CMIS Overview

OIF Webinar

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Gary Nicholl, OIF PLL Working Group Management Co-Vice Chair, Board Member; Cisco

Ian Alderdice, OIF PLL Working Group Management Co-Vice Chair; Ciena

Presenters

Gary Nicholl,
OIF Physical & Link Layer Working Group Management Co-Vice Chair and Secretary/Treasurer;
Principal Engineer at Cisco Systems

Ian Alderdice,
OIF Physical & Link Layer Working Group Management Co-Vice Chair;
Software Architect at Ciena

Future Sessions

- DPSM/Appsel – Doug Cattarusa, Cisco – Jan 31
- VDM – Todd Rope, Marvell – Feb 28
- CDB/upgrades – TBD – April 3
- Others?

What is CMIS ?

CMIS = **C**ommon **M**anagement **I**nterface **S**pecification

Electrical
(OIF CEI, IEEE, etc)

Optical/Copper
(IEEE, MSAs, OIF)

Host (switch/router)

Pluggable Module

Management
- configure
- initialize
- monitor

= “the forgotten interface”

What is CMIS?

Common **M**anagement **I**nterface **S**pecification (**CMIS**) is a management interface for optical modules and cable assemblies

CMIS provides a defined set of registers and functions for standard module management including:

- Inventory data
- Module and traffic configuration
- Module monitoring (alarms/defects, performance monitoring)
- Capability advertising

CMIS is intended to manage a wide range of optical modules including passive copper cables, 1300 nm client plugs, 400ZR coherent modules, etc.

CMIS is written to operate over a two wire interface but can be implemented on other physical interfaces

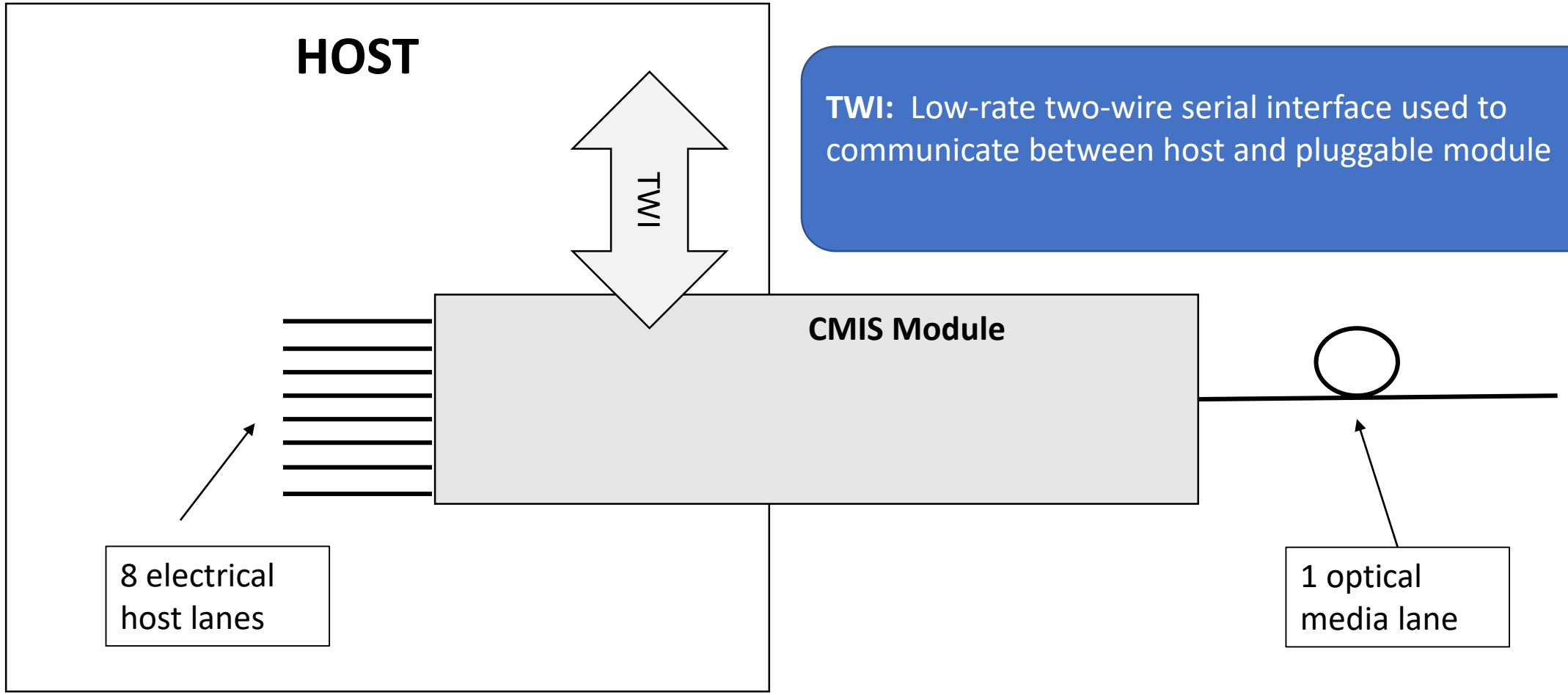
How is CMIS structured?

CMIS has grown from a single document to a collection of documents. CMIS is the core and is supported by a set of supplements for specific applications.

- C-CMIS – Coherent CMIS – Provides extensions to CMIS to manage modules with coherent interfaces
- CMIS-FF – CMIS Form Factor – Provides details of HW pins and related registers for different module form factors.
- CMIS- ELSFP – CMIS External Laser Small Form Factor Pluggable – Provides details for managing Co-Packaging and ELSFP modules.
- CMIS-LT – CMIS Link Training – Provides details for managing host side link training on CMIS modules.
- CMIS-CSID – CMIS Configuration Set Item Description – Provides details for managing electrical characteristics of host interfaces.

CMIS works in conjunction with other industry standards like SFF-8024 and hardware MSAs.

400ZR CMIS Managed Module

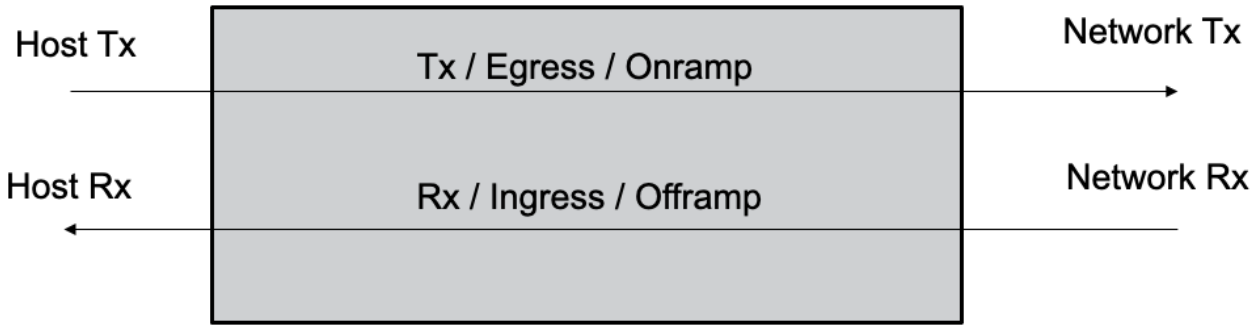


TWI: Low-rate two-wire serial interface used to communicate between host and pluggable module

CMIS key concepts - Direction

Direction

- Rx direction means optical to electrical direction
- Tx means electrical to optical direction.
- Examples
  - RX LOS = input optical loss of signal.
  - TX LOS = input electrical loss of signal.



CMIS key concepts - Lanes

LANES

Physical links on the module and are described in APPSEL* codes
Each lane is an individually manageable entity

Media Lane = Optical output lane	Host Lane = Electrical output lane
CMIS supports up to 8 media lanes in a module **400ZR supports one media lane per module** **A DR4 module has 4 media lanes**	**CMIS supports up to 8 host lanes in a module** • Will be expanded for OIF CPO project **QSFP-DD modules can support up to 8 host lanes** • 400GE – 8 lanes of GAUI8 (8 x 50Gbps) • 4x100GE – 4 pairs of GAUI2 lanes (4 x 2 x 50Gbps) • 2x100GE – 2 pairs of CAUI4 lanes (2 x 4 x 25Gbps)

*APPSEL: Application Select – code for host to select Application

CMIS key concepts - Lanes

Lane Specific Flags

Table 8-80 Lane-Specific Tx Flags (Page 11h)

Byte	Bit	Field Name	Register Description	Type
135	7	FailureFlagTx8	**FailureFlagTx<i>** Latched Tx Failure Flag, affecting media lane <i> This Flag indicates an internal failure that causes an unspecified malfunction in the Tx facility used by media lane <i>. *Note: This Flag was formerly named Tx Fault. See glossary for definitions of Fault and Failure.* Advertisement: 01h:157.0	RO/COR Adv.
	6	FailureFlagTx7		
	5	FailureFlagTx6		
	4	FailureFlagTx5		
	3	FailureFlagTx4		
	2	FailureFlagTx3		
	1	FailureFlagTx2		
	0	FailureFlagTx1		
136	7	LOSFlagTx8	**LOSFlagTx<i>** Latched Tx LOS Flag, host lane <i> Advertisement: 01h:157.1	RO/COR Adv.
	6	LOSFlagTx7		
	5	LOSFlagTx6		
	4	LOSFlagTx5		
	3	LOSFlagTx4		
	2	LOSFlagTx3		
	1	LOSFlagTx2		
	0	LOSFlagTx1		
137	7	CDRLOLFlagTx8	**CDRLOLFlagTx<i>** Latched Tx CDR LOL Flag, host lane <i> Advertisement: 01h:157.2	RO/COR Adv.
	6	CDRLOLFlagTx7		
	5	CDRLOLFlagTx6		
	4	CDRLOLFlagTx5		
	3	CDRLOLFlagTx4		
	2	CDRLOLFlagTx3		
	1	CDRLOLFlagTx2		
	0	CDRLOLFlagTx1		
138	7	AdaptiveInputEqFailFlagTx8	**AdaptiveInputEqFailFlagTx<i>** Latched Tx Adaptive Input Eq Fail, host lane <i> Advertisement: 01h:157.3	RO/COR Adv.
	6	AdaptiveInputEqFailFlagTx7		
	5	AdaptiveInputEqFailFlagTx6		
	4	AdaptiveInputEqFailFlagTx5		
	3	AdaptiveInputEqFailFlagTx4		
	2	AdaptiveInputEqFailFlagTx3		
	1	AdaptiveInputEqFailFlagTx2		
	0	AdaptiveInputEqFailFlagTx1		

Lane Specific Control

Table 8-62 Lane-specific Direct Effect Control Fields (Page 10h)

Byte	Bits	Field Name	Register Description	Type
129	7	InputPolarityFlipTx8	**InputPolarityFlipTx<i>** 0b: No Tx input polarity flip for lane <i> 1b: Tx input polarity flip for lane <i> Advertisement: 01h:155.0	RW Adv.
	6	InputPolarityFlipTx7		
	5	InputPolarityFlipTx6		
	4	InputPolarityFlipTx5		
	3	InputPolarityFlipTx4		
	2	InputPolarityFlipTx3		
	1	InputPolarityFlipTx2		
	0	InputPolarityFlipTx1		
130	7	OutputDisableTx8	**OutputDisableTx<i>** 0b: Tx output enabled for media lane <i> 1b: Tx output disabled for media lane <i> Advertisement: 01h:155.1	RW Adv.
	6	OutputDisableTx7		
	5	OutputDisableTx6		
	4	OutputDisableTx5		
	3	OutputDisableTx4		
	2	OutputDisableTx3		
	1	OutputDisableTx2		
	0	OutputDisableTx1		

CMIS key concepts

ADVERTISING — Modules uses advertising to notify the host of supported functionality

Use	Advertising examples
Hosts are expected to read the advertising and manage the module based on what is supported Many of the features in CMIS are optional and within features there may be additional configuration options	Supported grid spacing (e.g. 100GHz, 75GHz, 50GHz) Supported upgrade type (EPL vs LPL) Supported temperature monitoring (AUX1, AUX2, ..)

CMIS Memory Map

From I2C to module Memory Map

CMIS uses pages to turn the 256-byte TWI message into a memory map consisting of thousands of registers

Registers are grouped in pages of 128 bytes

Each page provides specific functionality

Banking allows module to instantiate multiple copies of a page

- **4x100GE: 4 banks of 100GE alarms/PMs**

The *host* initiates all management interactions

The *module* can only respond

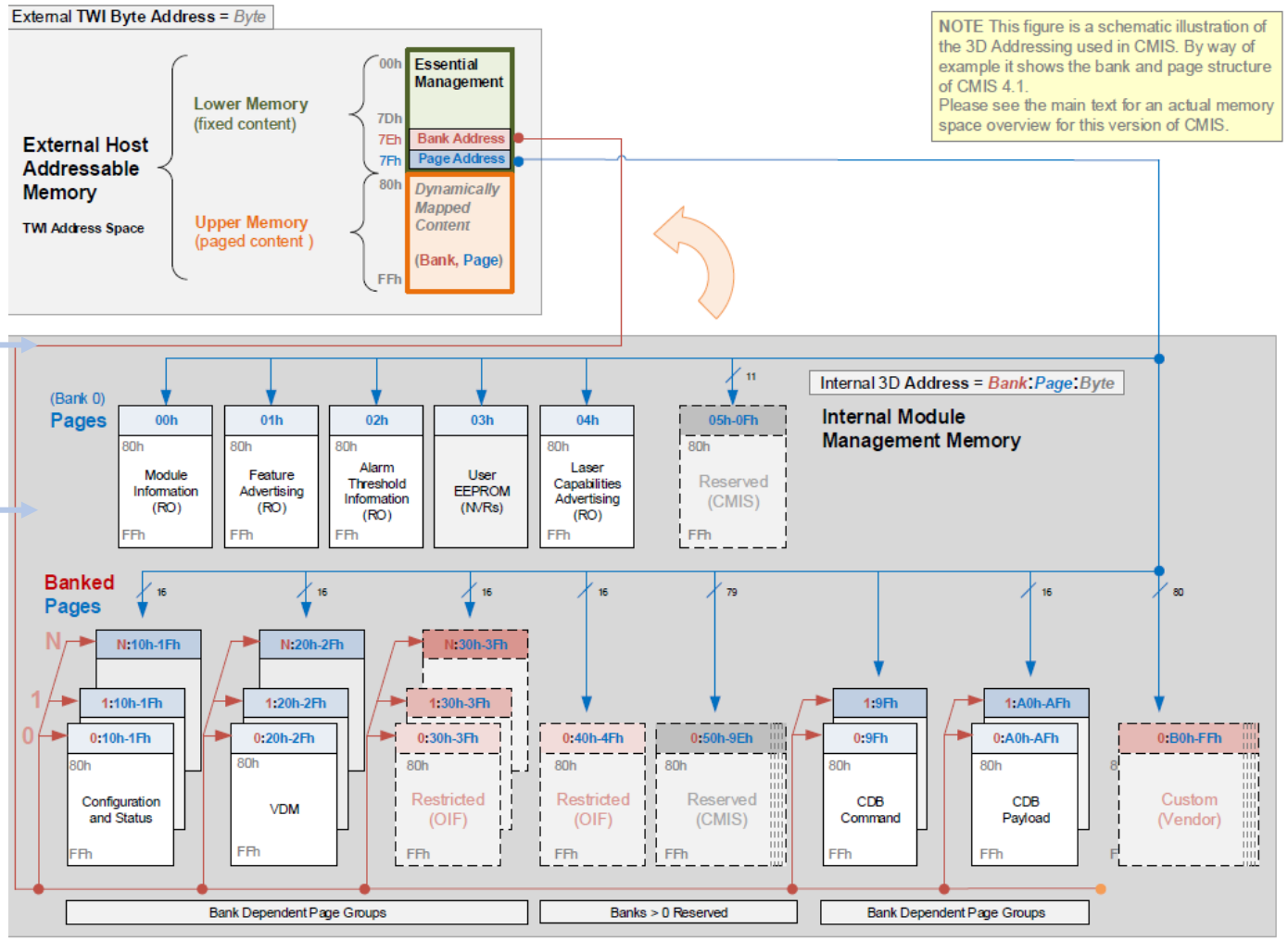


Figure 8-1 CMIS Module Memory Map (Conceptual View)

CMIS Memory Map example – lower memory

Page Overview

Table 8-4 Lower Memory Overview

Address	Size	Subject Area	Description
0–2	3	Management Characteristics	Basic Information about how this module is managed
3	1	Global Status Information	Current state of Module, Interrupt signal status
4–7	4	Flags Summary	Summary of Flags set on specific Pages (and Banks)
8-13	6	Module-Level Flags	Flags that are not lane or Data Path specific
14-25	12	Module-Level Monitors	Monitors that are not lane or Data Path specific
26-30	5	Module-Level Controls	Controls applicable to the module as a whole
31-36	6	Module-Level Masks	Mask bits for the Module-Level Flags
37-38	2	CDB Command Status	Status of current CDB command
39-40	2	Module Active Firmware Version	Module Active Firmware Version number
41	1	Fault Information	Fault cause for entering ModuleFault state
42-63	22	-	**Reserved[22]**
64-84	21	-	**Custom[21]**
85-117	33	Supported Applications Advertising	Applications supported by module Data Path(s)
118-125	8	Password Facilities	Password Entry and Change (mechanism only)
126-127	2	Page Mapping	Page mapping into host addressable Upper Memory

Specific Registers

Table 8-5 Management Characteristics

Byte	Bits	Field Name	Field Description	Type
0	7-0	SFF8024Identifier	**SFF8024Identifier** is an SFF-8024 module type Identifier from the Identifier Values table in [5] which allows to infer both physical form factor and management protocol of the module. *Note: The CMIS interpretation of all other registers or fields is valid only when the fundamental SFF8024Identifier indicates that the module uses the CMIS management protocol.*	RO Rqd.
1	7-0	CmisRevision	CMIS revision number (decimal): The upper nibble (bits 7-4) is the integer part (major number) The lower nibble (bits 3-0) is the decimal part (minor number) *Example: 01h indicates version 0.1, 21h indicates version 2.1.* *Note: See Appendix G.3 for interoperability implications of the major revision number (integer part).*	RO Rqd.
2	7	MemoryModel	Indicator of the memory model of the module: 0b: Paged memory (Pages 00h-02h, 10h-11h supported) 1b: Flat memory (Page 00h supported only)	RO Rqd.
	6	SteppedConfigOnly	0b: Module supports **intervention-free reconfiguration** 1b: Module supports **only step-by-step reconfiguration**, where a host WRITE to ApplyDPInit is (technically) accepted in **all** states **without** causing DPSM state changes, and where ApplyImmediate is not supported (i.e. a WRITE to ApplyImmediate is ignored). *Note: Support for intervention-free reconfiguration is required for any Application that supports or requires time critical speed negotiation with active modules that is not achievable with stepwise configuration, such as InfiniBand or Fibre Channel.* *Note: See section 6.2.4 for more information*	
	5-4	-	**Reserved**	
	3-2	MciMaxSpeed	Indicates maximum supported clock speed of Management Communication Interface (MCI): 00b: Module supports up to 400 kHz 01b: Module supports up to 1 MHz 10b: **Reserved** 11b: **Reserved**	RO Rqd.
	1-0	-	**Reserved**	

CMIS Memory Map example – Page 12h

Page Overview

Table 8-91 Page 12h Overview

Byte	Size (bytes)	Subject Area	Description
128-135	8	Grid Spacings	array with one Byte per media lane
136-151	8 x 2	Channel Offset Numbers	array with one S16 Word per media lane
152-167	8 x 2	Fine Tuning Offsets	array with one S16 Word per media lane
168-199	8 x 4	Laser Frequencies	array with one U32 double word per media lane
200-215	8 x 2	Target Output Power	array with one S16 word per media lane
216-221	6	-	**Reserved[6]**
222-229	8	Status Indicators	array with one Byte per media lane
230	1	Flag Summary	one Bit per media lane
231-238	8	Flags	array with one Byte per media lane
239-246	8	Masks (default: 1)	array with one Byte per media lane, **Masks all set by default**
247-255	9	-	**Reserved[9]** *Note: This page has no Page Checksum*

Specific Registers

Table 8-92 Laser tuning, status, and Flags for tunable transmitters (Page 12h)

Byte	Bit	Field Name	Field Description	Type
128-135	7-4	GridSpacingTx<n>	Selected grid spacing of media lane <n>=1-8 0000b: 3.125 GHz 0001b: 6.25 GHz 0010b: 12.5 GHz 0011b: 25 GHz 0100b: 50 GHz 0101b: 100 GHz 0110b: 33 GHz 0111b: 75 GHz 8-14: Reserved 1111b: Not available	RW Rqd.
	3-1	-	**Reserved**	RO
	0	FineTuningEnableTx<n>	Bool: fine-tuning enabled for media lane <n>=1-8 0b: Fine-tuning disabled 1b: Fine-tuning enabled	RW Rqd.
136-151	7-0	ChannelNumberTx<n>	S16 Channel (offset) Number for media lane <n>=1-8 *The meaning of the signed channel (offset) number and its dependence on the selected grid spacing is defined in section 8.7.*	RW Rqd.
152-167	7-0	FineTuningOffsetTx<n>	S16 fine-tuning frequency offset for media lane <n>=1-8 in units of 0.001 GHz	RW Rqd.
168-199	7-0	CurrentLaserFrequencyTx<n>	U32 Current frequency for media lane <n>=1-8 in units of 0.001 GHz	RO Rqd.
200-215	7-0	TargetOutputPowerTx<n>	S16 Target programmable output power for media lane <n>=1-8 in units of 0.01 dBm	RW Rqd.
216-221	7-0	-	**Reserved[6]**	RO Rqd.
222-229	7-2	-	**Reserved**	RO Rqd.
	1	TuningInProgressTx<n>	Bool: Status indication for tuning in progress on media lane <n>=1-8 0b/1b: Tuning not in progress/in progress	RO Rqd.

CMIS Module State Machine (MSM)

MSM

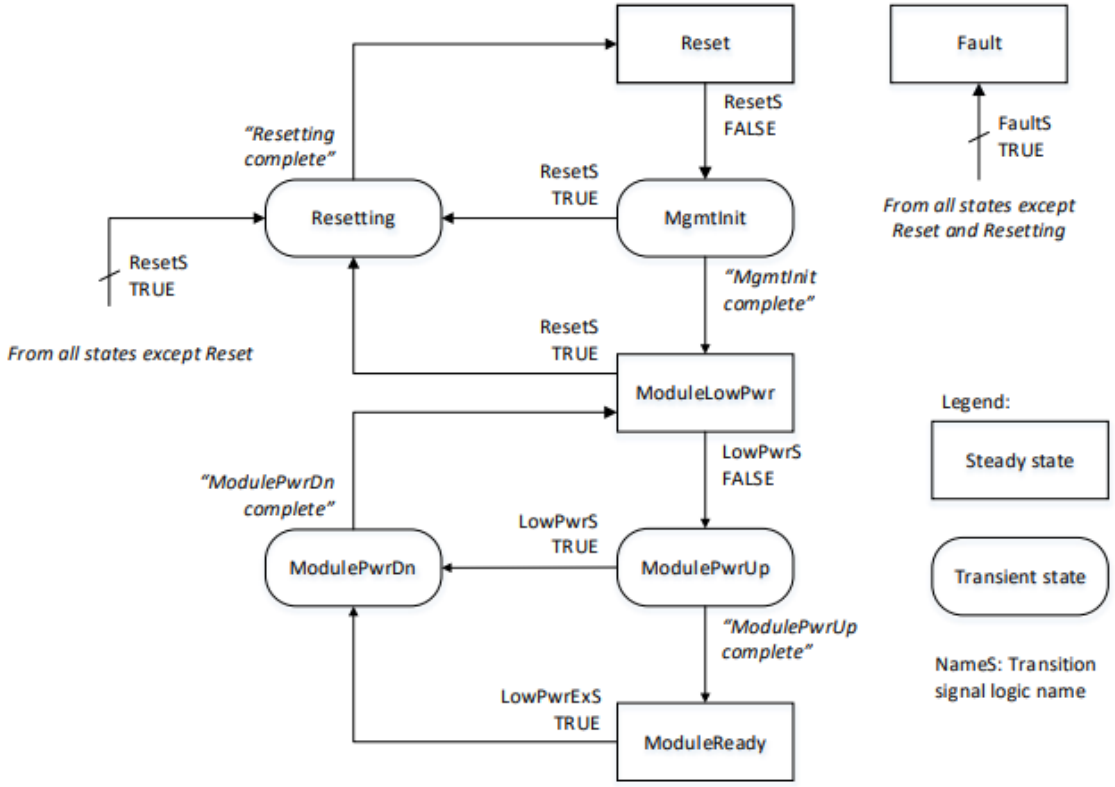
Used to progress the module from reset to low power mode and ultimately into high power mode

Use

Although this seems very basic, the advantage is that every CMIS module does this in the same way and allows the host to write MSM code one time for all the modules they support

Hosts can read the state of the MSM through register 3 in page 00h.

Code	Module State	Description
000b	-	**Reserved**
001b	ModuleLowPwr	
010b	ModulePwrUp	
011b	ModuleReady	This is the only state reported by flat memory modules
100b	ModulePwrDn	
101b	ModuleFault	
110b	-	**Reserved**
111b	-	**Reserved**



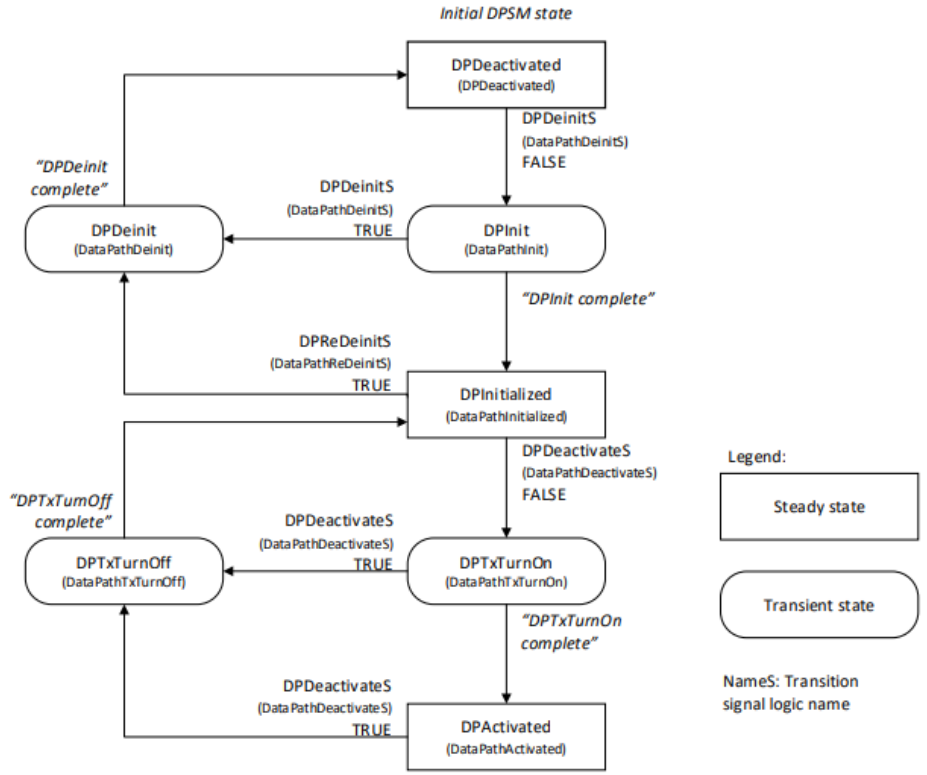
CMIS Data Path State Machine (DPSM)

DPSM — **Used to progress the module from DP_Deactivated (laser off) to DP_Activated (laser on)**

Use

Although not a simple as the module state machine, but commonality is also the advantage of this mechanism

Every CMIS module does this in the same way and allows the host to write DPSM code one time for all the modules they support



CMIS Data Path State Machine - Provisioning

Before enabling the Data Path State Machine, the module needs to be provisioned. This provisioning is performed in a few areas

- **Wavelength/Power**
  - **Provisioned in page 12h**
  - **Power is set directly through registers**
  - **Wavelength is set by selection of grid and channel numbers.**
- **Application/Host Electrical settings**
  - **There are two staged sets to provision the application and host electrical parameters. The host can provision one or both staged sets.**
  - **Hosts set the application (advertised in page 00h and 01h through host and media codes) for all 8 lanes in the selected staged set.**
  - **Hosts can provision electrical settings for amplitude, pre-cursors and post-cursors in the selected stage set.**
- **Applying the data to hardware**
  - **Once all provisioning is entered, hosts use the apply registers to apply the selected stage set.**
  - **Applying the staged set pushes the selected provisioning into the active set. These settings will be used when the DPSM is enabled.**

CMIS APPSEL Code

APPSEL

Application Select codes are used to provision a module
A module advertises a set of supported APPSEL codes that can be applied to the module

Example

Table shows the two supported APPSEL codes for a 400ZR module

Also shows the start of APPSEL 3 where FF indicates this is the end of supported APPSEL codes

86	Appl sel 1 Host Elec IF ID	11	ID from Table 4-5 SFF-8024: 400GAUI-8 C2M
87	Appl sel 1 module media if id	3E	ID from Table 4-7 SFF-8024: 400GBZR
88	appl sel 1 lane count	81	Host Lane Count: 8
			Media Lane Count: 1
89	Appl sel 1 host lane assignment opt	1	Application allowed to start on host lane 1. Refer to Section 6.2.1.1 for details
90	Appl sel 2 host elec if id	D	ID from Table 4-5 SFF-8024: 100GAUI-2 C2M
91	Appl sel 2 module media if id	3E	ID from Table 4-7 SFF-8024: 400GZR
92	Appl sel 2 lane count	21	Host Lane Count: 2
			Media Lane Count: 1
93	Appl sel 2 host lane assignment opt	55	Application allowed to start on host lane 1. Refer to Section 6.2.1.1
94	Host interface ID app 3	FF	first unused ApSel code

CMIS VDM – Versatile Diagnostic Monitoring

VDM

Wide range of modules supported by CMIS means assigning fixed registers for all observables and supported configs/combinations is *not* feasible
VDM provides 256 instances of observables and 64 thresholds that are defined by the module
CMIS and C-CMIS define a set of observable types that can be monitored (plus custom type)

Each VDM instance defined by	Each VDM provides
Type (e.g., media Pre-FEC BER, host errored frame, media PDL, etc.) Lane being monitored (lane 1 for 400ZR media; lanes 1,3,5,7 for 4x100GE host lanes) Threshold	Advertising of the instance (type, lane, threshold) Observable Value (counts or floating-point reading) Flags (high/low, alarm/warning)

Versatile Diagnostic Monitoring Register Mapping

- Each module will advertise the VDMs that they support on CMIS pages 20h-23h (2 bytes advertising per instance and 64 instances per page).
- The VDM readings are available in pages 24h-27h (2 bytes per instance amd 64 instances per page)
- VDM thresholds are available in pages 28h-2Bh (8 bytes per threshold type and 16 thresholds per page)
- VDM flags are available in page 2Ch (4 bits per instance and 256 instances per page)

Page	Subject Area	Description
20h	Descriptors for VDM Instances 1-64 (Group 1)	Every 2-byte value describes a VDM instance offered by the module. (RO access)
21h	Descriptors for VDM Instances 65-128 (Group 2)	
22h	Descriptors for VDM Instances 129-192 (Group 3)	
23h	Descriptors for VDM Instances 193-256 (Group 4)	
24h	Samples of VDM Instances 1-64 (Group 1)	Every 2-byte value is a (possibly frozen) sample of the observable monitored by a VDM instance. (RO access)
25h	Samples of VDM Instances 65-128 (Group 2)	
26h	Samples of VDM Instances 129-192 (Group 3)	
27h	Samples of VDM Instances 193-256 (Group 4)	

Page	Subject Area	Description
28h	Thresholds 1-16 (Group 1)	Every set of four 2-byte values describes a threshold set of a threshold crossing detector, possibly shared by several VDM instances. The association of these threshold sets and VDM instances is described in the VDM descriptors. (RO access)
29h	Thresholds 17-32 (Group 2)	
2Ah	Thresholds 33-48 (Group 3)	
2Bh	Thresholds 49-64 (Group 4)	
2Ch	VDM Flags (Groups 1-4)	Every Byte contains the latched threshold crossing Flags of 2 VDM instances (4 bits each) (RO/COR access)
2Dh	VDM Masks (Groups 1-4)	Every Byte contains the Masks for the threshold crossing Flags of 2 VDM instances (4 bits each) (RW access) The default of each Mask is 1 (masked)
2Eh	-	**Reserved**
2Fh	Advertisement and Dynamic Controls	VDM support details and dynamic controls (Mixed RO and RW access)

Versatile Diagnostic Advertising Structure

- The VDM mechanism supports 256 instances of observables.
- An observable is defined by it's type (ie Media preFEC BER, media ESNR, host FERC, etc) it's lane or datapath and it's thresholds.
- The supported types are defined in CMIS and C-CMIS, as well as a set of types set aside for custom observables.
- There are also a set of thresholds to support the various VDM types

Byte	Bits	Field Name and Description
Even Address	7-4	**LocalThresholdSetID** This number determines which threshold set will be used for this observable. The threshold set is in the same group as the observable descriptor. The global ThresholdSetID (1-64) is defined as follows: Page 20h: (group 1): ThresholdSetID = 1 + LocalThresholdSetID Page 21h: (group 2): ThresholdSetID = 17 + LocalThresholdSetID Page 22h: (group 3): ThresholdSetID = 33 + LocalThresholdSetID Page 23h: (group 4): ThresholdSetID = 49 + LocalThresholdSetID
	3-0	**Monitored Resource** 0: Lane 1 or Data Path starting on lane 1 1: Lane 2 or Data Path starting on lane 2 2: Lane 3 or Data Path starting on lane 3 3: Lane 4 or Data Path starting on lane 4 4: Lane 5 or Data Path starting on lane 5 5: Lane 6 or Data Path starting on lane 6 6: Lane 7 or Data Path starting on lane 7 7: Lane 8 or Data Path starting on lane 8 15: Module (not associated with a lane or Data Path)
Odd Address	7-0	Observable Type (see Table 8-147 for observables and encodings)

Versatile Diagnostic Monitoring Types

CMIS and C-CMIS define a set of types that can be used for VDMs. New type are added as needed and module vendors have the ability to add custom types to meet their application.

Type ID	Observable Type	Instance Type	Data Type	Unit Scale	Unit
0	Not Used indicator[1]	N/A	N/A		
1	Laser Age (0% at BOL, 100% EOL) (Data Path)	Basic	U16	1	%
2	TEC Current (Module)	Basic	S16	100/32767	%
3	Laser Frequency Error (Media Lane)	Basic	S16	10	MHz
4	Laser Temperature (Media Lane)	Basic	S16	1/256	C
5	eSNR Media Input (Media Lane)	Basic	U16	1/256	dB
6	eSNR Host Input (Lane)	Basic	U16	1/256	dB
7	PAM4 Level Transition Parameter Media Input (Media Lane)	Basic	U16	1/256	dB
8	PAM4 Level Transition Parameter Host Input (Lane)	Basic	U16	1/256	dB
9	Pre-FEC BER Minimum Media Input (Data Path)	Statistic	F16	N/A	
10	Pre-FEC BER Minimum Host Input (Data Path)	Statistic	F16	N/A	
11	Pre-FEC BER Maximum Media Input (Data Path)	Statistic	F16	N/A	
12	Pre-FEC BER Maximum Host Input (Data Path)	Statistic	F16	N/A	
13	Pre-FEC BER Average Media Input (Data Path)	Statistic	F16	N/A	
14	Pre-FEC BER Average Host Input (Data Path)	Statistic	F16	N/A	
15	Pre-FEC BER Current Value Media Input (Data Path)	Basic	F16	N/A	
16	Pre-FEC BER Current Value Host Input (Data Path)	Basic	F16	N/A	
17	FERC Minimum Media Input (Data Path)	Statistic	F16	N/A	
18	FERC Minimum Host Input (Data Path)	Statistic	F16	N/A	
19	FERC Maximum Media Input (Data Path)	Statistic	F16	N/A	
20	FERC Maximum Host Input (Data Path)	Statistic	F16	N/A	
21	FERC Average Media Input (Data Path)	Statistic	F16	N/A	
22	FERC Average Host Input (Data Path)	Statistic	F16	N/A	
23	FERC Current Value Media Input (Data Path)	Basic	F16	N/A	
24	FERC Current Value Host Input (Data Path)	Basic	F16	N/A	
25-99	Reserved				
100-127	**Custom** Observables				
128-255	**Restricted** OIF				

[1] Not Used means that the module does not present data for the VDM Instance described by the descriptor.

Identifier	Description	Data Type	LSB Scaling	Unit
128	Modulator Bias X/I	U16	100/65,535	%
129	Modulator Bias X/Q	U16	100/65,535	%
130	Modulator Bias Y/I	U16	100/65,535	%
131	Modulator Bias Y/Q	U16	100/65,535	%
132	Modulator Bias X_Phase	U16	100/65,535	%
133	Modulator Bias Y_Phase	U16	100/65,535	%
134	CD – high granularity, short link	S16	1	Ps/nm
135	CD – low granularity, long link	S16	20	Ps/nm
136	DGD	U16	0.01	Ps
137	SOPMD	U16	0.01	Ps^2
138	PDL	U16	0.1	dB
139	OSNR	U16	0.1	dB
140	eSNR	U16	0.1	dB
141	CFO	S16	1	MHz
142	EVM_modem	U16	100/65,535	%
143	Tx Power	S16	0.01	dBm
144	Rx Total Power	S16	0.01	dBm
145	Rx Signal Power	S16	0.01	dBm
146	SOP ROC	U16	1	krad/s
147	MER	U16	0.1	dB

CMIS VDM – Versatile Diagnostic Monitoring

Each VDM instance is defined by its

- **type (ie media PreFEC BER, host errored frame, media PDL, etc)**
- **the lane being monitored (lane 1 for 400ZR media; lanes 1,3,5,7 for 4x100GE host lanes)**
- **threshold.**

This data is advertised in two bytes per instance using pages 20h-23h. The host reads the advertising and connects types and instances, allowing the host to know where to read the data for each observable.

Each VDM instance has two registers for advertising in pages 20h-23h and two registers for the reading in pages 24h-27h. Each VDM instance has 4 bits (high/low, warning/alarm) for flags in page 2Ch and corresponding masks in page 2Dh.

There are 64 thresholds that can be assigned to the 256 instances and thresholds can be used for multiple instances (ie host preFEC BER threshold is used for 4 instances in lanes 1,3,5,7).

CMIS CDB – Command Data Block

CDB — **A mechanism to support bulk data transfer into or out of the module**

Use

Most common use is module upgrade where the CDB is used to pass data into the module

CDB can also be used to pull data like logs or constellation data out of the module

Method

The CDB is made of two pieces

- Page 9Fh where the CDB commands are executed
- Pages A0h-AFh used as the Extended PayLoad

Each CDB command has a unique ID

These are example of common CDB commands:

- CDB 0041h - Firmware Management Features
- CDB 0100h - Get Firmware Info
- CDB 0101h - Start Firmware Download
- CDB 0104h - Write Firmware Block EPL

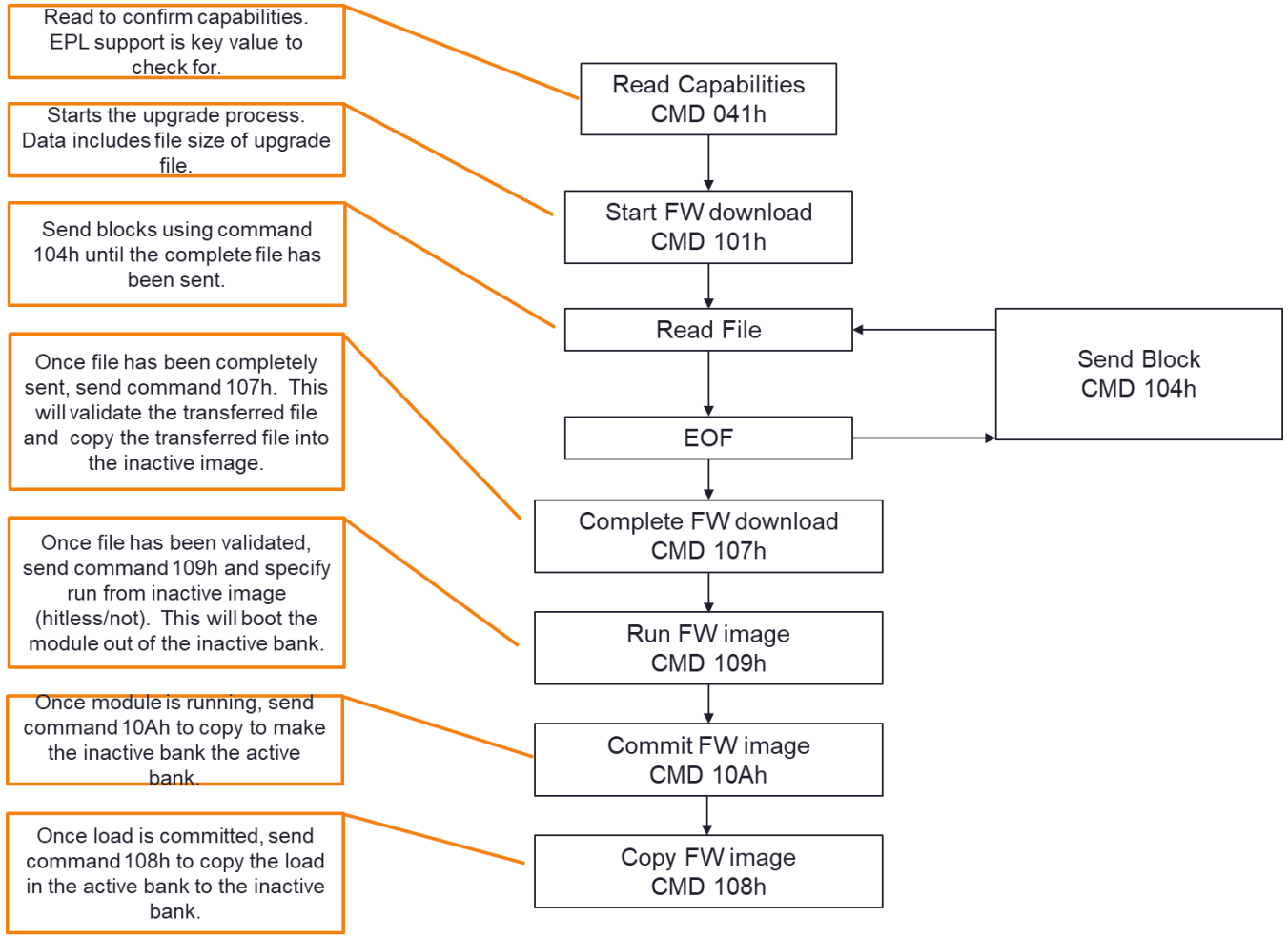
CDB Example – Get Firmware Info

- The Host will initiate the CDB command by filling in CMD header Fields
  - Can be written in one twi transaction, must be complete header if one transaction
  - If written in a set to twi transactions, Register 129 must be in the final transaction.
  - Writing Register 129 signifies that the module can process the command
- The Module will:
  - Read the command header information
  - Process the command
  - Fill the reply data into the LPL
  - Set the CdbStatus in reg 37
  - Set the CdbCmdCompleteFlag in reg 8
- The host will:
  - Detect that the command is complete by reading register 8
  - Confirm that the command was successful in register 37
  - Read the data from the LPL

Table 9-15 CDB Command 0100h: Get Firmware Info

Page	Byte	Field Name	Description	Value
CMD Header Fields				
9Fh	128-129	CMDID	Get Firmware Info CMD ID	0100h
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	FEh
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	-	No host-written payload	
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	110
9Fh	135	RPLChkCode	See Table 8-161	comp.
9Fh	136	FirmwareStatus	Bitmask to indicate FW Status. Image in **Bank A**: Bit 0: Operational Status Bit 1: Administrative Status Bit 2: Validity Status Bit 3: Reserved Image in **Bank B**: Bit 4: Operational Status Bit 5: Administrative Status Bit 6: Validity Status Bit 7: Reserved Encoding as follows: **Operational Status**: 1 = running, 0 = not running **Administrative Status**: 1=committed, 0=uncommitted **Validity Status**: 1 = invalid, 0 = valid *Note: Zero-encoding of valid maintains backwards compatibility with CMIS 4.0* Hints: 0x00h Factory image is running (if supported) See also section 7.3.1.4 for a more detailed description.	
9Fh	137	ImageInformation	Bit 0: Firmware image A information in 9Fh:138-173 Bit 1: Firmware image B information in 9Fh:174-209 Bit 2: Factory or Boot image information in 9Fh:201-245	
9Fh	138	ImageAMajor	Image A firmware major revision	
9Fh	139	ImageAMinor	Image A firmware minor revision	
9Fh	140-141	ImageABuild	Image A firmware build number	
9Fh	142-173	ImageAExtraString	Additional information	

CMIS Firmware Upgrade Flow



C-CMIS – Coherent CMIS

C-CMIS is an additional document that works with the CMIS document to provide Coherent functionality

C-CMIS adds a set of Coherent VDM types

C-CMIS adds a set of FEC defects and PMs for the media and host side

C-CMIS adds coherent-specific provisioning

Thank you!

Future CMIS Tutorials

- DPSM/Appsel – Doug Cattarusa, Cisco – Jan 31, 2024
- VDM – Todd Rope, Marvell – Feb 28, 2024
- CDB/upgrades – TBD – April 3, 2024
- Others?

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