9.8 CDB Performance Monitoring Commands

Table 9-26 CDB Performance Monitoring Commands Overview

ID	Command Title	Description	Type	Section
0200h	Control PM	General Performance Monitoring Controls	Rqd.	9.8.1
0201h	Get PM Feature Information	Advertisement on optional PM is supported.	Rqd.	9.8.2
0202h-020Fh	-	**Reserved**		
0210h	Get PM Module LPL	Get Module-level X16 PM using LPL	Adv.	9.8.3
0211h	Get PM Module EPL	Get Module-level X16 PM using EPL	Adv.	9.8.3
0212h	Get PM Host Side LPL	Get Lane-specific host side X16 PM using LPL	Adv.	9.8.4
0213h	Get PM Host Side EPL	Get Lane-specific host side X16 PM using EPL	Adv.	9.8.4
0214h	Get PM Media Side LPL	Get Lane-specific media side X16PM using LPL	Adv.	9.8.5
0215h	Get PM Media Side EPL	Get Lane-specific media side X16 PM using EPL	Adv.	9.8.5
0216h	Get PM Data Path LPL	Get Lane-specific Data Path X16 PM using LPL	Adv.	9.8.6
0217h	Get PM Data Path EPL	Get Lane-specific Data Path X16 PM using EPL	Adv.	9.8.6
0218h-027Fh	-	**Reserved**		

The following Table provides an Overview of the PM Observables available for retrieval by CDB commands.

See Table 8-153 for VDM Observable IDs

Table 9-27 CDB Performance Monitoring Observables

PM Group	Instances	ID: Type and Observable	Unit	Corresponds to Observables
Module	1	0: S16 Module Temperature 1: S16 Vcc 2: S16 Aux1Mon 3: S16 Aux2Mon 4: S16 Aux3Mon	1/256 degC 100 uV see → see → see →	0:00h:14-15 0:00h:16-17 0:00h:18-19 0:00h:20-21 0:00h:22-23
Host Side	Per Lane (across Banks)	0: U16 Host Side Lane SNR 1: F16 Host Side PAM4 LTP 2: F16 Host Side Pre-FEC BER	1/256 dB 1/256 dB	VDM ID 6 VDM ID 8 n/a
Media Side	Per Media Lane (across Banks)	0: U16 Tx Laser Bias 1: U16 Tx Optical Power 2: U16 Rx Optical Power 3: S16 Per-Lane Laser Temperature	0.1 uW 2uA * x 0.1 uW	0-3:11h:170-185 0-3:11h:154-169 0-3:11h:186-201 VDM ID 4
Data Path	Per Data Path (across Banks)	0: F16 Frame Error Count (FERC) 1: F16 Media Side Pre-FEC BER		VDM ID 19 VDM ID 13

9.8.1 CMD 0200h: Control PM

Controls the behavior of CDB Performance Monitoring and its behavior with respect to the Versatile Diagnostic Monitoring in Page 20h-2Fh.

This section details the messages used to extract PM data records such as minimum, average, maximum values.

Note: Unless otherwise specified, a 2-byte, 4-byte, or 8-byte value is encoded in Big Endian format, i.e. the lowest byte address stores the most significant byte of the word.

Table 9-28 CDB Command 0200h: Control PM

Page	Byte	Field Name	Description	Value
CMD Header Fields				
9Fh	128-129	CMDID	Control PM CMD ID	0200h
9Fh	130-131	EPLLength	EPL is not used	0000h
9Fh	132	LPLLength	LPL length	04h
9Fh	133	CdbChkCode	Check Code over 9Fh:128-132 and LPL. See Table 8-161	comp.
9Fh	134	RPLLength	*Note: Initiator may fill those reply fields, to later verify field updates by the target in the reply. See Table 8-161*	undef.
9Fh	135	RPLChkCode		undef.
CMD Data (LPL)				
9Fh	136.1-7	-	**Reserved**	0
	136.0	LinkMode	0b: PM Objects are Independent 1b: PM Objects are the same as 20h-2Fh (linked) When PM objects are linked, this means that PM data in Page 20-2Fh are based on the same objects as the PM records that are returned by CDB Get PM commands. It also means that clearing statistics using either method in Page 2Fh will clear the statistics in CDB, too.	
9Fh	137	-	**Reserved**	00h
9Fh	138.1-7	-	**Reserved**. Set to 0.	0
	138.0	ClearAllStatistics	0b: No operation 1b: Clear all statistics (minimum, average, maximum) for all observables for all lanes at the same time, across all Banks, in a best-effort manner	
9Fh	139	-	**Reserved**	00h
9Fh	140-255	-	**Reserved** Not sent	
REPLY Status				
00h	8.6 or 8.7	CdbCmdCompleteFlag	Set by module when the CDB command is complete	1
00h	37 or 38	CdbStatus	**On Success** 00 000001b: Success **On Failure** 01 000000b: Failed, no specific failure 01 000010b: Parameter range error or not supported 01 000101b: CdbChkCode error	
REPLY Header and Data (LPL)				
9Fh	134	RPLLength	See Table 8-161	0
9Fh	135	RPLChkCode	See Table 8-161	0
9Fh	136-255	-	**Reserved**	

9.8.2 CMD 0201h: Get PM Feature Information

Identifies which of the PM monitors defined in CMD 0210h to 0217h is supported by the module.

Table 9-29 CDB Command 0201h: Get PM Feature Information

Page	Byte	Field Name	Description	Value
CMD Header Fields				
9Fh	128-129	CMDID	Get PM Feature Information CMD ID	0201h
9Fh	130-131	EPLLength	EPL is not used	0000h
9Fh	132	LPLLength	LPL is not used	00h
9Fh	133	CdbChkCode	Check Code over 9Fh:128-132 and LPL. See Table 8-161	FCh
9Fh	134	RPLLength	*Note: Initiator may fill those reply fields, to later verify field updates by the target in the reply. See Table 8-161*	undef.
9Fh	135	RPLChkCode		undef.
CMD Data (LPL)				
9Fh	136-255	-	**Reserved**	
REPLY Status				
00h	8.6 or 8.7	CdbCmdCompleteFlag	Set by module when the CDB command is complete.	1
00h	37 or 38	CdbStatus	**On Success** 00 000001b: Success **On Failure** 01 000000b: Failed, no specific failure 01 000010b: Parameter range error or not supported 01 000101b: CdbChkCode error	
REPLY Header and Data (LPL)				
9Fh	134	RPLLength	See Table 8-161	4
9Fh	135	RPLChkCode	See Table 8-161	comp.
9Fh	136	HostSideMonitors	Bit 0: Bool: Host Side SNR monitor available Bit 1: Bool: Host Side LTP monitor available	X
9Fh	137	MediaSideMonitors	Bit 0: Bool: Media Side SNR monitor available Bit 1: Bool: Media Side LTP monitor available	X
9Fh	138	-	**Reserved**	00h
9Fh	139	-	**Reserved**	00h
9Fh	140-255	-	**Reserved** Not sent	

9.8.3 CMD 0210h/0211h: Get Module PM LPL/EPL

Table 9-30 CDB Command 0210h/0211h: Get Module PM LPL/EPL

Page	Byte	Field Name	Description	Value
CMD Header Fields				
9Fh	128-129	CMDID	Get Module PM using LPL CMD ID	0210h
			Get Module PM using EPL CMD ID	0211h
9Fh	130-131	EPLLength	EPL is not used	0000h
9Fh	132	LPLLength	LPL length	05h
9Fh	133	CdbChkCode	Check Code over 9Fh:128-132 and LPL. See Table 8-161	comp.
9Fh	134	RPLLength	*Note: Initiator may fill those reply fields, to later verify field updates by the target in the reply. See Table 8-161*	undef.
9Fh	135	RPLChkCode		undef.
CMD Data (LPL)				
9Fh	136.7	ClearOnRead	0b: return selected PM data 1b: return selected PM data and then reset their statistics	
	136.1-6	-	Reserved	
	136.0	RecordType	0b: Return 6-byte PM record (min, mean, max) 1b: Return 8-byte PM record (append "current" value)	
9Fh	137	Observables	Bit 0: Module Temperature Bit 1: Vcc Bit 2: Aux1 Bit 3: Aux2 Bit 4: Aux3 Bit 5-7: Reserved	
9Fh	138	-	**Reserved**	
9Fh	139	-	**Restricted** (OIF)	
9Fh	140	-	**Custom**	
9Fh	141-255	-	**Reserved**	
REPLY Status				
00h	8.6 or 8.7	CdbCmdCompleteFlag	Set by module when the CDB command is complete.	1
00h	37 or 38	CdbStatus	**In Progress** 10 000001b: Busy processing command, CMD captured 10 000010b: Busy processing command, CMD checking 10 000011b: Busy processing command, CMD execution **On Success** 00 000001b: Success **On Failure** 01 000000b: Failed, no specific failure 01 000010b: Parameter range error or not supported 01 000101b: CdbChkCode error	
REPLY Header				
9Fh	134	RPLLength	See Table 8-161	comp.
9Fh	135	RPLChkCode	See Table 8-161	comp.
REPLY Data (LPL) (CMD 0210h)				
9Fh	136-255	LPL PM data (up to 120 bytes)	PM record of one observable consists of 6 or 8 bytes: X16 minimum value X16 average (mean) value X16 maximum value X16 current value (if requested) *Note: A maximum of 15 to 20 records can be returned using LPL, depending on the requested PM record length.* The sequence of PM records is the same as the sequence of set bits in the Observables field, in order of ascending significance.	

Page	Byte	Field Name	Description	Value
REPLY Data (EPL) (CMD 0211h)				
A0h to AFh	128-255	EPL PM data (maximum number of bytes depends on available EPL Pages)	PM record of one observable consists of 6 or 8 bytes: X16 minimum value X16 average (mean) value X16 maximum value X16 current value (if requested) *Note: The maximum number of records depends on the size of the EPL and the requested PM record length.* Data is contiguous across EPL Pages, and the sequence of PM records corresponds to the sequence of set bits in the Observables field, in order of ascending significance.	

9.8.4 CMD 0212h/0213h: Get PM Host Side LPL/EPL

Table 9-31 CDB Command 0212h/0213h: Get PM Host Side LPL/EPL

Page	Byte	Field Name	Description	Value
CMD Header Fields				
9Fh	128-129	CMDID	Get PM Host Side LPL CMD ID	0212h
			Get PM Host Side EPL CMD ID	0213h
9Fh	130-131	EPLLength	EPL is not used	0000h
9Fh	132	LPLLength	LPL length	14h
9Fh	133	CdbChkCode	Check Code over 9Fh:128-132 and LPL. See Table 8-161	comp.
9Fh	134	RPLLength	*Note: Initiator may fill those reply fields, to later verify field updates by the target in the reply. See Table 8-161*	undef.
9Fh	135	RPLChkCode		undef.
CMD Data (LPL)				
9Fh	136.7	ClearOnRead	0b: return selected PM data 1b: return selected PM data and then reset their statistics	
	136.1-6	-	Reserved	
	136.0	RecordType	0b: Return 6-byte PM record (min, mean, max) 1b: Return 8-byte PM record (append "current" value)	
9Fh	137-139	-	**Reserved** *In future, we could define start/stop/increment lanes here if needed for modules with more than 32 lanes.*	
9Fh	140-143	Lanes	U32 Lanes is a bitmask indicating which host lane is present, where bit i represents lane i+1	
9Fh	144	Observables	Bit 0: Host Side Lane SNR Bit 1: Host Side PAM4 LTP Bit 2: Host Side Pre-FEC BER Bits 3-7: Reserved	
9Fh	145-147	-	**Reserved**	
9Fh	148-151	-	**Restricted** (OIF)	
9Fh	152-155	-	**Custom**	
REPLY Status				
00h	8.6 or 8.7	CdbCmdCompleteFlag	Set by module when the CDB command is complete.	1
00h	37 or 38	CdbStatus	**In Progress** 10 000001b: Busy processing command, CMD captured 10 000010b: Busy processing command, CMD checking 10 000011b: Busy processing command, CMD execution **On Success** 00 000001b: Success **On Failure** 01 000000b: Failed, no specific failure 01 000010b: Parameter range error or not supported 01 000101b: CdbChkCode error	
REPLY Header				
9Fh	134	RPLLength	See Table 8-161	comp.
9Fh	135	RPLChkCode	See Table 8-161	comp.
REPLY Data (LPL) (CMD 0212h)				
9Fh	136-255	LPL PM data (up to 120 bytes)	PM record of one PM observable consists of 6 or 8 bytes: X16 minimum value X16 average (mean) value X16 maximum value X16 current value (if requested) *Note: A maximum of 15 to 20 records can be returned using LPL depending on the requested PM record length.* The sequence of PM records is the same as the sequence of set bits in the Observables field, in order of ascending significance.	

Page	Byte	Field Name	Description	Value
REPLY Data (EPL) (CMD 0213h)				
A0h to AFh	128-255	EPL PM data (number of bytes depends on available Pages)	PM record of one observable consists of 6 or 8 bytes: X16 minimum value X16 average (mean) value X16 maximum value X16 current value (if requested) *Note: The maximum number of records depends on the size of the EPL and the requested PM record length.* Data is contiguous across EPL Pages, and the sequence of PM records corresponds to the sequence of set bits in the Observables field, in order of ascending significance.	

9.8.5 CMD 0214h/0215h: Get PM Media Side LPL/EPL

Table 9-32 CDB Command 0214h/0215h: Get PM Media Side LPL/EPL

Page	Byte	Field Name (Type)	Description	Value
CMD Header Fields				
9Fh	128-129	CMDID (U16)	Get PM Media Side LPL CMD ID	0214h
			Get PM Media Side EPL CMD ID	0215h
9Fh	130-131	EPLLength (U16)	EPL is not used	0000h
9Fh	132	LPLLength	LPL length	14h
9Fh	133	CdbChkCode	Check Code over 9Fh:128-132 and LPL. See Table 8-161	comp.
9Fh	134	RPLLength	*Note: Initiator may fill those reply fields, to later verify field updates by the target in the reply. See Table 8-161*	undef.
9Fh	135	RPLChkCode		undef.
CMD Data (LPL)				
9Fh	136.7	ClearOnRead	0b: return selected PM data 1b: return selected PM data and then reset their statistics	
	136.1-6	-	Reserved	
	136.0	RecordType	0b: Return 6-byte PM record (min, mean, max) 1b: Return 8-byte PM record (append "current" value)	
9Fh	137-139	-	**Reserved** for modules with more than 32 lanes.	
9Fh	140-143	Lanes	U32 Lanes is bitmask indicating which media lane is present, where bit i represents lane i+1.	
9Fh	144	Selected PM data	Bit 0: Media Side SNR Bit 1: Media Side PAM4 LTP Bits 2-7 : Reserved	
9Fh	145	Selected PM data	Bit 0: Tx Laser Bias Bit 1: Tx Power Bit 2: Rx Power Bit 3: Per-Lane Laser Temperature Bits 4-7 :Reserved	
9Fh	146-147		**Reserved**	
9Fh	148-151		**Restricted** (OIF)	
9Fh	152-155		**Custom**	
REPLY Status				
00h	8.6 or 8.7	CdbCmdCompleteFlag	Set by module when the CDB command is complete.	1
00h	37 or 38	CdbStatus	**In Progress** 10 000001b: Busy processing command, CMD captured 10 000010b: Busy processing command, CMD checking 10 000011b: Busy processing command, CMD execution **On Success** 00 000001b: Success **On Failure** 01 000000b: Failed, no specific failure 01 000010b: Parameter range error or not supported 01 000101b: CdbChkCode error	
REPLY Header				
9Fh	134	RPLLength	See Table 8-161	comp.
9Fh	135	RPLChkCode	See Table 8-161	comp.

Page	Byte	Field Name (Type)	Description	Value
REPLY Data (LPL) (CMD 0214h)				
9Fh	136-255	LPL PM data (up to 120 bytes)	PM record of one observable consists of 6 or 8 bytes: X16 minimum value X16 average (mean) value X16 maximum value X16 current value (if requested) *Note: A maximum of 15 to 20 records can be returned using LPL, depending on the requested PM record length.* The sequence of PM records is the same as the sequence of set bits in the Observables field, in order of ascending significance.	
REPLY Data (EPL) (CMD 0215h)				
A0h to AFh	128-255	EPL PM data (maximum number of bytes depends on available EPL Pages)	PM record of one PM parameter consists of 6 or 8 bytes: X16 minimum value X16 average (mean) value X16 maximum value X16 current value (if requested) *Note: The maximum number of records depends on the size of the EPL and the requested PM record length.* Data is contiguous across EPL Pages, and the sequence of PM records corresponds to the sequence of set bits in the Observables field, in order of ascending significance.	

9.8.6 CMD 0216h/0217h: Get Data Path PM LPL/EPL

Table 9-33 CDB Command 0216/0217h: Get Data Path PM LPL/EPL

Page	Byte	Field Name	Description	Value
CMD Header Fields				
9Fh	128-129	CMDID	Get PM Data Path LPL CMD ID	0216h
			Get PM Data Path EPL CMD ID	0217h
9Fh	130-131	EPLLength	EPL is not used	0000h
9Fh	132	LPLLength	LPL length	14h
9Fh	133	CdbChkCode	Check Code over 9Fh:128-132 and LPL. See Table 8-161	comp.
9Fh	134	RPLLength	*Note: Initiator may fill those reply fields, to later verify field updates by the target in the reply. See Table 8-161*	undef.
9Fh	135	RPLChkCode		undef.
CMD Data (LPL)				
9Fh	136.7	ClearOnRead	0b: return selected PM data 1b: return selected PM data and then reset their statistics	
	136.1-6	-	Reserved	
	136.0	RecordType	0b: Return 6-byte PM record (min, mean, max) 1b: Return 8-byte PM record (append "current" value)	
9Fh	137-139	-	**Reserved** for modules with more than 32 lanes.	
9Fh	140-143	DataPaths	U32 DataPaths is a mask indicating which Data Path is present, where bit i represents the Data Path with DataPathID (lowest lane number) i+1	
9Fh	144	Observables	Bit 0: Frame Error Count (FERC, uncorrectable frames) Bit 1: Media Side Pre-FEC BER Bits 2-7 : Reserved	
9Fh	145-147	-	**Reserved**	
9Fh	148-151	-	**Restricted** (OIF)	
9Fh	152-155	-	**Custom**	
REPLY Status				
00h	8.6 or 8.7	CdbCmdCompleteFlag	Set by module when the CDB command is complete.	1
00h	37 or 38	CdbStatus	**In Progress** 10 000001b: Busy processing command, CMD captured 10 000010b: Busy processing command, CMD checking 10 000011b: Busy processing command, CMD execution **On Success** 00 000001b: Success **On Failure** 01 000000b: Failed, no specific failure 01 000010b: Parameter range error or not supported 01 000101b: CdbChkCode error	
REPLY Header				
9Fh	134	RPLLength	See Table 8-161	comp.
9Fh	135	RPLChkCode	See Table 8-161	comp.
Returned Data Path Lane PM Using LPL (0216h)				
9Fh	136-255	LPL PM data (up to 120 bytes)	PM record of one observable consists of 6 or 8 bytes: X16 minimum value X16 average (mean) value X16 maximum value X16 current value (if requested) *Note: A maximum of 15 to 20 records can be returned using LPL depending on the requested PM record length.* The sequence of PM records data is the same as the sequence of set bits in the Observables field, in order of ascending significance.	

Page	Byte	Field Name	Description	Value
Returned Data Path Lane PM Using EPL (0217h)				
A0h to AFh	128-255	EPL PM data (maximum number of bytes depends on available EPL Pages)	PM record of one observable consists of 6 or 8 bytes: X16 minimum value X16 average (mean) value X16 maximum value X16 current value (if requested) *Note: The maximum number of records depends on the size of the EPL and the requested PM record length*. Data is contiguous across EPL Pages and the sequence of PM records corresponds to the sequence of set bits in the Observables field, in order of ascending significance.	