Dell EMC Unity and Unity XT Statement of Volatility

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For Dell EMC Customer Use Only

Abstract

This document describes characteristics of the volatile and non-volatile memory components of Dell EMC Unity and Dell EMC Unity XT. The information contained within this document is pertinent to system owners that may need to qualify the risk associated with ensuring that all memory within a product has been cleared in compliance with regulatory requirements.

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Executive Summary

To facilitate the most effective and efficient functionality, most information technology systems utilize various forms of data storage. These may include Random Access Memory (RAM), Read-Only Memory (ROM), flash memory, virtual memory, and magnetic storage devices. Each form of storage maintains unique characteristics that may affect how organizations protect information stored by the system. In particular, storage devices may retain data for a period of time after power ceases to be provided. In order to adequately protect information and make appropriate decisions that support regulatory requirements, it is critical to understand all of the storage components and their memory volatility characteristics. This paper will provide the necessary information for organizations on which to base their decisions about the response to security incidents and regulatory compliance.

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Introduction

Memory components are categorized as either volatile or non-volatile. Volatile memory includes Random Access Memory (RAM) such as Static RAM (SRAM) and Dynamic RAM (DRAM). Non-volatile memory includes Read-Only Memory (ROM), Electrically Erasable Programmable ROM (EEPROM), Non-Volatile RAM (NVRAM), and Flash memory devices. Because of their unique characteristics, systems may use a combination of memory types to maintain efficient and effective functionality. In order for organizations to determine mitigation steps following a security incident or to make decisions about steps that should be taken before changing the approved system confidentiality, a solid understanding of the memory volatility specific to the product needs to be established and well-documented.

Purpose

The purpose of this document is to provide organizations with knowledge about memory volatility within Dell EMC Unity and Unity XT on which security decisions can be made and, where appropriate, remediation steps that can be incorporated into organizational processes.

Scope

This document provides a description of short-term memory storage components and their characteristics including, where appropriate, the method by which memory can be cleared. It is intended to provide product-specific memory volatility and may supplement organization-specific policy, standards, or guidance.

Additional Information

Abbreviations used in this document

SP = Storage Processor
LCC = Link Controller Card
DAE = Disk Array Enclosure
DPE = Disk Processor Enclosure
SPE = Storage Processor Enclosure
OS = Operating System

Product Description

The following table displays the model, part numbers, manufacturer and the Corporate Headquarters address for the manufacturer.

Platform Disk Processor Enclosures (DPEs)

Table 1 – Statement of Volatility

Statement of Volatility		
Model	**Manufacturer**	**Address**
Dell EMC Unity XT 480/F, 680/F, and 880/F	Dell EMC	176 South Street, Hopkinton, Ma 01748
Dell EMC Unity 300/F, 350/F, 380/F, 400/F, 450/F, 500/F, 550/F, 600/F, 650/F	Dell EMC	176 South Street, Hopkinton, Ma 01748

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Table 2 – Unity XT 480/F, 680/F, and 880/F CPU Module Non-Volatile Memory

CPU Module non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
FLASH @ U24 on the CPU Module	(316-002-370) AVNET W25Q256 JVFIM	32MB per SP	N	Contains BIOS & POST (Power-On-Self-Test) code.	Cleared when new code level is applied and original configuration is destroyed.
FLASH @ U63 on CPU Module	(316-002-369) Avnet W25Q256 JVFIM	32MB per SP	N	Contains code which controls and monitors resets, fans, & critical system environment errors.	Cleared when new code level is applied and original configuration is destroyed.
FLASH @ U56 on CPU Module	(363-000-109) Winbond W25Q256 FVFIG	32MB per SP	N	Contains a redundant copy of code which controls and monitors resets, fans, & critical system environment errors.	Cleared when new code level is applied and original configuration is destroyed.
EEPROM @ U167 on CPU Module	(363-000-084) Microchip 24LC32AT-I/SN	32Kb per SP	N	Contains CPU module resume information.	Cleared when new code level is applied and original configuration is destroyed.

Table 3 – Unity XT 480/F, 680/F, and 880/F CPU Module Volatile Memory

CPU Module Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
SDRAM (DDR4 2666 @DIMM 1~24 on CPU Module)	(317-003-349) Foxconn AH98843-A1B1-4M	Up to 1536GB	Y	Caching, pre-fetching blocks for I/O operations.	Power down

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CPU Module Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
SDRAM (DDR4 3200@DIMM 1-24 on CPU Module)	(314-900-091 8GB) Hynix HMA81GR 7CJR8N-XN (314-900-090 16GB) Hynix HMA82GR 7DJR8N-XN (314-900-087 32GB) Hynix HMA84GR 7DJR4N-XN	Up to 1536GB	Y	Caching, pre-fetching blocks for I/O operations.	Power down
BMC DDR4 @U1 on CPU Module	(314-721-425) Micron MT40A256 M16GE-083E:B	4Gb	N	BMC Runtime data and operating kernel	Power down
BMC SPI SRAM @ U39 on CPU Module	(314-170-220) ON SEMICON DUCTOR N01S830B AT22IT	1Mb	N	BMC SPI Runtime data	Power down
BMC SPI SRAM @ U40 on CPU Module	(314-170-220) ON SEMICON DUCTOR N01S830B AT22IT	1Mb	N	BMC SPI Runtime data	Power down

Table 4 – Dell EMC Unity 300/F, 350/F, 380/F, 400/F, 450/F, 500/F, 550/F, 600/F, 650/F CPU Module Non-Volatile Memory

CPU Module Non-Volatile Memory					
Type (BBRAM, Flash, EEPROM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
FLASH @ U154 on the CPU Module	Winbond W25Q128FVF IG	16MB per SP	N	Contains BIOS & POST (Power-On-Self-Test) code.	Cleared when new code level is applied and original configuration is destroyed.

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CPU Module Non-Volatile Memory					
Type (BBRAM, Flash, EEPROM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
FLASH @ U67 on CPU Module	Winbond W25Q128FVF IG	16MB per SP	N	Contains code which controls and monitors resets, fans, & critical system environment errors.	Cleared when new code level is applied and original configuration is destroyed.
FLASH @ U66 on CPU Module	Winbond W25Q128FVF IG	16MB per SP	N	Contains a redundant copy of U29 code which controls and monitors resets, fans, & critical system environment errors.	Cleared when new code level is applied and original configuration is destroyed.
FLASH @ U216 on CPU Module	Winbond W25Q16CLS NIG	2MB per SP	N	Contains code which controls the Dual 10 Gigabit Ethernet controller including Unique MAC Address.	Cleared when new code level is applied and original configuration is destroyed.
NVRAM @ U111 on CPU Module	Cypress CY62138FV30 LL-45ZAXIT	256KB per SP	N	Contains a redundant copy of the systems configuration for BIOS & POST to use and some OS level counters, logs and IP address.	Cleared when POST command is run to initialize NVRAM or coin cell Battery is removed.
FLASH @ U208 on CPU Module	Micron-M45PE20-VMN6TP	2Mb per SP	N	Contains code which controls the Dual Gigabit Ethernet controller including Unique MAC Address.	Cleared when new code level is applied and original configuration is destroyed.
EEPROM @ U80 on CPU Module	Atmel AT24C32D-SSHM-T	32Kb per SP	N	This will load and verify the firmware images, initialize the internal processors, read the bootstrap configuration, and read the bootloader configuration table in the SEEPROM.	Cleared when new code level is applied, and original configuration is destroyed.
EEPROM @ U72 on CPU Module	Atmel AT24C64CN-SH-T	8KB per SP	N	Expander SAS Address storage	Cleared when new CDES code is re-programing, and original configuration is destroyed.
EEPROM @ U140 on CPU Module	Atmel AT24C32D-SSHM-T	32Kb per SP	N	Contains CPU module resume information.	POST command to re-write contents.
Flash @ U93 on CPU Module	Macronix-MX29GL128E UT2I-11G Or SPANSION S29GL128P11 TFIV10	128Mb per SP	N	Memory for PMC SAS Expander PM8054	Cleared when new CDES code is re-programing, and original configuration is destroyed.
Flash @ U212 on CPU Module	Winbond W25Q128FVF IG	128MB per SP	N	Contains code which controls the Dual port fiber channel controller including Unique MAC Address.	Cleared when new code level is applied and original configuration is destroyed.
BBRAM /CMOS (Intel Wellsburg internal CMOS SRAM @ U167 on CPU Module)	Intel Wellsburg internal CMOS	256B per SP	N	Located in the on-board Southbridge used to store BIOS setup.	Remove coin cell Battery from CPU Module.
FPGA (LCMXO2-4000HC-4FTG256C @ U39)	LCMXO2-4000HC	800Kb	No	The Configuration Flash is to store the compressed configuration data that is loaded into the SRAM configuration memory.	Cleared when new code level is applied, and original configuration is destroyed.

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Table 5 – Dell EMC Unity 300/F, 350/F, 380/F, 400/F, 450/F, 500/F, 550/F, 600/F, 650/F CPU Module Volatile Memory

CPU Module Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
SDRAM (DDR4 2133 @ J18, J19, J20, J21 on CPU Module	PC4-2133	128GB per SP	Y	Caching, pre-fetching blocks for I/O operations	Power down the Unity array.
SDRAM (DDR4 3200@DIMM 1-24 on CPU Module)	(314-900-090 16GB) Hynix HMA82GR 7DJR8N-XN	128GB per SP	Y	Caching, pre-fetching blocks for I/O operations.	Power down the Unity array
SRAM Intel Xeon E5-2680 12 Core processor with L3 Cache located @ U108 on CPU Module	Intel Xeon E5-2680 Processor with L3 Cache	30MB	Y	CPU internal shared 3nd level Cache, pre-fetching blocks for I/O operations.	Power down the Unity array.
BMC DDR3 @U94 on CPU Module	Micron MT41J128 M16HA or Samsung K4B2G164 6C	2Gb	N	BMC Runtime data and operating kernel	Power down the Unity array.
Hilda DDR3 @U230, U231 on CPU module	Micron-MT41J128 M16HA-15E:D	2Gb	N	Hilda Runtime data	Power down the Unity array.
SAS expander cell RAM @U92 on CPU module (DEPOP)	Micron-MT45W4M W16BCGB -701 IT	64MB	N	SAS Expander run time data	Power down the Unity array.

Table 6 – LCC Module Volatile Memory

LCC Module Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
SRAM @ U9 on LCC Module	(314-121-413) Micron MT45W4M W16BCGB -701 IT	64Mb	N	Used for debug purpose only to aid in firmware development.	Power down

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Table 7 – LCC Module Non-Volatile Memory

LCC Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
Flash @ U5 on LCC Module	(363-000-071) Spansion S29GL128P11TFIV10	128Mb per SP	N	Contains firmware image for PMC SAS Expander PM8054.	Cleared when new code level is applied and original configuration is destroyed.
EEPROM @ U13 on LCC Module	(363-000-049) Atmel AT24C64D-SSHM-T	8KB per SP	N	Expander SAS Address storage	Cleared when new code level is applied and original configuration is destroyed.
Flash @ U36 on LCC Module	(316-002-339) Winbond W25Q128FWPIQ	128Mb Per SP	N	SPI Flash contains firmware and configuration file image for PCIe Switch PM8532.	Cleared when new code level is applied and original configuration is destroyed.
EEPROM @ U59 on LCC Module	(363-000-039) ON SEMICONDUCTOR CAT24C128WI-GT3	128Kb	N	Holds a subset of the PFX configuration file which will override settings during device boot up.	Cleared when new code level is applied and original configuration is destroyed.
EEPROM @ U116 on LCC Module	(363-000-083) ON SEMICONDUCTOR CAT24C128WI-GT3	512Kb	N	Contains microcode and configuration data for KR PHY(CS4227).	Cleared when new code level is applied and original configuration is destroyed.
FPGA (LCMXO2-7000HC-4FTG256C @ U42)	LCMXO2-7000HC	1.38Mb	N	The Configuration Flash is to store the compressed configuration data that is loaded into the SRAM configuration memory.	Cleared when new code level is applied, and original configuration is destroyed.

Table 8 – IOM Module Non-Volatile Memory

IOM Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
EEPROM @ U8 on IOM Moudle	(363-000-057) Atmel AT25256B-SSHL-T	32KB Per SP	N	Contains register data for PCIe Switch(PEX8747) configuration and initialization	Cleared when new code level is applied and original configuration is destroyed.
EEPROM @ U167 on IOM Moudle	(363-000-084) Microchip 24LC32AT-I/SN	4KB Per SP	N	Contains IOM Modulel resume information	Cleared when new code level is applied and original configuration is destroyed.
Flash @ U31 on IOM Moudle	(316-000-071) Avnet W29GL128CH9T	128Mb per SP	N	Flash Contains image for SAS Controller(PM8073)	Cleared when new code level is applied and original configuration is destroyed.
EEPROM @ U14 on IOM Module	(316-001-710) Avnet CAT24C128WI-GT3	32Kb	N	Contains default register setting to allow for errata changes and correct initialization of SAS Controller(PM8073).	Cleared when new code level is applied and original configuration is destroyed.
Flash @U19 on IOM Module	(316-002-348) Avnet AT45DB041E-SSHN2B-T	4Mb	N	Contains firmware image for Ethernet Controller (BCM5720)	Cleared when new code level is applied and original configuration is destroyed.

Table 9 – MP Module Non-Volatile Memory

MP Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
EEPROM @ U8 on IOM Moudle	(363-000-057) Atmel AT25256B-SSHL-T	32KB Per SP	N	Contains register data for PCIe Switch(PEX8747) configuration and initialization	Cleared when new code level is applied and original configuration is destroyed.
EEPROM @ U167 on IOM Moudle	(363-000-084) Microchip 24LC32AT-I/SN	4KB Per SP	N	Contains IOM Modulel resume information	Cleared when new code level is applied and original configuration is destroyed.
Flash @ U31 on IOM Moudle	(316-000-071) Avnet W29GL128CH9T	128Mb per SP	N	Flash Contains image for SAS Controller(PM8073)	Cleared when new code level is applied and original configuration is destroyed.
EEPROM @ U14 on IOM Module	(316-001-710) Avnet CAT24C128WI-GT3	32Kb	N	Contains default register setting to allow for errata changes and correct initialization of SAS Controller(PM8073).	Cleared when new code level is applied and original configuration is destroyed.
Flash @U19 on IOM Module	(316-001-790) Avnet M45PE40-VMN6TP	4Mb	N	Contains firmware image for Ethernet Controller (BCM5720)	Cleared when new code level is applied and original configuration is destroyed.

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Disk Array Enclosures (DAEs)

Table 10 – 25-drive DAE Module Non-Volatile Memory

25-drive DAE Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
FLASH (S29GL128P11TFIV10 located @ U2 on LCC Module)	S29GL128	32MB	N	Memory for PMC SAS Expander PM8054	Cleared when new code level is applied, and original configuration is destroyed.
EEPROM (24LC32AT-I/SN @ U25 on LCC Module)	24LC32AT	4KB	N	Expander SAS Address storage	Cleared when new code level is applied, and original configuration is destroyed.
EEPROM (AT24C64D-SSHM-T @ U209 on LCC Module)	AT24C64D	8KB	N	LCC Resume EEPROM for SAS Addressing	CDES command to re-write contents
FPGA (LCMXO2-4000HC-4FTG256C @ U10 on LCC Module)	LCMXO2-4000HC	800Kb	N	The Configuration Flash is to store the compressed configuration data that is loaded into the SRAM configuration memory.	Cleared when new code level is applied, and original configuration is destroyed.
EEPROM (24LC32AT-I/SN @ U1/U2 on Midplane)	24LC32A	4KB	N	Enclosure SAS Address Storage	CDES command to re-write contents

Table 11 – 15-drive DAE Module Non-Volatile Memory

15-drive DAE Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
FLASH (S29GL128P11TFIV10 located @ U8 on LCC Module)	S29GL128	32MB	N	Memory for PMC SAS Expander PM8053	Cleared when new code level is applied, and original configuration is destroyed.
EEPROM (24LC32AT-I/SN @ U11 on LCC Module)	24LC32AT	4KB	N	Expander SAS Address storage	CDES command to re-write contents
EEPROM (AT24C64D-SSHM-T @ U211 on LCC Module)	AT24C64D	8KB	N	LCC Resume EEPROM for SAS Addressing	CDES command to re-write contents
FPGA (LCMXO2-4000HC-4FTG256C @ U10 on LCC Module)	LCMXO2-4000HC	96Kb	N	The Configuration Flash is to store the compressed configuration data that is loaded into the SRAM configuration memory.	Cleared when new code level is applied, and original configuration is destroyed.
EEPROM (24LC32A-I/SN @ U1 on Midplane)	24LC32A	4KB	N	Enclosure SAS Address Storage	CDES command to re-write contents

Table 12 – 80-drive DAE Non-Volatile Memory

80-drive DAE Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
FLASH (S29GL128P11TFIV10 located @ U8 on LCC Module)	S29GL128	32MB	N	Boot memory for PMC SAS Expander PM8054	Cleared when new code level is applied, and original configuration is destroyed.

80-drive DAE Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
FLASH (S29GL128P11TFIV10 located @ U29 on LCC Module)	S29GL128	32MB	N	Boot memory for PMC SAS Expander PM8056	Cleared when new code level is applied, and original configuration is destroyed.
FLASH (S29GL128P11TFIV10 located @ U49 on LCC Module)	S29GL128	32MB	N	Boot memory for PMC SAS Expander PM8056	Cleared when new code level is applied, and original configuration is destroyed.
EEPROM (AT24C32D-SSHM-T @ U10 on LCC Module)	AT24C32	4KB	N	LCC Resume EEPROM for SAS Addressing	CDES command to re-write contents
EEPROM (AT24C64CN-SH-T @ U302 on LCC Module)	AT24C64 CN	8KB	N	Expander SAS Address storage	CDES command to re-write contents
EEPROM (AT24C64CN-SH-T @ U303 on LCC Module)	AT24C64 CN	8KB	N	Expander SAS Address storage	CDES command to re-write contents
EEPROM (AT24C64CN-SH-T @ U304 on LCC Module)	AT24C64 CN	8KB	N	Expander SAS Address storage	CDES command to re-write contents
FPGA (LCMXO2-4000HC-4FTG256C @ U31 on LFC Module)	LCMXO2-4000HC	96Kb	N	The Configuration Flash is to store the compressed configuration data that is loaded into the SRAM configuration memory	Cleared when new code level is applied, and original configuration is destroyed.
FPGA (LCMXO2-4000HC-4FTG256C @ U32 on LFC Module)	LCMXO2-4000HC	96Kb	N	The Configuration Flash is to store the compressed configuration data that is loaded into the SRAM configuration memory	Cleared when new code level is applied, and original configuration is destroyed.
EEPROM (AT24C32D-SSHM-T @ U1 on Baseboard)	AT24C32	4KB	N	Baseboard Resume EEPROM for Enclosure Information	CDES command to re-write contents
EEPROM (M24C32@ U2 on SSC)	M24C32	4KB	N	SSC Resume EEPROM for board information	CDES command to re-write contents

Input/Output (I/O) Modules

Table 13 – 4-port 10-GbE optical SFP or active/passive TwinAx I/O Module Volatile Memory

4-port 10-GbE optical SFP or active/passive TwinAx I/O Module Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
DDR3 (2GIGABIT SDRAM, 128Megx16, 1333 @ U45 on Ethernet I/O Module)	(314-312-400) MicronMT41J128 M16JT-125:K Samsung K4B2G1646C-HCH9	128Meg x 16	No	RTOS for Skyhawk controller. Image from flash is loaded and run out of DDR during normal operation.	Power down I/O module.
SRAM (Emulex Skyhawk XE104 Network Controller @ U46 on Ethernet IO Module)	Emulex P007402-02A	Various	No	Context memory used by internal TX and RX Protocol Processors	Power down I/O module.

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Table 14 – 4-port 10-GbE optical SFP or active/passive TwinAx I/O Module Non-Volatile Memory

4-port 10-GbE optical SFP or active/passive TwinAx I/O Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	Part Number	Size	User Modifiable (Y/N)	Function	Process to Clear
EEPROM (@ U66 on Ethernet I/O Module)	(363-000-084) Microchip 24LC32A T-I/SN	4 KB	No	Each FRU has a 4KB Resume which contains part numbers, date of manufacture. This is static information that is set at time of manufacture and never updated.	POST command to re-write contents.
EEPROM (In copper SFP+ twin-ax cable @ J3, J4, J5, and J6 on Ethernet I/O Module)	Atmel AT24C02 C-XHM	2 KB	No	EEPROM contains part numbers, date of manufacture. This is static information that is set at time of manufacture and never updated. Up to four twin-ax SFP+ cables can be present if optics transceivers not populated).	N/A
EEPROM (In optical SFP+ transceiver @ J3, J4, J5, and J6 on Ethernet I/O Module)	Atmel AT24C04	4 KB	No	EEPROM holds optical transceiver identification and real-time digitized information relating to transceiver's diagnostic performance. Up to four SFP modules may be present.	N/A
FLASH @ U58 on Ethernet IO Module)	(316-000-258) Bel TRKA-64D82AR	64 KB	No	Embedded Flash memory in the device is used to hold application firmware, configuration information, and application data for the board power sub-system.	POST command to re-write/erase contents.
FLASH (@U17 on Ethernet IO Module)	(363-000-104) Macronix MX25L12 845EMI-10G	128 Mbit	No	Skyhawk external flash memory holds firmware image which is loaded to DDR for Ethernet controller Real Time Operating System.	POST & Platypus commands to re-write contents.
EERPOM (@U4 on Ethernet IO Module)	(363-000-055) Microchip 24LC16B T-I/SN ST Micro M24C16-WMN6TP	2KB x 8	No	Holds MAC controller capabilities and MAC address. Capabilities include port configuration capability for iSCSI, FCoE, or NIC.	Platypus commands to re-write contents.

Table 15 – 4-port 10-GbE BaseT IO Module Volatile Memory

4-port 10-GbE BaseT IO Module Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
SRAM integrated in the BCM57840 ASIC (Broadcom quad port 10GbE controller located @ U19	Broadcom BCM57840	Various amount	No	PCIe/10GbE receive and transmission buffers/RAM internal to Broadcom ASIC.	Power down
RAM integrated in the BCM84834 PHY (Broadcom quad port 10GbE PHY located @ U5	Broadcom BCM84834	Various amount	No	Runtime RAM insider for BCM84834 PHY	Power down

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Table 16 – 4-port 10-GbE BaseT IO Module Non-Volatile Memory

4-port 10-GbE BaseT IO Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
SPI Flash (Micron M45PE16-VMW6TG @ U4)	Micron M45PE16-VMW6TG 363-000-078	16 Mbit per board	No	This device is used to hold BCM57840 Ethernet controller Firmware.	This device is installed pre-programmed. Can be re-programmed with Dell EMC code.
EEPROM (STMicroelectronics M24C32 located @U21)	STMicroelectronics M24C32 ON Semi CAT24C32 WI-GT3 MICROCHIP 24LC32AT-I/SN ATMEL AT24C32D-SSHM-T 363-000-084	32 Kbit per board	No	This device contains board part numbers, board serial number and date of manufacture. This is static information that is set at time of manufacture and never updated.	POST command to modify contents.
SPI Flash (ADESTO AT25DF081A @U32)	ADESTO TECHNOLOGIES AT25DF081A 363-000-110	8 Mbit Per board	No	This device is used on hold BCM84834 Ethernet PHY firmware.	This device is installed pre-programmed. Can be re-programmed with Dell EMC code.
SRAM (PMC Sierra SPCv PM8073 SAS Controller located @ U1 on SAS I/O Module)	PMC Sierra PM8073 SAS Controller PM8073 B1-F3GI	Various amounts L1 cache, L2 cache, EGSM	No	Memory buffers, FIFOs and RAM internal to the SAS controller used for SAS I/O operations.	Power down SLIC.

Table 17 – 4-port 1-GbE BaseT IO Module Volatile Memory

4-port 1-GbE BaseT IO Module Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
SRAM integrated in the BCM5719 ASIC (Broadcom quad port 1GbE controller located @ U44	Broadcom BCM5719	Various amount	No	PCIe/1GbE receive and transmission buffers/RAM internal to Broadcom ASIC.	Power down

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Table 18 – 4-port 1-GbE BaseT IO Module Non-Volatile Memory

4-port 1-GbE BaseT IO Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
SPI Flash (Micron M45PE20-VMN6TP @ U45)	Micron M45PE20-VMN6TP 363-000-034	2 Mbit per board	No	This device is used to hold BCM5719 Ethernet controller Firmware.	This device is installed pre-programmed. Can be re-programmed with Dell EMC code
EEPROM (STMicroelectronics M24C32 located @U21)	STMicroelectronics M24C32 ON Semi CAT24C32WI-GT3 MICROCHIP 24LC32AT-I/SN ATMEL AT24C32D-SSHM-T 363-000-084	32 Kbit per board	No	This device contains board part numbers, board serial number and date of manufacture. This is static information that is set at time of manufacture and never updated.	POST command to modify contents.

Table 19 – 4-port 25GbE SFP based I/O Module Volatile Memory

4-port 25GbE SFP based I/O Module Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
SRAM integrated @ U1 on Ethernet I/O Module	Qlogic QL41041	Various Amount	N	Memory buffers, FIFOs and RAM internal to the Ethernet controller	Power down SLIC

Table 20 – 4-port 25GbE SFP based I/O Module Non-Volatile Memory

4-port 25GbE SFP based I/O Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
EEPROM (@ U5 on Ethernet I/O Module)	(063-000-197) Atmel AT24C32D-SSHM-T	4 KB	N	Each FRU has a 4KB Resume which contains part numbers, date of manufacture. This is static information that is set at time of manufacture and never updated	POST command to re-write contents.
FLASH (@U7 on Ethernet IO Module)	(363-000-139) Macronix MX25L12835FM2I-10G	128 Mb	N	Qlogic QL41401 external flash memory which contains firmware image .	POST commands to re-write contents.

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4-port 25GbE SFP based I/O Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
FLASH(@U27 on Ethernet IO Module)	**(361-000-199) BEL Fuse INC TRKF-44D62ER**	**64KB**	**N**	Embedded Flash memory in the device is used to hold application firmware, configuration information and application data for board's power sub-system.	POST command to re-write/erase contents.

Table 21 – 2-port 10-Gb/s optical SFP or active/passive TwinAx I/O Module Volatile Memory

2-port 10-Gb/s optical SFP or active/passive TwinAx I/O Module Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
SRAM (@U15 on Ethernet/iSCSI/FCoE I/O Module)	(315-000-215) Qlogic EP8324-B0G-2407035	Various Amounts	N	Memory buffers and RAM internal to the controllers; used for FC I/O operations.	Power down SLIC.
DDR3 (@ U48 & U49 on Ethernet/iSCSI/FCoE I/O Module)	314-312-400 Micon MT41J128 M16JT-125:K	128Mb x16	N	Two 128MegX16 (2Gbits) DDR3-1333 memory are used for NIC, iSCSI and FCoE in Qlogic controller. The DDR3 will have X16 data and x8 ECC data bus.	Power down SLIC.

Table 22 – 2-port 10-Gb/s optical SFP or active/passive TwinAx I/O Module Non-Volatile Memory

2-port 10-Gb/s optical SFP or active/passive TwinAx I/O Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
EEPROM (@ U24 on Ethernet/iSCSI/FCoE I/O Module)	363-000-105 MACRONIX MX25L12835FMI-10G WINBOND W25Q128FVFIG	128Mb	N	A 128Mbit SPI flash device is required to be connected to the QLogic controller which stores the ARM processor firmware and configuration.	POST command to re-write/erase contents.
EEPROM (Microchip 24LC32A located @ U37 on Ethernet I/O Module)	363-000-084 Microchip 24LC32A	4 KB	N	Each FRU has a 4KB Resume which contains part numbers, date of manufacture. This is static information that is set at time of manufacture and never updated.	POST command to re-write contents.
FLASH (Bel TRKF-44D62ER@ U7 on Ethernet I/O Module)	361-000-199 Bel TRKF-44D	64 KB	N	Embedded Flash memory in the device is used to hold application firmware, configuration information and application data for board's power sub-system.	POST command to re-write/erase contents.

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Table 23 – 4-port BaseT Ethernet IO Module Volatile Memory

4-port BaseT Ethernet IO Module Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
SRAM integrated @ U1 on Ethernet I/O Module	Qlogic QL41041	Various Amount	N	Memory buffers, FIFOs and RAM internal to the Ethernet controller	Power down SLIC
SRAM integrated @ U12 on Ethernet I/O Module	Broadcom BCM84858	Various Amount	N	Runtime RAM inside for BCM84858	Power down SLIC

Table 24 – 4-port BaseT Ethernet IO Module Non-Volatile Memory

4-port BaseT Ethernet IO Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
FLASH (@U7 on Ethernet IO Module)	(363-000-139) Macronix MX25L12835FM2I-10G	128 Mb	N	Qlogic QL41401 external flash memory which contains firmware image.	POST commands to re-write contents.
EEPROM (@ U5 on Ethernet I/O Module)	(063-000-197) Atmel AT24C32D-SSHM-T	4 KB	N	Each FRU has a 4KB Resume which contains part numbers, date of manufacture. This is static information that is set at time of manufacture and never updated.	POST command to re-write contents.
SPI Flash (@U13)	Macronix MX25U4033EM1I-12G	4 Mb Per board	N	This device is used on hold BCM84858 Ethernet PHY firmware.	POST commands to re-write contents.
FLASH (Bel @ U27 on Ethernet I/O Module)	361-000-258 Bel TRKA-64D82AR	64 KB	N	Embedded Flash memory in the device is used to hold application firmware, configuration information and application data for board's power sub-system.	POST command to re-write/erase contents.

Table 25 – 4-port 12-Gb/s SAS I/O Module Volatile Memory

4-port 12-Gb/s SAS I/O Module Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
SRAM (PMC Sierra SPCv PM8073 SAS Controller located @ U1 on SAS I/O Module)	PMC Sierra PM8073 SAS Controller PM8073B1-F3GI	Various amounts L1 cache, L2 cache, EGSM	N	Memory buffers, FIFOs and RAM internal to the SAS controller used for SAS I/O operations.	Power down SLIC.

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Table 26 – 4-port 12-Gb/s SAS I/O Module Non-Volatile Memory

4-port 12-Gb/s SAS I/O Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
EEPROM (@ U10 on SAS I/O Module)	(363-000-084) Microchip 24LC32AT-I/SN ST Micro M24C32-RMN6TP Atmel AT24C32D-SSHM-T On Semi CAT24C32WI-GT3	4 KB	N	Each FRU has a 4KB Resume which contains part numbers, date of manufacture. This is static information that is set at time of manufacture and never updated.	POST command to re-write contents.
EEPROM (U25 on SAS I/O Module)	(363-000-084) Microchip 24LC32AT-I/SN ST Micro M24C32-RMN6TP Atmel AT24C32D-SSHM-T On Semi CAT24C32WI-GT3	4 KB per board	N	PM8073 uses a 32Kb serial EEPROM device for boot block and errata storage.	The part is installed pre-programmed and is in-system updatable by diagnostic SW and OS driver. PMC DFSBurn utility can be used to erase contents of this EEPROM.
Flash (@ U3 on SAS I/O Module)	363-000-071 MACRONIX MX29GL128EUT2I-11G SPANSION S29GL128P11TFIV10 WINBOND ELECTRONICS W29GL128CH9T	128Mb	N	128Mbit NOR flash holds SAS controller firmware along with user writeable VPD section.	The part is installed pre-programmed and is in-system updatable by diagnostic SW and OS driver. PMC DFSBurn utility can be used to erase contents of this EEPROM.
FLASH (Bel @ U32 on Ethernet I/O Module)	361-000-258 Bel TRKA-64D82AR	64 KB	N	Embedded Flash memory in the device is used to hold application firmware, configuration information and application data for board's power sub-system.	POST command to re-write/erase contents.

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Table 27 – 4-port 16-Gb/s FC I/O Module Volatile Memory

4-port 16-Gb/s FC I/O Module Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
SRAM (@U15 & U37 on FC I/O Module)	(315-000-215) Qlogic EP8324-B0G-2407035	Various Amounts	N	Memory buffers and RAM internal to the controllers; used for FC I/O operations.	Power down SLIC.

Table 28 – 4-port 16-Gb/s FC I/O Module Non-Volatile Memory

4-port 16-Gb/s FC I/O Module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
EEPROM (@ U8 on FC I/O Module)	(363-000-084) Microchip 24LC32AT-I/SN ST Micro M24C32-RMN6TP Atmel AT24C32D-SSHM-T On Semi CAT24C32WI-GT3	4 KB	N	Each FRU has a 4KB Resume which contains part numbers, date of manufacture. This is static information that is set at time of manufacture and never updated	POST command to re-write contents.
FLASH (@ U10 on FC IO Module)	(361-000-199) Bel TRKF-44D62ER	64 KB	N	Embedded Flash memory in the device is used to hold application firmware, configuration information and application data for board's power sub-system.	POST command to re-write/erase contents.
FLASH (@ U1, U24 on FC IO Module)	(363-000-105) MACRONIX MX25L12845EMI-10G	16 MB	N	Holds firmware/configuration information for HILDA.	POST command to re-write contents.

Table 29 – 4-port 32-Gb/s FC I/O Module Volatile Memory

ColdspellX I/O Module Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
SRAM (QLOGIC EP2714 4-Port 32G FC controller located @ U1 on Coldspell)	**QLOGIC 32G FC controller EP2714-A0G**	**Various Amounts**	**No**	**Memory buffers, FIFOs and RAM internal to the FC controller used for FC I/O operations.**	**Power down SLIC.**

Table 30 – 4-port 32-Gb/s FC Module Non-Volatile Memory

ColdspellX I/O Module Non-Volatile Memory					
Type (BBRAM, Flash, EEPROM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
EEPROM (@ U8 on Coldspell FC I/O Module)	**363-000-084 Microchip 24LC32AT-I/SN ST Micro M24C32-RMN6TP Atmel AT24C32D-SSHM-T On Semi CAT24C32WI-GT3**	**4 KB**	**No**	**Each FRU has a 4KB Resume which contains part numbers, date of manufacture. This is static information that is set at time of manufacture and never updated**	**POST command to re-write contents.**
Flash (@ U11 on Coldspell FC I/O Module)	**363-000-109 MACRONIX MX25L25635FMI-10G MICRON MT25QL256ABA8ESF-0SIT WINBOND W25Q256JVFIM**	**256Mb**	**No**	**128Mbit flash holds switchtec PM8531 PCIE bridge firmware**	**The part is installed pre-programmed and is in-system updatable by diagnostic SW and OS driver.**
FLASH (Bel @ U55 on Ethernet I/O Module)	**361-000-258 Bel TRKA-64D82AR**	**64 KB**	**N**	**Embedded Flash memory in the device is used to hold application firmware, configuration information and application data for board's power sub-system.**	**POST command to re-write/erase contents.**

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Table 29 – 4-port 10GBaseT embedded module

4-port 10GBaseT embedded module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
U7/Flash	WINBOND ELECTRONICS CORP W25Q128FVSIG or MACRONIX INTERNATIONAL CO LTD MX25L12835FM2I-10G	128Mbit	N	FW 41152_4x10GRJv41.00.04.img	POST command to re-write contents.
U18/Flash	MACRONIX MX25U4033EM1I-12G or WINBOND ELECTRONICS CORP W25Q40EWSNIG	4Mbit	N	FW BCM8485-B1-v01-03-04.rom.bin	POST command to re-write contents.
U13/EEPROM	MICROCHIP TECHNOLOGY INC AT24C32D-SSHM-T	32Kbit	N	VPD OCP CARD VPD_Full_Image_v0.52.bin	POST command to re-write contents.

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Table 30 – 4-port 25GbE SFP-based embedded module

4-port 25GbE SFP-based embedded module Non-Volatile Memory					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
U7/Flash	WINBOND ELECTRONICS CORP W25Q128FVSIG or MACRONIX INTERNATIONAL CO LTD MX25L12835FM2I-10G	128Mbit	N	FW 41254_4x25Gv42.00.05.img	POST command to re-write contents.
U13/EEPROM	MICROCHIP TECHNOLOGY INC AT24C32D-SSHM-T	32Kbit	N	VPD OCP CARD VPD_Full_Image_v0.52.bin	POST command to re-write contents.

Power Supplies

Table 31 –Power Supplies

Power Supply					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
NA	071-000-750-01	NA	N	Unity XT[1] AC Power Supply Atlas	NA. Contains no customer data
NA	071-000-760-03	NA	N	Unity XT[1] AC Power Supply Poseidon	NA. Contains no customer data
NA	071-000-698-00	NA	N	Unity XT DC Power Supply Blastoff	NA. Contains no customer data
NA	071-000-553/071-000-554	NA	N	15-drive DAE AC Power Supply	NA. Contains no customer data
NA	071-000-602-01	NA	N	25-Drive DAE AC Power Supply	NA. Contains no customer data
NA	071-000-605-02	NA	N	25-Drive DAE DC Power Supply	NA. Contains no customer data
NA	071-000-611	NA	N	Unity[2] AC Power Supply	NA. Contains no customer data

[1] Dell EMC Unity XT 480/F, 680/F, and 880/F
[2] Dell EMC Unity 300/F, 350/F, XT 380/F, 400/F, 450/F, 500/F, 550/F, 600/F, and 650/F

Power Supply					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
NA	071-000-610	NA	N	Unity[2] AC Power Supply	NA. Contains no customer data
NA	071-000-598	NA	N	Unity[2] DC Power Supply	NA. Contains no customer data
NA	071-000-712-01	NA	N	Unity[1]/ 80-drive DAE AC Power Supply	NA. Contains no customer data
NA	071-000-208	NA	N	25-drive DAE AC Power Supply meeting Lot-9 Requirement	NA. Contains no customer data
NA	071-000-705-00	NA	N	25-drive DAE DC Power Supply	NA. Contains no customer data

Media

Table 32 –Media

Media					
Type (SRAM, DRAM, etc.)	**Part Number**	**Size**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
Disk Removable	All available drive options	All available drive options	Y	Appliance OS and configuration as well as general purpose data storage capacity.	Dell EMC Full Data Erasure based on sensitivity of data.
Tape Removable	N/A	N/A			
Removable	N/A	N/A			
Additional Information: This unit is a Unity storage array that can be utilized as direct-connect, NAS, or SAN.					

Table 35 - M.2

M.2					
Type (SRAM, DRAM, etc.)	**Part Number**	**description**	**User Modifiable (Y/N)**	**Function**	**Process to Clear**
M.2	118000653	SMART X10 DRV 240GB MLC M.2 6G 512 PLP	Y	For Vaulting	Dell EMC Full Data Erasure based on sensitivity of data.
M.2	118000041	INTEL S3500 DRV 340G MLC M.2 SATA 6G 512	Y	For Vaulting	Dell EMC Full Data Erasure based on sensitivity of data.
M.2	118000782	SAM PM983 DR 960G 1WPD M.2 NVM 8G 512	Y	For Vaulting	Dell EMC Full Data Erasure based on sensitivity of data.
M.2	118000039	INTEL S3500 DRV 80G MLC M.2 SATA 6G 512	Y	For Vaulting	Dell EMC Full Data Erasure based on sensitivity of data.
M.2	118001033	SAM PM9A3 960GB 1WPD M.2 NVME 512 ISE	Y	For Vaulting	Dell EMC Full Data Erasure based on sensitivity of data.

References

1. Industrial Security Field Operations (ISFO) Process Manual for Certification and Accreditation of Classified Systems under the National Industrial Security Programs Operating Manual (NISPOM)", Revised March 1, 2010 Defense Security Service

2. DoD 5220.22-M, "National Industrial Security Program Operating Manual (NISPOM)" United States Department of Defense. Revised February 28, 2006. http://www.dss.mil/isp/fac_clear/download_nispom.html

3. ODAA Process Guide for C&A of Classified Systems under NISPOM Defense Security Service

http://www.dss.mil/isp/odaa/request.html

4. Health Insurance Portability and Accountability Act of 1996 (HIPAA, Title II)
   http://www.cms.gov/HIPAAGenInfo/02_TheHIPAALawandRelated%20Information.asp

5. Gramm–Leach–Bliley Act (GLB), also known as the Financial Services Modernization Act of 1999, (Pub.L. 106-102, 113 Stat. 1338)
   http://www.gpo.gov/fdsys/pkg/PLAW-106publ102/content-detail.html

6. Sarbanes–Oxley Act of 2002 (Pub.L. 107-204, 116 Stat. 745, enacted July 30, 2002)
   http://www.gpo.gov/fdsys/pkg/PLAW-107publ204/content-detail.html

7. Payment Card Industry Data Security Standard (PCI DSS)
   https://www.pcisecuritystandards.org/pdfs/pr_080930_PCIDSSv1-2.pdf