Problem determination and troubleshooting

Using ThinkSystem tools to perform troubleshooting actions on DCPMMs

Lenovo

Problem determination and troubleshooting overview

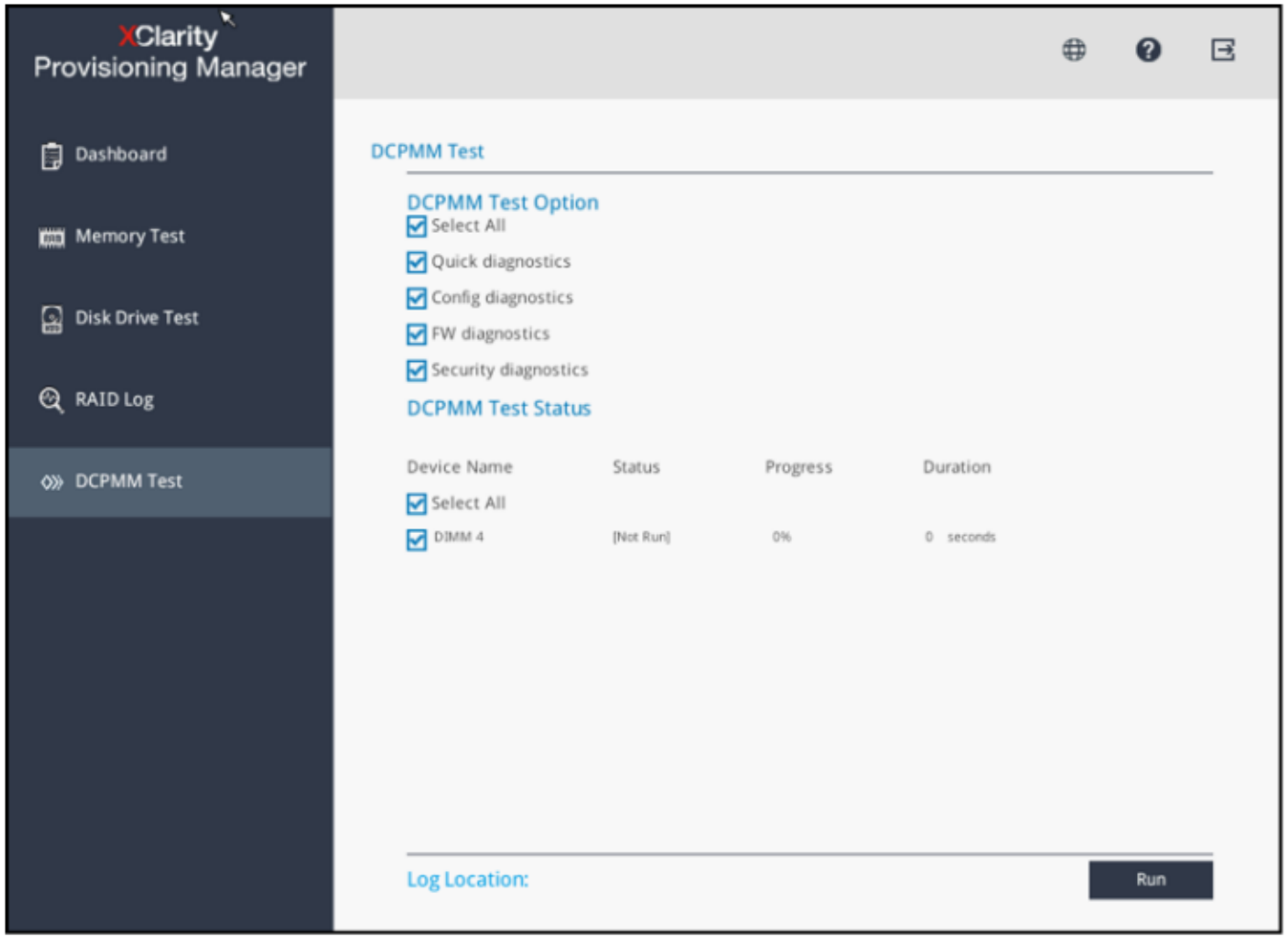
Use the following methods to monitor DCPMM status or collect service data about DCPMMs:

- XCC
  - Collect service data
  - Check the XCC event log
- OneCLI
  - Collect the out-of-band or in-band FFDC log
- LXPM
  - Run a DCPMM diagnostics test
- OS environment
  - Use ipmctl commands to check DCPMM health status
  - Check the OS event log and disk management for DCPMM health status

DCPMM diagnostics testing in LXPM

Go to the LXPM diagnostics page to run a diagnostics test on DCPMMs.
If the DCPMMs are provisioned for App Direct mode, run a DCPMM test for DCPMM hardware diagnostics.
If the DCPMMs are provisioned for Memory mode or Mixed Memory mode, run both a Memory test and DCPMM test for diagnostics.

- Click HERE to view DCPMM test item definitions.
- Click HERE to view a DCPMM test log sample.



DCPMM test item definitions

- Quick diagnostics – Verify the basic health status for installed DCPMMs
- Config diagnostics – Verify whether the UEFI platform configuration matches the installed hardware
- FW diagnostics – Verify the consistency of firmware for installed DCPMMs
- Security diagnostics – Verify the consistency of security states for installed DCPMMs

DCPMM test log sample

Scroll down for more information.

```
DCPMM Test

Start Time : 2019-01-23 00:22:10

DIMM slot:  DIMM 4, DIMM ID: 0x0001
---Diagnostic=Quick---
   State=Ok
   Message=The quick health check succeeded.
---Diagnostic=Config---
   State=Ok
   Message=The platform configuration check succeeded.
---Diagnostic=FW---
   State=Ok
   Message=The firmware consistency and settings check succeeded.
---Diagnostic=Security---
   State=Ok
   Message=The security check succeeded.
 DimmID | Type                                | CurrentValue | CurrentState
========================================================================
 0x0001 | Health                              | Healthy      | Normal
 0x0001 | MediaTemperature                    | 47C          | Normal
 0x0001 | ControllerTemperature               | 49C          | Normal
 0x0001 | PercentageRemaining                 | 100%         | Normal
 0x0001 | LatchedDirtyShutdownCount           | 15           | Normal
```

DCPMM test log sample

Scroll down for more information.

```
---Diagnostic=Config---
   State=Ok
   Message=The platform configuration check succeeded.
---Diagnostic=FW---
   State=Ok
   Message=The firmware consistency and settings check succeeded.
---Diagnostic=Security---
   State=Ok
   Message=The security check succeeded.
```

DimmID	Type	CurrentValue	CurrentState
0x0001	Health	Healthy	Normal
0x0001	MediaTemperature	47C	Normal
0x0001	ControllerTemperature	49C	Normal
0x0001	PercentageRemaining	100%	Normal
0x0001	LatchedDirtyShutdownCount	15	Normal
0x0001	PowerOnTime	2081022s	Normal
0x0001	UpTime	122s	Normal
0x0001	PowerCycles	457	Normal
0x0001	FwErrorCount	8	Normal
0x0001	UnlatchedDirtyShutdownCount	208	Normal

```
End Time : 2019-01-23 00:22:21
```

Check DCPMM status through ipmctl commands in the OS environment

Use the following command to check the DCPMM hardware health status in the OS environment.

`ipmctl show -dimm`

```
PS C:\Users\Administrator> ipmctl show -dimm

 DimmID | Capacity  | HealthState | ActionRequired | LockState | FWVersion
==========================================================================
 0x0001 | 502.5 GiB | Healthy     | 0              | Disabled  | 01.02.00.5336
```

Use the following command to check the DCPMM namespace health status in the OS environment.

`Get-PmemDisk`

```
PS C:\Users\Administrator> Get-PmemDisk

DiskNumber Size   HealthStatus AtomicityType CanBeRemoved PhysicalDeviceIds UnsafeShutdownCount
---------- ----   ------------ ------------- ------------ ----------------- ------------------
1          502 GB Unhealthy    None          True         {1}               3
```

OneCLI commands for problem determination

Use the OneCLI `show IntelOptaneDCPMM` command to monitor DCPMM status, or use the `inventory getinfor --ffdc --htmlreport` command to collect system service data, which includes DCPMM service data.
It is recommend that users collect in-band service data for problem determination and escalation actions, especially when running DCPMMs in App Direct mode or Mixed Memory mode. In this way, service personnel can also collect the OS-level logs for problem determination actions.
Click the buttons for service data sample screens. Refer to the OneCLI log sample.zip file in the course landing page for the complete log sample file.

show command result

Service data

`show` command result

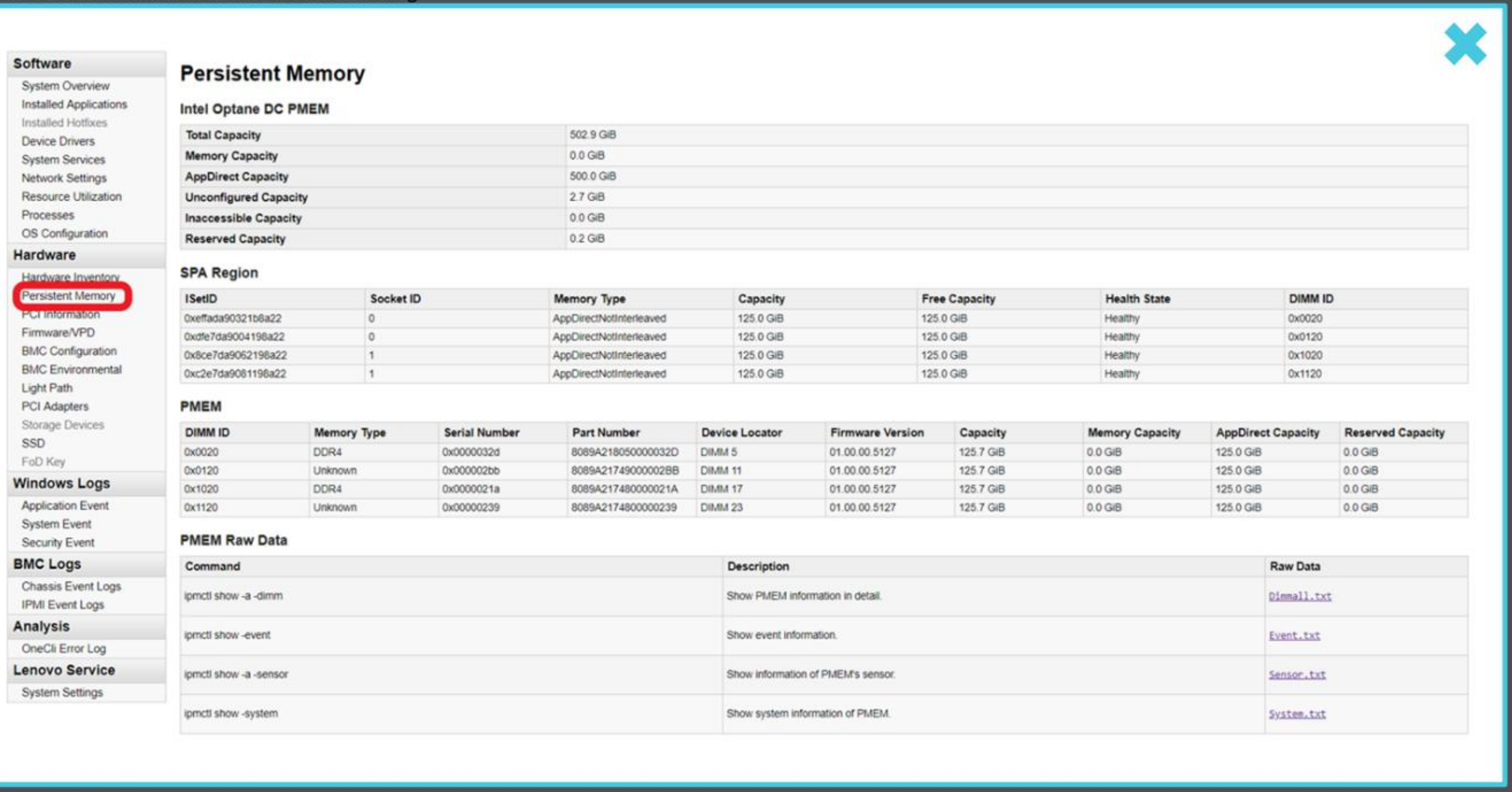
Scroll down for more information.

```
IntelOptaneDCPMM.CreateGoal=No
IntelOptaneDCPMM.MemoryModePercentage=0
IntelOptaneDCPMM.PersistentMemoryType=App Direct
IntelOptaneDCPMM.TotalRawCapacity=505.6 GB
IntelOptaneDCPMM.TotalMemoryCapacity=248.0 GB
IntelOptaneDCPMM.TotalAppDirectCapacity=256.0 GB
IntelOptaneDCPMM.PercentageRemainingThresholds=10
IntelOptaneDCPMM.RegionID.1=0x0001
IntelOptaneDCPMM.RegionSocket.1=Processor 1
IntelOptaneDCPMM.RegionCapacity.1=256.0 GB
IntelOptaneDCPMM.RegionType.1=App Direct
IntelOptaneDCPMM.SecurityState=Disabled
IntelOptaneDCPMM.SecurityOperation=None
```

`show` command result

Scroll down for more information.

```
IntelOptaneDCPMM.DcpmmLocation.4=DIMM 9
IntelOptaneDCPMM.DcpmmUid.1=8089-A2-1834-00000FB8
IntelOptaneDCPMM.DcpmmUid.2=8089-A2-1834-00001538
IntelOptaneDCPMM.DcpmmUid.3=8089-A2-1834-00000D38
IntelOptaneDCPMM.DcpmmUid.4=8089-A2-1834-0000100A
IntelOptaneDCPMM.DcpmmSecurityState.1=Disabled
IntelOptaneDCPMM.DcpmmSecurityState.2=Disabled
IntelOptaneDCPMM.DcpmmSecurityState.3=Disabled
IntelOptaneDCPMM.DcpmmSecurityState.4=Disabled
IntelOptaneDCPMM.DcpmmAutoUnlockState.1=Not Applicable
IntelOptaneDCPMM.DcpmmAutoUnlockState.2=Not Applicable
IntelOptaneDCPMM.DcpmmAutoUnlockState.3=Not Applicable
IntelOptaneDCPMM.DcpmmAutoUnlockState.4=Not Applicable
```



- **Software**
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  - System Settings

Persistent Memory

Intel Optane DC PMEM

Total Capacity	502.9 GiB
Memory Capacity	0.0 GiB
AppDirect Capacity	500.0 GiB
Unconfigured Capacity	2.7 GiB
Inaccessible Capacity	0.0 GiB
Reserved Capacity	0.2 GiB

SPA Region

ISetID	Socket ID	Memory Type	Capacity	Free Capacity	Health State	DIMM ID
0xeffada90321b8a22	0	AppDirectNotInterleaved	125.0 GiB	125.0 GiB	Healthy	0x0020
0xdfe7da9004198a22	0	AppDirectNotInterleaved	125.0 GiB	125.0 GiB	Healthy	0x0120
0x8ce7da9062198a22	1	AppDirectNotInterleaved	125.0 GiB	125.0 GiB	Healthy	0x1020
0xc2e7da9081198a22	1	AppDirectNotInterleaved	125.0 GiB	125.0 GiB	Healthy	0x1120

PMEM

DIMM ID	Memory Type	Serial Number	Part Number	Device Locator	Firmware Version	Capacity	Memory Capacity	AppDirect Capacity	Reserved Capacity
0x0020	DDR4	0x0000032d	8089A2180500000032D	DIMM 5	01.00.00.5127	125.7 GiB	0.0 GiB	125.0 GiB	0.0 GiB
0x0120	Unknown	0x000002bb	8089A21749000002BB	DIMM 11	01.00.00.5127	125.7 GiB	0.0 GiB	125.0 GiB	0.0 GiB
0x1020	DDR4	0x0000021a	8089A217480000021A	DIMM 17	01.00.00.5127	125.7 GiB	0.0 GiB	125.0 GiB	0.0 GiB
0x1120	Unknown	0x00000239	8089A2174800000239	DIMM 23	01.00.00.5127	125.7 GiB	0.0 GiB	125.0 GiB	0.0 GiB

PMEM Raw Data

Command	Description	Raw Data
ipmctl show -a -dimm	Show PMEM information in detail.	Dimmall.txt
ipmctl show -event	Show event information.	Event.txt
ipmctl show -a -sensor	Show information of PMEM's sensor.	Sensor.txt
ipmctl show -system	Show system information of PMEM.	System.txt

DCPMM migration problems

If users do not follow the DCPMM installation order when they install DRAM DIMMs and DCPMMs on their systems, or if they don't follow the correct rules when they migrate DCPMMs to other systems, the DCPMMs may not work normally, and users may find one or more of the following SELs in the XCC event log:

Scroll down for more information.

Event ID	Description	Actions
FQXSFMA0033M	Intel Optane DCPMM persistent memory interleave set has # DCPMMs(DIMM [#]), [#] DIMMs' location is not correct	Ask the user to follow the DCPMM installation order in the Setup Guide to reinstall the DCPMMs to the correct slots.
FQXSFMA0034M	DIMM [#] (UID: [#]) of Intel Optane DCPMM persistent memory interleave set should be moved to DIMM slot [#] in sequence	The user migrated the DCPMM to another system and did not install it in the same slot number as the original system. Check the DIMM slot number and reinstall the DCPMM.
FQXSFMA0035M	Intel Optane DCPMM interleave set should have # DCPMMs, but # DCPMMs are missing	The user might have installed one or more DCPMMs in the incorrect DIMM slots. Ask the user to collect and provide the XCC service data. Use the service data to determine the details about the DIMM slot numbers of any missing DCPMMs, and then ask the user to follow the system Setup

DCPMM migration problems

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Scroll down for more information.

		Guide to reinstall any incorrectly installed DCPMMs in the correct DIMM slots.
FQXSFMA0036M	DIMM # (UID: #) of Intel Optane DCPMM persistent memory interleave set is missing.	The user might have installed one or more DCPMMs in the incorrect DIMM slots. Ask the user to collect and provide the XCC service data. Use the service data to determine the details about the DIMM slot numbers of the missing DCPMMs, and then ask the user to follow the system Setup Guide to reinstall any incorrectly installed DCPMMs in the correct DIMM slots.
	Intel Optane DCPMM interleave set	The user migrated DCPMMs set to App Direct mode or Mixed Memory mode from one type of system platform to another (for example, from an SR650 to an SR550). The user first needs to check the system specifications and make sure the DCPMMs are supported on the new system. If the DCPMMs are supported, ask the user to: 1. Reinstall the DCPMMs to the original system.

DCPMM migration problems

If users do not follow the DCPMM installation order when they install DRAM DIMMs and DCPMMs on their systems, or if they don't follow the correct rules when they migrate DCPMMs to other systems, the DCPMMs may not work normally, and users may find one or more of the following SELs in the XCC event log:

Scroll down for more information.

FQXSFMA0037G	Intel Optane DCPMM interleave set (DIMM #) is migrated from another system (machine type: #), these migrated DCPMMs are not supported nor warranted in this system.	The user migrated DCPMMs set to App Direct mode or Mixed Memory mode from one type of system platform to another (for example, from an SR650 to an SR550). The user first needs to check the system specifications and make sure the DCPMMs are supported on the new system. If the DCPMMs are supported, ask the user to: 1. Reinstall the DCPMMs to the original system. 2. Back up the data from the DCPMMs. 3. Delete all file systems and namespaces on the DCPMMs. 4. Make sure the DCPMMs' security state is disabled. 5. Set the DCPMMs to non-interleaved. 6. Perform the secure erase action on all the DCPMMs and reboot the system. 7. Migrate the DCPMMs to the new system and re-provision the DCPMMs on the new system.

DCPMMs with no remaining spare blocks

If a DCPMM has no remaining spare blocks, users should contact Lenovo to purchase a replacement. (This is not covered by the service warranty.)
Users can find DCPMM remaining spare block information in the following locations:

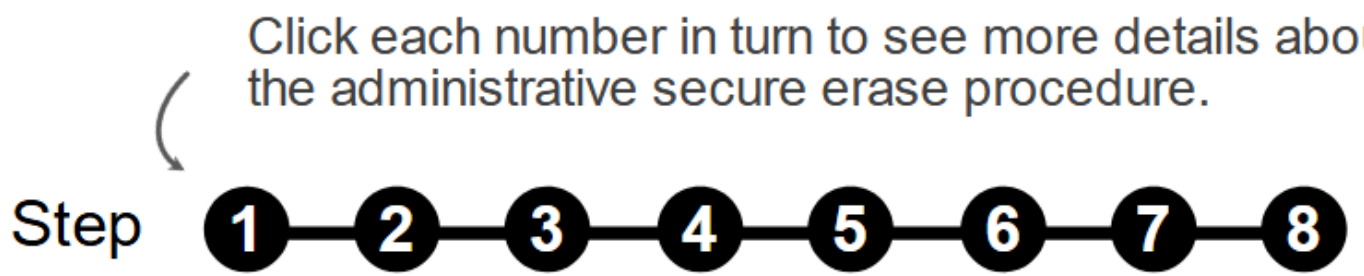
- The DCPMM test log in LXPM diagnostics.
- The System Event Log (SEL) in UEFI: FQXSFMA0032M Intel Optane DCPMM DIMM %s has no remaining spare blocks.

Note: For more information on warranty coverage for DCPMM, refer to Lenovo Statement of Limited Warranty documentation.

Forgotten DCPMM passphrase

If a user enables the DCPMM security setting, forgets the passphrase, and then asks Lenovo support to perform secure erase actions, the service personnel should perform the administrative secure erase procedure to unlock the DCPMM without the passphrase.

Note: When the DCPMM is unlocked with the administrative secure erase procedure, all stored data in the DCPMM will be deleted and cannot be recovered. There is no way to extract the stored data on the DCPMM without the correct passphrase. Make sure the user understands this before performing the administrative secure erase procedure on the DCPMM.



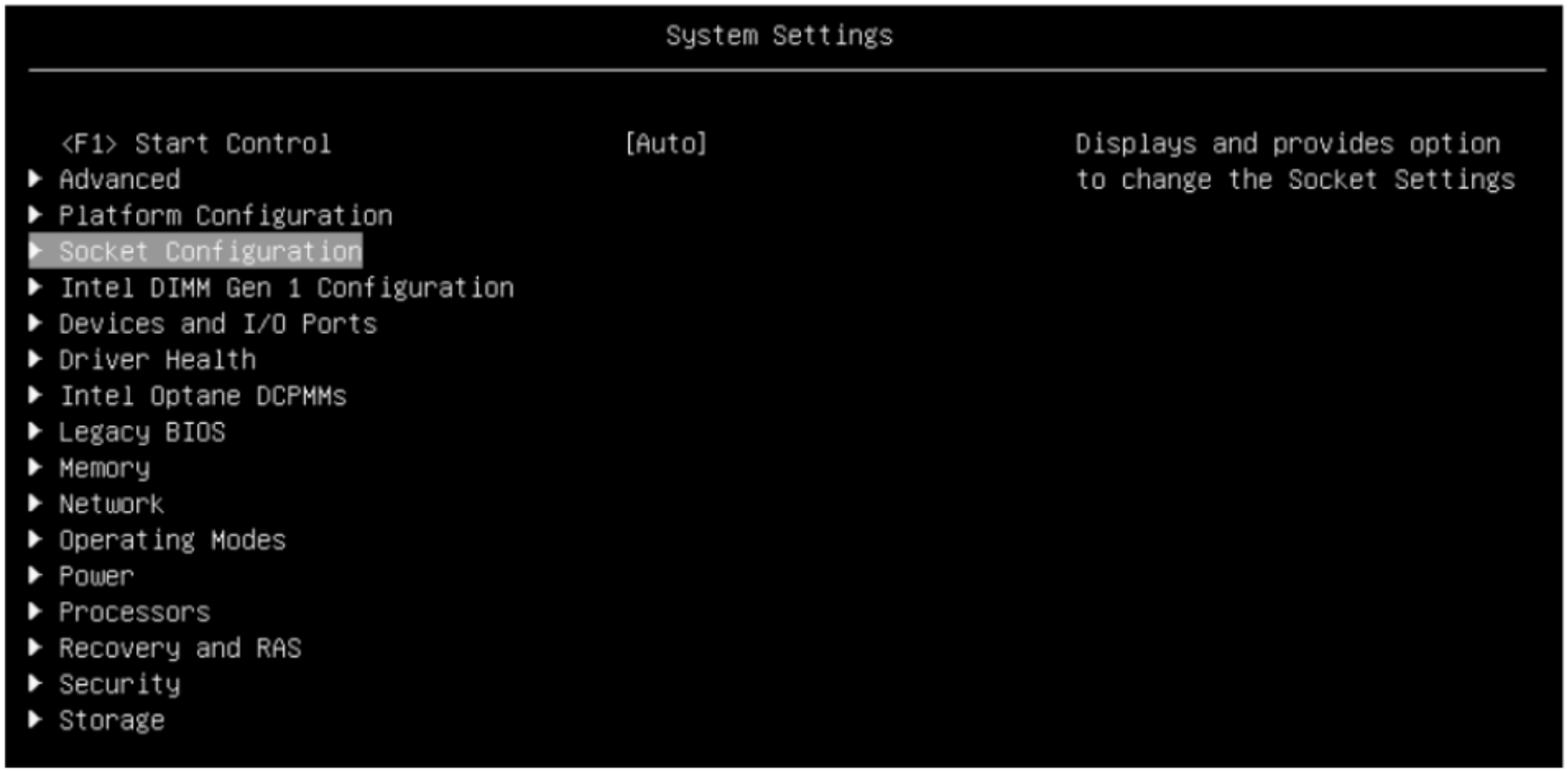
Forgotten DCPMM passphrase

Use the following OneCLI command to enable the UEFI advanced debug control mode on the system:

- `onecli config set SystemOobCustom.AdvancedDebugControl "Enable" --override --bmc <XCC user name>:<XCC password>@<XCC IP address>`
- Example: `onecli config set SystemOobCustom.AdvancedDebugControl "Enable" --override --bmc USERID:PASSW0RD@10.10.120.72`

Forgotten DCPMM passphrase

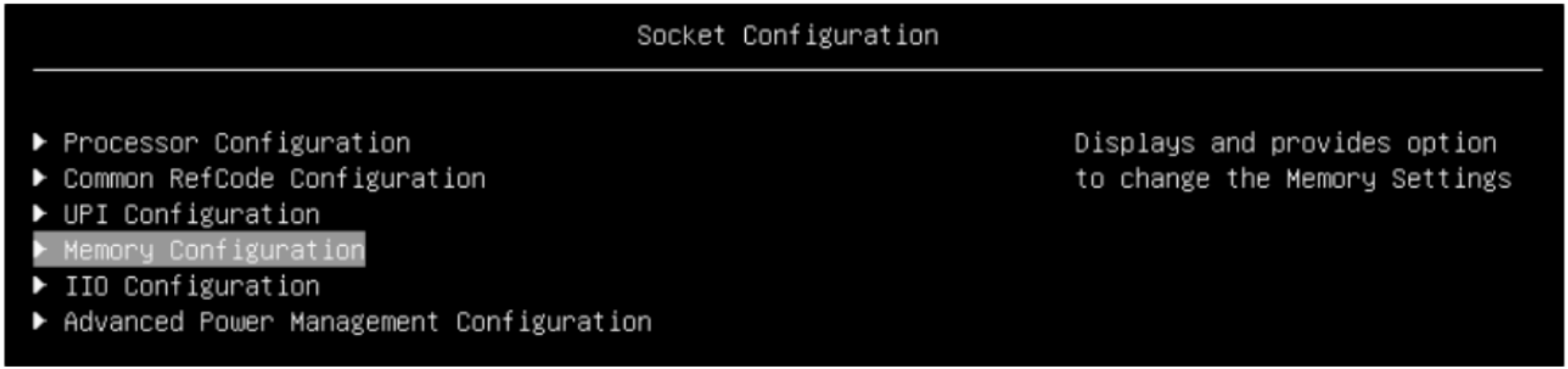
Restart the system and enter UEFI. Go to **System Setting → Socket Configuration**.



Step 1 2 3 4 5 6 7 8

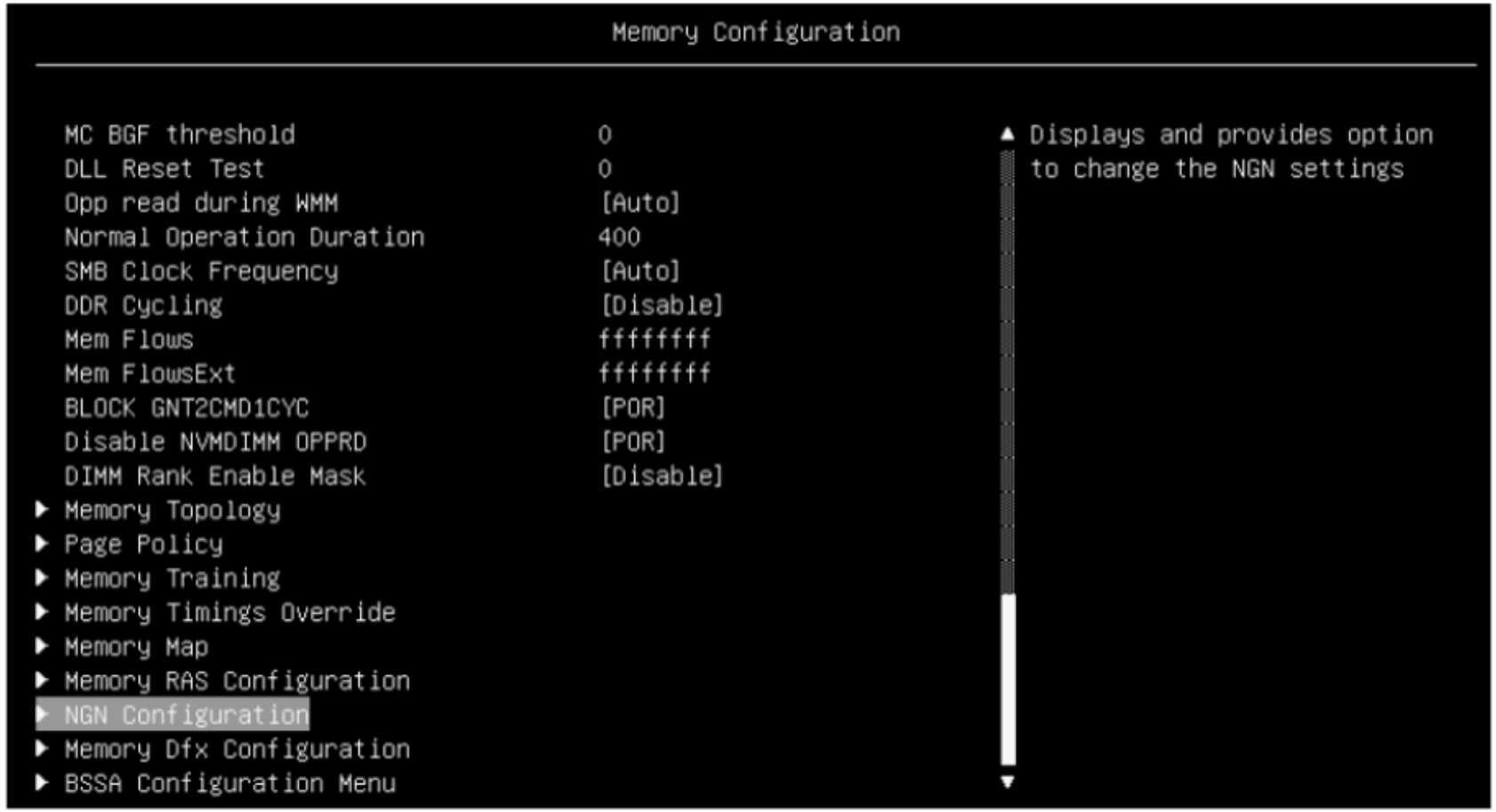
Forgotten DCPMM passphrase

Select **Memory Configuration**.



Forgotten DCPMM passphrase

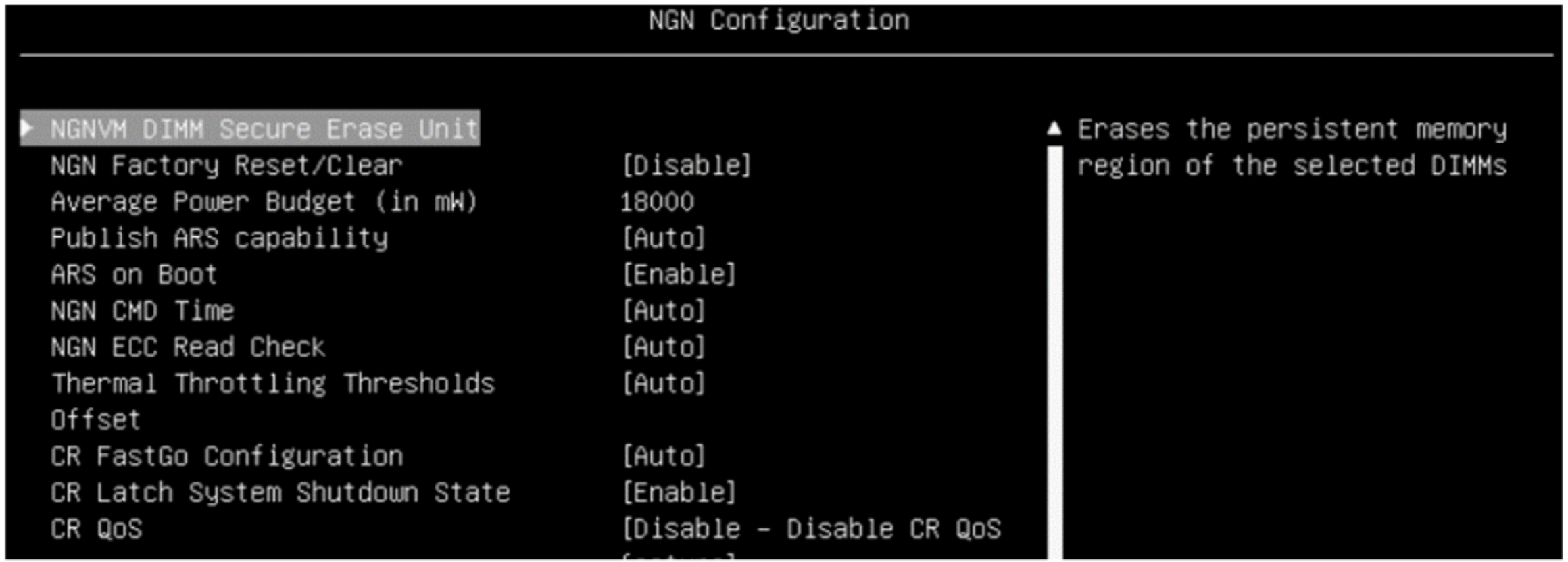
Select **NGN Configuration**.



Step 1 2 3 4 5 6 7 8

Forgotten DCPMM passphrase

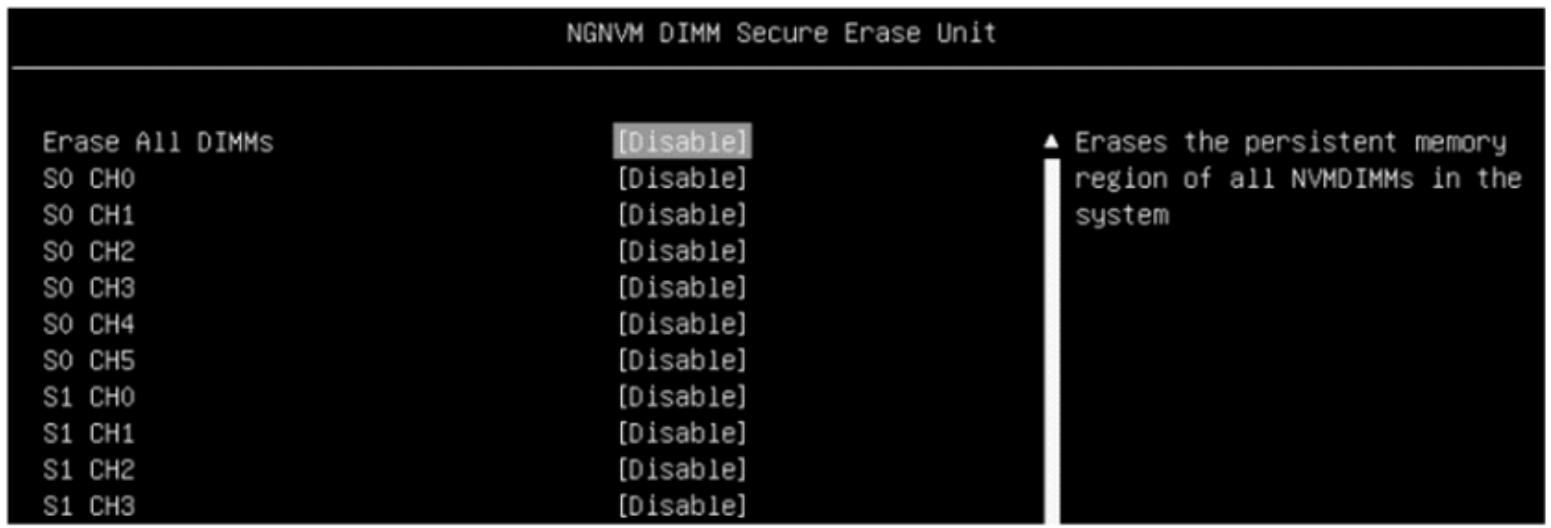
Select **NGNVM DIMM Secure Erase Unit**.



Step 1 2 3 4 5 6 7 8

Forgotten DCPMM passphrase

Enable **Erase All DIMMs** to erase the memory region of all DCPMMs, or enable one DCPMM to erase a single DCPMM. (S# = processor socket number, CH# = processor integrated memory controller channel number - refer to each system's *DIMM configuration* on the ThinkSystem Documentation Web site for processor socket / channel / DIMM slot number information)



Forgotten DCPMM passphrase

Go back to the UEFI main page, select Save Settings, and reboot the system to implement the erase procedure. When the administrative secure erase procedure is complete, the DCPMM will be unlocked, all the data stored in the DCPMM will have been erased, and the DCPMM can be re-provisioned.

Step 1 2 3 4 5 6 7 8

Forgotten DCPMM passphrase

Use the following OneCLI command to disable the UEFI advanced debug control mode on the system:

- `onecli config set SystemOobCustom.AdvancedDebugControl "Disable" -override -bmc <XCC user name>:<XCC password>@<XCC IP address>`
- Example: `onecli config set SystemOobCustom.AdvancedDebugControl "Disable" --override --bmc USERID:PASSW0RD@10.10.120.72`

Summary

This course enabled you to:

- Describe the features of DCPMMs
- Describe the DCPMM operation modes
- Describe the DCPMM population rules
- Describe the DCPMM configuration procedures
- Describe the DCPMM firmware update procedures
- Describe the DCPMM replacement procedures
- Describe the DCPMM problem determination and troubleshooting steps