

# **Hitachi Advanced Server DS7000**

# **Configuration Guide**

This document explains how to configure and manage a Hitachi Advanced Server DS7000 series scalable server.

MK-97HAS7012-04

November 2021

#### © 2021 Hitachi Vantara LLC. All rights reserved.

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or stored in a database or retrieval system for commercial purposes without the express written permission of Hitachi, Ltd., or Hitachi Vantara Corporation (collectively, "Hitachi"). Licensee may make copies of the Materials provided that any such copy is: (i) created as an essential step in utilization of the Software as licensed and is used in no other manner; or (ii) used for archival purposes. Licensee may not make any other copies of the Materials. "Materials" mean text, data, photographs, graphics, audio, video and documents.

Hitachi reserves the right to make changes to this Material at any time without notice and assumes no responsibility for its use. The Materials contain the most current information available at the time of publication.

Some of the features described in the Materials might not be currently available. Refer to the most recent product announcement for information about feature and product availability, or contact Hitachi Vantara Corporation at https://support.HitachiVantara.com/ en\_us/contact-us.html.

**Notice:** Hitachi products and services can be ordered only under the terms and conditions of the applicable Hitachi agreements. The use of Hitachi products is governed by the terms of your agreements with Hitachi Vantara Corporation.

By using this software, you agree that you are responsible for:

- 1) Acquiring the relevant consents as may be required under local privacy laws or otherwise from authorized employees and other individuals to access relevant data; and
- 2) Verifying that data continues to be held, retrieved, deleted, or otherwise processed in accordance with relevant laws.

**Notice on Export Controls.** The technical data and technology inherent in this Document may be subject to U.S. export control laws, including the U.S. Export Administration Act and its associated regulations, and may be subject to export or import regulations in other countries. Reader agrees to comply strictly with all such regulations and acknowledges that Reader has the responsibility to obtain licenses to export, re-export, or import the Document and any Compliant Products.

**EXPORT CONTROLS** - Licensee will comply fully with all applicable export laws and regulations of the United States and other countries, and Licensee shall not export, or allow the export or re-export of, the Software, API, or Materials in violation of any such laws or regulations. By downloading or using the Software, API, or Materials, Licensee agrees to the foregoing and represents and warrants that Licensee is not located in, under the control of, or a national or resident of any embargoed or restricted country.

Hitachi is a registered trademark of Hitachi, Ltd., In the United States and other countries.

AIX, AS/400e, DB2, Domino, DS6000, DS8000, Enterprise Storage Server, eServer, FICON, Flash Copy, IBM, Lotus, MVS, OS/390, PowerPC, RS6000, S/390, System z9, System z10, Tivoli, z/OS, z9, z10, z13, z/VM, BCPii<sup>™</sup> and z/VSE are registered trademarks or trademarks of International Business Machines Corporation.

Active Directory, ActiveX, Bing, Excel, Hyper-V, Internet Explorer, the Internet Explorer logo, Microsoft, the Microsoft Corporate Logo, MS-DOS, Outlook, PowerPoint, SharePoint, Silverlight, SmartScreen, SQL Server, Visual Basic, Visual C++, Visual Studio, Windows, the Windows logo, Windows Azure, Windows PowerShell, Windows Server, the Windows start button, and Windows Vista are registered trademarks or trademarks of Microsoft Corporation. Microsoft product screen shots are reprinted with permission from Microsoft Corporation.

All other trademarks, service marks, and company names in this document or web site are properties of their respective owners.

# Table of Contents

Preface			p-1
About tl	nis Docur	ment	p-1
Docume	ent Conv	entions	p-1
Intende	d Audien	асе	p-1
Accessir	ng Produ	ct Downloads	p-1
Getting	Help		p-1
Chapter 1.	Setting	g BIOS Parameters	1-1
1.1.	Setting	up Remote Access	1-2
1.2.	Setting	the Supervisor Password	1-4
1.3.	Changi	ng BIOS Settings	1-8
	1.3.1.	Configuring with the BIOS Interface	1-8
	1.3.2.	Configuring with the Command Line	1-11
1.4.	Changi	ng the Boot Device Order	1-12
	1.4.1.	Configuring with the BIOS Interface	1-12
	1.4.2.	Configuring with the Command Line	1-14
. –	1.4.3.		1-14
1.5.		Iring the Sub-NUMA Clustering (SNC) Mode	1-15
	1.5.1.	Configuring with the Command Line	1-15
1.6	Dicabli	ng/Enabling PCIe blade Slots	1_10
1.0.		Configuring with the BIOS Interface	1-19
	1.6.2.	Configuring with the Command Line	1-23
1.7.	Disabliı	ng External USB ports	1-24
	1.7.1.	Configuring with the BIOS Interface	1-24
	1.7.2.	Configuring with the Command Line	1-27
1.8.	Managi	ng the PCH SATA RAID Configuration	1-28
	1.8.1.	Configuring PCH SATA RAID	1-28
	1.8.2.	Creating RAID1 Volume	1-34
	1.8.3. 1.9.1	Installing Operating Systems on PCH SATA RAID	1-39
1.0	1.0.4. Managi	Monitoring PCH SATA RAID	1 42
1.9.	1 Q 1	DCPMM Configuration Modes Overview	1-42
	1.9.2.	Configuring DCPMM Modes	1-43
	1.9.3.	Checking DCPMM Modes	1-51
	1.9.4.	Erasing DCPMM Memory Modules	1-55
Chapter 2.	Manag	jing RAS Features Settings	2-1
2.1.	RAS Fe	atures Overview	2-1
2.2.	Managi	ng Correctable Memory Errors	2-2
	2.2.1.	Introduction	2-2
	2.2.2.	Overview of Memory Errors	2-2
	2.2.3.	Correctable Error Signaling	2-3

	2.2.4. Repairing Correctable Errors	2-4
2.3.	Managing Adaptive Double Device Data Correction (ADDDC)	2-5
	2.3.1. Configuring with the BIOS Interface	2-5
	2.3.2. Configuring with the Command Line	2-8
2.4.	Managing Single Device Data Correction Plus One (SDDC+1)	2-9
	2.4.1. Configuring with the BIOS Interface	2-9
	2.4.2. Configuring with the Command Line	2-11
2.5.	Managing Memory Rank Sparing	2-12
	2.5.1. Configuring with the BIOS Interface	2-12
	2.5.2. Configuring with the Command Line	2-15
2.6.	Managing Demand Scrubbing	2-16
2.7.	Managing Patrol Scrubbing	2-17
	2.7.1. Configuring with the BIOS Interface	2-17
	2.7.2. Configuring with the Command Line	2-20
2.8.	Managing Memory Mirroring	2-21
	2.8.1. Overview	2-21
	2.8.2. Full Memory Mirroring	2-22
	2.8.3. Partial Memory Mirroring below 4 GB	2-24
	2.8.4. Partial Memory Mirroring above 4 GB (Fixed Sizes)	2-27
	2.8.5. Partial Memory Mirroring above 4 GB (Percentage Amount)	2-31
2.9.	Managing Post Package Repair (PPR)	2-35
	2.9.1. PPR Overview	2-35
	2.9.2. Configuring PPR with Command Line	2-36
Chapter 3.	Configuring the Hitachi Advanced Server DS7000 Series for VMware ESXi .	3-1
3.1.	ESXi Host Configuration Maximums	3-1
3.2.	Configuring VMware ESXi	3-1
Chambon 4	Tratelling on Organizing Custom on DCDMM Memory Medules	
Chapter 4.	Installing an Operating System on DCPMM Memory Modules	4-1
Chapter 5.	Configuring some Specific PCIe Cards	5-1
5.1.	Optimizing the Mellanox ConnectX-4, -5 Network Card Performance	5-1
5.2.	Configuring the Broadcom MegaRAID 9460-16i Card to NVME Mode	5-2
Appendix A.	BIOS Settings for PCIe blade Slots	A-1
Appendix B.	Supported Processors for DCPMM Memory modules	B-1
Appendix C.	Creating Namespaces	C-1
C.1.	Creating Namespaces with the BIOS Interface	C-1
C.2.	Creating Namespaces with the Linux Commands	C-5
Appendix D.	BIOS Settings for USB Ports	D-1

# Preface

# **About this Document**

This document explains how to configure and manage a Hitachi Advanced Server DS7000 series scalable server.

# Important ATTENTION: Please read carefully the safety instructions before you perform the procedures described in this manual. Multilingual Safety Notices Guide

# **Document Conventions**

The following highlighting conventions are used in this guide:

Bold	Indicates text in a window, including window titles, menus, menu options, buttons, fields, and labels. Example: <b>Click OK</b> .
monospace	Indicates text that is displayed on screen or entered by the user. Example: pairdisplay -g oradb
< >	Identifies parameters to be supplied by the user.

# **Intended Audience**

This guide is intended for use by System Administrators and Operators.

# **Accessing Product Downloads**

Product software, drivers, and firmware downloads are available on Hitachi Vantara Support Connect: <u>https://support.hitachivantara.com/</u>.

Log in and select Product Downloads to access the most current downloads, including updates that may have been made after the release of the product.

# **Getting Help**

<u>Hitachi Vantara Support Connect</u> is the destination for technical support of products and solutions sold by Hitachi Vantara. To contact technical support, log on to Hitachi Vantara Support Connect for contact information: <u>https://support.hitachivantara.com/en\_us/contact-us.html</u>.

<u>Hitachi Vantara Community</u> is a global online community for customers, partners, independent software vendors, employees, and prospects. It is the destination to get answers, discover insights, and make connections. **Join the conversation today!** Go to <u>community.hitachivantara.com</u>, register, and complete your profile.

# **Chapter 1. Setting BIOS Parameters**

W083

# 

W083: Do not change BIOS setup settings unless directed to do so by the support team.

W082

# 

W082:

These procedures are for advanced users only. Risk of system damage.

# Important ATTENTION: Please read carefully the safety instructions before you perform the procedures described in this manual.

Multilingual Safety Notices Guide

# 1.1. Setting up Remote Access

Each server is equipped with an embedded management controller for local and/or remote administration via a web-based administration console.

The embedded management controller's communication interface is based on TCP/IP. On delivery, it is configured with the factory-default network parameters.

**See** The documentation provided for more information.

#### **Prerequisites**

The server is connected to the site power supply.

The MAC address has been noted.

The server is connected to the LAN.

The DHCP server (where applicable) is installed on the same network subnet.

The computer used for the operation is on the same network subnet.

The Resource and Documentation ISO file is available.

### Procedure

#### 1. Install the mc-setup or the psetup tool

- 1. Switch on the computer that will be used for the operation (remote or local).
- 2. According to the operating system, do one of the following:
  - (Linux) Install mc-setup from the installation package corresponding to the Linux version (example: mc-setup-1.2.1.BD.1-1.fc<x>.i386.rpm, where <x> is the Fedora core version number).
  - (Windows) Copy the psetup file on the computer (psetup does not need to be installed).

### 2. Detect the embedded management controller

- 1. Start the tool. The Device Setup screen appears.
- 2. On the Device Setup screen, click the **Refresh Devices** button. The tool automatically detects all the embedded management controllers connected to the network subnet.
- 3. Select the embedded management controller's MAC address from the drop-down list.

**Note** The management controller's MAC address is provided on labels on the server or can be obtained by downloading the NFC tag from the server's MLB.

# 3. Configure the embedded management controller's network settings

- 1. Click Query Device. The current network settings appear in the Network Configuration box.
- 2. To configure a static IP address, proceed as follows:
  - a. Complete the following fields.
  - Super user login: super
  - Super user password: pass
  - IP autoconfiguration: None
  - IP address, Subnet Mask and Gateway: to be completed according to the network settings.
  - b. Click Setup Device.

```
Important Although the super user password can be changed using
the tool, it is advised to log on to the Server Hardware
Console for the first time with the default super user logon
and password. The default super user logon and password
can be changed by the customer once installation is
completed.
```

# 4. Check remote access to the Hardware Console

- 1. If the mainboard Ethernet port is connected to a computer for local configuration, connect it to the LAN.
- 2. Open a Web browser and enter the IP address that has just been configured. If the Hardware Console is accessed correctly, the authentication page opens.

# **1.2.** Setting the Supervisor Password

It is possible to set a supervisor password to access to the Device Manager and the Setting BIOS configuration and optionally to launch the Power on.

# Procedure

# 1. If not already done, set up remote access

# 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

# 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

# 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

# 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

# Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

# 6. Launch the BIOS interface

1. Click Power > Power Management to open the Power Management page

- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen.
- 4. Press [Esc] when the **Press Esc for boot options** message is displayed.



# 7. Launch the Setup Utility

From the main menu, select Setup Utility, and press [Enter].

Front Page		
Front Page		
Continue PBoot Hanager Device Management PBoot From File PAdminister Secure Boot >Setup Utility	Go to Setup Utility.	
R		

# 8. Launch the supervisor password configuration

From the list, select Set Supervisor Password, and press [Enter].



# 9. Set the supervisor password

Enter the new password twice and press [Enter]

	Setup Utility	Rev. 5.
Main Advanced Security Power	Boot Exit	
Current TPM Device	<not detected=""></not>	Install or Change the password and the length of password must be greater than
Supervisor Password	Not installed	
Set Supervisor Password Set All Hdd Password Set All Master Hdd Password		
▶Storage Password Setup Page		
▶Platform Hierarchy Policy		
		_
	Set Supervisor Password	
	Enter New Password: Enter New Password Again:	

# 10. If required, enable the Power On password

1. Select Power on Password and press [Enter]



2. Select Enabled and press [Enter]

	Setup Utility	Rev. 5.
Main Advanced Security Power	Boot Exit	
Current TPM Device	<not detected=""></not>	Enable:System will ask input password on post time. Disable:System will ask input password when on to Setup Utility
Supervisor Password	Installed	
Set Supervisor Password Power on Password Set All Hdd Password Set All Master Hdd Password	<d i="" led="" sab=""></d>	
▶Storage Password Setup Page		
▶Platform Hierarchy Policy		
	Power on Password Enabled Disabled	
	Ŕ	

**Note** After the supervisor password setting, the server reboots automatically. If the Power On password is enabled, the supervisor password is required.

# 1.3. Changing BIOS Settings

BIOS settings are configured with either the BIOS Setup utility or the command line.

- **Notes** For each BIOS release, a BIOS\_SKLxxx\_settings spreadsheet is provided in the Resource and Documentation ISO file. It lists all BIOS settings.
  - Firmware, software, tools and associated documentation are provided in the Resource & Documentation ISO file. Updates can also be downloaded from the Hitachi Vantara support web site: http://support.HitachiVantara.com

# **1.3.1.** Configuring with the BIOS Interface

# Procedure

1. If not already done, set up remote access

# 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

# 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

# 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

# 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

# Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

# 6. Launch the BIOS interface

- 1. Click Power > Power Management to open the Power Management page
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen.
- 4. Press [Esc] when the **Press Esc for boot options** message is displayed.



# 7. Edit BIOS parameters

1. Using the navigation arrows, select Setup Utility from the main menu and press [Enter].



2. Most of the BIOS parameters are located in the Advanced tab. Use the Up and Down arrows to move to the required option.

Setup Utility		Rev. 5
Main Advanced Security Power Boot Exit		
Platform Information	Form for Platform Information	
PBoot Configuration Peripheral Configuration PVideo Configuration		
ACP1 Table/Features Control System Event Log		
PUEDUG CONTIGURATION PPILOT3 PSocket Configuration		
▶HE Configuration ▶Pch Configuration ▶P20 LPUL Configuration		
APEI Configuration +H20 Event Log Config Hanager		
▶Console Redirection ▶H2oUve Configuration		

# **1.3.2.** Configuring with the Command Line

This section provides some command line examples.

**See** Remote Hardware Management CLI Reference Guide for more information.

### **Check one or multiple BIOS settings**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a get -n '<Parameter1Name> <Parameter2Name>'

#### Output

```
<Parameter1Name> : <value1>
<Parameter2Name> : <value2>
```

# **Check all BIOS settings**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a list

#### Output

```
CPU.ProcessorHyperThreadingDisable: 0
MEM.PatrolScrub : 1
UPI.TscSyncEn : 0
....
```

#### Set one or multiple BIOS settings

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n '<Parameter1Name> <value1>
<Parameter2Name> <value2>'

#### Output

#### **Reset BIOS settings to the default values**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a reset

# **1.4. Changing the Boot Device Order**

BIOS device order is configured with either the BIOS Setup utility, the command line or the Server Hardware Console (SHC).

# **1.4.1. Configuring with the BIOS Interface**

# Procedure

# 1. If not already done, set up remote access

# 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

# 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

# 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

# 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

### Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

# 6. Launch the Boot Manager

- 1. Click Power > Power Management to open the Power Management page
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen and follow the boot sequence.
- 4. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.

5. Using the navigation arrows, select Boot Manager from the main menu and press [Enter].

- 6. Select the required boot option.
- 7. Use F6 key to move up or F5 key to move down.

The new boot order is saved.

	Boot Manager
R	
Bo	oot Option Menu
EF EF EF EF	FI Boot Devices         11 Network 0 for IPv4 (08-00-38-B3-54-7A)         FI Network 1 for IPv4 (08-00-38-B3-54-7B)         FI Hard Drive (Hicron_H600_HTED0AK128HBF)         FI Network 2 for IPv4 (08-00-38-B3-54-7C)         FI Network 3 for IPv4 (08-00-38-B3-54-7D)
t	and ↓ to change option, ENTER to select an option, ESC to exit
l	
l	

# **1.4.2.** Configuring with the Command Line

This section provides some command line examples.

- **See** Remote Hardware Management CLI Reference Guide for more information.
- **Note** If the system is running, the setting command will only apply to the next power on. It is advised to power off the system, launch the command and power on the system.

# Set the boot device for the next boot:

\$ bsmBootDevice -H X.X.X.X -u super -p <password> -d <device> -l <instance\_number> -O efiboot

# Set the boot device permanently:

\$ bsmBootDevice -H X.X.X.X -u super -p <password> -d <device> -I <instance\_number> -O efiboot,persistent

# **1.4.3.** Configuring with the Server Hardware Console (SHC)

**See** SHC Reference Guide for more information.

# Procedure

1. If not already done, set up remote access

# 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

# 3. Change the boot device order

- 1. From the **Configuration** tab, click **BIOS Settings > Boot Device** to open the **Boot Device** page.
- 2. Select or clear the check boxes as required and click Apply.

# **1.5.** Configuring the Sub-NUMA Clustering (SNC) Mode

The Sub-NUMA Clustering (SNC) mode breaks the Last Level Cache (LLC) into two disjointed clusters based on address range. The LLC capacity is used more efficiently and the average latency is improved.

This setting may improve performance on NUMA-aware operating systems.

The server is factory-configured as follows:

SNC Disabled

IMC Interleaving Auto

**Note** When SNC is disabled, IMC interleaving must be set to Auto.

This procedure describes how to configure SNC-2 mode (Two clusters in each CPU).

Sub-NUMA Clustering (SNC) mode is configured with either the BIOS Setup utility or the command line.

# **1.5.1. Configuring with the BIOS Interface**

#### **Procedure**

# 1. If not already done, set up remote access

### 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

# 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

# 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

# 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

# 6. Launch the UPI General Configuration

- 1. Click Power > Power Management to open the Power Management page.
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen and follow the boot sequence.
- 4. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.
- 5. From the main menu, select Setup Utility > Advanced > Socket Configuration > UPI Configuration > UPI General Configuration.

Se Advanced	etup Utility Rev. 5
UPI Configuration	Displays and provides option to change the UPL General Settings
▶UPI General Configuration ▶UPI Per Socket Configuration ▶UPI Dfx Configuration	

6. Press [Enter].

# 7. Configure SNC

1. From the list, select SNC and press [Enter].

Advanced	Seti	up Utility	Rev. 5
UPI General Configuration			AUTO supports 1-cluster or 2-clusters
WP1 Status           Degrade Precedence           Link Speed Mode           Link Frequency Select           Link L1 Enable           UP1 Failover Support           U0 Directory Cache (100C)           Directory Mode Enable           SNC           XPT Prefetch           KT1 Prefetch           RdCur for XPT Prefetch           UP1 Load Board for Failed Links           Legacy VGA Stack           HM10 P2P Disable           CPU Hot Plug           CPU Hot Plug           CPU Hot Plug Topology           CPU SKU Type Hismatch check           UP1 Debug Print Level           Local/Remote Threshold           TSC Sync support           Stale AtoS	<topology preceder<br=""><fast> <use link="" per="" sett<br=""><oisabled> <auto> <auto> <auto> <chabled> <oisabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <chabled> <ch< th=""><th>nce&gt; ting&gt; SNC Disabled Enabled Auto</th><th>depending on INC interleave. SNC and INC interleave both AUTO will support 1-cluster (XPT/KTI Prefetch enable) 2-HKC way interleave. SNC Enable supports Full SNC (2 clusters) and 1-way INC interleave.</th></ch<></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></chabled></oisabled></chabled></auto></auto></auto></oisabled></use></fast></topology>	nce> ting> SNC Disabled Enabled Auto	depending on INC interleave. SNC and INC interleave both AUTO will support 1-cluster (XPT/KTI Prefetch enable) 2-HKC way interleave. SNC Enable supports Full SNC (2 clusters) and 1-way INC interleave.

- 2. Use the Up and Down arrows to move to the Enabled option.
- 3. Press [Enter] to complete changes.

# 8. Configure IMC Interleaving

- 1. Return to the Advanced menu by pressing [Esc].
- 2. From the Advanced menu, select Socket Configuration > Memory Configuration > Memory Map.
- 3. From the list, select IMC Interleaving and press [Enter].

Advanced		Kev.
Volatile Memory Mode ILH Memory Interleave Granularity INC Interleaving Channel Interleaving Rank Interleaving Socket Interleave Below 468	<1LH> <auto> <auto> <auto> <disabled> IHC Interleavi Auto 1-way Interlea 2-way Interlea</disabled></auto></auto></auto>	Select IMC Interleaving setting

- 4. Use the Up and Down arrows to move to the 1-way Interleave option.
- 5. Press [Enter] to complete changes.
- 6. Return to the Advanced menu by pressing [Esc].

- Save changes by selecting Exit > Save Change Without Exit and press [Enter].
- 8. Select YES in the confirmation dialog box and press [Enter].
- 9. Return to the main menu by pressing [Esc].
- 10. Select YES in the confirmation dialog box and press [Enter].

# **1.5.2.** Configuring with the Command Line

This section provides some command line examples.

**See** Remote Hardware Management CLI Reference Guide for more information.

# **Enable SNC**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'UPI.SncEn 1'

# Set IMC Interleaving to 1-way Interleave

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.ImcInterleaving 1'

# **1.6.** Disabling/Enabling PCIe blade Slots

The server is factory-configured as follows:

PCI-E Port Auto

PCIe blade slots are configured with either the BIOS Setup utility or the command line.

See Appendix A BIOS Settings for PCIe blade Slots

# **1.6.1. Configuring with the BIOS Interface**

# Procedure

#### 1. If not already done, set up remote access

#### 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

#### 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

#### 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

#### 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

# Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

# 6. Launch the I IO configuration

- 1. Click Power > Power Management to open the Power Management page
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen and follow the boot sequence.
- 4. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.
- 5. From the main menu, select Setup Utility > Advanced > Socket Configuration.
- 6. Select I IO Configuration or I IO Configuration 2:
  - I IO Configuration Configuration from socket 0 to 3
  - I IO Configuration2 Configuration from socket 4 to 7

Advanced	utility Kev.
Processor Configuration Common RefCode Configuration PUPL Configuration PUPL Configuration PHemory Configuration PHO Configuration PHO Configuration 2 PAdvanced Power Management Configuration	Displays and provides option to change the 110 Settings

7. Press [Enter].

# 7. Exclude or include PCIe blade slot

1. From the list, select the required Socketx Configuration and press [Enter].

	S	etup Utility 👘	Rev.
Advanced			
110 Configuration			
▶Socket0 Configuration			
▶Socket1 Configuration			
▶Socket2 Configuration			
▶Socket3 Configuration			
▶ IOAT Configuration			
▶110 General Configuration			
▶Intel® VT for Directed 1/0 (VT-d)			
▶Intel® VMD technology			
▶Intel® AIC Retimer/AIC SSD Technolog	gy (non-VMD)		
▶110 DFX Configuration			
LIQ-DCIE Everage Clobal Options			
TTO PCTE Express Glubal options			
PCI 64-Bit Resource Allocation	<pre><enabled></enabled></pre>		
PCIe Train by BIOS	<yes></yes>		
PCIe Hot Plug	<enabled></enabled>		
PCIe ACPI Hot Plug	<disabled></disabled>		
MultiCast Enable	<disabled></disabled>		
NoSnoop Read Config	<d i="" led="" sab=""></d>		
NoSnoop Write Config	<enabled></enabled>		
Max Read Comp Comb Size	<minimum></minimum>		
Problematic port	<d i="" led="" sab=""></d>		
DMI Allocating Write Flows	<allocating></allocating>		
PCIe Allocating Write Flows	<allocating></allocating>		
Skip Halt On DMI Degradation	<d i="" led="" sab=""></d>		
Rx Clock WA	<disabled></disabled>		

2. Select the required port and press [Enter].

Advanced	Setup Utility	Rev. 5
10U0 (110 PC1e Br1) 10U1 (110 PC1e Br2) 10U2 (110 PC1e Br3) MCP0 (110 PC1e Br4) MCP1 (110 PC1e Br4) PC1-E Completion Timeout Disable PC1-E Completion Timeout Value Sck1 RP Correctable Err Sck1 RP NonFatal Uncorrectable Err Sck1 RP Fatal Uncorrectable Err Sck1 RP Fatal Uncorrectable Err Socket 1 PcieBr1D02F0 - Port 1A >Socket 1 PcieBr1D02F0 - Port 1C >Socket 1 PcieBr2D02F0 - Port 2A >Socket 1 PcieBr2D02F0 - Port 2A >Socket 1 PcieBr2D02F0 - Port 3A >Socket 1 PcieBr2D00F0 - HCP 0 >Socket 1 PcieBr5D00F0 - HCP 1	<auto> <auto> <auto> <auto> <auto> <enabled> &lt;260ms to 900ms&gt; <disabled> <disabled> <disabled> &lt;</disabled></disabled></disabled></enabled></auto></auto></auto></auto></auto>	Settings related to PCI Express PortS (0/1a/1B/1C/1D/2a/2B/2C/2D/3a/3B/3C/3D/4 /5a)

3. Select PCI-E Port and press [Enter].



4. Use the Up and Down arrows to move to the required option:

Disabled	PCIe blade port is disabled
Enabled	PCIe blade port is enabled

- 5. Press [Enter] to complete changes.
- 6. Return to the Advanced menu by pressing [Esc].
- Save changes by selecting Exit > Save Change Without Exit and press [Enter].
- 8. Select YES in the confirmation dialog box and press [Enter].
- 9. Return to the main menu by pressing [Esc].
- 10. Select YES in the confirmation dialog box and press [Enter].

# **1.6.2.** Configuring with the Command Line

This section provides some command line examples.

**See** Remote Hardware Management CLI Reference Guide for more information.

Use the bsmBiosSettings.sh CLI command with the PciePortDisable\_xx BIOS setting. The Pcie.PortDisable\_xx setting depends on the location of the PCIe blade slot.

See	Appendix A BI	OS Settings for PCIe blade Slots	
-----	---------------	----------------------------------	--

Setting values:

2	Auto (default value)
1	Enabled
0	Disabled

# **Disable PCIe blade Slot 0 for Module 0**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'PCI.PciePortDisable\_1 0'

### Enable PCIe blade Slot 0 for Module 0

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'PCI.PciePortDisable\_1 1'

# 1.7. Disabling External USB ports

USB ports are configured with either the BIOS Setup utility or the command line.

USB port settings depend on the location of the USB port on the server.

**See** Appendix D BIOS Settings for USB Ports for more information.

The server is factory-configured as follows:

USB HS Port Enabled

# **1.7.1. Configuring with the BIOS Interface**

# Procedure

1. If not already done, set up remote access

# 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

# 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

# 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

# 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

# See SHC Reference Guide for more information.

# Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

# 6. Launch the PCH Configuration

- 1. Click Power > Power Management to open the Power Management page.
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen and follow the boot sequence.
- 4. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.
- 5. From the main menu, select Setup Utility > Advanced > Pch Configuration

Main Advanced Security Power	Boot Exit	RC+.
Platform Information PBoot Configuration Prepipheral Configuration PACPI Table/Features Control PSystem Event Log Poebug Configuration PPILOT3 PSocket Configuration PHC Configuration PHC Configuration PACPI Configuration PACPI Configuration PACPI Configuration PACPI Configuration PH20 Event Log Config Hanager PCONsole Redirection PH20UVe Configuration		Displays and provides option to change the Pch Settings

6. Press [Enter].

# 7. Launch the USB Configuration

Select USB Configuration and press [Enter].



# 8. Enable the USB Per-Connector Disable

1. Select USB Per-Connector Disable and press [Enter].



2. Use the Up and Down arrows to move to the required setting:

Enabled	Per-Port Control Disable is	s enabled (default value)
---------	-----------------------------	---------------------------

3. Press [Enter] to complete changes.

# 9. Disable the USB ports

1. From the list, select the required USB HS Physical Connector and press [Enter].

Advanced	Setup Utility	Rev. 5
1 USB House 1 USB Keyboard 1 USB HassStorage USB Precondition USB Per-Connector Disable	<d i="" led="" sab=""> <enab led=""></enab></d>	Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BlOS or OS.
USB HS Physical Connector #2 Disable USB HS Physical Connector #3 Disable USB HS Physical Connector #4 Disable USB HS Physical Connector #6 Disable USB HS Physical Connector #7 Disable USB HS Physical Connector #8 Disable USB HS Physical Connector #8 Disable	<pre><frableb< pre=""> <pre></pre></frableb<></pre></frableb<></pre></frableb<></pre></frableb<></pre></frableb<></pre></frableb<></pre></frableb<></pre></frableb<></pre></frableb<></pre></frableb<></pre></frableb<></pre></frableb<></pre></frableb<></pre></frableb<></pre>	
USB HS Physical Connector #10 Disable USB HS Physical Connector #11 Disable USB HS Physical Connector #12 Disable USB HS Physical Connector #13 Disable USB HS Physical Connector #14 Disable USB SPhysical Connector #11 Disable	<pre>do bas Hs Physical Connector #1 Disable </pre> <pre> 4   Disabled   CE Enabled   CE Enabled&gt;   <enabled> </enabled></pre>	
USB SS Physical Connector #2 Disable USB SS Physical Connector #3 Disable USB SS Physical Connector #4 Disable USB SS Physical Connector #6 Disable	<d i="" led="" sab=""> <enab led=""> <d i="" led="" sab=""> <d i="" led="" sab=""> <d i="" led="" sab=""></d></d></d></enab></d>	

- 2. Use the Up and Down arrows to move to the required setting:
- **Disabled** USB HS Physical Connector is disabled

**Enabled** USB HS Physical Connector is enabled (default value)

- 3. Press [Enter] to complete changes.
- 4. Return to the **Advanced** menu by pressing [Esc].
- 5. Boot the server to save changes by selecting **Exit > Save and Exit**.
- 6. Press [Enter].

# **1.7.2.** Configuring with the Command Line

This section provides some command line examples.

**See** Remote Hardware Management CLI Reference Guide for more information.

#### Procedure

#### 1. Check the setting of the USB port.

Use the bsmBiosSettings.sh -a get command with the PCH.PchUsbHsPort\_x parameter.

### Example

To check the setting of the USB port 0, run the command:

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a get -n PCH.PchUsbHsPort\_0

#### Output

```
PCH.PchUsbHsPort_0 :1
```

#### 2. Disable the USB port.

Use the bsmBiosSettings.sh -a set command with the PCH.PchUsbHsPort\_x parameter.

# Example

To disable the USB port 0, run the command:

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'PCH.PchUsbHsPort\_0 0'

#### Output

```
Setting PCH.PchUsbHsPort_0 is OK
```

# **1.8. Managing the PCH SATA RAID Configuration**

# 1.8.1. Configuring PCH SATA RAID

PCH SATA RAID configuration is checked or corrected with either the BIOS Setup utility or the command line.

# **Prerequisites**

Two identical SATA disks are connected to FDB 2 and FDB 3 at the front of the Main Box.

The M3 CPB SATA cable is connected to the CPU Purley Board (CPB) motherboard.

# **1.8.1.1. Configuring with the BIOS Interface**

# Procedure

1. If not already done, set up remote access

# 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

# 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

# 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

# 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

# 6. Launch the PCH Configuration

- 1. Click Power > Power Management to open the Power Management page.
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen and follow the boot sequence.
- 4. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.
- 5. From the main menu, select Setup Utility > Advanced > Pch Configuration

Setup Utility	Rev. k
Main Advanced Security Power Boot Exit	
<pre>Platform Information Boot Configuration Peripheral Configuration PVideo Configuration PACPI Table/Features Control PSystem Event Log PDebug Configuration PPLOT3 PSocket Configuration PHE Configuration PHE Configuration PHE Configuration PACEI Configuration PHE0 Event Log Config Manager PConsole Redirection PH20UVe Configuration</pre>	Displays and provides option to change the Pch Settings

6. Press [Enter].

# 7. Configure PCH SATA

1. From the list, select PCH SATA Configuration and press [Enter].

Setup Utility F		
Advanced		
PCH Configuration	SATA devices and settings	
PPCH Devices         PPCI Express Configuration         PPCH SATA Configuration         PUSB Configuration         Puss Configuration         Psecurity Configuration         PAzalia Configuration         Phatform Thernal Configuration         PraceHub Configuration Henu         PPCH DEX Configuration         PPCH DEX Configuration         PPCH DEX Configuration         DPCH DEX Configuration         DPCH DEX Configuration         DPCH DUB Configuration         DPCH DUB Configuration         DPCH DUB Configuration         DPCH DUB Configuration         DC1 enable (HDCIEN) <disabled>         DC1 Auto Detect Enable       <disabled></disabled></disabled>		

- 2. Set Configure SATA as RAID
  - a. Select Configure SATA as and press [Enter].

2	Setup Utility	Rev. S
Advanced		
PCH SATA Configuration		Identify the SATA port is connected to Solid State Drive or Hard Disk Drive
SATA Controller Configure SATA as SATA test mode ▶SATA Hode options Support Aggressive Link Power Hanagement NVRAH CYCLE ROUTER 0 ENABLE NVRAH CRO PCIE Root Port Number NVRAH CRO PCIE Root Port Number NVRAH CRO PCIE Root Port Number NVRAH CYCLE ROUTER 1 ENABLE NVRAH CYCLE ROUTER 2 ENABLE NVRAH CR2 PCIE Root Port Number SATA Port 0 Software Preserve Port 0 SATA Port 0 DevSip Hot Plug Configure as eSATA Mechanical Presence Switch Sata Devsio	<pre><enabled> <alic1> <disabled> <enabled> <disabled> <pci 1="" express="" port="" root=""> <instabled> <pci 1="" express="" port="" root=""> </pci></instabled></pci></disabled></pci></disabled></pci></disabled></pci></disabled></enabled></disabled></alic1></enabled></pre> Not Instatuurknoom <enabled> <disabled> <disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></enabled>	
SATA Device Type SATA Topology SATA Port 1 Software Preserve	<pre><hard disk="" drive=""> <unknown> [Not Installed] Unknown</unknown></hard></pre>	

- b. Use the Up and Down arrows to move to the RAID option.
- c. Press [Enter] to complete changes.

# 8. Configure PCH sSATA

1. From the list, select PCH sSATA Configuration and press [Enter].

Setup Utility Re		
Advanced		
PCH Configuration		sSATA devices and settings
PCH Devices PCI Express Configuration PCH SATA Configuration PCH SATA Configuration PCH SATA Configuration PSecurity Configuration PAzalia Configuration PNetworking PPlatform Thermal Configuration PTraceHub Configuration Henu PCH DEX Configuration PCH DEX Configuration DCI enable (HDCIEN) DCI Auto Detect Enable	<d i="" led="" sab=""> <d i="" led="" sab=""></d></d>	

- 2. Set Configure sSATA as RAID.
  - a. Select Configure sSATA as and press [Enter].

	Setup Utility	Rev. 5
Advanced Advanced		
PCH SATA Configuration		Identify the SATA port is connected to Solid State Drive or Hard Disk Drive
sSATA Controller Configure sSATA as SATA test mode PSATA Mode options Support Aggressive Link Power Management	<enabled> <ahc1> <d isabled=""> <enabled></enabled></d></ahc1></enabled>	
SATA Port 0 Port 0 Hot Plug Configure as eSATA Spin Up Device sSATA Device Type SATA Topology SSATA Port 1 Port 1 Hot Plug Configure as eSATA Spin Up Device sSATA Device Type SATA Topology SSATA Port 2 Port 2 Hot Plug Configure as eSATA Spin Up Device	INot Installed] <enabled> <disabled> <disabled> <hard disk<br=""><unknown> INot Instal <enabled> <hard disk<br="">Configure sSATA as IAHC1 RA 1D <disabled> <disabled> <hard disk="" drive=""> <hard disk="" drive=""> <hard disk="" drive=""> <unknown> INot Installed] <enabled> <disabled> <hard disk="" drive=""> <unknown> INot Installed] <enabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabl< td=""><td></td></disabl<></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></enabled></unknown></hard></disabled></enabled></unknown></hard></hard></hard></disabled></disabled></hard></enabled></unknown></hard></disabled></disabled></enabled>	

- b. Use the Up and Down arrows to move to the RAID option.
- c. Press [Enter] to complete changes.
- 3. Enable Load EFI Driver for RAID.
  - a. Select Load EFI Driver for RAID and press [Enter].

	Setup Utility	Rev.
Advanced		
PCH sSATA Configuration		In RAID mode load EFI driver. (If disabled loads LEGACY OPROM)
sSATA Controller Configure sSATA as SATA test mode ▶SATA Hode options Support Aggressive Link Power Management Alternate Device ID on RAID Load EFI Driver for RAID	<pre>% CEnabled&gt; <raid> <disabled> <enabled> <disabled> <disabled> <disabled> <disabled> <disabled> </disabled></disabled></disabled></disabled></disabled></enabled></disabled></raid></pre>	
sSATA Port 0 Port 0 Hot Plug Configure as eSATA Spin Up Device sSATA Device Type SATA Topology sSATA Port 1 Port 1 Hot Plug Configure as eSATA Spin Up Device sSATA Device Type SATA Topology SSATA Port 2	[Not installed] <enabled> <disabled> <disable <hard di<br=""><hard di<br=""><hard di<br="">Enabled Disabled Disabled&gt; <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <disabled> <unknown Kard Disk Drive&gt; <unknown Knot Ins Chashled&gt; <disabled> <unknown Known&gt; Knot Ins Chashled&gt; <disabled> <unknown Chashled&gt; <disabled> <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled&gt; <unknown Chashled Chashled&gt; <unknown Chashled Chashled Chashled&gt; <unknown Chashled Chashled Chashled Chashled&gt; <unknown Chashled Chash</unknown </unknown </unknown </unknown </unknown </unknown </unknown </unknown </unknown </unknown </unknown </unknown </unknown </unknown </unknown </unknown </unknown </unknown </unknown </unknown </unknown </disabled></unknown </disabled></unknown </disabled></unknown </unknown </disabled></disabled></disabled></disabled></disabled></disabled></disabled></disabled></hard></hard></hard></disable </disabled></enabled>	

- b. Use the Up and Down arrows to move to the Enabled option.
- c. Press [Enter] to complete changes.
- 4. Enable Spin Up Device for Port 2 and Port 3.
  - a. From the sSATA Port2 list, select Spin Up Device as and press [Enter].

Advanced	Setup Utility	Rev. 5
Advanced sSATA Device Type SATA Topology sSATA Port 1 Port 1 Hot Plug Configure as eSATA Spin Up Device sSATA Device Type SATA Topology SSATA Port 2 Port 2 Hot Plug Configure as eSATA Spin Up Device sSATA Device Type SATA Poplogy SATA Port 3 Port 3 Hot Plug Configure as eSATA Spin Up Device sSATA Device Type SATA Device Type SATA Device Type SATA Device Type SATA Doplogy	Setup Utility <pre></pre>	Rev. If enabled for any of ports Staggerred Spin Up will be performed and only the drives witch have this option enabled will spin up at boot. Otherwise all drives spin up at boot.
Port 4 Port 4 Hot Plug	[Not installed] <enabled> <disabled></disabled></enabled>	
Configure as eSATA	<disabled></disabled>	

- b. Use the Up and Down arrows to move to the Enabled option.
- c. Press [Enter] to complete changes.

d. From the sSATA Port3 list, select Spin Up Device as and press [Enter].

12	Setup Utility	Rev. 5
Advanced		*
sSATA Device Type	<pre><hard disk="" drive=""></hard></pre>	If enabled for any of ports Staggerred
SATA Topology	<unknown></unknown>	Spin Up will be performed and only the
sSATA Port 1	[Not Installed]	drives witch have this option enabled
Port 1	<enabled></enabled>	will spin up at boot. Otherwise all
Hot Plug	<disabled></disabled>	drives spin up at boot.
Configure as eSATA	<disabled></disabled>	
Spin Up Device	<disabled></disabled>	
sSATA Device Type	<hr/> Hard Disk Drive>	
SATA Topology	<unknown></unknown>	
sSATA Port 2	[Not Installed]	
Port 2	<enabled></enabled>	
Hot Plug	<disabled></disabled>	
Configure as eSATA	<disabled></disabled>	
Spin Up Device	<enabled></enabled>	
sSATA Device Type	<hr/> Hard Disk D	
SATA Topology	<pre><unknown> Spin Up Device</unknown></pre>	
sSATA Port 3	[Not Install	
Port 3	<enabled> Disabled</enabled>	
Hot Plug	<pre><disabled> Enabled</disabled></pre>	
Configure as eSATA	<disabled></disabled>	
Spin Up Device	<disabled></disabled>	
sSATA Device Type	<hr/> Hard Disk Drive>	
SATA Topology	<unknown></unknown>	
sSATA Port 4	[Not Installed]	
Port 4	<enabled></enabled>	
Hot Plug	<disabled></disabled>	
Configure as eSATA	<disabled></disabled>	

- e. Use the Up and Down arrows to move to the Enabled option.
- f. Press [Enter] to complete changes.
- 5. Return to the Advanced menu by pressing [Esc].

#### 9. Save changes and reboot the system

Select Exit > Exit Saving Changes and press [Enter]. The system reboots.

#### **1.8.1.2.** Configuring with the Command Line

This section provides some command line examples.

**See** Remote Hardware Management CLI Reference Guide for more information.

#### Procedure

#### 1. Power off the system

\$ bsmpower.sh -a off -m lanplus -H X.X.X.X -u super -p <password>

#### 2. Configure PCH SATA

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'PCH.SataInterfaceMode 1'

Setting PCH.SataInterfaceMode is OK

#### 3. Configure PCH sSATA

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'PCH.sSataInterfaceMode 1'

```
Setting PCH.sSataInterfaceMode is OK
```

#### 4. Enable Spin Up Device for Port 2

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'PCH.sSataExternal\_2 1'

Setting PCH.sSataExternal\_2 is OK

#### 5. Enable Spin Up Device for Port 3

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'PCH.sSataExternal\_3 1'

```
Setting PCH.sSataExternal_3 is OK
```

#### 6. Enable PCH sSATA Load EFI Driver for RAID

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'PCH.sSataRaidLoadEfiDriver 1'

#### 7. Power on the system

\$ bsmpower.sh -a on -m lanplus -H X.X.X.X -u super -p <password>

# 1.8.2. Creating RAID1 Volume

#### Procedure

1. If not already done, set up remote access

#### 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

#### 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

#### 4. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

#### 5. Launch the Device Manager

- 1. On the Remote Console screen, follow the boot sequence.
- 2. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.
- 3. From the main menu, select Device Management.

Front Page				
Front Page				
Continue PBoot Manager PDevice Management Boot From File PAdminister Secure Boot PSetup Utility	This selection will take you to the Device Manager			

4. Press [Enter].

#### 6. Create a RAID1 volume

1. From the list, select Intel<sup>®</sup> RSTe sSATA Controller and press [Enter].



2. Select Create RAID Volume and press [Enter].

This page allows you to create a RAID volume

3. Set RAID Level to RAID1(Mirror).

a. Select RAID Level and press [Enter].

Intel(R) RSTe sSATA Controller				
Create RAID Volume	22.00	Select RAID Level		
Name: RAID Level:	Volume0 <raido(stripe)> 🔊</raido(stripe)>			
Select Disks: Port 2, Hicron.H600_HTEDDAK128HBF SN:154711242E06, 119.268 Port 3, Hicron.H600_HTEDDAK128HBF SN:154711242AA3, 119.268	<.>			
Strip Size: Capacity (MB):	<128KB> [0]			
⊬Create Volume Select at least two disks	RAID Level: RAIDO(Stripe) RAIDI(Hirror)			

- b. Use the Up and Down arrows to move to the RAID1(Mirror) option.
- c. Press [Enter] to complete changes.
- 4. Select the disks.
  - a. From the Select Disks list, select Port 2 and press [Enter].
  - b. Enter X.
  - c. Press [Enter] to complete changes.
  - d. From the Select Disks list, select Port 3 and press [Enter].
  - e. Enter X.

Intel(R) RSTe_sSATA_Controller				
Intel(R) RSTe sSATA Controller				
Create RAID Volume		X - to Select Disk		
Name: RAID Level:	VolumeO <raidi(hirror)></raidi(hirror)>			
Select Disks: Port 2, Micron_M600_MTFDOAK128MBF SN:154711242E08, 119.268 Port 3, Micron_M600_MTFDDAK128MBF SN:154711242aA3, 119.268	ф Хсэ			
Capacity (HB);	[0]			
▶Create Volume Select two disks	Port 3, Hicron_H600_HTFDDak128H8F SN:154711242aa3,	119. 268		

f. Press [Enter] to complete changes.

5. Select Create Volume and press [Enter].

Intel(R) RSTe sSATA Controller			
Create RAID Volume		Create a volume with the settings	
Name: RAID Level:	Volume0 <raid1(mirror)></raid1(mirror)>	specified above	
Select Disks: Port 2, Hicron_H600_HTEDDak128HBF SN:154711242E00, 119.200 Port 3, Hicron_H600_HTEDDak128HBF SN:154711242aA3, 119.200	↔		
Capacity (HB):	[115995]		
▶Create Volume			

6. From the Intel<sup>®</sup> RSTe sSATA Controller screen, return to the Advanced menu by pressing [Esc].

Intel(R) RSTe sSATA Controller		
Intel(R) RSTe 5.2.0.1029 sSATA Driver	This page allows you to create a RAID	
▶Create RAID Volume	YO TURE	
RAID Volumes: =Volume0, RAIDI(Mirror), 113.368, Normal		

- 7. Save changes by selecting Exit > Save Change Without Exit and press [Enter].
- 8. Select YES in the confirmation dialog box and press [Enter].
- 9. Return to the main menu by pressing [Esc].
- 10. Select YES in the confirmation dialog box and press [Enter].

# **1.8.3.** Installing Operating Systems on PCH SATA RAID

#### Important VMware is not supported on PCH SATA RAID

The following operating systems can be installed on PCH SATA RAID1 volume:

- Redhat 7.3
- SUSE Linux Enterprise Server 12 SP2
- Windows Server 2016 (with iaStorA.free.win8.64bit.4.3.0.1198 driver)

## **1.8.4.** Monitoring PCH SATA RAID

This section explains how to monitor RAID1 for the integrated Intel<sup>®</sup> Rapid Storage Technology entreprise (RTSe) RAID controller for the PCH.

#### **1.8.4.1.** Monitoring PCH SATA RAID in Windows

- 1. Check that the iaStorA.free.win8.64bit.4.3.0.1198 driver is installed.
- 2. Install the RTSe utility.
- **Note** Consult the Hitachi Vantara support web site for the most up-to-date product information, documentation, firmware updates, software fixes and service offers: http://support.HitachiVantara.com
- 3. Launch the RTSe utility.
- 4. From the Home menu, monitor the RAID controller(s) and disks.



5. From the Preferences menu, click System to configure the notifications.

gi neef Apol Scrap Indexing elegene Home Palemons D		🛃 насталетан на 🕅	- B ×
<u>System</u> E-mail	System Preferences IP Show the introduction area icon Show the Schwing notifications: IP Stronge system examings IP Stronge system examps IP Stronge system errors		

6. Click E-mail to configure email notifications.

() Intel # Rupol Storage Technology enterginae	all ware ware ware set of the	- 0 X
Rome References	C WOMANA A C	intel
System Lenar		

#### **1.8.4.2.** Monitoring PCH SATA RAID for Linux systems (Red Hat, SUSE)

Use the mdadm command to monitor PCH SATA RAID.

#### Example

To get detailed information for a RAID device, run the command:

```
Mdadm -D /dev/md126
 _____
  [rooti~]#_mdadm -D /dev/md126
  /dev/md126:
        Container : /dev/md/imsm, member 0
       Raid Level : raid1
       Array Size : 463962112 (442.47 GiB 475.10 GB)
    Used Dev Size : 463962244 (442.47 GiB 475.10 GB)
     Raid Devices : 2
    Total Devices : 2
            State : active, degraded, recovering
   Active Devices : 1
  Norking Devices : 2
   Failed Devices : 0
    Spare Devices : 1
   Rebuild Status : 4% complete
             UUID : dd8983c2:f7e7d117:9cccb888:d8996ded
      Number Major Minor RaidDevice State

1 8 0 0 active sync /dev/sda

0 8 16 1 spare rebuilding /dev/sdb
```

# 1.9. Managing Intel<sup>®</sup> Optane<sup>™</sup> DC Persistent Memory (DCPMM) Modes

## W081

# WARNING W081:

The goal creation require the removal of the existing namespaces, that may result in a loss of data.

Important The DCPMM memory modules must be configured in one of the two modes for normal operation.

> The DCPMM mode applies to all DCPMM memory modules in a partition.

# Supported operating systems

- RedHat
- Suse Linux Enterprise (SLE)

See Release Note for more information.

#### **Prerequisites**

• Second generation Intel® Xeon® Scalable processor with DCPMM capability

## **1.9.1. DCPMM Configuration Modes Overview**

Two configuration modes are possible for DCPMM modules.

#### **Memory mode**

DRAM modules are used as a memory cache for DCPMM modules. DRAM modules are no longer visible to the OS in the memory capacity.

The ratio between the DRAM and volatile DCPMM memory sizes must be between one to four and one to sixteen. The recommended value is one to eight.

**Important** The ratio between the DRAM and volatile DCPMM memory sizes must not be greater than one to two.

#### Example

Total DCPMM capacity	100% memory mode Volatile DCPMM capacity	DRAM capacity Ratio 1/16	DRAM capacity Ratio 1/4
6 TB	6 TB	375 MB	1.5 TB

For 6 TB of DCPMM between 375 MB and 1.5 TB of DRAM must be available. The DRAM capacity must not exceed 3 TB.

#### **Application Direct mode**

DCPMM modules are considered as regular disks (persistent memory) that can be mounted under Linux. DRAM modules are used as volatile memory.

**Note** Some memory space is reserved for internal DCPMM usage and is not available for the configuration modes.

#### Configuration modes supported by the operating systems

RedHatMemory mode, Application Direct modeSuse Linux Enterprise (SLE)Application Direct mode

# **1.9.2.** Configuring DCPMM Modes

The DCPMM modes can be configured with either the BIOS Setup utility or the Linux command lines.

#### **1.9.2.1.** Configuring with the BIOS Interface

W081

## 📥 WARNING

W081:

The goal creation require the removal of the existing namespaces, that may result in a loss of data.

#### Procedure

1. If not already done, set up remote access

#### 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

#### 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

#### 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

#### 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

#### 6. Launch the BIOS interface

- 1. Click Power > Power Management to open the Power Management page
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen.
- 4. Press [Esc] when the **Press Esc for boot options** message is displayed.



## 7. Launch the Device Manager

- 1. On the Remote Console screen, follow the boot sequence.
- 2. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.

3. From the main menu, select Device Management.



4. Press [Enter].

# 8. Lauch the DCPMM memory configuration

From the list, select Intel® Optane<sup>m</sup> DC Persistent Memory Configuration and press [Enter].

Device Manage	r
Devices List ▶iSCSI Configuration ▶Network Device List ▶Intel(R) Optane(TH) DC Persistent Hemory Configuration Driver Health ▶ The platform is healthy	Configure Intel(R) Optane(TH) DC persistent memory modules.
Press ESC to exit.	

#### 9. Configure the DCPMM mode

1. From the list, select Regions and press [Enter].

Intel Intel(R) Optane(TM) DC Persistent Memory	(R) Optane(TH) DC Persistent Memory Configu Configuration	ration
Version: 1.0.0.3344 Select an action below.		View and configure regions.
Detected DIMMs: All DIMMs are healthy.	[4]	
▶D Hilts ▶Regions ▶Namespaces ▶Total capacity ▶Diagnostics ▶Preferences		

2. Select Create goal config and press [Enter].

Intel(R) Optane(TH) DC Persistent Memory Configu Intel(R) Optane(TH) DC Persistent Memory Configuration	ration
Current configuration There are no regions defined in the system.	Create goal configuration of DIMM regions.
Memory allocation goal configuration No goal configuration specified.	
⊬Create goal config	
▶Back to main menu	

3. Select Memory Mode [%] and press [Enter].



4. Set the required value for the configuration mode in the dialog box.



5. Press [Enter].

**Note** Some memory space is reserved for management and is not available for the configuration modes.

6. Select YES and press [Enter].

7. Select Create goal config and press [Enter].



8. Check the goal details.

#### Memory mode configuration example

	Intel(R) Optane(TM) <u>DC Persiste</u>	ent Memory Configuration	
Intel(R) Optane(TM) DC Persist	ent Memory Configuration		
Current configuration		Create goal configuration o	f DIMM
There are no regions defined in	the system.	regions.	
Memory allocation goal configura	ation		
MomorySize:	196 0 GIP		
AnnDirect1Size:	0 B		
AnnDirect2Size:	0 B		
New: A reboot is required for th	he memory allocation goal to be proc	cessed by the	
B10S.			
▶DIMM ID 0x0101			
MemorySize:	126.0 618		
AppDirect1Size:			
New: A reboot is required for the	v b ne memory allocation goal to be proc	ressed by the	
BIOS.	ic memory arrocation goar to be proc		
▶DIMM ID 0x1001			
MemorySize:	126.0 GiB		
AppDirect1Size:	0 8		
AppDirect2Size:	U B	econd by the	
New: A repool is required for a	le memory arrocation goar to be proc	cessed by the	
5100.			
▶DIMM ID 0x1101			
MemorySize:	126.0 GiB		
AppDirect1Size:	0 B		
AppDirect2Size:	0 B		
New: A reboot is required for the	ie memory allocation goal to be proc	cessed by the	
B105.			
▶Create goal config			
▶Delete goal config			
▶Back to main menu			

#### Application Direct mode configuration example

	Intel(R) Optane(TM) DC Persistent Memory	/ Configuration
Intel(R) Optane(TM) DC Per	sistent Memory Configuration	
Current configuration		Create goal configuration of DIMM
There are no regions define	d in the system.	regions.
Memory allocation goal conf	iguration	
	0.0	
nemurysize: AppDirect10ize:	U B 196 0 C D	
AppDirect2Size:	120.0 01B A R	
New: A reboot is required f	or the memory allocation goal to be processed by	the
BIOS.		
ND INH ID 0.0101		
	Ωp	
AppDirect1Size:	U D 196 0 CiD	
AppDirect29ize:	120.0 01b	
Now: A reboot is required f	or the memory allocation goal to be processed by	the
BIOS.		uic.
ND IMM ID 0v1001		
MemorySize:	0 B	
AnnDirect1Size:	126 0 GIB	
AnnDirect2Size:	0 B	
New: A reboot is required f	or the memory allocation goal to be processed by	the
BIOS.		
▶DIMH ID 0x1101		
MemorySize:	0 B	
AppDirect1Size:	126.0 GiB	
AppDirect2Size:	0 B	
New: A reboot is required f	or the memory allocation goal to be processed by	the
B10S.		
Create goal config		
▶Delete goal config		
Back to main menu		

9. Select Back to main menu and press [Enter].

#### 10. Reboot the system

- 1. Switch to the SHC.
- 2. From the System Control tab, click Power > Power Management to open the Power Management page.
- 3. From the Emergency or Unresponsive System Power Operations box, click the Hard Reset button.
- 4. Click OK in the confirmation dialog box to launch the selected sequence, which may take a few minutes to complete.
- **Note** For Application Direct Mode, new namespaces must be created after reboot.

See Appendix C, Creating Namespaces

#### **1.9.2.2.** Configuring with the Linux commands



# 

W081: The goal creation require the removal of the existing namespaces, that may result in a loss of data.

W082

# 

W082:

These procedures are for advanced users only. Risk of system damage.

#### **Prerequisites**

ndctl tool and its dependencies are installed ipmctl tool and its dependencies are installed

#### Procedure

#### 1. Creating a goal

Run the command:

\$ ipmctl create -goal MemoryMode=YY	
With YY	
100	Memory mode
0	Application direct mode (default)

#### **Examples**

Creating a goal for the Memory mode

\$ ipmctl create -goal MemoryMode=100

Creating a goal for the Application Direct mode

\$ ipmctl create -goal

#### Output

(reated fol)	lowing region	n configurati	ion goal		
SocketID	DimmĪD	MemoryŚize	AppDirect1Size	AppDirect2Size	ActionRequired
0x0000	0x0021	0.0 GİB	491.0 GiB	0.0 GiB	0
0x0000	0x0121	0.0 GiB	491.0 GiB	0.0 GiB	0
0x0001	0x1021	0.0 GiB	491.0 GiB	0.0 GiB	0
0x0001	0x1121	0.0 GiB	491.0 GiB	0.0 GiB	0
A reboot is	required to	process new	memory allocation	goals.	

Creating a goal for the Application Direct mode and disable interleaving across  $\mathsf{DCPMM}$ 

\$ ipmctl create -goal PersistentMemoryType=AppDirectNotInterleaved

#### 2. Check the goal

Run the command:

\$ ipmctl show -goal

#### Output

SocketID DimmID MemorySize AppDirect1Size AppDirect2Size 0.0 GiB 0x0000 0x0021 0.0 GiB 491.0 GiB 0x0000 0x0121 0.0 GiB 491.0 GiB 0.0 GiB 0x1021 0.0 GiB 491.0 GiB 0x0001 0.0 GiB 0x1121 0.0 GiB 491.0 GiB 0.0 GiB 0x0001 A reboot is required to process new memory allocation goals.

#### 3. Reboot the system

**Note** For the Application Direct mode, new namespaces must be created after reboot.

See Appendix C, Creating Namespaces

# 1.9.3. Checking DCPMM Modes

The DCPMM modes can be ckecked with either the BIOS Setup utility or the Linux command lines.

#### **1.9.3.1.** Checking with the BIOS Interface

#### Procedure

#### 1. If not already done, set up remote access

#### 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

#### 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

#### 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

#### 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

#### 6. Launch the BIOS interface

- 1. Click Power > Power Management to open the Power Management page
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen.
- 4. Press [Esc] when the **Press Esc for boot options** message is displayed.



## 7. Launch the Device Manager

- 1. On the Remote Console screen, follow the boot sequence.
- 2. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.

3. From the main menu, select Device Management.



4. Press [Enter].

# 8. Lauch the DCPMM memory configuration

From the list, select Intel® Optane<sup>m</sup> DC Persistent Memory Configuration and press [Enter].

Device Manage	r
Devices List ▶iSCSI Configuration ▶Network Device List ▶Intel(R) Optane(TH) DC Persistent Hemory Configuration Driver Health ▶ The platform is healthy	Configure Intel(R) Optane(TH) DC persistent memory modules.
Press ESC to exit.	

#### 9. Check the DCPMM mode

1. From the list, select Total Capacity and press [Enter].



2. Check the capacity.

Memory mode capacity example

	Intel(R) Optane(TM)	DC Persistent Memory	Configuration
Intel(R) Optane(TM) DC Pe	rsistent Memory Configuration		
7			+
Total DCPMM resource alloc	ation across the host server.		Return to the main menu.
Raw capacity:	1.9 TiB		
App Direct capacity:	0 B		Letter and the second se
Memory capacity:	1.9 TiB		I Contraction of the second
Unconfigured capacity:	0 B		I Contraction of the second
Inaccessible capacity:	2.8 GiB		I Contraction of the second
Reserved capacity:	0 B		I Contraction of the second
L. C.			I Contraction of the second
L. C.			1
>Back to main menu			I and the second se

#### **Application Direct mode capacity example**

	Table 1 (D) Organization (TM)	DC Development Memory	C	
	Intel(R) Optane(IM)	DC Persistent Memory	Configuration	
Intel(R) Optane(TM) D	C Persistent Memory Configuration			
/				
Total DCPMM resource a	llocation across the host server.		IReturn	to the main menu.
1				
Raw capacity:	1.9 TiB		i i i	
App Direct capacity:	1.9 TiB		1	
Memory capacity:	0 B		1	
Unconfigured capacity:	0 B			
Inaccessible capacity:	2.8 GiB		1.00	
Reserved capacity:	0 B		1	
L. C.			I. I.	
1				
>Back to main menu			1	

3. Select Back to main menu and press [Enter].

#### 1.9.3.2. Checking with the Linux commands

This section provides some command line examples.

#### **Prerequisites**

ipmctl tool and its dependencies are installed

#### Check the memory resources capacity

\$ ipmctl show -memoryresources

Output (Application direct mode example)

```
Capacity=379.2 GiB
MemoryCapacity=0.0 GiB
AppDirectCapacity=378.0 GiB
UnconfiguredCapacity=0.0 GiB
InaccessibleCapacity=1.2 GiB
ReservedCapacity=0.0 GiB
```

# 1.9.4. Erasing DCPMM Memory Modules

#### **Prerequisites**

The Resource and Documentation ISO file is available

#### Procedure

1. Copy the ipmctl.efi utility from the Resource and Documentation ISO file to the /boot/efi directory.

\_\_\_\_\_

- 2. Copy the startup.nsh script from the Resource and Documentation ISO file to the /boot/efi directory.
- 3. Set the boot device for the next boot to EFI Shell with either Redfish or the command line.

#### **Command line example**

\$ bsmBootDevice -H X.X.X.X -u super -p <password> -d diag -O efiboot

4. Reboot the system.

The startup.nsh script starts. It deletes the namespaces and erases the DCPMM memory modules. The system then reboots automatically.

# **Chapter 2. Managing RAS Features Settings**

Important ATTENTION: Please read carefully the safety instructions before you perform the procedures described in this manual.

Multilingual Safety Notices Guide

# 2.1. RAS Features Overview

RAS feature name	Default value
Adaptive Double Device Data Correction (ADDDC)	Enabled
Single Device Data Correction plus one (SDDC+1)	Disabled
Memory Rank Sparing	Disabled
Demand Scrubbing	Enabled
Patrol Scrubbing	Enabled
Memory Mirroring	Disabled
Post Package Repair (PPR)	Enabled

# 2.2. Managing Correctable Memory Errors

# 2.2.1. Introduction

Even if DRAM errors have been encountered for a long time, the trends in complex computer systems are showing an increase of memory error incidents. The increase of the system memory size, the smaller fabrication process and the greater bandwidth are the main reasons for the rise in memory-error rates.

Memory errors are usually handled by replacing the faulty DIMM. However, correctable errors are not managed as uncorrectable errors. And there is no hard evidence that correctable errors will lead to uncorrectable errors.

**Important** Hitachi Advanced Server DS7000 series server manages correctable memory errors with mechanisms such as ECC (Error Correcting Code), memory error threshold policy (leaky bucket), Adaptive Double Device Data Correction (ADDDC), Post Package Repair (PPR). These technologies detect and repair the faulty cell: ECC corrects, ADDDC maps out, and PPR repairs. It is strongly recommended to enable these mechanisms which avoid replacing faulty DIMMs and increase server availability.

# 2.2.2. Overview of Memory Errors

Errors are encountered when an attempt is made to read a memory location and the value read does not match the last value written.

Memory errors can be soft or hard. Some errors can be corrected, but several simultaneous soft or hard errors for a single memory access may be impossible to correct.

- **Correctable errors** can be detected and corrected by an error correcting code (ECC) mechanism within the DIMM. Basic ECC allows an error on one bit to be corrected and to detect an error on two bits, by adding 8 ECC bits per 64 data bits. It is therefore transparent to the software. A XEON CPU ECC is able to correct up to 4 bits
- **Uncorrectable errors** exceed the limit of what the hardware, typically the ECC, can correct. The impact is an application crash, or even a system crash or a machine failure, depending on what is the content of the memory
- Hard errors are caused by a persistent physical defect and will repeat
- **Soft errors** are caused by a brief electrical disturbance and are transient. Rewriting the memory will correct the error
- **Boot time errors** are detected and handled by the MRC (Memory Reference Code)
- **Runtime errors** are handled by BIOS RAS event handlers

CPUs also implement several RAS features that limit the impact of memory errors. As corrected errors do not necessarily require changing the DIMM, there are also mechanisms to limit the signaling of these errors. All these RAS features depend on the architecture of the processor.

# 2.2.3. Correctable Error Signaling

Correctable errors are transparent to the software as they are directly handled by hardware. Encountering a few correctable errors is considered as normal behavior (cosmic soft errors, link transient errors).

However, encountering too many correctable errors may indicate a potential issue with a small part of the DIMM (row/bank). It is important not to signal all correctable errors, but to count them and react when they are too frequent. A leaky bucket mechanism allows them to be signaled when they reach a given amount.

This leaky bucket mechanism has 2 parameters:

- A threshold N
- A drip interval t

Each rank of each DIMM has a counter c which is incremented each time a correctable error occurs on this rank.

When a counter c reaches the threshold N an action is triggered via the System Management Interrupt (SMI).

To measure a frequency and not an absolute value, this counter is decremented by 1 if nonzero every t interval.

The leaky bucket parameters are configured by default to keep in line with DIMM technology evolution.

The triggered action is to send an error message from the BMC and launch a default process that allows the activity to run and then repair the DIMM later.

2021-06-14	BIOS	Module 3: Correctable memory leaky bucket overflow in DIMM CHG-0
20:03:43	Message	(CPU socket nb: 1, iMC nb: 0, DDR channel nb: 0, DIMM nb: 0)

**Important** Hitachi Advanced Server DS7000 series count and signal correctable errors with a BMC message. They use a memory error threshold policy, configured to be in line with DIMM technology evolution. This triggers a default protecting and repairing process, described in the following sections of this chapter.

# 2.2.4. Repairing Correctable Errors

#### Process

When a **Correctable leaky bucket overflow** is indicated, a default process is triggered. This includes two steps:

1. Adaptive Double Device Data Correction (ADDDC) is launched first, at run time.

This feature tracks correctable errors and dynamically maps out failing bits by spare-copying contents into another cache line.

2. Post Package Repair (PPR) is launched at the next reboot. This feature permanently replaces the failing row with a spare one. A complete memory check can be done with the Advanced Memory Test option.

#### **BMC Messages Log**

The operations are recorded in the System Event Log (SEL) and message logs. The Messages Log identifies the failing DIMM.

2021-06-14 20:10:41	BIOS Message	BIOS Init Memory Warning: Module=3 DIMM=CHG-0: FPT: Post Package Repair row repaired
2021-06-14 20:09:56	BMC Message	Platform reset asserted
2021-06-14 20:09:37	BIOS Message	BIOS Init Memory Warning: Module=3 DIMM=CHG-0: FPT: Post Package Repair row repaired
2021-06-14 20:08:52	BMC Message	Platform reset asserted
2021-06-14 20:08:35	BMC Message	Platform powered ON
2021-06-14 20:08:17	BMC Message	Platform reset asserted
2021-06-14 20:06:51	BMC Message	Platform powered OFF
2021-06-14 20:03:48	BIOS Message	Module 3: ADDDC spare copy complete in DIMM CHG-0 (CPU socket nb: 1, iMC nb: 0, DDR channel nb: 0, DIMM nb: 0)
2021-06-14 20:03:43	BIOS Message	Module 3: Correctable memory leaky bucket overflow in DIMM CHG-0 (CPU socket nb: 1, iMC nb: 0, DDR channel nb: 0, DIMM nb: 0)
2021-06-14 20:03:42	BIOS Message	Module 3: ADDDC spare copy started in DIMM CHG-0 (CPU socket nb: 1, iMC nb: 0, DDR channel nb: 0, DIMM nb: 0)

**Important** Following a **Correctable leaky bucket overflow** BMC message, Hitachi Advanced Server DS7000 series server automatically triggers a default process. This allows the application to run without data corruption. At the next reboot, a servicing operation is planned, without urgency, and the memory error is repaired.

An optional complete check and repair is recommended even if it impacts the reboot performance.

This process avoid changing faulty DIMMs.

See	Section
	2.3. Managing Adaptive Double Device Data Correction (ADDDC)
	and section 2.9. Managing Post Package Repair (PPR) for details.

# 2.3. Managing Adaptive Double Device Data Correction (ADDDC)

Adaptive Double Device Data Correction (ADDDC) can correct two sequential device failures. It is an improved implementation of legacy DDDC as the memory channels are no longer required to run in lockstep mode. System performance is therefore improved.

ADDDC uses Adaptive Virtual Lockstep. Adaptive indicates that the lockstep is invoked at run time as part of a data correction sequence, not during memory initialization. The lockstep operations are done across a single channel using two regions (banks or ranks), not across different channels. Therefore, there is an impact on system performance only if a fault occurs and only in a limited memory region.

**Note** With ADDDC enabled, there is an application dependent performance impact, typically a few percent, because the Paging Policy is changed from Open Adaptive to Closed. If the performance impact becomes a problem, the setting should be changed back to Disabled.

ADDDC operations are recorded in the System Event Log (SEL) and Messages Log. The Messages Log identifies the failing DIMM.

ADDDC requires four DDR4 RAM devices.

The server is factory-configured as follows:

AUTO

ADDDC

The Auto option enables or disables ADDDC depending on the platform type.

On Hitachi Advanced Server DS7000 series, the Auto option enables ADDDC sparing.

ADDDC is configured with either the BIOS Setup utility or the command line.

# **2.3.1. Configuring with the BIOS Interface**

#### Procedure

#### 1. If not already done, set up remote access

#### 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

#### 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

#### 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.

3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

#### 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

#### Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

#### 6. Launch Memory RAS Configuration

- 1. Click Power > Power Management to open the Power Management page
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen and follow the boot sequence.
- 4. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.
- 5. From the main menu, select Setup Utility > Advanced > Socket Configuration > Memory Configuration > Memory RAS Configuration.

Advanced	S	etup Utility	Rev. S
Advanced         BDAT         Data Scrambling for NVHDIHH         Data Scrambling for DDR4         Allow Correctables         WR CRC feature Control         DIHH Isolation Enable         Scrambling Seed Low         Scrambling Seed High         Enable ADR         Legacy ADR Mode         Check PCH_PH_STS         Check PlatformDetectADR         Custom Refresh Enable         MC BGF threshold         DLL Reset Test         Opp read during WHH         Normal Operation Duration         C/A Parity Enable         SHB Clock Frequency         DDR Cycling         Hem Flows         Hem FlowsExt         DIHM Rank Enable Hask         BLOCK GNT2CHDICYC         Disable NVHDIHH OPPRD         Hemory Training         Hemory Training         Hemory Training         Hemory Training Hemory Map         Hemory Disconfiguration         HMON Configuration         HMON Configuration	CD is abled> <auto> <auto> <auto> <auto> <auto> <auto> <auto> <chuto> (1003) [54165] <enabled> <d abled="" is=""> <d abled="" is=""> <d abled="" is=""> <d abled="" is=""> (D is abled&gt; (D is abled&gt; <d abled="" is=""> <d a<="" is="" th=""><th></th><th>Rev. 1</th></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></enabled></chuto></auto></auto></auto></auto></auto></auto></auto>		Rev. 1
F1 Help Esc Exit	1/1 Select Item +/+ Select Item	F5/F6 Change Values Enter Select⊦ SubMenu	F9 Setup Defaults F10 Save and Exit

6. Press [Enter].

# 7. Configure ADDDC

1. From the list, select ADDDC Sparing and press [Enter].



2. Use the Up and Down arrows to move to the required option:

Disabled	ADDDC is turned off
Enabled	ADDDC is turned on
Auto	ADDDC is turned on

- 3. Press [Enter] to complete changes.
- 4. Return to the Advanced menu by pressing [Esc].
- Save changes by selecting Exit > Save Change Without Exit and press [Enter].
- 6. Select YES in the confirmation dialog box and press [Enter].
- 7. Return to the main menu by pressing [Esc].
- 8. Select YES in the confirmation dialog box and press [Enter].

**Note** When ADDDC is enabled, the MemTest and MemInit stages of the BIOS boot sequence may take a long time to complete.

# 2.3.2. Configuring with the Command Line

This section provides some command line examples.

**See** Remote Hardware Management CLI Reference Guide for more information.

#### **Disable ADDDC**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.ADDDCEn 0'

#### **Enable ADDDC**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.ADDDCEn 1'

Or (Auto option)

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.ADDDCEn 2'

# 2.4. Managing Single Device Data Correction Plus One (SDDC+1)

Single Device Data Correction (SDDC) provides error checking and correction that protects against a single DRAM device failure.

Single Device Data Correction plus one (SDDC+1) refers to the ability to provide single bit error correction after the initial DRAM failure.

SDDC+1 operations are recorded in the System Event Log (SEL) and Messages Log. The Messages Log identifies the failing DIMM.

SDDC+1 requires x4 RAM devices.

The server is factory-configured as follows:

SDDC+1 Disabled

SDDC+1 is configured with either the BIOS Setup utility or the command line.

**Note** For DRAM memory modules on a system equipped with Intel<sup>®</sup> Optane<sup>™</sup> DC Persistent Memory (DCPMM), SDDC+1 is disabled by default (not supported).

# 2.4.1. Configuring with the BIOS Interface

#### Procedure

1. If not already done, set up remote access

#### 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

#### 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

#### 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

#### 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

#### 6. Launch Memory RAS Configuration

- 1. Click Power > Power Management to open the Power Management page
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen and follow the boot sequence.
- 4. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.
- 5. From the main menu, select Setup Utility > Advanced > Socket Configuration > Memory Configuration > Memory RAS Configuration.

Advanced       BDAT        Data     Scraubling for NVHD IMI       Auto>        Allow Correctables        W CRC feature Control        QW CRC feature Control        Cata Scraubling Seed Low     (41003)       Scraubling Seed High     1541651       Enabled>        Legacy ADR Hode        Oheck PCH_PH_STS        Otheck PCH_PH_STS        Check PCH_PH_STS        Check PCH_PH_STS        Operad during WH        Causton Refresh Enable        Operad during WH        Auto>        Streambling Operation Duration     DX4001       Check PCH_PH_STS        Operad during WH        Auto>        Streamble        Operad during WH        Causton Refresh Enable        Auto>        Streamble        Disbled>        Disbled>        Causton Refresh Enable        Auto>        Streamble        Streamble        Streamble        Streamble	<u>w</u>			Setup Utility	Rev. S
BDAT ← Oisabled> Displays and provides option to change the Hemory Ras Settings Displays and provides option to change the Hemory Ras Settings Hemory Ras Settings Hemory Ras Settings Displays and provides option to change the Hemory Ras Settings Hemory Ras Settings Displays and provides option to change the Hemory Ras Settings Hemory Ras Settings Displays and provides option to change the Hemory Ras Settings Displays and provides option to change Displays and provides option to change the Hemory Ras Settings Displays and provides option to change Displays and provides option to change Displays and provides option to change Displays and provides option Displays and provides option Displays and provides option Hemory Training Hemory Training Hemory Dra Configuration Hemory Dra Configurat	Advanced				
Dual Constant of the features of statures of statures of the features of the	DDAT		dD i ank lands		
Data Scrambling for DRM     CAUD>     Other Hendry Res Settings       Allow Correctables     CAUD>       Allow Correctables     CAUD>       W CRC facture Control     CAUD>       DIMI isolation Enable     CAUD>       Scrambling Seed Low     [41003]       Scrambling Seed High     [54165]       Enable ADR     Chabled>       Legacy ADR Mode     Oisabled>       Check PCLPH,STS     Oisabled>       Nornal Operation Duration     [0x400]       C/A Parity Enable     CAuto>       StB Clock Frequency     Auto>       DDR Cycling     Oisabled>       Chock Frequency     Auto>       DR Cycling     OverFFFFFFF1       Hean Flows     [OvFFFFFFFFFF1]       Hean Flows     [OvFFFFFFFFF1]       Hean Y Doology     Poe>       Page Policy     POR>	BUAI Data Carembling for NVMDIMM		<utsabled></utsabled>		the Memory Dec Settings
At a Scramp Trig for boxes study At a Cramb Trig for boxes study WR CRC feature Control study Scramb Ling Seed Low [41003] Scramb Ling Seed High [54165] Enable ADR Sechaled> Legacy ADR Mode Olisabled> Check PCH_PT_STS OLISABLED> DLT Reset Test [0x61] Check PCH_PT_STS OLISABLED> Check PC	Data Scrambling for DDDA		Chuto2		the hemory kas settings
Minor Confectances Sectors Control Con	Allow Correctables		CAUTO2		
Mit Low Tealure Control     Shutub       Scrambling Seed Low     [41003]       Scrambling Seed High     [54165]       Enable ADR     Chabled>       Legacy ADR Hode     Olisabled>       Check PCH_PLSTS     Olisabled>       Check PCH_PLSTS     Olisabled>       Custom Refresh Enable     Olisabled>       Normal Operation Duration     [0x400]       C/A Parity Enable     Auto>       SMB Clock Frequency     Chisabled>       OB Cycling     Olisabled>       NB Clock Frequency     Chisabled>       BLOCK CN12CPDICVC     CPOR>       DIHH Rank Enable Hask     Olisabled>       BLOCK CN12CPDICVC     CPOR>       Page Policy     Heaory Training       Heancy Tinings Override     Heaory Training       Heancy Tinings Override     Heaory Tinings Override	WD CDC feature Control		Chuto>		
Time isolaritorial solution isolations     Findot       Scrambling Seed Low     [41003]       Scrambling Seed High     [54165]       Enable ADR     Chabled>       Legacy ADR Hode     Olisabled>       Check PitfornDetectADR     Olisabled>       Custom Refresh Enable     Auto>       Normal Operation Duration     [0x400]       C/A Parity Enable     Auto>       SHB Clock Frequency <auto>       SHB Clock Frequency     <auto>       DB cycling     Olisabled&gt;       Plane FlowsExt     [0xfFFFFFFF1]       Hene Flows     [0xfFFFFFFF1]       Plane Flows AC Onliguration     <por>       PHenory Training     <phenory td="" training<="">       PHenory Training     <phenory configuration<="" flows="" td="">       PHEnory Thap     <pa item<="" select="" td="">       PHenory Thap     <pa item<="" select="" td="">       PHenory Train Menu     <pa item<="" select="" td=""></pa></pa></pa></phenory></phenory></por></auto></auto>	DIMM Isolation Enable		CAuto>		
Crambing Seed High     [54165]       Enable ADR        Legacy ADR Hode        Custon Refresh Enable        Opp read during WHH        Auto>        Normal Operation Duration        DR Cycling        Custon Refrequency        SHB Clock Frequency        Auto>        DR Cycling        Custon Kerequency        Guston Kerequency        Obschled>        Hen FlowsExt        Disable MDR HopRD        Poisable MDR Configuration        Phemory Mas Configuration </td <td>Scrawbling Seed Low</td> <td></td> <td>[A1003]</td> <td></td> <td></td>	Scrawbling Seed Low		[A1003]		
Charlow Try     Control       Legacy ADR Hode     Charlow       Charlow Construction     Charlow       Check PId Form2etectADR     Chisabled>       Custom Refresh Enable     Chisabled>       Cytom Refresh Enable     Sauto>       Nornal Operation Duration     IDx4001       C/A Parity Enable     Sauto>       SHB Clock Frequency     Cauto>       SHB Clock Frequency     Cauto>       DDR Cycling     ClostFFFFFFF1       Hem Flows     IDxFFFFFFF1       Hem Flows     ClostFFFFFFF1       DIHT Rank Enable Hask     Chisabled>       BLOCK GNT2CMDICYC     CPOR>       Phenory Training     Phenory RAS Configuration       PHenory RAS Configuration     Phenory Station       PBSA Configuration     F5/F6 Change Values       F1 Help	Scrambling Seed Ligh		[54165]		
Lindborn Ministry Consistence Legacy ADR hode clisabled> Check PCH_PH_STS clisabled> Check PlatformDetectADR clisabled> Custom Refresh Enable clisabled> CBGF threshold [0] DLL Reset Test [0x0] Opp read during WHI clustence Normal Operation Duration [0x400] C/A Parity Enable clustence SHB Clock Frequency clustence SHB Clock Freq	Enable ADD		<enabled></enabled>		
Leguby Hum Hud     > 1/1 Subled>       Check PULPT_SIS     < 01 sabled>       Custom Refresh Enable        Custom Refresh Enable        CBGF Hrveshold     [01]       DLL Reset Test     [0x0]       Opp read during WH1        Auto>        Normal Operation Duration     [0x400]       C/A Parity Enable        Auto>        SHB Clock Frequency        Auto>        DDR Cycling        Hen Flows     [0xFFFFFFF]]       Hen Flows     [0xFFFFFFF]]       Hen Flowskxt     [0xFFFFFFF]]       BLCK GNT2CHDICYC        Yeage Policy        Yhenory Training        Yeage Policy <tr< td=""><td>Lindble HDK Lenacy ADD Mode</td><td></td><td><disabled></disabled></td><td></td><td></td></tr<>	Lindble HDK Lenacy ADD Mode		<disabled></disabled>		
Check PlatformDetectADR <disabled>       Custom Refresh Enable     <disabled>       CBGF threshold     [0]       DLL Reset Test     [0x0]       Opp read during WH     <auto>       Normal Operation Duration     [0x400]       C/A Parity Enable     <auto>       SHB Clock Frequency     <auto>       SHB Clock Frequency     <auto>       SHB Clock Frequency     <auto>       DR Cycling     <disabled>       Hene Flows     [0xFFFFFFFF]]       Hene Flows     [0xFFFFFFFF]]       Hene Flows     [0xFFFFFFFF]]       Disabled&gt;     <disabled>       Block GNZCHOICYC     <por>       Disable NVHDIHH OPPRD     <por>       Phemory Taining     <por>       Hemory Training     <por>       Hemory RAS Configuration     <por>       Hemory RAS Configuration        PHSSA Configuration Henu        F1     Help       f1     Help       f1     Help       f1     Help       f4/ Select Item     Enter Select V Sublenu       F10     Save and Exit</por></por></por></por></por></disabled></disabled></auto></auto></auto></auto></auto></disabled></disabled>	Check DCH DM STS		<disabled></disabled>		
Custom Refresh Enable     ⊂Disabled>       UC BGF threshold     [0]       DLL Reset Test     [0x0]       Opp read during WH <auto>       Normal Operation Duration     [0x400]       C/A Parity Enable     <auto>       SHB Clock Frequency     <auto>       DDR Cycling     <disabled>       tem Flows     [0xFFFFFFFF]       tem FlowsExt     [0xFFFFFFFF]       DIM Rank Enable Hask     <disabled>       BLOCK GNT2CHDICYC     <por>       Hemory Training     <por>       Hemory Training        Hemory Take Configuration        &gt;BSSA Configuration Hemu        F1     Help       flib Select Item     Enter Select + S</por></por></disabled></disabled></auto></auto></auto>	Check PlatformDetectADR		<disabled></disabled>		
HC BGF threshold     [0]       DLL Reset Test     [0x0]       Opp read during WHH <auto>       Normal Operation Duration     [0x400]       C/A Parity Enable     <auto>       SYB Clock Frequency     <auto>       DR Cycling     <disabled>       Nem Flows     [0xFFFFFFF]       Hen Flows     [0xFFFFFFF]       Hen FlowsSxt     [0xFFFFFFF]       DIHH Rank Enable Hask     <disabled>       BLOCK GNT2CHDICYC     <por>       Page Policy     <por>       Phemory Training     <por>       Phemory Map        Phemory Map        Phemory Map        Phemory Training        Phemory Training        Phemory Map        Phemory Map        Phemory Training        Phemory Map        Phemory Map        Phemory Map        Phemory This Configuration        Phemory Disclot Henu        F1     Help       f1     Help       f1     Select Item       Enter Select V Sublenu     F0 Save and Exit</por></por></por></disabled></disabled></auto></auto></auto>	Custom Refresh Enable		<disabled></disabled>		
DLL Reset Test     [0x0]       Opp read during WHH <auto>       Normal Operation Duration     [0x400]       C/A Parity Enable     <auto>       SHB Clock Frequency     <auto>       DDR Cycling     <disabled>       Hen Flows     [0xfFFFFFFF]       Hen FlowsKxt     [0xfFFFFFFF]       DIM Rank Enable Mask     <disabled>       BLOCK GNIZCHDICYC     <por>       Disable NVHDIHH OPPRD     <por>       Phemory Topology     <por>       Phemory Training     <por>       Phemory Map        Phemory Map        Phemory Training        Phemory Training     <t< td=""><td>MC BGE threshold</td><td></td><td>[0]</td><td></td><td></td></t<></por></por></por></por></disabled></disabled></auto></auto></auto>	MC BGE threshold		[0]		
Opp read during WH1 <auto>       Normal Operation Duration     [0x400]       C/A Parity Enable     <auto>       SHB Clock Frequency     <auto>       DDR Cycling     <disabled>       DDR Cycling     <disabled>       Hem Flows     [0xFFFFFFF]       DIM Rank Enable Mask     <disabled>       BLOCK GNT2CHDICYC     <por>       Plemory Topology     <por>       Phemory Training     <phemory td="" training<="">       Phemory Map     <pmenory map<="" td="">       Phemory KaS Configuration        &gt;NSSA Configuration Menu        F1     Help       f1     Help       f1     Help       f1     F2 elect Item       F1     F0 Save and Exit</pmenory></phemory></por></por></disabled></disabled></disabled></auto></auto></auto>	DLL Reset Test		[0x0]		
Normal Operation Duration     [0x400]       C/A Parity Enable <auto>       SHB Clock Frequency     <auto>       DDR Cycling     <disabled>       DDR Cycling     <disabled>       Hem Flows     [0xFFFFFFF]       Hem FlowsExt     [0xFFFFFFF]       DIHH Rank Enable Hask     <disabled>       BLOCK GNI2CHDICYC     <por>       Hemory Topology     <por>       Hemory Training        Hemory Tax Configuration        NON Configuration        PSSA Configuration Henu        F1     Help       f1     Help       f2     Select Item       Enter Select V SubHenu     F0 Save and Exit</por></por></disabled></disabled></disabled></auto></auto>	Opp read during WMM		<auto></auto>		
C/A Parity Enable < Auto> SHB Clock Frequency < Auto> DR Cycling <disabled> Hen Flows (DxFFFFFFF] Hen Flowskxt (DxFFFFFFF] Hen Flowskxt            UDX FYFFFFF] Hen Flowskxt          DxFFFFFFF] D1HH Rank Enable Hask            D1 Sabled&gt;           BLOCK GNT2CHD1CYC            V OR&gt;           Disable NVHD1HH OPPRD <por>           Phemory Training           PHemory Training           PHemory Training           PHemory RAS Configuration           PMEMORY MAD           PHemory Disconfiguration           PBSA Configuration Henu           F1         Help           f1/4 Select Item         F5/F6 Change Values           F0         Setup Defaults           F10         Save and Exit</por></disabled>	Normal Operation Duration		[0x400]		
SHB Clock Frequency <auto>         DR Cycling       <disabled>         DR Cycling       <disabled>         Hen Flows       [0xFFFFFFF]         Hem FlowsExt       [0xFFFFFFF]         DIMT Rank Enable Hask       <disabled>         BLOCK GNZCHDICYC       <por>         Disable NVHDIHH OPPRD       <por>         Phemory Topology       <por>         Phemory Training       <por>         Phemory Training       <por>         Phemory RAS Configuration       <por>         Phemory Training          Phemory Training          Phemory Tax          &lt;</por></por></por></por></por></por></disabled></disabled></disabled></auto>	C/A Parity Enable		<auto></auto>		
DDR Cycling <disabled>       Hem Flows     [0xFFFFFFF]       Hem FlowsExt     [0xFFFFFF]       DIMH Rank Enable Hask     <disabled>       BLOCK GNT2CHDICYC     <por>       Disable NMHDIHH OPPRD     <por>       Memory Topology     <por>       Page Policy        Memory Training        Memory Map        Memory Map        Memory KaS Configuration        &gt;NGN Configuration Henu        F1     Help       f1     Help       f1     Help       f1     + Select Item       F0     Setup Defaults       F10     Save and Exit</por></por></por></disabled></disabled>	SMB Clock Frequency		<auto></auto>		
Hem Flows     [0xFFFFFFF]       Hem FlowsExt     [0xFFFFFFF]       DIMT Rank Enable Hask <disabled>       BLOCK GN12CHDICYC     <por>       Disable NVHD1HH OPPRD     <por>       Memory Topology     <por>       Memory Training        Memory Training        Memory RAS Configuration        NNO Configuration        Memory Ka Configuration        PBSA Configuration Henu        F1     Help       f1     Help       f1     Help       f4's Select Item     Enter Select V SubHenu       F10 Save and Exit</por></por></por></disabled>	DDR Cycling		<disabled></disabled>		
Hem FlowsExt     [0xFFFFFFF]       DIMM Rank Enable Mask     <0isabled>       BLOK GNIZCHDICYC <por>       Disable NVHDIHH OPPRD     <por>       Phemory Topology     <por>       Phemory Training     <por>       Phemory Map     <por< td="">       Phemory Map     <por< td="">       Phemory Map     <por< td="">       Phemory Inings Override        Phemory Inings Configuration        Phemory Dfx Configuration        PBSSA Configuration Henu        F1     Help       F1     Help       F1     F4 Select Item       Ease Exit     +/4 Select Item       Enter Select &gt; Sublenu     F10 Save and Exit</por<></por<></por<></por></por></por></por>	Mem Flows		[0xFFFFFFFF]		
DIHH Rank Enable Hask <disabled> BLOCK ONT2CHDICYC <por> Disable NYHDIHH OPPRD <por> Phemory Topology Phemory Training Phemory Training + Phemory RAS Configuration Phemory RAS Configuration Phemory Ka Configuration Phemory Ka Configuration Phemory Ka Configuration Phemory RAS Configuration Phemory End Configuration Phemory End Configuration Phemory End Configuration Phemory Configuration Phemory Configuration Phemory Configuration Phemory Configuration Phemory End Configuration Phemory Configuration Phemory End Configuration Phemory</por></por></disabled>	Mem FlowsExt		[0xFFFFFFFF]		
BLOCK GNT2CHDICYC <por> Disable NVHD1HH OPPRD <por> Memory Topology Page Policy Memory Training Memory Taining Soverride Memory Map Memory Memory Map Mem</por></por>	DIMM Rank Enable Mask		<disabled></disabled>		
Disable NVHDIHH OPPRD <por> Hemory Topology Page Policy Hemory Training Hemory Training Hemory Map Hemory Map Hemory Map Hemory Configuration NNN Configuration Hemory Dfx Configuration F1 Help t/4 Select Item E5/F6 Change Values F9 Setup Defaults Esc Exit +/4 Select Item Enter Select ▶ SubHemu F10 Save and Exit</por>	BLOCK GNT2CMD1CYC		<por></por>		
Hemory Topology         Page Policy         PHemory Training         Memory Training         Memory Timings Override         Hemory Map         Memory RAS Configuration         Memory Dfx Configuration         F1 Help       1/1 Select Item         Esc Exit       +/4 Select Item         Enter Select N SubHenu       F10 Save and Exit	Disable NVMDIMM OPPRD		<por></por>		
PPage Policy Memory Training Memory Trainings Override Memory Map Memory RAS Configuration NGN Configuration Memory Dfx Configuration Memory	▶Memory Topology				
Hemory Training         Hemory Training         Hemory Timings Override         Hemory Rap         Hemory RAS Configuration         NON Configuration         Hemory Tx Configuration         Hemory Tx Configuration         >BSSA Configuration Henu         F1       Help         f1/1 Select Item       F5/F6 Change Values         F9       Setup Defaults         Esc Exit       +/4 Select Item         Enter Select > SubHenu       F10 Save and Exit	▶Page Policy				
Memory Timings Override         Memory Hap         Memory RAS Configuration         Monory Dfx Configuration         Memory Dfx Configuration Menu         F1 Help       1/1 Select Item         F2 Kit       +/4 Select Item         Ease Exit       +/4 Select Item         Enter Select > Sublemu       F10 Save and Exit	▶Memory Training				
Phemory Hap         PHemory RAS Configuration         PNON Configuration         PHemory Dfx Configuration         PBSSA Configuration Henu         F1         F1         Esc Exit       +/4 Select Item         Enter Select ▶ SubMenu         F10 Save and Exit	▶Memory Timings Override				
Memory RAS Configuration         NGN Configuration         Memory Dfx Configuration         BSSA Configuration Henu         F1 Help       1/1 Select Item         F2 Esc Exit       +/4 Select Item         Enter Select Item       Enter Select Itenu	▶Memory Map				
NON Configuration         >Hemory Diffusion         >BSSA Configuration Henu         F1         F1       F1 Select Item         Esc Exit       +/4 Select Item         Enter Select Item       Enter Select Item	▶Memory RAS Configuration				
Phemory Dix Configuration ▶BSSA Configuration Henu F1 Help t/1 Select Item F5/F6 Change Values F9 Setup Defaults Esc Exit +/+ Select Item Enter Select ▶ SubMenu F10 Save and Exit	▶NGN Configuration				
PBSSA Configuration Henu F1 Help 1/1 Select Item F5/F6 Change Values F9 Setup Defaults Esc Exit +/+ Select Item Enter Select ト SubHenu F10 Save and Exit	Memory Dtx Configuration				
F1 Help 1/J Select Item F5/F6 Change Values F9 Setup Defaults Esc Exit +/→ Select Item Enter Select ト SubHenu F10 Save and Exit	PBSSA Configuration Menu				
Esc Exit +/+ Select item Enter Select ► SubHenu F10 Save and Exit	F1 Help	1/1 Select	Item	F5/F6 Change Values	F9 Setup Defaults
	Esc Exit	+/+ Select	Item	Enter Select ► SubMenu	F10 Save and Exit

6. Press [Enter].

# 7. Configure SDDC+1

1. From the list, select SDDC Plus One and press [Enter].



2. Use the Up and Down arrows to move to the required option:

Disabled	SDDC Plus One is turned off
Enabled	SDDC Plus One is turned on

- 3. Press [Enter] to complete changes.
- 4. Return to the Advanced menu by pressing [Esc].
- Save changes by selecting Exit > Save Change Without Exit and press [Enter].
- 6. Select YES in the confirmation dialog box and press [Enter].
- 7. Return to the main menu by pressing [Esc].
- 8. Select YES in the confirmation dialog box and press [Enter].

# 2.4.2. Configuring with the Command Line

This section provides some command line examples.

**See** Remote Hardware Management CLI Reference Guide for more information.

#### **Disable SDDC+1**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.SddcPlusOneEn 0'

#### Enable SDDC+1

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.SddcPlusOneEn 1'

# 2.5. Managing Memory Rank Sparing

When a persistent correctable error is detected on a rank (the correctable error count has reached the "leaky bucket" threshold), the rank sparing handler is called. Assuming ADDDC is not invoked first and a spare rank is available on the channel, the contents of the failing rank are copied to the spare rank.

The spare rank is scrubbed before copy. This may take a long time to complete (20 minutes or more) depending on the memory size.

With Rank Sparing enabled, the available system memory is reduced by the size of the spare ranks. Spare rank number can be set to one or two.

Rank Sparing operations are recorded in the System Event Log (SEL) and Messages Log. The Messages Log identifies the failing DIMM.

The server is factory-configured as follows:

Memory Rank Sparing Disabled

Multi Rank Sparing Two Rank

Memory rank sparing is configured with either the BIOS Setup utility or the command line.

# 2.5.1. Configuring with the BIOS Interface

#### **Procedure**

1. If not already done, set up remote access

#### 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

#### 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

#### 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.
#### 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

#### 6. Launch Memory RAS Configuration

- 1. Click Power > Power Management to open the Power Management page
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen and follow the boot sequence.
- 4. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.
- 5. From the main menu, select Setup Utility > Advanced > Socket Configuration > Memory Configuration > Memory RAS Configuration.

w		St	etup Utility	Rev. S
Advanced				
BDAT		<disabled></disabled>		Displays and provides option to change
Data Scrambling for NVMDIMM		<auto></auto>		the Memory Ras Settings
Data Scrambling for DDR4		<auto></auto>		
Allow Correctables		<auto></auto>		
WR CRC feature Control		<auto></auto>		
DIMM Isolation Enable		<auto></auto>		
Scrambling Seed Low		[41003]		
Scrambling Seed High		[54165]		
Enable ADR		<enabled></enabled>		
Legacy ADR Mode		<disabled></disabled>		
Check PCH_PM_STS		<disabled></disabled>		
Check PlatformDetectADR		<disabled></disabled>		
Custom Refresh Enable		<disabled></disabled>		
MC BGF threshold		[0]		
DLL Reset Test		[0x0]		
Opp read during WMM		<auto></auto>		
Normal Operation Duration		[0x400]		
C/A Parity Enable		<auto></auto>		
SMB Clock Frequency		<auto></auto>		
DDR Cycling		<disabled></disabled>		
Mem Flows		[0xFFFFFFFF]		
Mem FlowsExt		[0xFFFFFFFF]		
DIMM Rank Enable Mask		<disabled></disabled>		
BLOCK GNT2CMD1CYC		<por><por>POR&gt;</por></por>		
Disable NVMDIMM OPPRD		<por><por>POR&gt;</por></por>		
▶Memory Topology				
▶Page Policy				
▶Memory Training				
▶Memory Timings Override				
▶Memory Map				
▶Memory RAS Configuration				
▶NGN Configuration				
▶Memory Dfx Configuration				
▶BSSA Configuration Menu				
F1 Help	t/1 Select	Item	F5/F6 Change Values	F9 Setup Defaults
Esc Exit	+/+ Select	Item	Enter Select 🕨 SubMenu	F10 Save and Exit

6. Press [Enter].

# 7. Configure Memory Rank Sparing

1. From the list, select Memory Rank Sparing and press [Enter].

×	Setup Utility	Rev. 5
Advanced		
		Enable/Disable Memory Rank Sparing
Memory RAS Configuration Setup		
Operation DAC wade.		
None		
Support DAS mode:		
Mirror 11M   Mirror 21M   Rank Sparin	DI PARTIAL MIRROR 11M I PARTIAL MIRROR 21M	
Support ext RAS mode:		
SDDC EN I DMNDSCRB EN I PTRLSCRB EN I	ADDDC EN I	
Static Virtual Lockstep Mode	<disabled></disabled>	
Mirror mode	<disabled></disabled>	
Mirror TADO	<disabled></disabled>	
Enable Partial Mirror	<disabled></disabled>	
UEFI ARM Mirror	<disabled> Memory Rank Sparing</disabled>	
Memory Rank Sparing	<disabled></disabled>	
Correctable Error Threshold	[0x3E8] Disabled	
SDDC Plus One	<disabled> Enabled</disabled>	
ADDDC Sparing	<pre><disabled></disabled></pre>	
Set NGN Die Sparing	<enabled></enabled>	
NGN DIE Sparing Aggressiveness	[120]	
Patrol Scrub Interval		
Datrol Scrub Address Mode	(System Drysical Address)	
	System Hysteur Hudiess?	

2. Use the Up and Down arrows to move to the required option:

Disabled	Memory rank Sparing is turned off
Enabled	Memory Rank Sparing is turned on

- 3. Press [Enter] to complete changes.
- 4. If Memory Rank Sparing is enabled, select Multi Rank Sparing and press [Enter].

		Setup Utility	Rev.
Advanced			
Memory RAS Configuration Setup			Set Hulti Rank Sparing number, default and the maximum is 2 ranks per channel
Operation RAS mode: None Support RAS mode: Rank Sparing Support ext RAS mode: SDDC_EN   OHNDSCRB_EN   PTRLSCRB_EN Static Virtual Lockstep Hode Hirror mode Hirror TADO Enable Partial Hirror UEFI ARH Hirror Hemory Rank Sparing Hufti Rank Sparing Correctable Error Threshold Leaky bucket low bit Leaky bucket high bit SDDC Plus One ADDDC Sparing Set NGN Die Sparing NGN Die Sparing Aggressiveness Patrol Scrub Interval Patrol Scrub Address Mode	N I ADDDC_EN I	Multi Rank Sparing One Rank Two Rank	

5. Use the Up and Down arrows to move to the required option:

One Rank One spare rank

Two Rank Two spare ranks (default value)

- 6. Press [Enter] to complete changes.
- 7. Return to the Advanced menu by pressing [Esc].

- 8. Save changes by selecting Exit > Save Change Without Exit and press [Enter].
- 9. Select YES in the confirmation dialog box and press [Enter].
- 10. Return to the main menu by pressing [Esc].
- 11. Select YES in the confirmation dialog box and press [Enter].

# 2.5.2. Configuring with the Command Line

This section provides some command line examples.

**See** Remote Hardware Management CLI Reference Guide for more information.

#### **Enable Memory Rank Sparing**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.RankSparing 1'

#### **Disable Memory Rank Sparing**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.RankSparing 0'

#### Set the number of spare rank to one

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.multiSparingRanks 1'

#### Set the number of spare rank to two

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.multiSparingRanks 2'

# 2.6. Managing Demand Scrubbing

Demand Scrubbing writes the corrected data back to the memory once a correctable error is detected on a read transaction.

Demand Scrubbing is enabled by default and cannot be turned off.

# 2.7. Managing Patrol Scrubbing

Patrol Scrubbing runs in the background searching system memory for errors and repairing correctable errors before these correctable errors might turn into uncorrectable errors.

The default duration of one complete patrol scrub cycle is 24 hours.

The server is factory-configured as follows:

Patrol Scrub Enabled

Patrol Scrub Interval 24

Patrol Scrubbing is configured with either the BIOS Setup utility or the command line.

# 2.7.1. Configuring with the BIOS Interface

#### Procedure

1. If not already done, set up remote access

#### 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

#### 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

#### 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

#### 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

#### 6. Launch Memory RAS Configuration

- 1. Click Power > Power Management to open the Power Management page
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen and follow the boot sequence.
- 4. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.
- 5. From the main menu, select Setup Utility > Advanced > Socket Configuration > Memory Configuration > Memory RAS Configuration.

<i>w</i>			Setup Utility	Rev. S
Advanced				
PDAT		<pre>cDicablod&gt;</pre>		Displays and provides option to change
Deta Scrambling for NVMDIMM		<ul> <li>Chito&gt;</li> </ul>		the Memory Das Settings
Data Scrambling for DDRA		<auto></auto>		the headry kus settings
Allow Correctables		<auto></auto>		
WR CRC feature Control		<auto></auto>		
DIMM Isolation Enable		<auto></auto>		
Scrambling Seed Low		[41003]		
Scrambling Seed High		[54165]		
Enable ADR		<enabled></enabled>		
Legacy ADR Mode		<disabled></disabled>		
Check PCH_PM_STS		<disabled></disabled>		
Check PlatformDetectADR		<disabled></disabled>		
Custom Refresh Enable		<disabled></disabled>		
MC BGF threshold		[0]		
DLL Reset Test		[0x0]		
Opp read during WMM		<auto></auto>		
Normal Operation Duration		[0x400]		
C/A Parity Enable		<auto></auto>		
SMB Clock Frequency		<auto></auto>		
DDR Cycling		<disabled></disabled>		
Mem Flows		[UxFFFFFFF]		
Mem FlowsExt		[UxFFFFFFF]		
DIMM Rank Enable Mask		<uisabled></uisabled>		
BLUCK GNT2CMDTCYC		<puk></puk>		
		<puk></puk>		
Premory Topology				
Momery Training				
Memory Timings Override				
Memory Man				
▶Memory RAS Configuration				
►NGN Configuration				
Memory Dfx Configuration				
▶BSSA Configuration Menu				
F1 Help	t/1 Select	Item	F5/F6 Change Values	F9 Setup Defaults
Esc Exit	+/+ Select	ltem	Enter Select 🕨 SubMenu	F10 Save and Exit

6. Press [Enter].

# 7. Configure patrol scrubbing

1. From the list, select Patrol Scrub and press [Enter].

	Setup Utility		Rev. 5
	ß	Enable/Disable Patrol Scrub	
Memory RAS Configuration Setup			
Operation RAS mode:			
Support RAS mode:			
Mirror 11M   Mirror 21M   Rank Sparing	I PARTIAL MIRROR 11M I PARTIAL MIRROR 21M		
Support ext RAS mode:			
SDDC_EN I DMNDSCRB_EN I PTRLSCRB_EN I #	ADDDC_EN I		
Static Virtual Lockstep Mode	<disabled></disabled>		
Mirror mode	<d i="" led="" sab=""></d>		
Mirror TADO	<disabled></disabled>		
Enable Partial Mirror	<disabled></disabled>		
UEFI ARM Mirror	<d i="" led="" sab=""></d>		
Memory Rank Sparing	<enabled></enabled>		
Multi Rank Sparing	<two rank=""></two>		
Correctable Error Threshold	[0x3E8]		
Leaky bucket low bit	[0x1F]		
Leaky bucket high bit	[0x20]		
SDDC Plus One	<disabled></disabled>		
ADDDC Sparing	<disabled></disabled>		
Set NGN Die Sparing	<enabled></enabled>		
NGN Die Sparing Aggressiveness	[128]		
Patrol Scrub	<enabled></enabled>		
Patrol Scrub Interval	[24]		
Patrol Scrub Address Mode	<system address="" physical=""></system>		

2. Use the Up and Down arrows to move to the required option:

Disabled	Patrol Scrub is turned off
Enabled	Patrol Scrub is turned on

- 3. Press [Enter] to complete changes.
- 4. Return to the Advanced menu by pressing [Esc].
- Save changes by selecting Exit > Save Change Without Exit and press [Enter].
- 6. Select YES in the confirmation dialog box and press [Enter].
- 7. Return to the main menu by pressing [Esc].
- 8. Select YES in the confirmation dialog box and press [Enter].

# 2.7.2. Configuring with the Command Line

This section provides some command line examples.

**See** Remote Hardware Management CLI Reference Guide for more information.

## **Enable Patrol Scrubbing**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.PatrolScrub 1'

#### **Disable Patrol Scrubbing**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.PatrolScrub 0'

#### Set the Patrol Scrub Interval to 20

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.PatrolScrubDuration 20'

Note MEM.PatrolScrubDuration value can be set from 1 to 24 (default value). 0 is equivalent to 24 hours.

# 2.8. Managing Memory Mirroring



W084:

The full and partial mirroring options are mutually exclusive. Enabling mirroring with multiple options will affect the operation of the system.

# 2.8.1. Overview

Memory mirroring is a high availability RAS feature which maintains a copy of memory data. It improves the fault tolerance for single-bit, multi-bit, single device and multi device faults. Data is stored on two different channels of the memory controller, the primary channel and the secondary channel. Read data is obtained from the primary channel and is written to both channels.

There are two mirroring options:

Full mirror

Full mirroring mirrors all system memory, reducing the amount of memory available to the operating system by half.

- Partial mirror
  - Partial mirror below 4 GB
  - Partial mirror above 4 GB (Fixed sizes)
  - Partial mirror above 4 GB (Percentage amount)

Partial mirroring mirrors only a portion of memory, reducing the memory available to the operating system by the amount mirrored. It is possible to specify mirrored amounts as either a fixed sized region in gigabytes or as a percentage of memory above 4 GB.

Mirroring of the region below 4 GB can be mirrored independently when partial mirroring is used.

**Note** Any changes to the mirroring configuration require the system to be reinitialized.

#### Rules

- On each CPU memory controller (iMC), at least 2 channels must be populated (3 channel mirroring is supported)
- Memory module population must be identical on the mirrored channels
- Only one mirror region is supported on each iMC
- Mirror regions are specified in increments of 1 GB
- Mirroring is possible across iMCs if they use the same channel-way interleave

#### **Prerequisites**

Any other mirroring options are disabled

The Memory Rank Sparing feature is disabled

The KTI XPT prefetch feature is disabled

# 2.8.2. Full Memory Mirroring

The server is factory-configured as follows:

Mirror Mode Disabled

Full memory mirroring is configured with either the BIOS Setup utility or the command line.

# 2.8.2.1. Configuring with the BIOS Interface

#### Procedure

1. If not already done, set up remote access

#### 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

#### 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

#### 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

#### 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

#### Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

#### 6. Launch Memory RAS Configuration

- 1. Click Power > Power Management to open the Power Management page
- 2. Click Power On to launch the boot sequence.

- 3. Switch to the Remote Console screen and follow the boot sequence.
- 4. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.
- 5. From the main menu, select Setup Utility > Advanced > Socket Configuration > Memory Configuration > Memory RAS Configuration.

		St	etup Utility	Rev. R
Advanced				
BDAT		<disabled></disabled>		Displays and provides option to change
Data Scrambling for NVMDIMM		<auto></auto>		the Memory Ras Settings
Data Scrambling for DDR4		<auto></auto>		
Allow Correctables		<auto></auto>		
WR CRC feature Control		<auto></auto>		
DIMM Isolation Enable		<auto></auto>		
Scrambling Seed Low		[41003]		
Scrambling Seed High		[54165]		
Enable ADR		<enabled></enabled>		
Legacy ADR Mode		<disabled></disabled>		
Check PCH_PM_STS		<disabled></disabled>		
Check PlatformDetectADR		<disabled></disabled>		
Custom Refresh Enable		<disabled></disabled>		
MC BGF threshold		[0]		
DLL Reset Test		[0x0]		
Opp read during WMM		<auto></auto>		
Normal Operation Duration		[0x400]		
C/A Parity Enable		<auto></auto>		
SMB Clock Frequency		<auto></auto>		
DDR Cycling		<disabled></disabled>		
Mem Flows		[0xFFFFFFFF]		
Mem FlowsExt		[0xFFFFFFFF]		
DIMM Rank Enable Mask		<disabled></disabled>		
BLOCK GNT2CMD1CYC		<por></por>		
Disable NVMDIMM OPPRD		<por></por>		
▶Memory Topology				
▶Page Policy				
▶Memory Training				
▶Memory Timings Override				
▶Memory Map				
▶Memory RAS Configuration				
▶NGN Configuration				
▶Memory Dfx Configuration				
▶BSSA Configuration Menu				
F1 Help	↑/↓ Select	Item	F5/F6 Change Values	F9 Setup Defaults
Esc Exit	+/+ Select	Item	Enter Select 🕨 SubMenu	F10 Save and Exit

6. Press [Enter].

#### 7. Configure full memory mirror

1. From the list, select Mirror mode and press [Enter].



2. Use the Up and Down arrows to move to the required option:

DisabledFull mirroring is turned offMirror Mode 1LMFull mirroring (Level 1 memory) is turned on

Mirror Mode 2LM Full mirroring (Level 2 memory) is turned on

- 3. Press [Enter] to complete changes.
- 4. Return to the Advanced menu by pressing [Esc].
- 5. Save changes by selecting Exit > Save Change Without Exit and press [Enter].
- 6. Select YES in the confirmation dialog box and press [Enter].
- 7. Return to the main menu by pressing [Esc].
- 8. Select YES in the confirmation dialog box and press [Enter].

# 2.8.2.2. Configuring with the Command Line

This section provides some command line examples.

**See** Remote Hardware Management CLI Reference Guide for more information.

## **Disable full memory mirroring**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'RC.MirrorMode 0'

# Enable full memory mirroring (1-level memory)

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'RC.MirrorMode 1'

# Enable full memory mirroring (2-level memory)

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'RC.MirrorMode 2'

# 2.8.3. Partial Memory Mirroring below 4 GB

When a region is enabled, all valid memory addresses will be mirrored. Memory addresses associated with memory-mapped I/O and any special regions are not mirrored.

This option is possible with the other BIOS partial mirror options for memory above 4 GB.

The server is factory-configured as follows:

Mirror TAD0 Disabled

Full memory mirroring is configured with either the BIOS Setup utility or the command line.

# 2.8.3.1. Configuring with the BIOS Interface

#### **Procedure**

#### 1. If not already done, set up remote access

#### 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

#### 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

#### 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

#### 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

#### Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

#### 6. Launch Memory RAS Configuration

- 1. Click Power > Power Management to open the Power Management page
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen and follow the boot sequence.
- 4. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.

5. From the main menu, select Setup Utility > Advanced > Socket Configuration > Memory Configuration > Memory RAS Configuration.

10	Se	tup Utility	Rev. 5
Advanced			
BDAT	<disabled></disabled>		Displays and provides option to change
Data Scrambling for NVMDIMM	<auto></auto>		the Memory Ras Settings
Data Scrambling for DDR4	<auto></auto>		
Allow Correctables	<auto></auto>		
WR CRC feature Control	<auto></auto>		
DIMM Isolation Enable	<auto></auto>		
Scrambling Seed Low	[41003]		
Scrambling Seed High	[54165]		
Enable ADR	<enabled></enabled>		
Legacy ADR Mode	<d i="" led="" sab=""></d>		
Check PCH_PM_STS	<d i="" led="" sab=""></d>		
Check PlatformDetectADR	<d i="" led="" sab=""></d>		
Custom Refresh Enable	<d i="" led="" sab=""></d>		
MC BGF threshold	[0]		
DLL Reset Test	[0x0]		
Opp read during WMM	<auto></auto>		
Normal Operation Duration	[0x400]		
C/A Parity Enable	<auto></auto>		
SMB Clock Frequency	<auto></auto>		
DDR Cycling	<d i="" led="" sab=""></d>		
Mem Flows	[0xFFFFFFFF]		
Mem FlowsExt	[0xFFFFFFFF]		
DIMM Rank Enable Mask	<d i="" led="" sab=""></d>		
BLOCK GNT2CMD1CYC	<p0r></p0r>		
Disable NVMDIMM OPPRD	<p0r></p0r>		
▶Memory Topology			
▶Page Policy			
▶Memory Training			
▶Memory Timings Override			
▶Memory Map			
▶Memory RAS Configuration			
▶NGN Configuration			
▶Memory Dfx Configuration			
▶BSSA Configuration Menu			
F1 Helpf	/↓ Select Item	F5/F6 Change Values	F9 Setup Defaults
Esc Exit +	/→ Select Item	Enter Select ► SubMenu	F10 Save and Exit

6. Press [Enter].

# 7. Configure partial memory mirror below 4 GB

1. From the list, select Mirror TAD0 and press [Enter].



2. Use the Up and Down arrows to move to the required option:

EnabledPartial mirroring below 4 GB is turned onDisabledPartial mirroring below 4 GB is turned off

- 3. Press [Enter] to complete changes.
- 4. Return to the Advanced menu by pressing [Esc].

- 5. Save changes by selecting Exit > Save Change Without Exit and press [Enter].
- 6. Select YES in the confirmation dialog box and press [Enter].
- 7. Return to the main menu by pressing [Esc].
- 8. Select YES in the confirmation dialog box and press [Enter].

#### 2.8.3.2. Configuring with the Command Line

This section provides some command line examples.

**See** Remote Hardware Management CLI Reference Guide for more information.

#### Disable partial memory mirroring below 4 GB

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.partialmirrorsad0 0'

#### Enable partial memory mirroring below 4 GB

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.partialmirrorsad0 1'

## **2.8.4. Partial Memory Mirroring above 4 GB (Fixed Sizes)**

From one to four memory region sizes may be configured.

The server is factory-configured as follows:

Enable Partial Mirror Disabled

Partial Mirror1 Size in GB0Partial Mirror2 Size in GB0

Partial Mirror3 Size in GB 0

Partial Mirror4 Size in GB 0

Partial memory mirroring is configured with either the BIOS Setup utility or the command line.

#### **2.8.4.1. Configuring with the BIOS Interface**

# Procedure

#### 1. If not already done, set up remote access

#### 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

#### 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

#### 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

# 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

#### **See** SHC Reference Guide for more information.

#### Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

## 6. Launch Memory RAS Configuration

- 1. Click Power > Power Management to open the Power Management page
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen and follow the boot sequence.
- 4. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.

5. From the main menu, select Setup Utility > Advanced > Socket Configuration > Memory Configuration > Memory RAS Configuration.

<u> </u>	\$	etup Utility	Rev. 5
Advanced			
BDAT	<disabled></disabled>		Displays and provides option to change
Data Scrambling for NVMDIMM	<auto></auto>		the Memory Ras Settings
Data Scrambling for DDR4	<auto></auto>		
Allow Correctables	<auto></auto>		
WR CRC feature Control	<auto></auto>		
DIMM Isolation Enable	<auto></auto>		
Scrambling Seed Low	[41003]		
Scrambling Seed High	[54165]		
Enable ADR	<enabled></enabled>		
Legacy ADR Mode	<disabled></disabled>		
Check PCH_PM_STS	<disabled></disabled>		
Check PlatformDetectADR	<d i="" led="" sab=""></d>		
Custom Refresh Enable	<disabled></disabled>		
MC BGF threshold	[0]		
DLL Reset Test	[0x0]		
Opp read during WMM	<auto></auto>		
Normal Operation Duration	[0x400]		
C/A Parity Enable	<auto></auto>		
SMB Clock Frequency	<auto></auto>		
DDR Cycling	<disabled></disabled>		
Mem Flows	[0xFFFFFFFF]		
Mem FlowsExt	[0xFFFFFFFF]		
DIMM Rank Enable Mask	<d i="" led="" sab=""></d>		
BLOCK GNT2CMD1CYC	<por><por>POR&gt;</por></por>		
Disable NVMDIMM OPPRD	<por><por>POR&gt;</por></por>		
▶Memory Topology			
▶Page Policy			
▶Memory Training			
▶Memory Timings Override			
▶Memory Map			
▶Memory RAS Configuration			
▶NGN Configuration			
▶Memory Dfx Configuration			
▶BSSA Configuration Menu			
F1 Help	lect Item	F5/F6 Change Values	F9 Setup Defaults
Esc Exit +/+ Se	lect Item	Enter Select ► SubMenu	F10 Save and Exit

6. Press [Enter].

# 7. Configure partial memory mirror above 4 GB using fixed sizes

1. From the list, select Enable Partial Mirror and press [Enter].



2. Use the Up and Down arrows to move to the required option:

Disabled	Partial mirroring is turned off
Partial Mirror Mode 1LM	Partial mirroring (Level 1 memory) is turned on
Partial Mirror Mode 2LM	Partial mirroring (Level 2 memory) is turned on

- 3. Press [Enter] to complete changes.
- 4. Set the partial mirror sizes.

**Note** The value must be a multiple of 1 GB. The default value is 0 GB (no setting).

a. Select Partial Mirror1 Size in GB and press [Enter].

	Setup Utility		Rev. 5
Advanced			
Hemory RAS Configuration Setup		Select multiplier of 1 GB for the S of the SAD to be created	Size
Operation RAS mode: None Support RAS mode: Hirror ILM   Hirror 2LM   Rank Sparing Support ext RAS mode: SDDC_EN   DINDSCRB_EN   PTRLSCRB_EN   A Static Virtual Lockstep Mode Hirror mode Hirror mode Hirror TADO Enable Partial Mirror Partial Hirror2 Size in GB Partial Hirror2 Size in GB Partial Hirror3 Size in GB Partial Hirror4 Size in GB UEFI ARH Mirror Hemory Rank Sparing Correctable Error Threshold SDDC Plus One ADDDC Sparing Set NGM Die Sparing	I PARTIAL HIRROR ILM I PARTIAL HIRROR 2LM DDDC_EN I   		

- b. Enter the required value in the dialog box and press [Enter].
- c. Select YES and press [Enter].
- d. Repeat this operation for the Partial Mirror 2, Partial Mirror 3 and Partial Mirror 4.
- 5. Return to the Advanced menu by pressing [Esc].
- Save changes by selecting Exit > Save Change Without Exit and press [Enter].
- 7. Select YES in the confirmation dialog box and press [Enter].
- 8. Return to the main menu by pressing [Esc].
- 9. Select YES in the confirmation dialog box and press [Enter].

#### **2.8.4.2. Configuring with the Command Line**

This section provides some command line examples.

**See** Remote Hardware Management CLI Reference Guide for more information.

#### Disable partial memory mirroring above 4 GB (Fixed sizes)

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.partialmirror 0'

#### Enable partial memory mirroring above 4 GB (Fixed sizes)

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.partialmirror 1'

#### Set Partial Mirror1 size to 2 GB

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.partialmirrorsize\_0 2'

#### Set Partial Mirror2 size to 2 GB

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.partialmirrorsize\_1 2'

#### Set Partial Mirror3 size to 2 GB

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.partialmirrorsize\_2 2'

#### Set Partial Mirror4 size to 2 GB

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.partialmirrorsize\_3 2'

**Note** The size value must be a multiple of 1 GB. The default value is 0 GB (no setting).

# 2.8.5. Partial Memory Mirroring above 4 GB (Percentage Amount)

The amount of mirrored memory can be set as a percentage of the total memory available. The maximum amount that can be set is 50%.

The server is factory-configured as follows:

ARM Mirror Disabled

ARM Mirror percentage 0

Partial memory mirroring is configured with either the BIOS Setup utility or the command line.

#### 2.8.5.1. Configuring with the BIOS Interface

#### Procedure

1. If not already done, set up remote access

#### 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

#### 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

#### 4. Power Off the Server from the SHC

- From the System Control tab, click Power > Power Management to open the Power Management page.
- 2. From the Standard Power Operations box, click Power Off.

3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

# 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

#### Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

## 6. Launch Memory RAS Configuration

- 1. Click Power > Power Management to open the Power Management page
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen and follow the boot sequence.
- 4. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.
- 5. From the main menu, select Setup Utility > Advanced > Socket Configuration > Memory Configuration > Memory RAS Configuration.

Advanced	S	etup Utility	Rev. S
Advanced BDAT Data Scrambling for NVHDIHH Data Scrambling for DDR4 Allow Correctables WR CRC feature Control DIHM Isolation Enable Scrambling Seed High Enable ADR Legacy ADR Hode Check PCH_PH_STS Check PIatformDetectADR Custom Refresh Enable HC BGF threshold DLL Reset Test Opp read during WHH Nornal Operation Duration C/A Parity Enable SHB Clock Frequency DDR Cycling Hem Flows Hem FlowsExt DIHM Rank Enable Hask BLOCK GNT2CHDICYC Disable NVHDIHH OPPRD Hemory Training Hemory Training Hemory Training Hemory Tab Hemory Map Hemory Dfx Configuration >NGK Configuration PMSNC Configuration PMSNC Configuration	CD is sabled> <auto> <auto> <auto> <auto> <auto> <auto> <auto> <chuto> (41003] [54165] <chuto> CD is abled&gt; <d abled="" is=""> <d abled="" is=""> <d abled="" is=""> (D is abled&gt; (D is abled&gt; <d abled="" is=""> <d a<="" is="" th=""><th></th><th>Rev. 1</th></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></d></chuto></chuto></auto></auto></auto></auto></auto></auto></auto>		Rev. 1
F1 Help Esc Exit	1/1 Select Item +/+ Select Item	F5/F6 Change Values Enter Selectト SubMenu	F9 Setup Defaults F10 Save and Exit

6. Press [Enter].

## 7. Configure partial memory mirror above 4 GB with a percentage amount

1. From the list, select UEFI ARM Mirror and press [Enter].

	Setup Utility	Rev. 5
Advanced		
Memory RAS Configuration Setup		Initate behavior of UEFI based Address Range Hirror with setup option
Operation RAS mode: None Support RAS mode: Mirror 1LH 1 Hirror 2LH 1 Rank Sparing Support ext RAS mode: SDDC_EN 1 DINDSCRB_EN 1 PTRLSCRB_EN 1 A Static Virtual Lockstep Mode Hirror mode Hirror TADO Enable Partial Mirror UEF1 ARH Hirror Hemory Rank Sparing Correctable Error Threshold SDDC Plus One ADDDC Sparing Set NGN Die Sparing NGN Die Sparing Aggressiveness Patrol Scrub Patrol Scrub Address Mode	I PARTIAL HIRROR 1LH I PARTIAL HIRROR 2LH DDDC_EN I Oisabled> Oisabled> Oisabled> Oisabled> Oisabled> Oisabled> UEFI ARH Hirror Disabled> ICM3881 Enabled> Chabled>	

2. Use the Up and Down arrows to move to the required option:

Disabled Partial mirroring is turned off

Partial mirroring is turned on

- 3. Select ARM Mirror percentage and press [Enter].
- 4. Enter the required value in the dialog box and press [Enter].

**Note** The percentage value is in basis points. The default value is 0 and the maximum value is 5000.

#### Example of 12.75% percentage value

Enabled

		Setup Utility		Rev.
Advanced				
			Enter the percentage basis points. 12.75%	to be mirrored in is represented 127
nemory KAS Contiguration Setup				
Operation RAS mode:				
None				
Support RAS mode:				
Mirror 1LM   Mirror 2LM   Rank Spa	ring I PARTIAL MIR	ROR 1LM I PARTIAL MIRROR 2LM		
Support ext RAS mode:				
SDDC_EN I DMNDSCRB_EN I PTRLSCRB_E	IN I ADDDC_EN I			
Static Virtual Lockstep Mode	<disabled></disabled>			
Mirror mode	<disabled></disabled>			
Mirror TADO	<disabled></disabled>			
Enable Partial Mirror	<disabled></disabled>			
UEFI ARM Mirror	<enabled></enabled>	1275		
ARM Mirror percentage	[0]			
Memory Rank Sparing	<disabled></disabled>	LYesi LNoi		
Correctable Error Threshold	[Ux3E8]			
SDDC Plus One	<enabled></enabled>			
ADDDC Sparing	<d i="" led="" sab=""></d>			
Set NGN Die Sparing	<enabled></enabled>			
NGN Die Sparing Aggressiveness	[128]			
Patrol Scrub	<enabled></enabled>			
Patrol Scrub Interval	[24]			

- 5. Select Yes and press [Enter].
- 6. Return to the Advanced menu by pressing [Esc].
- Save changes by selecting Exit > Save Change Without Exit and press [Enter].
- 8. Select YES in the confirmation dialog box and press [Enter].

- 9. Return to the main menu by pressing [Esc].
- 10. Select YES in the confirmation dialog box and press [Enter].

#### 2.8.5.2. Configuring with the Command Line

This section provides some command line examples.

**See** Remote Hardware Management CLI Reference Guide for more information.

#### **Disable partial memory mirroring above 4 GB (Percentage amount)**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.PartialMirrorUefi 0'

#### Enable partial memory mirroring above 4 GB (Percentage amount)

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.PartialMirrorUefi 1'

#### Set memory mirroring to 20% of the total memory

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.PartialMirrorUefiPercent 2000'

#### Set memory mirroring to 9,25% of the total memory

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.PartialMirrorUefiPercent 925'

**Note** The percentage value is in basis points. The default value is 0 and the maximum value is 5000.

# 2.9. Managing Post Package Repair (PPR)

# **2.9.1. PPR Overview**

Post Package Repair (PPR) is a process that analyzes the memory cells and replaces the failing rows, or the weakest rows by spare ones. It can permanently repair failing memory regions within a DIMM by leveraging spare DRAM rows.

All memory vendors have added spare rows in their memory chips to be used in the event of failing cells.

The memory controller is able to swap a new area of DRAM (the spare cells) and allows the activity to continue using this DRAM as if nothing had happened.

PPR is integrated in the BIOS and requires a servicing reboot.

# **PPR Implementation**

PPR is launched at the reboot.

The PPR process includes two steps:

- 1. Power UP PPR is executed if a leaky bucket overflow was previously detected: it spares the failing row.
- 2. Autonomous PPR is only launched, once, if the Advanced Memory Test option is set and the Advanced Memory Test has failed.



PPR operations are recorded in the System Event Log (SEL) and message logs. The Messages Log identifies the failing DIMM.

2021-05-27 10:09:18 BIOS Message BIOS Init Memory Warning: Module=3 DIMM=CHG-1: FPT: Post Package Repair row repaired

#### **Default value**

The server is factory-configured as follows:PPREnabledAdvanced Memory TestDisabled

Test After Repair Enabled

#### Recommendations

- It is strongly recommended to enabled the Advanced Memory Test option. It is recommended to set it to Auto to be consistent across systems
- Advanced Memory Test is more comprehensive, increasing confidence that the DIMM is repaired and fully operational

- Advanced Memory Test is vendor dependant and is complex. Enabled, it impacts the reboot performance. For a fully populated system (12 DIMMs per socket) with 64 GB DIMMs, the estimated additional time is 8 minutes in the event of a detected row failure and 5 minutes in the event of no failure.
- To reduce the elapsed time after the PPR operation, the test following the repair can be disabled.

ImportantPower Up PPR is disabled for UNC servers, because the<br/>UEFI variable is not accessible to the Memory Reference<br/>Code (MRC) in the slave modules.<br/>Consequently, the Advanced Memory Test option must be<br/>enabled, so that the UNC servers DIMMs are repaired.

# 2.9.2. Configuring PPR with Command Line

This section provides command line examples.

**See** Remote Hardware Management CLI Reference Guide for more information.

#### **Check that PPR is enabled**

\$ bsmBiosSettings.sh X.X.X.X -u super -p <password> -a get -n 'MEM.pprType'

Possible output values:

- 0 : PPR Disabled
- 1: Hard: PPR is enabled permanently
- 2: Soft: PPR is enabled for one power cycle
- 3: Auto (same as Hard) Default value

#### **Enable PPR**

\$ bsmBiosSettings.sh X.X.X.X -u super -p <password> -a set -n 'MEM.pprType X'

Possible values for X:

- 0 : Disables PPR
- 1: Hard: enables PPR permanently
- 2: Soft: enables PPR for one power cycle (for test only)
- 3: Auto (same as Hard)

#### **Get the Advanced Memory Test value**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a get -n 'MEM.VendorAdvMemTest'

Possible output values:

- 0 : Disable Default value
- 1: Hynix
- 2: Samsung
- 3: Micron
- 4: Auto mode: automatically determine the vendor

#### **Enable Advanced Memory Test**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.VendorAdvMemTest X'

Possible values for X:

- 0 : Disable
- 1: Hynix
- 2: Samsung
- 3: Micron
- 4: Auto mode: automatically determine the vendor

Example: Enable Advanced Memory Test in auto mode

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.VendorAdvMemTest 4'

#### **Disable the Test after Repair**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.AdvMemTestRetryAfterRepair 0'

#### **Enable the Test after Repair**

\$ bsmBiosSettings.sh -H X.X.X.X -u super -p <password> -a set -n 'MEM.AdvMemTestRetryAfterRepair 1'

# Chapter 3. Configuring the Hitachi Advanced Server DS7000 Series for VMware ESXi

Important ATTENTION: Please read carefully the safety instructions before you perform the procedures described in this manual. Multilingual Safety Notices Guide

# 3.1. ESXi Host Configuration Maximums

The virtual and physical equipment must stay at or below the maximums supported by vSphere 5.5.

# 3.2. Configuring VMware ESXi

Once VMware ESXi has booted, the system parameters can be configured, including the keyboard layout, root password, or IP address.

It is advised to configure ESXi to dump the kernel memory to a network server rather than to disk when the system has encountered a critical failure.

**See** The documentation provided for more information.

#### Procedure

1. Enter the **Customize System** menu by pressing [F2].



- 2. Select **Configure Keyboard** and then select the required keyboard language.
- 3. When prompted, type the default password.
- 4. Press [Enter] to confirm and return to the System Customization menu.
- 5. Select **Configure Password** and enter the new password twice.
- 6. Press [Enter] to confirm and return to the System Customization menu.

7. Select **Configure Management Network** and configure network parameters, as required.



- 8. Press [Enter] to confirm and return to the System Customization menu.
- 9. Select **DNS Configuration** and configure DNS Servers and/or hostname, as required.
- 10. Press [Esc] to exit.

# Chapter 4. Installing an Operating System on DCPMM Memory Modules

This section describes how to install an operating system on Intel<sup>®</sup> Optane<sup>™</sup> DC Persistent Memory (DCPMM) memory modules configured as persistent memory.

# Important ATTENTION: Please read carefully the safety instructions before you perform the procedures described in this manual.

Multilingual Safety Notices Guide



# 📥 WARNING

W081:

The goal creation require the removal of the existing namespaces, that may result in a loss of data.

Important	DCPMM memory modules must be configured on Application Direct mode.			
See	Chapter 1.9.2., Configuring DCPMM Modes for more information.			
Note	The procedure below provides an example of the installation of Redhat 7.6 on the master module.			

# Procedure

1. If not already done, set up remote access

#### 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

#### 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

#### 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

## 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

## 6. Launch the BIOS interface

- 1. Click Power > Power Management to open the Power Management page
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen.
- 4. Press [Esc] when the **Press Esc for boot options** message is displayed.



# 7. Launch the Device Manager

- 1. On the Remote Console screen, follow the boot sequence.
- 2. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.

3. From the main menu, select Device Management.



4. Press [Enter].

# 8. Lauch the DCPMM memory configuration

From the list, select Intel® Optane<sup>m</sup> DC Persistent Memory Configuration and press [Enter].



#### 9. Check the DCPMM configuration mode

1. From the list, select Regions and press [Enter].

Intel(R) Optane(TM) DC F	Intel(R) Optane(TH) DC Pers Persistent Memory Configuration	sistent Hemory Configuration
Version: 1.0.0.3344 Select an action below.		View and configure regions.
Detected DIMMs: All DIMMs are healthy.	[4]	
►DIHHS Pregions ►Namespaces ►Total capacity ►Diagnostics ►Preferences		

2. Check that the Persistent memory type is set to App Direct.

Intel(R) Optane(TH) DC Persistent Hemory Configuration Intel(R) Optane(TH) DC Persistent Hemory Configuration				
Current configuration PRegion ID 1 Persistent memory type: Capacity: Free capacity:	App Direct 504.0 GiB 0 B	View region details.		
▶Region ID 2 Persistent memory type: Capacity: Free capacity:	App Direct 252.0 GiB 252.0 GiB			
Memory allocation goal configur No goal configuration specified	ation			
▶Create goal config				
▶Back to main menu				

3. Select Back to main menu and press [Enter].

#### **10.** Create namespaces

1. From the list, select Namespaces and press [Enter].

Intel(R) Optane(TM) DC	Intel(R) Optane(TH) DC Persiste Persistent Memory Configuration	nt Memory Configuration
Version: 1.0.0.3344 Select an action below.		View and configure regions.
Detected DIMMs: All DIMMs are healthy.	[4]	
+DIMHs +Regions +Nanespaces +Total capacity +Diagnostics +Preferences		

2. Select Create namespace.

Intel(R) Optame(TH) DC Persistent Memory Configuration Intel(R) Optame(TH) DC Persistent Memory Configuration				
Select a namespace to view more information.	View details for or modify selected			
NamespaceID Name Health Status +0x00000100 Healthy	frame space.			
▶Create namespace ▶Back to main menu				

- 3. Select Back to main menu and press [Enter].
- 4. Return to the BIOS main menu by pressing [Esc].

## 11. Load the ISO image of the operating system

 From the Remote System Console menu bar, select Virtual Media, or select the Virtual Media button ( ) from the toolbar. The Virtual Media dialog opens.



2. Select the Image File tab.

Current Virtual Media Sessions				
Virtual Drive 1: Not connected	Disconnect			
Virtual Drive 2: Not connected	Disconnect			
Create New Virtual Media Session				
Local Drive Image File Local Folder				
Please select an Image File for Virtual Media				
Browse				
Select Drive Number 1 Connect				
Close				

- 3. Click the **Browse** button to select the ISO image file.
- 4. Click Connect.

#### **Redhat example**

Connection Control Keyboard Virtual Media View					
💵 🚱 💫 😓 🖳 📜 🔚 Crit+"Alt+"Delete 🔍 🎄					
	Front Page				
Front Page	20 20	r			
Continue ÞBoot Manager ÞDevice Management ÞBoot From File ÞAdminister Secure Boot		This selection will direct the system to continue to booting process			
▶Setup Utility	🗱 Alpes2 Virtual Media	×			
	Current Virtual Media Sessions Virtual Drive 1: Image File - rhel-server-7.6-x86_64-dvd.iso Virtual Drive 2: Not connected  Create New Virtual Media Connect  Create New Virtual Media  Connect  Select Drive Number 2 Connect  Close Virtual Media (Image File - rhel-server-7.6-x86_64-dvd.iso - Drive 1) connected				
F1 Help 1/4 Select Item	Enter Select 🕨 Sublien	u			
Virtual Media (Image File - rhel-server-7.6-x86 64-dvd.iso	- Drive 1) connected.	FPS: 0 In: 0 B/s Out: 0 B/s			

5. Click **Close**.

#### 12. Boot from ISO file

1. Using the navigation arrows, select Boot Manager from the main menu and press [Enter].



2. Select EFI USB Device (Generic USB Storage).

Boot Manager			
Boot Option Menu			
EFI Hard Drive			
Windows Boot Manager			
SUSE Linux Enterprise			
Red Hat Enterprise Linux			
VHware ESXi			
EF1 USB			
EFI USB Device (Generic USB Storage)			
EF1 Network 0 for IPv4 (08-00-38-B4-67-86)			
EFI Network 1 for IPv4 (00-00-30-B4-07-07)			
EF1 Network 2 for IDv4 (00-00-30 D4-07-00)			
Internal FFI Spell			
t and ↓ to change option. ENTER to select an option. ESC to exit			

3. Press [Enter] to exit system setup and to complete the server boot.

The operating system installation starts.

## 13. Set installation destination

1. From the Installation Summary screen, click Installation Destination.

Redhat.	INSTALLATION S	JMMARY	REI	D HAT ENTERPRISE LINUX 7.6 INSTALLATION
nation and the second sec	LOCALIZA	TION		
- +	Θ	DATE & TIME Europe/Paris timezone		<b>KEYBOARD</b> French, English (US)
	á	LANGUAGE SUPPORT English (United States)		
	SOFTWAR	E		
	0	INSTALLATION SOURCE		SOFTWARE SELECTION Server with GUI
/ 🔻 /	SYSTEM			
	9	INSTALLATION DESTINATION No disks selected		KDUMP Kdump is enabled
	÷	NETWORK & HOST NAME Wired (enp23s0f0) connected		SECURITY POLICY No profile selected
			V	Quit Begin Installation Ve won't touch your disks until you click 'Begin Installation'.
	🛕 Please complete it	ems marked with this icon before continuing	g to the next step.	

2. Click Add a disk.

	ATION		RED HAT ENT	ERPRISE LINUX 7.6 INSTAL	LATION Help!			
Device Selection								
Select the device(s) you'd Local Standard Disks	d like to install to. They will b	e left untouched until you o	lick on the main menu's "f	Begin Installation" button.				
1117.31 GiB	372.09 GiB	1489.91 GiB	1117.31 GiB	1117.31 GiB				
AVAGO MR9361-8i	AVAGO MR9361-8i	AVAGO MR9361-8i	AVAGO MR9361-8i	AVAGO MR9361-8i				
sda / 2014.5 KiB free	sdb / 2014.5 KiB free	sdc / 2014.5 KiB free	sdd / 79 KiB free	sde / 2014.5 KiB free				
Specialized & Network Disks								
Add a disk								
Other Storage Options								
Partitioning								
Automatically configure partitioning.     I will configure partitioning.     I would like to make additional space available.								
Encryption Encrypt my data. You'll set	a passphrase next.							

- 3. Select the NVDIMM Devices tab.
- 4. Select a namespace.
- 5. Click Reconfigure NVDIMM.

INSTATION DESTINATION	$(\pi^{\prime})^{\prime}$		RED HAT ENTERPRISE L	INUX 7.6 INSTALLATION
Search Multipath Devices Other S	SAN Devices NVDIMM Devi	ices		
Filter By: None 👻				
Namespace Name Mode Capacity	1			
inamespaceuo pinemo ravi Son dis				
	Add iSCSI Target	Add FCoE SAN	Reconfigure NVDIMM	Refresh List
6. In the dialog box, set the Sector size field to 512.

Search	Multipath De	vices	Other SAN		s NVDIMM Devices
Filter By: N	one 👻				
Names	pace Name	Mode	Capacity		
namesp	ace0.0 pmem0	raw	504 GiB		
				No device Warning:	vice to be reconfigured selected.  ing: Existing data on reconfigured devices will be lost.  Sector size: 512 - +  Start Reconfiguration
					Cancel

7. Click Start Reconfiguration.

The reconfiguration of the NVDIMM devices starts. This may take a moment.

**Note** After the reconfiguration, pmemX name became pmemXs.

8. When the operation is complete, click OK.

The following NVDIMM devices selected from the list will be reconfigured to sector mode:					
namespace0.0					
Warning: Existing data on reconfigured devices will be lost.					
Sector size: 512 - +					
© Devices reconfiguration succeeded.					
Rescanning disks finished.					
Cancel OK					

9. From the Installation Destination screen, select the NVDIMM device.

INSTALLATION DESTIN	NATION		RED HAT ENT	ERPRISE LINUX 7.6 INSTAL	LATION
Done			🖽 us		Help!
Device Selection					
Select the device(s) you Local Standard Disks	ı'd like to install to. They will l	oe left untouched until you o	click on the main menu's "E	Begin Installation" button.	
1117.31 GiB	372.09 GiB	1489.91 GiB	1117.31 GiB	1117.31 GiB	
AVAGO MR9361-8i sda / 2014.5 KiB free	AVAGO MR9361-8i sdb / 2014.5 KiB free	AVAGO MR9361-8i sdc / 2014.5 KiB free	AVAGO MR9361-8i sdd / 79 KiB free	AVAGO MR9361-8i sde / 2014.5 KiB free	
Specialized & Network Dis	sks		Disk	ts left unselected here will not be	touched.
	500.09 GiB				
Add a disk	<b>4</b>				
N	VDIMM device namespace0.0				
I	omem0s / 500.09 GiB free				
			Disk	s left unselected here will not be	touched.
Other Storage Options					
Partitioning					
<ul> <li>Automatically configure</li> </ul>	partitioning. 🛛 🔾 I will configure pa	artitioning.			
I would like to make add	litional space available.				

- 10. Complete the installation of the operating system.
- 11. Reboot the system.

### 14. Boot on the operating system installed on DCPMM

- 1. On the Remote Console screen, follow the boot sequence.
- 2. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.
- 3. Using the navigation arrows, select Boot Manager from the main menu and press [Enter].

Front Page					
Front Page					
Continue ⊧Boot Hanager ⊅Device Hanagement SNont From File	This selection will take you to the Bo Manager				
ÞAdminister Secure Boot ⊳Setup Utility					

4. Select the desired device.

The operating system installed on DCPMM is displayed at the top of the list.

Boot Manager
Boot Option Menu
EFI Hard Drive
Red Hat Enterprise Linux
Windows Boot Manager
SUSE Linux Enterprise
VHware ESXi
Red Hat Enterprise Linux
EFI PXE
EFI Network 0 for IPv4 (08-00-38-B4-67-86)
EFI Network 1 for IPv4 (08-00-38-B4-67-87)
EF1 Network 2 for IPv4 (08-00-38-B4-67-88)
EF1 Network 3 for 1Pv4 (08-00-38-B4-67-89)
EFI Other Device
Internal EFT Shell
† and $\downarrow$ to change option, ENTER to select an option, ESC to exit

5. Press [Enter] to exit system setup and to complete the server boot.

### 15. Check the installation

Run the command:

\$ Lsblk						
pmem0s	259:0	0	500.1G	0	disk	
—pmem0s1	259:1	0	200M	0	part	/boot/efi
—pmem0s2	259:2	0	1G	0	part	/boot
└─pmem0s3	259:3	0	498.9G	0	part	
-rhel-root	253:0	0	50G	0	lvm	/
-rhel-swap	253:1	0	4G	0	lvm	[SWAP]
-rhel-home	253:2	0	444.9G	0	lvm	/home

## Chapter 5. Configuring some Specific PCIe Cards

Important ATTENTION: Please read carefully the safety instructions before you perform the procedures described in this manual. Multilingual Safety Notices Guide

## 5.1. Optimizing the Mellanox ConnectX-4, -5 Network Card Performance

### **Prerequisites**

OS SUSE SLES12SP4 release Mellanox inbox driver included in the Linux release Network interfaces are configured

### Procedure for the Mellanox ConnectX-4 and Mellanox ConnectX-5 adapters

### 1. Get the package optimize\_automation.tgz from Mellanox

### 2. Open the tar file

bin/optimize-numa.py etc/systemd/system/mlnx\_interface\_mgr@.service etc/udev/rules.d/90-mlnx.rules

### 3. Copy the files under main directory with the same privileges as provided

#### 4. Set MTU to 9000

- 1. Check the network interfaces are configured
- 2. Set MTU to 9000

ip link set mtu 9000 dev <ethx>

### 5. Disable irqbalancer

chkconfig irqbalance off

### Additional step for the Mellanox ConnectX-5 adapters: enable LRO

For each Mellanox ConnectX-5 configured adapters: enable Large Receive Offload (LRO) feature:

ifdown <ethxx> ethtool -K <ethxx> Iro on ethtool -k <ethxx> | grep large-receive-offload ifup <ethxx>

# 5.2. Configuring the Broadcom MegaRAID 9460-16i Card to NVME Mode

### **Prerequisites**

The Resource and Documentation ISO file is available.

### Procedure

- 1. Install the 51.12.0-30279460-16i\_SAS\_MR\_FW\_IMAGE firmware file with the version in the Resource and Documentation ISO file
  - 1. Switch on the computer that will be used for the operation (remote or local).
  - 2. Use the storcli command to install the firmware file on the Broadcom MegaRAID 9460-16i card.

storcli /cx download file=<filepath>

### 2. If not already done, set up remote access

### 3. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

### 4. Stop the Remote System Console

Close the Remote System Console screen if it is running.

### 5. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

### 6. Launch the BIOS interface

1. Click Power > Power Management to open the Power Management page

- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen.
- 4. Press [Esc] when the **Press Esc for boot options** message is displayed.



### 7. Launch the Device Manager

- 1. On the Remote Console screen, follow the boot sequence.
- 2. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.
- 3. From the main menu, select Device Management.

Front Page				
Front Page				
Front Page Continue PBoot Manager PDevice Management NBoot From File PAdminister Secure Boot PSetup Utility	This selection will take you to the Device Manager			

4. Press [Enter].

### 8. Configure the controller for the MEGARAID SAS 9460-16i

1. From the Devices List, select MEGARAID SAS 9460-16i Configuration Utility and press [Enter].



2. Select Main Menu and press [Enter].

NR AVAGO <avago< th=""><th>MegaRAID SAS 9460-16i&gt; Config</th><th>uration Utility - 07.12.06.00</th></avago<>	MegaRAID SAS 9460-16i> Config	uration Utility - 07.12.06.00
AVAGO <avago 9460-16i="" megaraid="" sas=""> Co</avago>	nfiguration Utility - 07.12.06	. 00
▶Main Henu		Shows menu options such as Configuration
▶Help		Management, Controller Management,
		Virtual Drive Management, Drive
PROPERTIES		Management and Hardware Components.
Status	<optimal></optimal>	
Backplane	[1]	
BBU	<no></no>	
Enclosure	[0]	
Drives	[4]	
Drive Groups	[2]	
Virtual Drives	[2]	
▶View Server Profile		
ACTIONS		
ACTIONS Configure		
Set Factory Defaults		
Modate Firmmare		
Silence Alarm		
BACKGROUND OPERATIONS		
Virtual Drive Operations in Progress	None	
Drive Operations in Progress	None	
MogoDAID ADVANCED SOFTWARE ODTIONS		
	(Enabled)	
MegaRAID RAIDS	<enabled></enabled>	
MegaRAID EastPath	<enabled></enabled>	
▶Manage MegaRAID Advanced Software Opti	ons	

3. Select Controller Management and press [Enter].



4. Select Advanced Controller Management and press [Enter].

AVAGO <avago 9460-16i="" hegaraid="" sas=""> Configuration Utility - 07.12.06.00 AVAGO <avago 9460-16i="" hegaraid="" sas=""> Configuration Utility - 07.12.06.00</avago></avago>					
ASIC PROPERTIES: Product Name Serial Number Controller Status Personality Mode Select Boot Device PCI ID PCI Slot Number Package Version Drive Count Virtual Drive Count Advanced Controller Hanagement Advanced Controller Properties	AVAGO HegaRAID SAS 9460-161 SP75037627 <0ptimal> <raid> <virtual 0:="" 0ptimal="" 1.454tb,="" drive="" raid1,=""> 0x100010x001410x100010x9460 51.12.0-3027 5.120.00-2904 5.1200.00-0013 [4] [2]</virtual></raid>	Provides a link to various controller nanagement activities such as, clear and save controller events, schedule a consistency check, set factory defaults, and so on.			

5. Select Manage Controller Profiles and press [Enter].



6. Choose Profile 11\_NVME4 and press [Enter].

### 7. Set Profile

AVAGO <avago 9460-16i="" hegaraid="" sas=""> Configuration Utility - 07, 12, 06, 00 AVAGO <avago 9460-16i="" hegaraid="" sas=""> Configuration Utility - 07, 12, 06, 00</avago></avago>				
Number of Profiles	[3]	Allows you to submit a selected profile.		
Choose Profile	<11 NVMe4>			
DETAILS OF THE PROFILE:				
Personality Mode	<raid></raid>			
Profile ID	[11]			
Requested Profile ID	[14]			
Default Profile	<no></no>			
Compatible	<yes></yes>			
Max VD Count	[64]			
Max NVMe Count	[4]			
Write Back Supported	<yes></yes>			
▶Set Profile				

8. Save the configuration.

### 9. Reboot the system

- 1. Switch to the SHC.
- 2. From the System Control tab, click Power > Power Management to open the Power Management page.
- 3. From the Emergency or Unresponsive System Power Operations box, click the Hard Reset button.
- 4. Click OK in the confirmation dialog box to launch the selected sequence, which may take a few minutes to complete.

**Note** The RAID volumes must created after reboot.

## Appendix A. BIOS Settings for PCIe blade Slots

### PCIe Slot Numbering





PCIe slot	Туре				
0	PCIe x8 blade	PCIex16 blade			
1	PCIe x8 blade				
2	PCIe x8 blade	PCIox16 blado			
3	PCIe x8 blade				
4	PCIe x8 blade dedicated to RAID/SAS controller				
5	Internal PCIe x16 connector dedicated to GPU card, SAS card or NVME adapter				
6	Internal PCIe x16 connector dedicated to GPU card				

### **BIOS Settings**

Module	Slot	Socket	PCIe Port Number	Cli Parameter
0	0	0	Port 1C	PCI.PciePortDisable_1
	1	0	Port 1A	PCI.PciePortDisable_3
	2	1	Port 2A	PCI.PciePortDisable_28
	3	1	Port 2C	PCI.PciePortDisable_26
	4	1	Port 1A	PCI.PciePortDisable_22
	5	1	Port 3A	PCI.PciePortDisable_30
	6	0	Port 3A	PCI.PciePortDisable_9
	0	2	Port 1C	PCI.PciePortDisable_43
	1	2	Port 1A	PCI.PciePortDisable_45
	2	3	Port 2A	PCI.PciePortDisable_70
1	3	3	Port 2C	PCI.PciePortDisable_68
	4	3	Port 1A	PCI.PciePortDisable_64
	5	3	Port 3A	PCI.PciePortDisable_72
	6	2	Port 3A	PCI.PciePortDisable_51
2	0	4	Port 1C	PCI.PciePortDisable_85
	1	4	Port 1A	PCI.PciePortDisable_87
	2	5	Port 2A	PCI.PciePortDisable_112
	3	5	Port 2C	PCI.PciePortDisable_110
	4	5	Port 1A	PCI.PciePortDisable_106
	5	5	Port 3A	PCI.PciePortDisable_114
	6	4	Port 3A	PCI.PciePortDisable_93
3	0	6	Port 1C	PCI.PciePortDisable_127
	1	6	Port 1A	PCI.PciePortDisable_129
	2	7	Port 2A	PCI.PciePortDisable_154
	3	7	Port 2C	PCI.PciePortDisable_152
	4	7	Port 1A	PCI.PciePortDisable_148
	5	7	Port 3A	PCI.PciePortDisable_156
	6	6	Port 3A	PCI.PciePortDisable_135

## Appendix B. Supported Processors for DCPMM Memory modules

Processor	Maximum supported memory
Intel® Xeon® Platinum 28C 2.7GHz P-8280-205W Intel® Xeon® Platinum 28C 2.2GHz P-8276-165W Intel® Xeon® Platinum 26C 2.6GHz P-8270-205W Intel® Xeon® Platinum 24C 2.9GHz P-8268-205W Intel® Xeon® Platinum 24C 2.4GHz P-8260-165W Intel® Xeon® Platinum 4C 3.8GHz P-8256-105W Intel® Xeon® Gold 24C 1.9GHz G-6262V-135W Intel® Xeon® Gold 18C 3.1GHz G-6254-200W Intel® Xeon® Gold 24C 2.1GHZ G-6252-150W	
Intel® Xeon® Gold 8C 3.6GHz G-6244-150W Intel® Xeon® Gold 16C 2.8GHz G-6242-150W Intel® Xeon® Gold 18C 2.6GHZ G-6240-150W Intel® Xeon® Gold 22C 2.1GHz G-6238-140W Intel® Xeon® Gold 8C 3.4GHZ G-6234-130W Intel® Xeon® Gold 20C 2.1GHz G-6230-125W Intel® Xeon® Gold 12C 2.8GHz G-6226-125W Intel® Xeon® Gold 12C 1.8GHz G-6222V-115W Intel® Xeon® Gold 4C 3.8GHz G-5222-105W Intel® Xeon® Gold 18C 2.2GHz G-5220-125W Intel® Xeon® Gold 16C 2.3GHz G-5218-125W	1 TB
Intel® Xeon® Platinum 28C 2.7GHz P-8280M-205W Intel® Xeon® Platinum 28C 2.2GHz P-8276M-165W Intel® Xeon® Platinum 24C 2.4GHz P-8260M-165W Intel® Xeon® Gold 18C 2.6GHz G-6240M-150W	2 ТВ
Intel® Xeon® Platinum 28C 2.7GHz P-8280L-205W Intel® Xeon® Platinum 28C 2.2GHz P-8276L-165W Intel® Xeon® Platinum 24C 2.4GHz P-8260L-165W Intel® Xeon® Gold 18C 2.6GHz G-6240L-150W	4.5 TB

## **Appendix C. Creating Namespaces**

Namespaces can be created with either the BIOS Setup utility or the Linux command lines.

### W081

### 📥 WARNING

W081:

The goal creation require the removal of the existing namespaces, that may result in a loss of data.

W082

### 

These procedures are for advanced users only. Risk of system damage.

### C.1. Creating Namespaces with the BIOS Interface

### Procedure

1. If not already done, set up remote access

### 2. Start the SHC

- 1. Launch the web browser and enter the standard or secure IP address or host name of the master module, according to the settings. The authentication page opens.
- 2. Complete the Username and Password fields and click Log On. The **System Control** page opens.

### 3. Stop the Remote System Console

Close the Remote System Console screen if it is running.

### 4. Power Off the Server from the SHC

- 1. From the **System Control** tab, click **Power > Power Management** to open the **Power Management** page.
- 2. From the Standard Power Operations box, click Power Off.
- 3. Click **OK** in the confirmation dialog box to launch the routine power off sequence, which may take a few minutes to complete.

### 5. Launch the Remote System Console

From the **System Control** tab, click **Remote Console > Launch**. The Remote System Console opens in a new window.

**See** SHC Reference Guide for more information.

Important Be sure to select NO when the Java security warning asks if the execution of potentially dangerous components should be blocked.

**Note** With some Java updates the Remote System Console is prevented from loading by Java security checks. In this case, the Remote System Console URL must be added to the Exception Site List in the Java control panel.

### 6. Launch the BIOS interface

- 1. Click Power > Power Management to open the Power Management page
- 2. Click Power On to launch the boot sequence.
- 3. Switch to the Remote Console screen.
- 4. Press [Esc] when the **Press Esc for boot options** message is displayed.



### 7. Launch the Device Manager

- 1. On the Remote Console screen, follow the boot sequence.
- 2. Press [Esc] when the Hit [Esc] for Boot Menu message is displayed.

3. From the main menu, select Device Management.



4. Press [Enter].

### 8. Lauch the DCPMM memory configuration

From the list, select Intel® Optane<sup>m</sup> DC Persistent Memory Configuration and press [Enter].



### 9. Create namespaces

1. From the list, select Namespaces and press [Enter].

Intel(R) Optane(TM) DC	Intel(R) Optane(TM) DC Persis Persistent Memory Configuration	tent Henory Configuration	
Version: 1.0.0.3344 Select an action below.		View and configure regions.	
Detected DIMMs: All DIMMs are healthy.	[4]		
+DIHHs FRegions FNamespaces FTotal capacity +Diagnostics +Preferences			

2. Select Create namespace.

Intel(R) Optane(TH) DC Persistent Memory Configuration			
Select a namespace to view more information.	View details for or modify selected		
NamespaceID Name Health Status +0x00000100 Healthy	namespace.		
≻Create namespace ▶Back to main menu			

- 3. Select Back to main menu and press [Enter].
- 4. Return to the BIOS main menu by pressing [Esc].

### C.2. Creating Namespaces with the Linux Commands

### **Prerequisites**

ndctl tool and its dependencies are installed ipmctl tool and its dependencies are installed

#### Procedure

### 1. List regions

Run the command:

\$ ndctl list --regions --human

```
Output
```

```
[
{
    "dev":"region5",
    "size":"982.00 GiB (1054.41 GB)",
    "available_size":"982.00 GiB (1054.41 GB)",
    "type":"pmem",
    "iset_id":"0x12c2eeb8232f2444"
},
{
    "dev":"region4",
    "size":"982.00 GiB (1054.41 GB)",
    "available_size":"982.00 GiB (1054.41 GB)",
    "type":"pmem",
    "iset_id":"0x4ae2eeb813312444"
}
]
```

### 2. If required, remove all the existing namespaces

Run the command:

\$ ndctl destroy-namespace all -f

### 3. Create namespaces

Create as many namespaces as regions.

Run the command:

\$ ndctl create-namespace

Output

```
{
   "dev":"namespace4.0",
   "mode":"memory",
   "size":"966.65 GiB (1037.94 GB)",
   "uuid":"54b2812d-6f60-49ac-9ecc-55f8a6b0dcc9",
   "blockdev":"pmem4",
   "numa_node":2
}
```

### 4. Check namespaces

Run the command:

\$ ndctl list --namespaces

#### Output

```
[
    {
        "dev":"namespace5.0",
        "mode":"memory",
        "size":1037937147904,
        "uuid":"86681349-cff3-43e5-8023-a865663ee360",
        "blockdev":"pmem5",
        "numa_node":1
    },
    {
        "dev":"namespace4.0",
        "mode":"memory",
        "size":1037937147904,
        "uuid":"54b2812d-6f60-49ac-9ecc-55f8a6b0dcc9",
        "blockdev":"pmem4",
        "numa_node":2
    }
]
```

### 5. Build the filesystems

1. List the persistent memory resources

Run the command:

\$ Is -Itr /dev/pmem\*

Output

brw-rw----. 1 root disk 259, 4 Dec 11 13:27 /dev/pmem5 brw-rw----. 1 root disk 259, 5 Dec 11 13:34 /dev/pmem4

2. Format the persistent memory areas

Run the command:

\$ mkfs -t xfs -f /dev/pmem<number>

#### Example

\$ mkfs -t xfs -f /dev/pmem4

#### Output

meta-data=/dev/pmem4		isize=512	agcount=4, agsize=63350656 blks
	=	sectsz=4096	attr=2, projid32bit=1
	=	crc=1	finobt=0, sparse=0
data	=	bsize=4096	blocks=253402624, imaxpct=25
	=	sunit=0	swidth=0 blks
naming	=version 2	bsize=4096	ascii-ci=0 ftype=1
log <u>l</u>	=internal log	bsize=4096	blocks=123731, version=2
	=	sectsz=4096	sunit=1 blks, lazy-count=1
realtime	=none	extsz=4096	blocks=0, rtextents=0

#### 6. Mount the namespaces

1. Create a directory

Run the command:

\$ mkdir /mnt/<dir>

2. Mount the /dev/pmem<number>

Run the command:

\$ mount -o dax /dev/pmem<number> /mnt/<dir>

### Example

\$ mount -o dax /dev/pmem4 /mnt/aep\_dir1

## **Appendix D. BIOS Settings for USB Ports**

BIOS settings depend on the location of the USB ports on the server.





Mark	Description	Command line parameter	BIOS setup utility parameter
А	Top USB port	UsbPort0	Usb Port1
В	Middle USB port	UsbPort8	Usb Port9
С	Bottom USB port	UsbPort9	Usb Port10

### Hitachi Vantara

Corporate Headquarters 2535 Augustine Drive Santa Clara, CA 95054 USA <u>www.HitachiVantara.com</u> <u>community.HitachiVantara.com</u> Regional Contact Information

Americas: +1 866 374 5822 or info@hitachivantara.com

Europe, Middle East and Africa: +44 (0) 1753 618000 or <u>info.emea@hitachivantara.com</u> Asia Pacific: +852 3189 7900 or <u>info.marketing.apac@hitachivantara.com</u>

##