to each budget when the derating function is active.

- **Power\_Budget Index:** The current active Power Bank.
  - **Power Budget:** The current user-defined budget (related to the Power Bank setting)
  - **Actual Budget:** Actual budget used by power management (calculated using a combination of user-defined budget and derating temperature algorithm)
  - **Temperature zone:** This parameter is used to give the host a fast view for derating problems. The first 3 bits are zone numbers, arranged according to severity 1 through 4 (Highest severity):
    - 1 – Measured temperature < T<sub>start</sub>
    - 2 – T<sub>start</sub> < Measured temperature < T<sub>shutdown</sub>
    - 3 – T<sub>shutdown</sub> < Measured temperature < (T<sub>shutdown</sub> + 20 degree Celsius)
    - 4 – Measured temperature > (T<sub>shutdown</sub> + 20 degree Celsius)
- Bit7: This bit is set whenever the system's power consumption passes the user's defined budget  
 (it can happen only when derating temperature feature is enabled).
- **Derating Temperature:** The temperature that was used for derating calculations (measured by an external temperature sensor or set by Host) in DeciCelsius units.

## 4.6 Layer2 Related Messages

### 4.6.1 Set BT Port Layer2 LLDP PD Request

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x05	0x50	Val	Val		Val		Val		Val	Val
Command		Channel	Layer2 BT LLDP_PD	Port Num	PD Request Power Single		PD Request Power Dual A		PD Request Power Dual B		Cable Length Req + AutoClass	L2 CFG

This command supports LLDP information configuration, based on the information that the Host was receiving from PD advertisement message and other host information. Part of the information is structured the same as LLDP TLV for easy host operation.

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).  
Note: All ports value is ignored in this command.
- **PD Request Power Single:** PD requested power value [0.1w lsb] at the PD input.  
Value ranges are:
  - 2-pair / 4-pair : from 1 to maximum power limit based on cable length.
  - This field should be used by the Host when SSPD was detected and a new LLDP BT frame is being used or when Typ1, Type2 LLDP frame is being used.
  - The value is expected to be a copy of the LLDP frame field defined in IEEE802.3bt, 79.3.2.5 PD requested power value
- **PD Request Power Dual A:** PD requested power value [0.1w lsb] at the PD input.  
Value ranges are:
  - 2-pair: from 1 to maximum power limit based on cable length.
  - This field should be used by the Host when DSPD was detected and a new LLDP BT frame is being used. When Type1, Type2 LLDP frame is being used, this value should be set to 0.
  - The value is expected to be a copy of the LLDP frame field defined in IEEE802.3bt, 79.3.2.6a Dual-signature PD requested power value for Mode A.
- **PD Request Power Dual B:** PD requested power value [0.1w lsb] at the PD input.  
Value ranges are:
  - 2-pair: from 1 to maximum power limit based on cable length.
  - This field should be used by the Host when DSPD was detected and a new LLDP BT frame is being used. When Typ1, Type2 LLDP frame is being used, this value should be set to 0.
  - The value is expected to be a copy of the LLDP frame field defined in IEEE802.3bt, 79.3.2.6a Dual-signature PD requested power value for Mode B.

- **Cable Length Req + AutoClass:** This value is used to calculate the cable resistance or initiate Autoclass.

When Autoclass is in use the cable length is irrelevant and the channel resistance losses become part of the autoclass power measurement.

There are 11 selection values for the cable length, in steps of 10 meters, start from 0.

The initial value is 10 = 100 meters and the corresponding resistance for 100 meters is 12.5 Ohm for 2-pair, 6.25 Ohm for 4-pair. (The TPPL value is updated according to the cable length to compensate on the power losses).

The field structure is:

Bits[7..4] – Autoclass operation:

0x0 – Power negotiation by requested power fields (The PSE will not use Autoclass)

0x1 – Power negotiation by Autoclass request

The request will be internally latched until autoclass execution. The autoclass flow for this specific port can be monitored using the Layer2 execution field in 4.6.2 Get BT Port Layer2 LLDP PSE Data, Layer2 Status).

All other values are reserved for future use, should not be sent by the Host and will be ignored.

Bits[3..0] – Cable length options:

10meters LSB, valid value range 0x0 to 0xA.

0x0 = 0 meters.

Note: The command will be executed automatically, after receive. If several commands were received prior to LLDP execution, they will be automatically executed based on port priority and port number (Lowest port number with same priority executes 1<sup>st</sup>).

- **L2 CFG** – This field configures port parameters that are required to be configured when Layer2 is being used, to reduce communication protocol transactions

- **Bits[3..0] – Priority**

0x1 – Critical.

0x2 – High.

0x3 – Low.

0xF – Do not change settings.

All other values are ignored.

For ports with the same priority, the PoE Controller sets the sub-priority according to the logic port number. (Lower number gets higher priority).

**Note:** Setting 0xF or other values will be ignored, maintaining the latest configuration.

Port priority affects:

1. **Power-up order:** After a reset, the ports are powered up according to their priority, highest to lowest, highest priority will power up first.
2. **Shutdown order:** When exceeding the power budget, lowest priority ports will turn off first.

- **Bits[7..4] – Reserved for future use**

Any set will be ignored.

**Additional LLDP Definition notes and considerations: Will be moved later to specific document.**

1. Value of 0 in the operational power will be ignored, maintaining the latest configuration.
2. Host Requirement: Dual / Single operation must be matched by the host prior to LLDP usage. In case of conflict, the host should not use LLDP.
3. Values above 499 for 2 pair or 999 for 4 pair will be ignored, maintaining the latest configuration.
4. Rejected LLDP request will maintain the latest approved LLDP configuration.
5. In 2 pair matrix configuration, the PD type cannot be defined by the detection. Due to that the LLDP values will be scanned as follows: Single 1<sup>st</sup> follow by Dual A and Dual B. The 1<sup>st</sup> value that is different from 0 will be used. The reply for Get PD Request will clear the unused values.
6. In 4 pair matrix configuration DSPD only Dual A and Dual B set/request fields will be used.
7. Host Requirement: In Dual 4 pair operation, the host must match the ALT-A, ALT-B to Mod-A, Mod-B requests. Otherwise, in case of crossed cable, the physical classification may not match with the LLDP request, causing wrong power allocation.
8. LLDP command will be ignored if the port status is not in the range of 0x80 to 0x86, 0x88, 0x89.
9. In case of 2 pair legacy operation due to connection check failure, the LLDP values will be scanned as follows: Single 1<sup>st</sup> follow by Dual A and Dual B. The 1<sup>st</sup> value that is different from 0 will be used.
10. In case of 4 pair legacy operation, the port will be treated as SSPD and only LLDP single field will be used.
11. LLDP/CDP set (If executed), will upgrade the port priority by ½ step or higher in the same group, like in Pre\_BT firmware.
12. If new LLDP command cannot be executed due to un-available power (PM limitation or such execution may cause other ports to be disconnected), or not executed due to error, the port will remain with the last configuration, including stay in dynamic mode.
13. LLDP power limit can be selected by Mask 0x2C to be up to Requested class or min(Requested class, Operation Mode).  
M - Devices will be limited to Type3 - class6 4P, class4 2P.
14. If operation mode 0x22 is not selected, port will power up with regular flow. If operation mode 0x22 is selected, the port will power up based on special proprietary power up sequence according to the mode.
15. If Autoclass is pending or in process, New LLDP request will override the autoclass process.
16. New autoclass request on autoclass pending or autoclass layer1 pending will reinit the autoclass process, without layer1 autoclass delay.
17. Autoclass port power will be treated as static, like LLDP/CDP (when port CFG2 is configured to value 0x2).

#### 4.6.2 Get BT Port Layer2 LLDP PSE Data

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0x51	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Channel	Layer2 BT LLDP_PSE	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val		Val		Val		Val	Val	Val	Val	Val
Telemetry		PSE Allocated Power Single / ALT-A		PSE Allocated Power ALT-B		PSE Max Power		Assigned Class	Layer2 Status	IEEE BT Power bits	Cable Length in Use	L2 CFG

This request returns the port Layer 2 data.

Refer to **Set Port Layer2 LLDP PD Data**, Section 4.6.1.

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).
- **PSE Allocated Power Single / ALT-A:** PSE allocated power value [0.1w lsb] at the PD input. Value ranges from 0 to 999 in single or 0 to 499 in ALT-A ('0' means inactive value or port). In case that the power allocation was done by autotclass process (Layer1 or Layer2), the value will be 0xACAC.
- **PSE Allocated Power ALT-B:** PSE allocated power value [0.1w lsb] at the PD input. Value ranges from 0 to 499 ('0' means inactive value or port).
- **PSE MAX Power:** The maximum power [0.1w lsb] that can be allocated to this port, when the command was executed.
  - Value = min(Requested class, (PSE power budget + Port allocated power))
- **Assigned Class:** The assigned classification depends on the requested class and the available power.  
An 0xC value means that classification was not assigned and power was not allocated to this port.

Bits[7..4] The allocated class of the Primary alternative, range from 1 to 8.  
If class was not assigned, this field returns 0xC.

Bits[3..0] The allocated class of the Secondary alternative, range from 1 to 5.  
In case of SSPD or when class was not assigned, this field will return 0xC.  
In case of DSPD, primary delivering and secondary wait for 2<sup>nd</sup> cycle, this field will return 0xD.

- **Layer2 Status:** This field is structured from 2 information types: 1. If and how power is delivered, 2. How the latest layer 2 command was executed.

**Layer2 execution:** Bits[7..4] This field contain the following values:

0x0 – Layer2 Idle. (No message received yet or port is not delivering power)  
 0x1 – Layer2 LLDP/CDP request pending  
 0x2 – Layer2 LLDP/CDP request was executed  
 0x3 – Layer2 LLDP/CDP last request was rejected due to lack of power  
 0x4 – Layer2 LLDP/CDP last request was rejected due to error  
 0x5 – Layer2 LLDP/CDP last request was rejected due mismatch  
 0x6 – Autoclass request pending  
 0x7 – Autoclass measurement completed  
 0x8 – Autoclass error (timeout)

**Layer2 usage:** Bits[3..0]

0x0 – Port is not deliver power  
 0x1 – Port deliver power, Using Layer1 (Assigned Class)  
 0x2 – Port deliver power, Using Layer1 Autoclass  
 0x3 – Port deliver power, using LLDP  
 0x4 – Port deliver power, using LLDP Autoclass

0x5 – Port deliver power, using CDP over 2P  
 0x6 – Port deliver power, using CDP over 4P

▪ **IEEE BT power bits**

This field contains the bit values that the host need to copy to the relevant PSE bits in the LLDP BT message, according to IEEE 802.3 BT standard **Table 79–6e—Power status field**

- Bits [7..4] are reserved for future use and should be ignored.

- Bits [3..2] IEEE PSE powering status 15:14

3 2

1 1 = 4-pair powering dual-signature PD

1 0 = 4-pair powering single-signature PD

0 1 = 2-pair powering

0 0 = Reserved/Ignore, port is not operational

- Bits [1..0] IEEE PSE power pairs ext bits 11:10

1 0

1 1 = Both Alternatives

1 0 = Alternative B

0 1 = Alternative A

0 0 = Reserved/Ignore, port is not operational

- **Cable Length in Use:** This value represents the cable length that is being used with the PSE allocated power.

When Autoclass is in use the cable length is irrelevant and the return value will be 0x0.

There are 11 values option for the cable length, in steps of 10 meters, start from 0.

The initial value is 10 = 100 meters and the corresponding resistance for 100 meters is 12.5 Ohm for 2-pair, 6.25 Ohm for 4-pair. (The TPPL value is updated according to the cable length to compensate on the power losses).

The field structure is:

Bits[7..4] – Reserved and should be ignored by the Host (0x0)

Bits[3..0] – Cable length options:

10meters LSB, valid value range 0x0 to 0xA.

0x0 = 0 meters.

- **L2 CFG** – This field returns the value that was set by L2 CFG or by other configuration command related to the port.

- **Bits[3..0] – Port Priority defined value**

0x1 – Critical.

0x2 – High.

0x3 – Low.

- **Bits[7..4] – Reserved for future use**

Return value = 0x0

#### 4.6.3 Get BT Port Layer2 LLDP PD Request

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0x50	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Channel	Layer2 BT LLDP_PD	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val		Val		Val	Val	Val	0x4E	0x4E	0x4E	0x4E
Telemetry		PD Request Power Single		PD Request Power Dual A		PD Request Power Dual B		Cable Length Req	N	N	N	N

This request returns the port Layer 2 request information for sanity check purposes. The returned values will be based on the PD detected load type, the received values and the used values.

PD detected load type and received values	PD Request Power Single	PD Request Power Dual A	PD Request Power Dual B
SSPD 4P	Value	0	0
DSPD 4P	0	Value	Value
2P	Value	0	0
2P	0	Value	0
2P	0	0	Value

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).
- **PD Request Power Single:** PD requested power value [0.1w lsb] at the PD input. Value ranges are: 0 to 999 or 0xACAC in case of autotest.
- **PD Request Power Dual A:** PD requested power value [0.1w lsb] at the PD input. Value ranges are:
  - 2-pair: from 1 to maximum power limit based on cable length.
  - This field should be used by the Host when DSPD was detected and a new LLDP BT frame is being used. When Type1, Type2 LLDP frame is being used, this value should be set to 0.
  - The value is expected to be a copy of the LLDP frame field defined in IEEE802.3bt, 79.3.2.6a Dual-signature PD requested power value for Mode A.
- **PD Request Power Dual B:** PD requested power value [0.1w lsb] at the PD input. Value ranges are:
  - 2-pair: from 1 to maximum power limit based on cable length.
  - This field should be used by the Host when DSPD was detected and a new LLDP BT frame is being used. When Type1, Type2 LLDP frame is being used, this value should be set to 0.
  - The value is expected to be a copy of the LLDP frame field defined in IEEE802.3bt, 79.3.2.6a Dual-signature PD requested power value for Mode B.

### Cable Length Req:

Bits[7..4] Reserved and should be ignored by the Host.

Bits[3..0] When Autoclass is in use the cable length is irrelevant and the channel resistance losses become part of the autoclass power measurement.

There are 11 selection values for the cable length, in steps of 10 meters, start from 0.

The initial value is 10 = 100 meters and the corresponding resistance for 100 meters is 12.5 Ohm for 2-pair, 6.25 Ohm for 4-pair. (The TPPL value is updated according to the cable length to compensate on the power losses).

#### 4.6.4 Set Layer2 CDP Port PowerUp ALT-B

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x05	0x52	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Command		Channel	CDP PowerUp ALT-B	Port Num	PuP CMD	N	N	N	N	N	N	N

This command enables the user to configure the port behavior, according to Host definitions. The command is built from configuration register field that enable Host power up sequence behavior and a command byte to request ALT\_B power up..

Before enabling PowerUp ALT-B the port must be configured to 4-Pair with valid matrix.

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).  
Note: All ports value is ignored in this command.
- **PuP CMD:** This is the command field that is used to power up ALT\_B according to CDP flow. When CDP mode is activated on this port and the value is set to 0x01, ALT\_B will turn on. When CDP mode is activated on this port and the value is set to 0x00, ALT\_B will turn off. When CDP mode is not activated this command is ignored, maintaining latest configuration.

Port status will alternate between SSPD 2P to SSPD 4P based on the usage of this command.

#### Notes:

1. PowerUp ALT-B command is relevant for 4-pair port only.
2. When ALT\_B turns off, the allocated power will be automatically limited to class4 power.



#### 4.6.5 Get Layer2 CDP Port PowerUp ALT-B

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0x52	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Channel	CDP PowerUp ALT-B	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry		PuP CMD	N	N	N	N	N	N	N	N	N	N

This request returns the port PowerUp ALT-B settings.

Refer to **Set Port PowerUp ALT-B**, for “PuP CMD” description.

#### 4.6.6 Set Port Layer2 CDP PD Request

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x00	##	0x05	0x53	Val	Val	Val	Val	Val	Val	Val	Val	Val
Command		Channel	Layer2 CDP_PD_Req	Port Num	Reserved	PD Request Power0	PD Request Power1	PD Request Power2	PD Request Power3	PD Request Power4	Pw4	Pw[3..0]

This command supports CDP information configuration, based on the information that the Host was receiving from PD advertisement message. The power value range supports 2P and 4P configurations.

This command can be used in CDP operation mode or any other mode with SSPD load (CDP mode treats the PD as SSPD).

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).
- **PD Request Power0,1,2,3,4:** 5 options for 8-LSB PD requested power values at the PSE side. The upper 2bit MSB are located in Pw[3..0] and Pw4.

Power = Value of the full 10bits [0.1w lsb].

Value ranges from 0 to 999 (Like BTSSPD).

**Note:** Cable Length is considered as zero and cannot be set when using this command. (The power is at the port input of the PSE side).

- **Pw4**

Bits[1..0] : Two upper MSB of the PD power information request, bits 10,9 respectively, for PD Request Power4.

Bits [7..2]:

Reserved bits for future use. Should be set to '0'.

- **Pw[3..0]:** Two upper MSB of the PD power information request, bits 10,9 respectively, for PD Request Power3,2,1,0.

**4.6.7 Get Port Layer2 CDP PSE Data**

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x02	##	0x05	0x54	Val	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Request		Channel	Layer2 CDP_PSE	Port Num	N	N	N	N	N	N	N	N
0x03	##	Val		Val		Val	Val	0x4E	0x4E	0x4E	0x4E	0x4E
Telemetry		PSE Allocated Power		PD Requested Power		Assigned Class	Layer2 Status	N	N	N	N	N

This request returns the port Layer 2 CDP data, as described in the following lines.

This command can be used in CDP operation mode or any other mode with SSPD load. In all other cases PSE Allocated Power and PD Requested Power will return zero and assigned class will return 0xCC.

CDP mode treats the PD as SSPD.

- **Port Num:** The logical port number, as referred to by the Host CPU and usually shown on the PSE front panel. (Value range 0x00 to 0x2F).
- **PSE Allocated Power:** PSE allocated power value [0.1w lsb] at the PSE output. Value ranges from 0 to 999 (Like BTSSPD).
- **PD Request Power:** PD requested power value at the PSE output. Value ranges from 0 to 999 (Like BTSSPD).
- **Assigned Class:** The assigned classification depends on the requested class and the available power.  
An 0xC value means that classification was not assigned and power was not allocated to this port.

Bits[7..4] The allocated class of the Primary alternative, range from 1 to 6 when CDP mode is activated or 1 to 8 in other modes.

If class was not assigned, this field returns 0xC.

Bits[3..0] The allocated class of the Secondary alternative, range from 1 to 5.

In case of SSPD or when class was not assigned, this field will return 0xC.

In case of DSPD, primary delivering and secondary wait for 2<sup>nd</sup> cycle, this field will return 0xD.

- **Layer2 Status:** This field is structured from 2 information types: 1. If and how power is delivered, 2. How the latest layer 2 command was executed.

**Layer2 execution:** Bits[7..4] This field contain the following values:

- 0x0 – Layer2 Idle. (No message received yet or port is not delivering power)
- 0x1 – Layer2 LLDP/CDP request pending
- 0x2 – Layer2 LLDP/CDP request was executed
- 0x3 – Layer2 LLDP/CDP last request was rejected due to lack of power
- 0x4 – Layer2 LLDP/CDP last request was rejected due to error
- 0x5 – Layer2 LLDP/CDP last request was rejected due mismatch
- 0x6 – Autoclass request pending
- 0x7 – Autoclass measurement completed
- 0x8 – Autoclass error (timeout)

**Layer2 usage:** Bits[3..0]

- 0x0 – Port is not deliver power
- 0x1 – Port deliver power, Using Layer1 (Assigned Class)
- 0x2 – Port deliver power, Using Layer1 Autoclass
- 0x3 – Port deliver power, using LLDP
- 0x4 – Port deliver power, using LLDP Autoclass
- 0x5 – Port deliver power, using CDP over 2P
- 0x6 – Port deliver power, using CDP over 4P

## 4.7 Report Key

Each message containing a **Command**, **TEST** or **Program Key** transmitted from the Host to the PoE controller is followed by a **Report Message** sent back from the PoE controller.

### 4.7.1 Command Received/Correctly Executed

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x52	##	0x00	0x00	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Report				N	N	N	N	N	N	N	N	N

This report indicates that the PoE controller received the command/program message and that it was properly executed.

### 4.7.2 Command Received/Wrong Checksum

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x52	##	0xFF	0xFF	0xFF	0xFF	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Report						N	N	N	N	N	N	N

This report indicates that the controller received the command/program message, but its checksum was incorrect; therefore, the command/program is not executed.

### 4.7.3 Failed Execution/Conflict in Subject Bytes

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x52	##	0x0001-0x7FFF		0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Report				N	N	N	N	N	N	N	N	N

This report indicates that the controller received the command/program message but the subject fields did not match; therefore the command/program is not executed. Any value between 0x0001-0x7FFF in bytes 3 and 4 indicates this type of error.

#### 4.7.4 Failed Execution/Wrong Data Byte Value

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x52	##	0x8001-0x8FFF		0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Report				N	N	N	N	N	N	N	N	N

This report indicates that the controller received the command/program message, but the data fields did not match; therefore, the command/program is not executed. Any value between 0x8001-0x8FFF in bytes 3 and 4 indicates this type of error.

#### 4.7.5 Failed Execution/Undefined Key Value

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x52	##	0xFF	0xFF	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E	0x4E
Report				N	N	N	N	N	N	N	N	N

This report indicates that the controller received the command/program message, but the KEY fields did not match; therefore the command/program is not executed.

## 5 Software Download

### Note:

A PD69200/PD69210 **controller** only accepts the PD69200/PD69210 firmware. If other firmware types such as PD69100 or PD69000 are downloaded, the controller will not run and an error will be reported after reset.

It is the user / host responsibility to use the correct file.

There are two methods to initiate a new firmware download:

- From an external PC, by implementing a “software bridge” on the Host and using a windows application on the PC. This option is explained in *Microsemi’s Application Note 126, Software Download for PoE Units*.
- Directly from the Host CPU, utilizing a series of protocol commands, detailed in Sections 5.1 and 5.2. When utilizing the I<sup>2</sup>C communication for the download process, refer to section 5.4 below.

### 5.1 Download Process (Valid Firmware Exists)

The following process specifies the download process for a Controller which has valid firmware.

In case of an “empty” Controller or invalid firmware, use the process as described in Section 5.2.

All letters signed with “” should be sent as characters or strings (ASCII value). “r” and “n” represent “carriage return” and “new line” ASCII codes.

Step	Action	Host Command	Controller Response		Comment
			OK	Error	
1	Enter program mode	Send the “Download” command (Section 5.1.1).	OK report	Error report	Response within 50mS. Report types show in Section 4.7
2	Await for boot section response		“TPE\r\n”	-	Response within 100ms.
3	Erase memory	“E”	“TOE\r\n”	None	Response within 100ms.
4	Wait for erasure	-	“TE\r\n” and then “TPE\r\n” (Within 100 ms).	“TNE\r\n” or “TNV\r\n” or none.	Erasure may last up to 600ms.
5	Program memory	“P”	“TOP\r\n”	None	Response within 10ms.
6	Send all lines of S19 file.	Send S19 lines, one by one, till EOF. Lines begin with “S0” should not be read.	“T*\r\n”	“TNP\r\n” or “TNV\r\n” or none.	Response within 10ms per line.
7	End of file	-	“TP\r\n”	None	Response within 10ms.
8	Await	-	-	-	Wait at least 400ms.
9	Reset Controller	“RST”	System status telemetry	-	Response within 1000ms.

#### 5.1.1 Download Command

[0] KEY	[1] ECHO	[2] SUB	[3] SUB1	[4] SUB2	[5] DATA	[6] DATA	[7] DATA	[8] DATA	[9] DATA	[10] DATA	[11] DATA	[12] DATA
0x01	##	0xFF	0x99	0x15	0x16	0x16	0x99	0x4E	0x4E	0x4E	0x4E	0x4E
Program		Flash						N	N	N	N	N

This command initiates the download process. Once the process is initiated, the above steps need to be accomplished.

## 5.2 Download Process (Invalid or Non-existing Firmware)

When the Controller is “empty” (was not burnt in factory), or its firmware is invalid (for example: after a download process interrupted in the middle), follow the same process as in Section 5.1, except for Step 1. Substitute this step with the following entry.

Step	Action	Host Command	Controller Response		Comment
			OK	Error	
1	Enter program mode	"E", "N", "T", "R"	"TPE\r\n"	None	Keep at least 10 ms delay between each transmitted character. Response within 100 ms (max)

**Note:**

Invalid or none-existing firmware can be monitored by a continuous System Status telemetry (refer to **Get BT System Status** command, Telemetry at Boot Up Error Section 4.1.6.1) with Byte 3 bit 1 set to '1' (Programming required), in less than 5 seconds.

### 5.3 Download File: S19

The “\*.S19” is the download file containing data in lines beginning with “S”.

- Lines beginning with “S0” are remarks and should not be written to the controller.
- Lines beginning with “S3” contain the data to be sent.
- “S7” designates the last line.

## S19 File Example

```
S0 Power Over Ethernet  
S0 Product Number: 22  
S0 Software Number: 0163  
S0 Param Number: 03  
S0 Build: 079  
S0 File Name – 22016303_0800_079.s19  
S0 Based On File – FSL_2015_06_16_09_37.elf  
S0 Time 09:37:09 Date Jun 16 2015  
S0  
S02C0000504436393230302020202020202020202020202020202030313633323230313633330335F30  
3830305F3037391D  
S31900001400E01B002009AE000025AA00002DAA00000000000005A  
S319000014140000000000000000000000000000000000000BE  
S31900001428000000035AA000000000000000000003DAA0000E4  
  
. .  
S3190000F3D4FAFAFAFAFAFAFAFAFAFAFAFAFAFAFAFAFAFA97  
S3190000F3E8FAFAFAFAFAFAFAFAFAFAFAFAFAFAFAFAFAFA83  
S3090000F3FC98427E8A25  
S70500000000FA
```

## 5.4 I<sup>2</sup>C Download Process

When utilizing the I<sup>2</sup>C communication for the download process, data can be transmitted and received as single bytes, or as long transaction with single I<sup>2</sup>C address at the beginning.



Single byte includes: start bit, address, R/W bit, data byte, stop bit.

Long transaction includes: start bit, address, R/W bit, many data bytes, stop bit. (Recommended to be used when transmitting a full S19 line information).

Perform the following:

- Send 'Get System Status' message to check firmware validity (CPU status-1 Bit 1 = 1 indicates invalid firmware).
  - If valid firmware is detected, perform the downloading process as described in Section 5.1.
  - If invalid firmware is detected, perform the downloading process as described in Section 5.2.

**Note:**

For more details on I<sup>2</sup>C firmware download, see Technical Note TN-140, Catalogue Number 06-0024-081.

## **5.5 Shared Memory Download Process**

PD69200M download process is completely different from the above, due to shared memory system structure. Refer to PD69200M documentation.

## 6 Synchronization during Communication Loss

As described in Section 2, each communication **Command** or **Request** is echoed to the Host with a **Report** or **Telemetry**, respectively. The echo packet is designed to be transmitted back typically within 15ms from the original packet sent from the Host (55mSec max). It is recommended that the Host receive the echo packet and use it as a command acknowledgement, or as verification for the communication feedback.

It is recommended that the Host timeout will be configured to 100mSec

In cases where the echo packet was not received by the Host within 100ms from the last transmitted packet, it is recommended that the Host communication be set to follow the command flow shown in Figure 3.

- If a "System Status" packet or other echo packet is correctly received during each one of the flow stages, the Host assumes a communication re-sync and return to normal operation.
- 15-byte packet Host transmission time should not exceed 20ms. (From 1<sup>st</sup> byte to last byte)

Note: The actual bytes transaction time need to be added to the above timing.

For example in UART (19200 bps) it will take 15.6125mSec minimum for TX/RX transmission.

$$[1/(19200 \cdot 10 \cdot 15) \text{sec}] \cdot 2$$

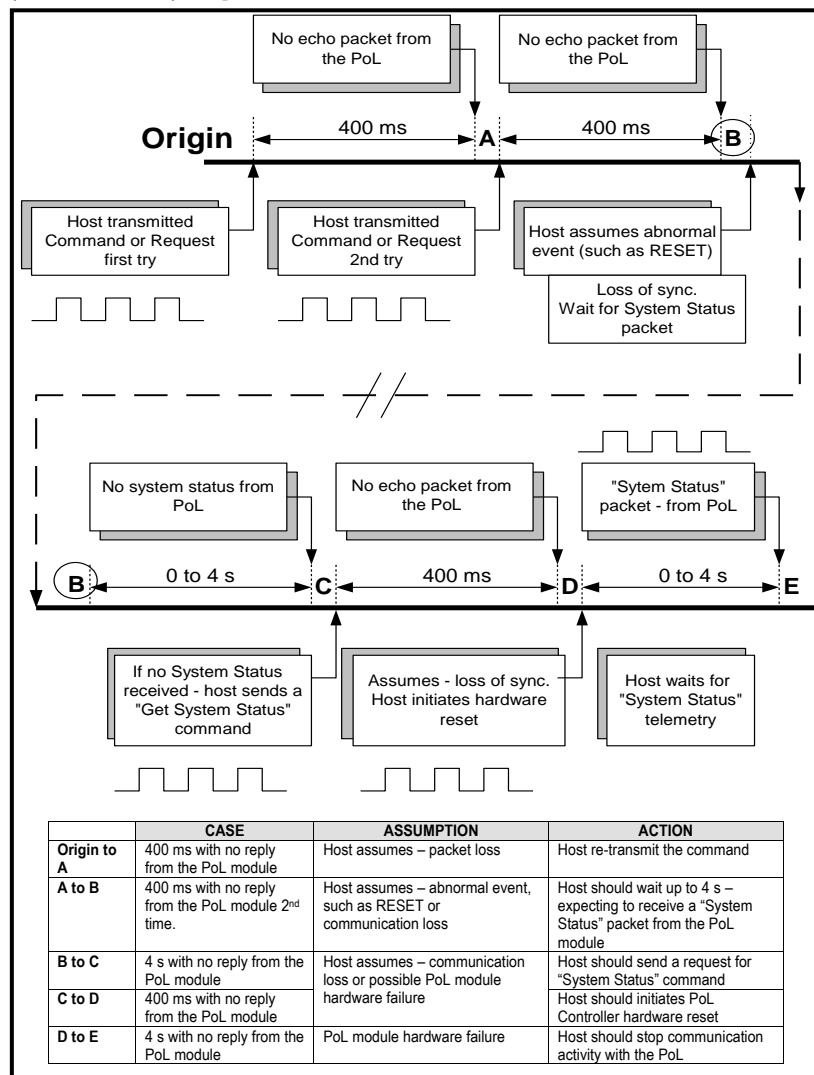


Figure 3: Host Communication During Sync Loss

### I<sup>2</sup>C communication is in use

Host steps	PoE Response
Reply Timeout (100mSec)	No Response (any)
Retransmit with different Echo number	
	No Response (any)
Reply Timeout (100mSec)	
wait 10sec for arbitration loss recovery and retransmit	I <sup>2</sup> C reinit peripheral module or WD after 2.5 sec
Wait for reply	No Response (any)
Reply Timeout (100mSec)	
Reset PoE	
	System status

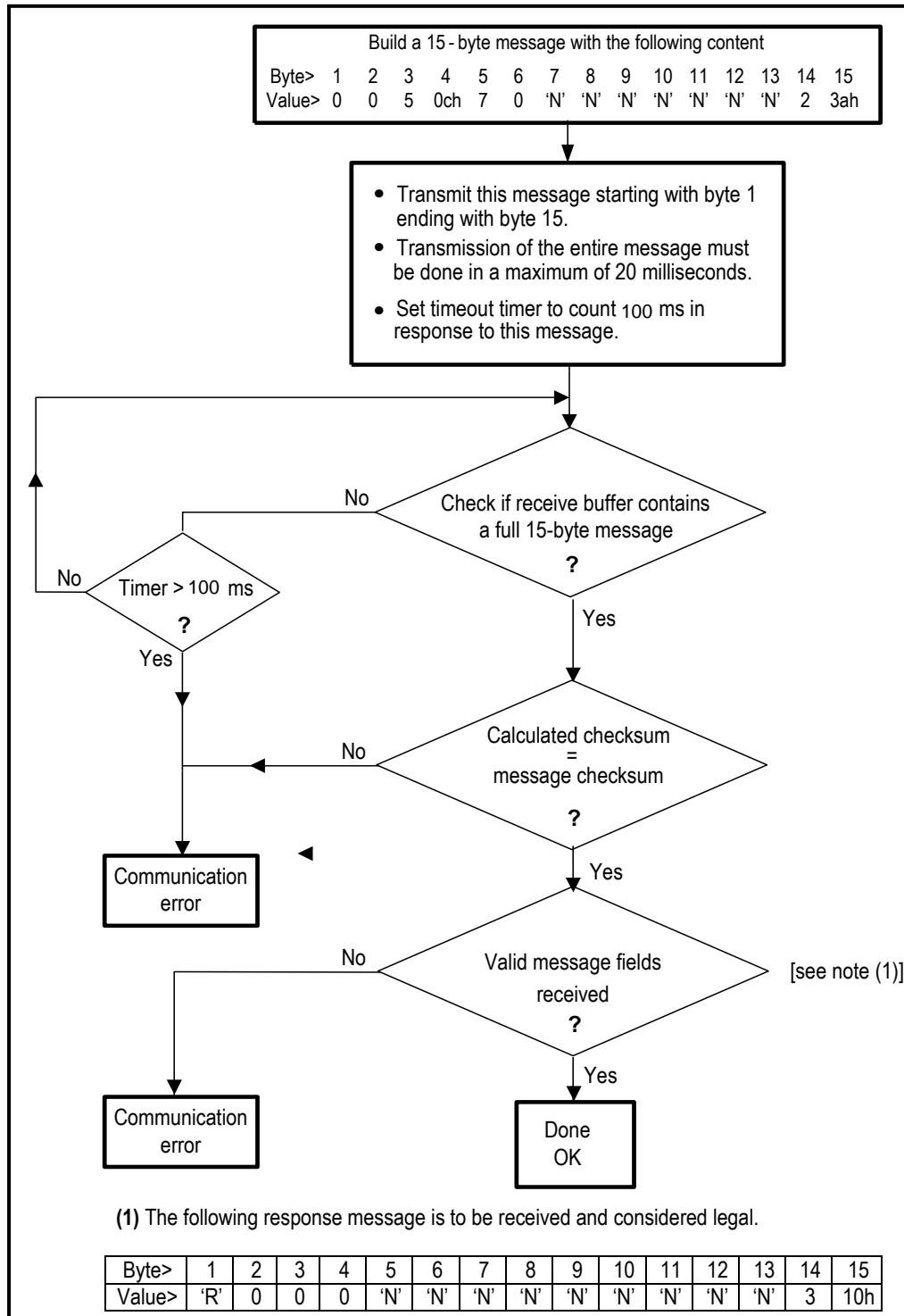
### Non I<sup>2</sup>C communication is in use

Host steps	PoE Response
Reply Timeout (100mSec)	No Response (any)
Retransmit with different Echo number	
	No Response (any)
Reply Timeout (100mSec)	
wait 2.5sec for PoE watch dog function	WD reset
Retransmit with different Echo number	No Response (any)
Reply Timeout (100mSec)	
Reset PoE	
	System status

**Note:** The host must handle unexpected system status reply, indicating PoE out of reset

## 7 Communication Example

A typical example of a message sent by the Host CPU (PSE side) to the Controller is provided in Figure 4. This message turns off Port 7. This figure describes the transmission from the Host and from the CPU.



**Figure 4: Typical Communication Flow**

## 8 Appendix

This appendix contains port statuses table and Mask registers list.

### 8.1 Port Statuses

This table describes the port statuses list the user will receive as telemetry:

**Table 4: Actual Port Status**

Value	Status	Comments
0x06	Port is off: Main supply voltage is high.	Mains voltage is higher than Max Voltage limit.
0x07	Port is off: Main supply voltage is low.	Mains voltage is lower than Min Voltage limit.
0x08	Port is off: 'Disable all ports' pin is active.	Hardware pin disables all ports.
0x0C	Port is off: Non-existing port number.	Fewer ports are available than the maximum number of ports that the Controller can support. Unavailable ports are considered 'off'. Currently not used.
0x11	Port is yet undefined.	Port is not mapped to physical port or port is in unknown state or PD69200 fail to communicate with PD69208 device allocated for this port.
0x12	Port is off: Internal hardware fault.	Port does not respond. Hardware fault, system initialization or PD69200 lost communication with PD69208 device allocated for this port. (Part of refresh function).
0x1A	Port is off: User setting.	User command set port to off.
0x1B	Port is off: Detection is in process.	Interim state during line detection. Status will change after detection process is completed.
0x1C	Port is off: Non-802.3AF/AT powered device.	Non-standard PD connected.
0x1E	Port is off: Underload state.	Underload state according to 802.3AF/AT (current is below I <sub>min</sub> ).
0x1F	Port is off: Overload state	Overload state according to 802.3AF/AT (current is above I <sub>cut</sub> ). OR (PM3 != 0 and (PD class report > user predefined power value)).
0x20	Port is off: Power budget exceeded.	Power Management function shuts down port, due to lack of power. Port is shut down or remains off.
0x22	Port is off: Configuration change	Port configuration was changed or port mode was changed, causing the port to turn off. This status is momentary (2sec delay). After the delay the port status will be updated according to the new configuration/mode.
0x24	Port is off: Voltage injection into the port.	Port fails due to voltage being applied to the port from external source.
0x25	Port is off: Improper Capacitor Detection results or Detection values indicating short	Fail due to out-of-range capacitor value or Fail due to detected short value (When mask 0x04 is set).

**Table 4: Actual Port Status**

Value	Status	Comments
0x26	Port is off: Discharged load.	Port fails due to system voltage supply through other port. Check other port for status 0x24. This error is linked with mask 0x1F enable.
0x34	Port is off: Short condition.	Short condition was detected.
0x35	Port is off: Over temperature at the port.	Port temperature protection mechanism was activated.
0x36	Port is off: Device is too hot.	The die temperature is above safe operating value.
0x37	Unknown device port status.	The device returns an unknown port status for the software. Currently not used.
0x3C	Power Management-Static.	Calculated power > power limit.
0x3D	Power Management-Static –ovl	Port Power up was denied due to (PD class report power > user predefined power value). <b>Note:</b> Power denied counter will advance.
0x41	Power denied: Hardware power limit	Port was not turned on due to hardware power limit (PD class power > Hardware class limit) Example: PoH PD over M device port.
0x43	Port is off: Class Error	Illegal class
0x44	Port turn off during host crash Reserved	Port is off – After host crash the port is off and waits for host command to proceed with new detection cycles. This status appears due to OVL,UDL or Short events during host crash
0x45	Delivered power port was forced to be shut down at host crash Reserved	Port is off – After host crash the port is off and waits for host command to proceed with new detection cycles. The port was delivering power before host crash but was configured to be forced shut when host crashes.
0x46	An enabled port was forced to be shut down at host crash Reserved	Port is off – after host crash the port is off and waits for host command to proceed with new detection cycles. The port was enabled and not delivering power before host crash and was configured to be forced shut when host crashes.
0x47	Force Power Crash Error Reserved	Port is at force power error, according to IEEE test mode error. The port was forced power and host crash occurred.
0x48	Port is off: Recovery UDL Reserved	During crash a recovery port delivering power was disconnected due to UDL.
0x49	Port is off: Recovery PG Event Reserved	During crash a recovery port delivering power was disconnected due to PG event.
0x4A	Port is off: Recovery OVL Reserved	During crash a recovery port delivering power was disconnected due to OVL.
0x4B	Port is off: Recovery SC Reserved	During crash a recovery port delivering power was disconnected due to SC.
0x4C	Port is off: Recovery Voltage injection Reserved	Voltage was applied to the port from external source, during or before crash.

**Table 4: Actual Port Status**

Value	Status	Comments
<b><u>New port statuses for BT ports</u></b>		
0x80	2P Port delivering non IEEE	non IEEE PD was detected using 2P matrix in BT mode
0x81	2P Port delivering IEEE	802.3BT-compliant PD was detected using 2P matrix
0x82	4P Port that deliver only 2 Pair non IEEE	Signature failure on Alt-B, allowing power only on Alt-A (Non IEEE or Legacy PD).
0x83	4P Port delivering 2P non IEEE	non IEEE PD was detected using 4P matrix in BT mode and power as 2Pair
0x84	4P Port delivering 4P non IEEE	non IEEE PD was detected using 4P matrix in BT mode and power as 4Pair
0x85	4P Port delivering 2P IEEE SSPD	802.3BT- SSPD was detected using 4P matrix and operate as 2P if requested class $\leq 4$
0x86	4P Port delivering 4P IEEE SSPD	802.3BT- SSPD was detected using 4P matrix and operate as 4P if requested class $> 4$
0x87	4P Port delivering 2P IEEE DSPD in 1st phase.	802.3BT- DSPD was detected using 4P matrix and operate as 2P due to 4pair candidate validation in two cycles.
0x88	4P Port delivering 2P IEEE DSPD	802.3BT- DSPD was detected using 4P matrix and operate as 2P
0x89	4P Port delivering 4P IEEE DSPD	802.3BT- DSPD was detected using 4P matrix and operate as 4P
0x90	Force Power BT 2P	Port matrix 2P and delivers power due to force power command
0x91	Force Power BT 4P	Port matrix 4P and delivers power on both pair sets due to force power command
0xA0	Force Power BT Error	Force power command was set, one of the port pair sets stop delivering power, from at least one reason out of various reasons (System related, Device related, port related or Pair set related)
0xA7	Connection Check error	This error will be reported only in 4 pair port when invalid connection check signature was detected. In such case detection fail counter will be incremented.
0xA8	Open	Port is not connected

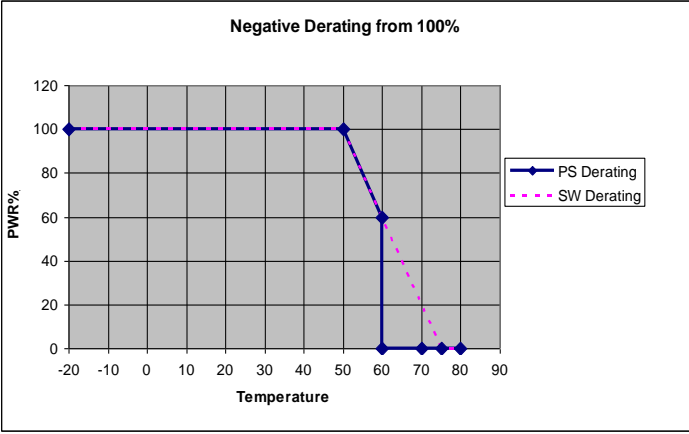
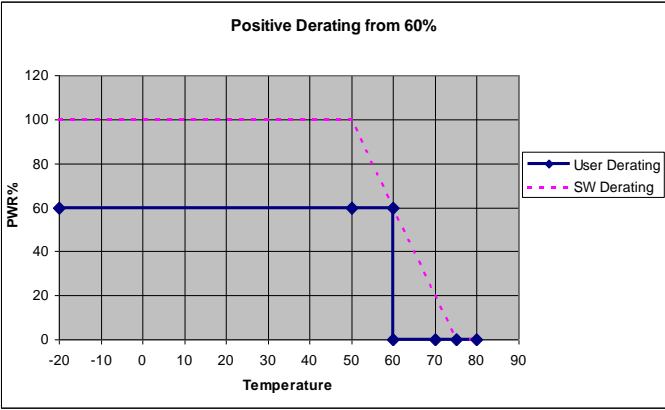
## 8.2 BT MASK Registers list

This list describes the individual mask registers that can be used in the PD69200 BT product.

Num	Name	Val	Description
0x00	Ignore higher priority	'0'	The allocation logic before classification will sum the delivering power ports with lower priority and add the result to the available power. After classification the disconnection function will execute and may disconnect lower priority ports to free power for the higher priority port.
		'1'	If power is not available for powering up any port, any new connected port power up will be denied, regardless of its priority.
0x09	Recovery support Note: Set is ignored at this point	0	BT systems Default Recovery feature is disabled in the system, and ports won't continue delivering power during crash (Host Recovery request will be ignored).
		1	Recovery feature is enabled in the system, and ports that where set to crash mode will continue to deliver power during crash (Host Recovery request will initiate recovery activity).
0x10	Support High res detection	'0'	Resistor detection range at normal range, according to IEEE802.3at.
		'1'	Open the upper range to 55Kohm at 2pair logical port only. <b>Note:</b> 1. This feature will not operate on any 4 pair logical port. 2. When this mask is set, the capability of "PSE connected to PSE" protection function is reduced.
0x14	Hardware reset on ASIC error	'0'	If ASIC fails (stops functioning) mark it as 'disabled' and continue working with other ASICs.
		'1'	fails perform HW reset.
0x1B	I <sup>2</sup> C restart enable	'0'	Don't initialize the I <sup>2</sup> C module in case of inactivity.
		'1'	Initializes the I <sup>2</sup> C module system after 10 seconds of inactivity.
0x1F	PSE powering PSE checking	'0'	PSE powering PSE condition will not deny powering new valid ports.
		'1'	In case PSE powering PSE condition occurs, no additional ports will be powered up, until this problem will be resolved.
0x20	LED stream type	0	LED stream disabled.
		1	LED stream supports unicolor BT
		2	LED stream supports Bicolor BT



Num	Name	Val	Description
		3	For Microsemi internal use only (NTGR).
		4	For Microsemi internal use only (Direct).
		5	<u>Reserved for future:</u> Direct led function (for 1 port Midspan products). Vmain LED is driven from the PD69200 (xSYS_OK, pin 32), and Port LED is driven from the PD69208 LED port (PD69200 BT LED definitions internal document).
		6	Direct led function from PD69208 LED ports (for 1 port Midspan products). 3 LEDs in the same package.
		7	Direct led function from PD69208 LED ports (for 1 port Midspan products). 1 package for 2P & 4P LED operation. Another package for SYS OK pin.
0x2A	Enable ASIC Refresh	'0'	If ASIC fails, do not try to refresh it and proceed according to mask 0x14 (Hardware reset on ASIC error).
		'1'	If ASIC fails, try to refresh it. If refresh fails, refresh operation will repeat till it succeed. The related port status during refresh operation will be "chip error" (0x12). The refresh operation is being performed every 60mSec.
0x2C	Layer2 Power Allocation Limit	'0'	Power allocation limit up to requested class (Non BT compliant).
		'1'	Power allocation limit up to minimum between the requested class and the operation mode (BT compliant).
0x30	Port LED Blinks at invalid signature or connection-check error	'0'	When port detects invalid signature or connection-check error, LED stays off.
		'1'	When port detects invalid signature or connection-check error, LED blinks.
0x32	Temperature Derating enable Midspan BT	'0'	Feature is disabled.
		'1'	Feature is enabled.

Num	Name	Val	Description
0x33	Temperature Derating Negative Delta	'0'	<p>Negative delta calculation.</p> <p>Negative derating: power will be reduced from the operational budget when temperature rise. In this mode, power consumption cannot get above the initial settings.</p> 
	Temperature Derating Positive Delta	'1'	<p>Positive delta calculation.</p> <p>Positive derating: Power will be added to the operational budget when temperature is reduced. In this mode, power consumption can get above the initial settings. If the temperature is low enough, additional power is added to the user budget settings, up to the power supply limit. When the actual consumption gets above the user settings, the user will get a warning bit.</p> 
0x40	xSystem OK pin behavior	0	Pin indicates if Vmain is in valid range or out of range. Refer to PD69200 datasheet.
		1	<p>Midspan main LED behavior (Microsemi internal usage).</p> <p>Led is ON when: Vmain is within the range, AND actual bank is even number (0,2,4...).</p> <p>In any other condition, LED blinks.</p>

Num	Name	Val	Description
		2	Pin behavior is according to power indication in %.
		3	Reserved
		4	Pin behavior is according to power indication in Watt.
0x46	Single detection fail event	'0'	When port detection consecutively fails, Counter related event (4.3.8 Get BT Port Status, Port Event field bit 2) and the correlated invalid signature counter will advance on every unsuccessful detection cycle.
		'1'	When port detection consecutively fails, Counter related event bit (4.3.8 Get BT Port Status, Port Event field bit 2) will be set only at the 1 <sup>st</sup> failure. The correlated invalid signature counter will continue to advance on every unsuccessful detection cycle.
0x49	Auto Zone2 port activation	'0'	Port with Zone2 error continues to operate regularly according to system pre settings
		'1'	Port with Zone2 error will switch automatically to Zone2 behavior
0x4F	Support_adding lldp_half_priority	'0'	Port at LLDP will not have additional half priority.
		'1'	Port at LLDP will have additional half priority compared to non LLDP port at the same priority settings.
0x50	HOCPP - High Over Current Pulse Protection	0	Internal port startup check duration is 500mSec and HOCPP is enabled immediately (0mSec) after port power up.
		1	Internal port startup check duration is 500mSec and HOCPP is enabled at the end of this time duration.
		2	Internal port startup check duration is 1000mSec and HOCPP is enabled at the end of this time duration.
		3	Internal port startup check duration is 1500mSec and HOCPP is enabled at the end of this time duration.
		4	Internal port startup check duration is 2000mSec and HOCPP is enabled at the end of this time duration.
		Notes: 1. For DSPD staggered power up, any selection above #1 will be treated as #1. 2. HOCPP will be enabled according to HOCPP protection policy.	
0x53	LER – Long Error Recovery	'0'	Systems with regular error recovery requirements.
		'1'	High energy systems that requires long error recovery shall set this mask to '1'.

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## Revision History

Revision	Description	Date
<b>BT</b> Beta 3.00	Initial document	13/DEC/2017
Draft 3.01	<ol style="list-style-type: none"> <li>Subjects values change in various commands</li> <li>Add control bits to BT port configuration command</li> <li>Description updates in various commands</li> </ol>	18/DEC/2017
Draft 3.02	<ol style="list-style-type: none"> <li>Mask 0x28 was changed to Mask 0x40</li> <li>Mask 0x16 was changed to Mask 0x20</li> <li>Added section 3.3, how to treat unused "N" fields.</li> </ol>	21/DEC/2017
Draft 3.03	<ol style="list-style-type: none"> <li>General description update.</li> <li>Remove backwards compatibility chapter.</li> <li>Port statuses update.</li> <li>4.3.7 Get BT Port Parameters, BT PortCFG1 (0xC1) was removed and changed to BT PortConfig1 (0xC0).</li> <li>Add Midspan tunneling command and telemetry.</li> <li>Add Midspan serial number telemetry request description.</li> <li>4.4.8 Get BT Port Measurements change.</li> </ol>	26/DEC/2017
Draft 3.04	<ol style="list-style-type: none"> <li>4.3.6 Set BT Port Parameters, Field - Port Mode CFG1 was updated by removing Legacy enable bit. The bit was moved to Field – Port Mode CFG2.</li> <li>4.3.6 Set BT Port Parameters, Field - Port Mode CFG2 was updated with Legacy bit. The bit name was changed to "Non IEEE Enable". "BT Port PM mode" Field was updated with additional option 2 selection, to enable the removal of system BT PM Mode.</li> <li>4.1.18 was updated with "Added Class Power Value" field as part of existing telemetry.</li> <li>4.3.7 Get BT Port Parameters, "Actual BT Port Mode" Field was removed.</li> <li>4.3.8 Get BT Port Status, "Port Event" Field was added. Port Mode CFG1 was updated.</li> <li>Set/Get BT PM Mode was removed since it can be configured per port.</li> <li>Get Total Power number was changed from 4.4.3 to 4.4.1 and "Vmain Voltage" field was added.</li> <li>Get BT Power Supply measurement was removed since all the information is already exist in Get Total Power telemetry.</li> <li>Get BT Port Measurement number was changed from 4.4.8 to 4.4.5 and thefield "Port Power Consumption" was changed to "Measured Port Power" with 0.1w LSB instead of 5mW LSB.</li> <li>Recovery Mask 0x09 default = 0 and set to '1' is ignored.</li> <li>Recovery statuses are reserved.</li> <li>4.1.7 Get BT Event Cause Telemetry Update. Interrupt register was removed and system event field was added.</li> <li>4.2.2 Get BT PoE Device Status update: Expected Device field was removed and replaced with Device Event field. "Vcal Counter" name was changed to "4.2.2 MSCC Use8". Reset/POR Counter field was added to DATA[11].</li> <li>Return back the interrupt register field to 4.1.6 Get BT System Status and update the statuses numbers that cause an event.</li> </ol>	01/JAN/2018
Draft 3.05	<ol style="list-style-type: none"> <li>4.3.8 Get BT Port Status, Port Event field description update by removing unnecessary statuses numbers.</li> <li>4.4.1 Get Total Power , Calculated Power field description update.</li> <li>Document references link errors were fixed.</li> </ol>	03/JAN/2018
Draft 3.06	<ol style="list-style-type: none"> <li>Minor description updates for clarification.</li> <li>Colors marking removal.</li> <li>Force power status numbers update.</li> <li>Assigned class description was copied from 4.3.11 to 4.3.8. Note about class 0 was added.</li> </ol>	08/JAN/2018

	<ol style="list-style-type: none"> <li>5. 4.1.17 Notes description update.</li> <li>6. 4.1.18 name change to Get BT Class Power + New field "Max Added Class Power".</li> <li>7. 4.3.6 Set BT Port Parameters, field Port Mode CFG2, BT port PM mode, Note was added.</li> <li>8. 4.3.1 Set Temporary Matrix description update for BT.</li> <li>9. Port status 0x93 – connection check error was added.</li> <li>10. 0x93 was added to the counter related event description in 4.3.8</li> </ol>	
Draft 3.07	<ol style="list-style-type: none"> <li>1. 4.1.6 Get BT System Status – Field name "Device Found" was changed to "Found Devices".</li> <li>2. 4.5.5 Get System Measurements, name change to "Get Derating System Measurements".</li> <li>3. Add (Midspan only) to all the commands under 4.5</li> <li>4. 4.3.11 Get BT Port Class, field Port PHY Info – CC Result was modified with "Open", that was split from "Other" and description update.</li> <li>5. Mask 0x00 description update.</li> <li>6. 4.1.13 Set System OK LED Mask Registers command description update, Mask 0x28 was changed to 0x40 to follow the mask change.</li> <li>7. 4.3.6 Set BT Port Parameters – Description corrections in fields numbering.</li> <li>8. Status 0x87 was updated and status 0x88 was added to replace the previous 0x87.</li> <li>9. 4.3.1 description update, 0x37 was changed to 0x11.</li> <li>10. Test commands 8.3.1, 8.3.2 updates.</li> </ol>	17/JAN/2018
Draft 3.08	<ol style="list-style-type: none"> <li>1. Modifications for Dual signature.</li> <li>2. 4.3.6 / 4.3.7 – Set / Get BT Port Parameters commands update, using modes instead of flags + Fields order change + New fields.</li> <li>3. 4.3.8 Get BT Port Status description update + New field.</li> <li>4. 4.3.11 Get BT Port Class, New fields update + fields shift + description updates.</li> <li>5. Added port statuses.</li> <li>6. Masks table description update for 0x20, 0x40</li> <li>7. 4.1.6 Get BT System Status, Interrupt Register, Event Table description update with new statuses numbers.</li> </ol>	27/MAR/2018
Draft 3.09	<ol style="list-style-type: none"> <li>1. 4.1.7 Get BT Event Cause, added system event bit 1 "Vmain Fault".</li> <li>2. 4.2.2 Get BT PoE Device Status, added device event bit, "PoE device refreshed" bit 3.</li> <li>3. 4.3.8 Get BT Port Status, description update in field "Last Shutdown Error Status".</li> <li>4. 4.1.9 Set Interrupt Mask was changed to "Set BT Event Interrupt Mask" using correlated new BT events.</li> <li>5. 4.1.10 Get Interrupt Mask was changed to "Get BT Event Interrupt Mask" using correlated new BT events.</li> <li>6. 4.1.6 Get BT System Status, Interrupt register field was removed, due to the use of new BT events registers. A single event bit was added instead.</li> <li>7. 4.1.13, 4.1.14 Set/Get System OK LED Mask Registers were removed.</li> <li>8. Mask 0x40 value #3 was removed and reserved due to the removal of the LED blink/light IRQ reflection commands.</li> <li>9. Added note to 4.3.8 Get BT Port Status, Port Event field description.</li> <li>10. 4.1.15, 4.1.16 Set/Get BT power indication LED updated command instead of pre_BT commands.</li> <li>11. Mask 0x46 description update due to the Old interrupt register removal.</li> </ol>	11/APR/2018
Draft 3.10	<ol style="list-style-type: none"> <li>1. Add a port status 0x22 - "Port is off: Configuration change", 0x41 – "Power denied: Hardware power limit"</li> <li>2. 4.2.2 Get BT PoE Device Status, "Device Event" change to "Device Event Reason".</li> <li>3. 4.1.15 Set BT Power Indication LED, description update</li> <li>4. 4.3.8 Get BT Port Status, Port Event field, bit1 and bit2 description change. Field 4.3.8 MSCC Use11 was removed. Recovery mentioning was removed.</li> </ol>	30/APR/2018

	<ol style="list-style-type: none"> <li>5. 4.3.7 Get BT Port Parameters, "Other" field was added.</li> <li>6. 4.3.6 Set BT Port Parameters, Port Mode CFG1, Mode 0x02 description change. Added note related to force power. Add 0xFF option to the Priority settings, to be consistent with other fields in this command. Recovery mentioning was removed.</li> <li>7. 4.3.11 Get BT Port Class, field Requested power, added units 0.1w to the description.</li> <li>8. 4.1.18 Get BT Class Power, Class Power Value Field description change.</li> </ol>	
Draft 3.10 Modifications by Customer Support	<ol style="list-style-type: none"> <li>9. Mask 0x19 was removed</li> <li>10. Mask 0x30 "Pot LED blinks at invalid signature or connection-check error" was added.</li> <li>11. Mask 0x20, LED stream type, updating fields 5,6,7 description from single field description.</li> </ol>	24/May/2018
Draft 3.20 Internal	<ol style="list-style-type: none"> <li>1. Added chapter 4.6 with Layer2 commands.</li> <li>2. Port operation mode 0x22 was added to Port operation mode field in 4.3.6 command, to support CDP operation flow.</li> <li>3. Port operation mode 0x21 description update – Type3 changed to Type2.</li> <li>4. Mask 0x2C was added.</li> <li>5. Mask 0x2B description update.</li> <li>6. Mask 0x20 updated LED stream types description for 1,2,3,5.</li> <li>7. 4.3.11 Get BT Port Class, field "Port PHY Info", nibble "Decided PD Structure": Update with additional value and numbering change. (Part of the 24/May modification that where missed during the document modifications).</li> <li>8. Table of content Update.</li> </ol>	06/JUNE/2018
Draft 3.20	<ol style="list-style-type: none"> <li>9. 4.3.8 description update CH Num changed to Port Num.</li> <li>10. 4.3.11 Get BT Port Class, field Autoclass support description update.</li> <li>11. Adding 4.6.8, 4.6.9 , Commands for Autoclass in LLDP.</li> <li>12. 4.6.2 and 4.6.7 Layer2 Status field was modified with additional values and existing values change.</li> <li>13. 4.6.1 Set BT Port Layer2 LLDP PD Request, Cable Length field was modified with nibble for 10 meter LSB length and AutoClass nibble.</li> <li>14. 4.6.2 Get BT Port Layer2 LLDP PSE Data, update in Layer2 Status field and added field "Cable Length in Use".</li> <li>15. 4.6.3 Get BT Port Layer2 LLDP PD Request, Cable length was changed to Cable Length Req and the field values where updated.</li> <li>16. 4.6.7 Get Port Layer2 CDP PSE Data, update in Layer2 Status field.</li> <li>17. CH Num field was changed to Port Num in all Layer2 commands for protocol consistency.</li> <li>18. Layer2 description updates in all commands, Light blue marked.</li> <li>19. Value of 0xACAC was added to "PSE Allocated Power Single / ALT-A" field and to "PD Request Power Single" field. (To report on Autoclass usage).</li> <li>20. 4.6.6 description update.</li> <li>21. 4.4.5 description update, CH Num changed to Port Num.</li> <li>22. 4.3.6 Set BT Port Parameters, Port Mode CFG2 field, BT port PM mode, add Autoclass to 0x2 value.</li> </ol>	12/JUNE/2018
Draft 3.21	<ol style="list-style-type: none"> <li>1. Command 4.3.10 Set Temporary Power Limits for BT Port was removed from the document since it was not supported and not planned to be supported.</li> <li>2. Mask 0x2B Check inrush was removed since it is not operational in BT.</li> <li>3. Port status table was updated with deleting unused strike through lines.</li> </ol>	11/JULY/2018
Draft 3.22	<ol style="list-style-type: none"> <li>1. 4.3.6 Set BT Port Parameters command, operation mode field, updated description in mode 0x20 and added mode 0x23.</li> </ol>	09/AUG/2018



Draft 3.23	<ol style="list-style-type: none"> <li>4.3.11 Get BT Port Class telemetry update on the CC result field and Decided PD Structure field.</li> <li>Added note for auto class at 4.3.11.</li> <li>Status 0xA7 description update.</li> </ol>	28/NOV/2018
Draft 3.24	<ol style="list-style-type: none"> <li>4.1.6.1 Telemetry at Boot Up Error update with download type field.</li> </ol>	06/FEB/2019
Draft 3.25	<ol style="list-style-type: none"> <li>4.3.6 Set BT Port Parameters: Added mode 0x24.</li> <li>5.1 Download Process (Valid Firmware Exists: Timing improvement.</li> <li>5.4 I<sup>2</sup>C Download Process update.</li> <li>8.2 BT MASK Registers list: New individual mask 0x50.</li> </ol>	20/MAR/2019
Draft 3.26	<ol style="list-style-type: none"> <li>4.3.6 Set BT Port Parameters: Added modes 0x14, 0x15. Add <b>"Class Error Operation Select"</b> to CFG2 reserved bits.</li> </ol>	15/APRIL/2019
Draft 3.27	<ol style="list-style-type: none"> <li>4.3.6 Set BT Port Parameters: Added modes 0x25, 0x26, 0x27. Update modes 0x14, 0x15. Update port mode CFG1 with new 0x2 enable mode.</li> <li>4.3.8 Get BT Port Status, Port Mode CFG1 field update with 0x2 description.</li> <li>4.6.1 Set BT Port Layer2 LLDP PD Request: Add L2 CFG Field with Priority nibble.</li> <li>4.6.2 Get BT Port Layer2 LLDP PSE Data: Add L2 CFG Field with Priority nibble.</li> <li>8.2 Masks table: Add new 0x4F Mask "Support adding lldp half priority".</li> </ol>	28/MAY/2019
Draft 3.28	<ol style="list-style-type: none"> <li>4.3.6 Set BT Port Parameters, Port Mode CFG1: Add force power 90w option.</li> <li>4.3.6 Set BT Port Parameters, New Port operation Mode, Dedicated for Microchip Midspans only.</li> <li>Mask 0x50 FIVE.</li> <li>4.1.15 Set BT Power Indication LED: Add new field for "Indication OFF Delay" selection. Notes description update.</li> <li>Mask 0x20, new selecting option #3, dedicated for NTGR LED stream.</li> <li>Pages numbering update.</li> <li>4.3.6 Set BT Port Parameters, Port Operation Mode table: Fixing configuration name fields description mistakes, due to copy paste errors.</li> </ol>	17/NOV/2019
Draft 3.29	<ol style="list-style-type: none"> <li>New mask – LER (0x53) in appendix 8.2.</li> <li>4.2.1 and 4.2.2 fix TSH description errors and add a note to the device error register in bit 1.</li> </ol>	11/FEB/2020

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