Lenovo XClarity Controller 2 on ThinkSystem V3 servers

New features and enhancements

Tool overview

XCC2 has the following new features and enhancements:

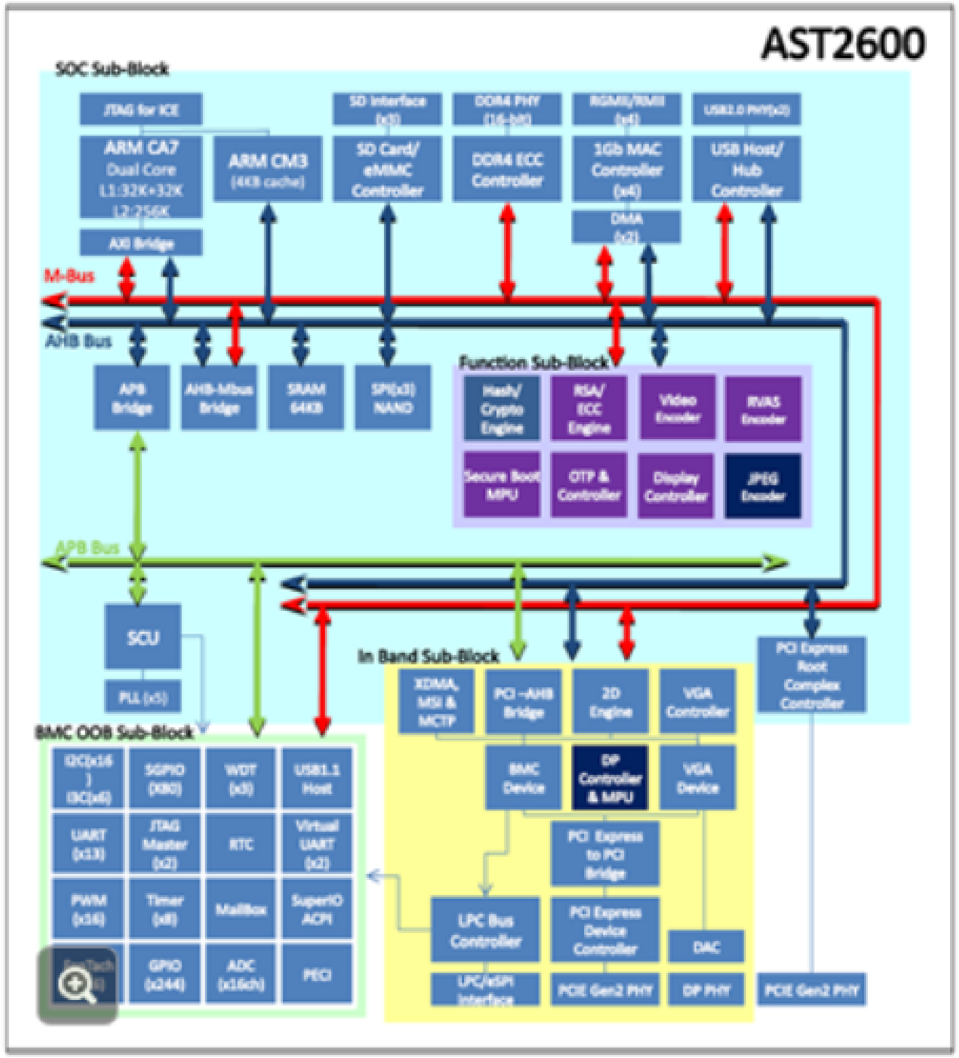
- New XCC chip with enhanced performance and security
  - ASPEED AST2600
- Advanced security enhancements
  - Enhanced security modes
    - Enterprise Strict Security Mode, Standard Security Mode, and Compatibility Security Mode
  - Enhanced NIST 800-193 (PFR) support
  - System Guard to protect against supply chain attacks
- New features to extend the manageability and serviceability functions
  - Redfish standard-based firmware update enhancement
  - Support for an SD card option to extend XCC storage
  - XCC federated group support
  - Enhanced LDAP configuration to support complex hierarchies
  - Customer-configurable thermal fan speed profile
  - Customer-selectable Service Data Log (Mini-Log)

Note: XCC2 is only available on the ThinkSytem V3 platform.

New XCC chip – ASPEED AST2600

The ASPEED AST2600 is the main XCC chipset, and it's installed on the system I/O board. This chip has the following improvements:

- Embedded dual-core ARM Cortex A7 32-bit RISC CPU, maximum running frequency: 1.2 GHz
- Integrated quad ports 10/100/1000 Mbps Fast Ethernet MACs compliant with IEEE802.3 and IEEE802.3z specification
- Integrated 16 multi-function I2C/SMBus bus controllers and six sets of MIPI I3C controllers
- Support for 13 UART controllers and 13 UART I/O interfaces
- Hardware hash and crypto engine
- Improved security for protection
  - Hardware secure boot, support for hardware boot image measurement and decryption
  - Hardware secure vault



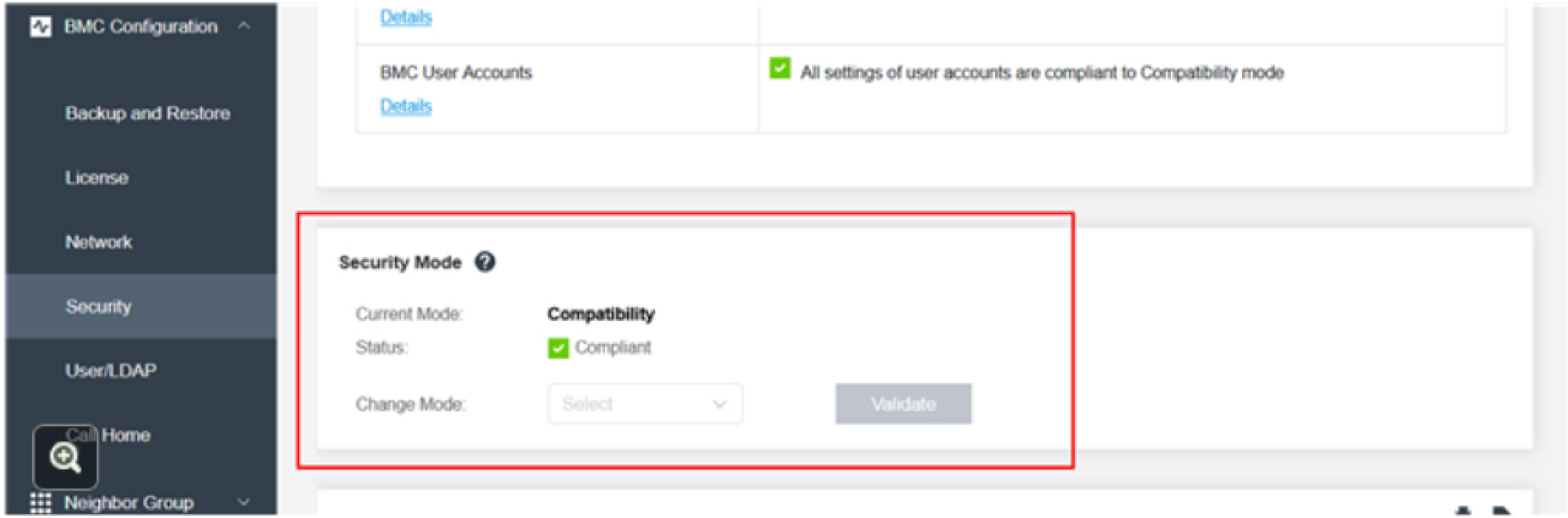
Security modes

Three new security modes are available for selection by going to the **XCC** page and selecting **BMC Configuration → Security**.

- Enterprise Strict Security Mode
  - Strict Security Mode is the most secure mode
  - Enablement requires an XCC Platinum license key
  - All cryptography algorithms used by XCC are CNSA compliant
  - XCC operates in FIPS 140-2/140-3 validated mode
  - Requires CNSA grade certificates
  - Only services that support CNSA-level cryptography are allowed
- Standard Security Mode
  - Standard Mode is the default security mode
  - Requires FIPs grade certificates
  - All cryptography algorithms used by XCC are FIPS 140-3/FIPS 140-2 compliant
  - XCC operates in FIPS 140-2/140-3 validated mode
  - Services that require cryptography that do not support FIPS 140-2/FIPS 140-3-level cryptography are disabled by default

Security modes - continued

- Compatibility Security Mode
  - Used when services and clients require cryptography that is not CNSA/FIPS compliant
  - A wider range of cryptography algorithms are supported
  - When this mode is enabled, XCC is NOT operating in FIPS-validated mode
  - Allows all services to be enabled



BMC User Accounts
Details

☑ All settings of user accounts are compliant to Compatibility mode

Security Mode

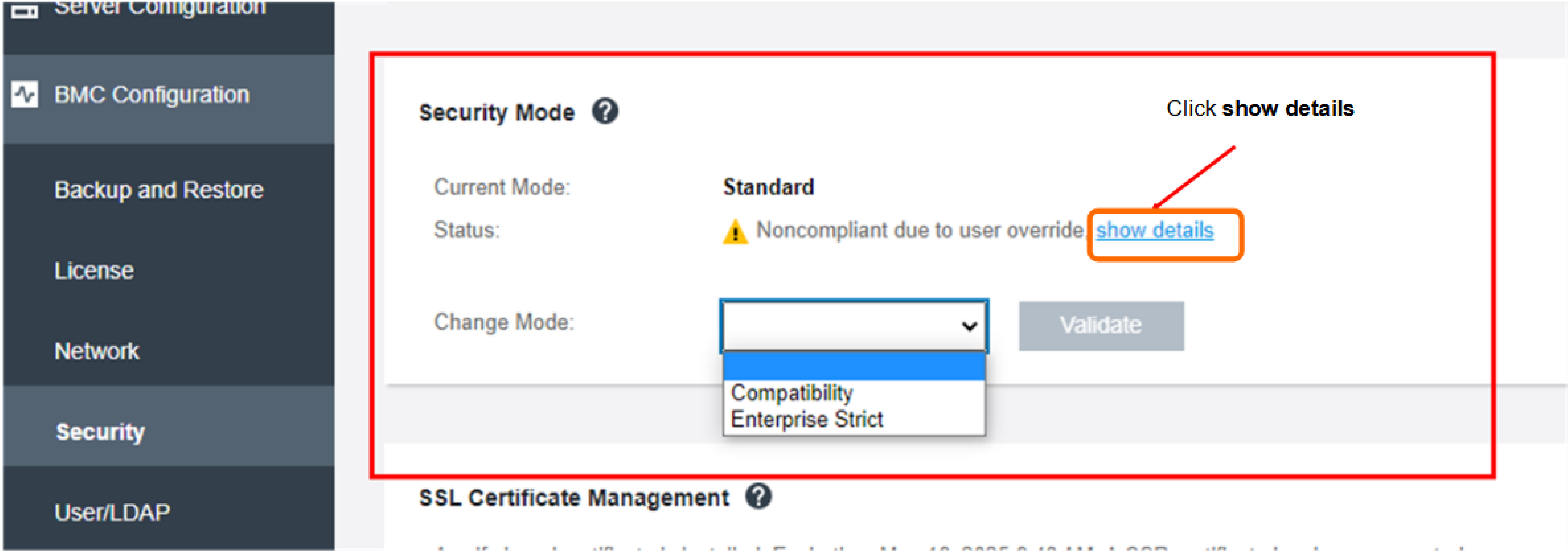
Current Mode: Compatibility

Status: ☑ Compliant

Change Mode: Select

Security modes – show details

Click **show details** to check the security mode status and to validate mode compliance and switch modes.



Security Mode

Current Mode: **Standard**

Status: ⚠ Noncompliant due to user override show details

Change Mode:

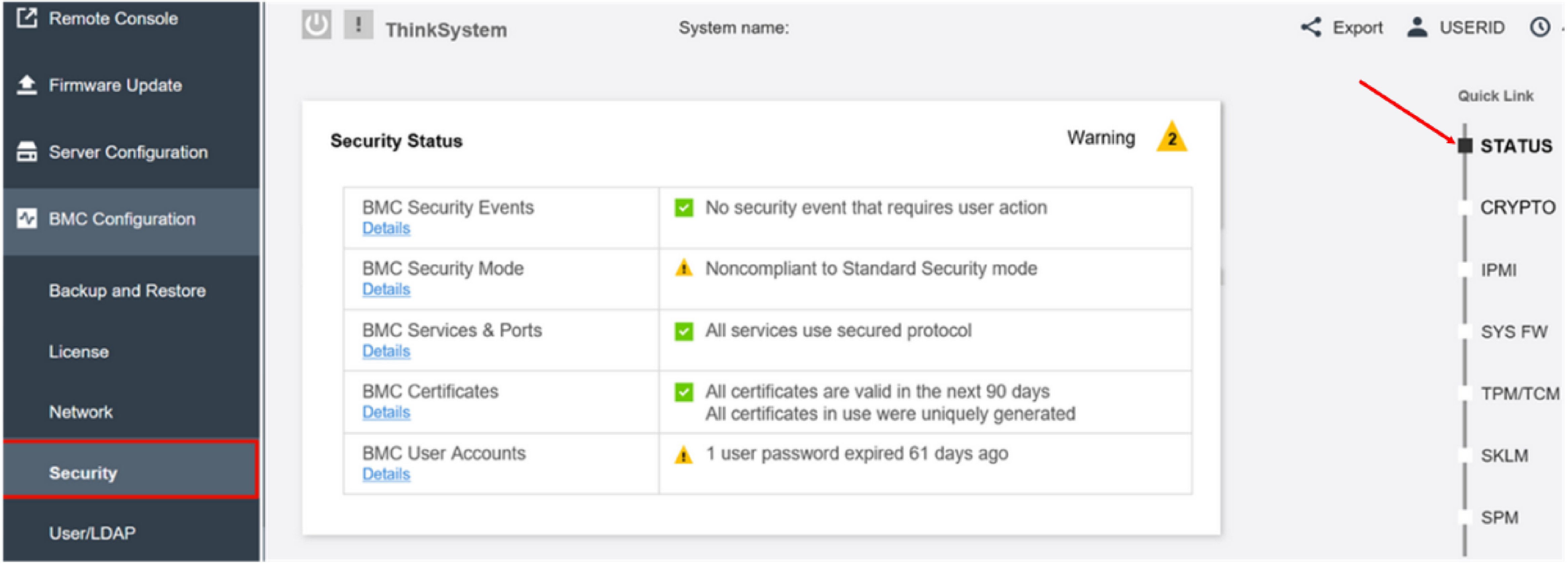
- Compatibility
- Enterprise Strict

Click **show details**

SSL Certificate Management

Security modes – Security Status

Use this feature to manage overall XCC security.



Security Status Warning ⚠ 2

BMC Security Events Details	✓ No security event that requires user action
BMC Security Mode Details	⚠ Noncompliant to Standard Security mode
BMC Services & Ports Details	✓ All services use secured protocol
BMC Certificates Details	✓ All certificates are valid in the next 90 days All certificates in use were uniquely generated
BMC User Accounts Details	⚠ 1 user password expired 61 days ago

Certified for FIPS 140-3

XCC2 has passed the FIPS 140-3 validation through the CMVP (Cryptographic Module Validation Program) program and has received FIPS 140-3 certification.

- Federal Information Processing Standard (140-3/140-2) specifies the security requirements that will be satisfied by a cryptographic module, providing four increasing, qualitative levels intended to cover a wide range of potential applications and environments.
- FIPS 140-3 supersedes FIPS 140-2 and outlines updated federal security requirements for cryptographic modules

Enhanced NIST 800-193 (PFR) support

The NIST SP 800-193 specification provides a set of high-level guidelines for implementing platform firmware resilience (PFR).

- A “platform” in this context is a collection of fundamental hardware and firmware components needed to boot and operate a server system.
- The key items of interest here are the CPU and PCH (southbridge), which run UEFI, and the BMC chip, which runs the BMC firmware.
- For more information, refer to the Platform Firmware Resiliency Guidelines.

These guidelines are based on the following three principles:

- Protection: Ensure that the platform firmware and updates are protected from corruption
- Detection: Detect corruption of platform firmware
- Recovery: Restore platform firmware to a state of integrity in the event of corruption

PFR on Lenovo servers

PFR operates on the following server components:

- UEFI image – This is the low-level server firmware that connects the OS to the server hardware
- XCC image – This is the management “engine” software that controls and reports on the server status separate from the server OS
- FPGA image – This is the code that runs the server’s lowest level hardware controller on the system board

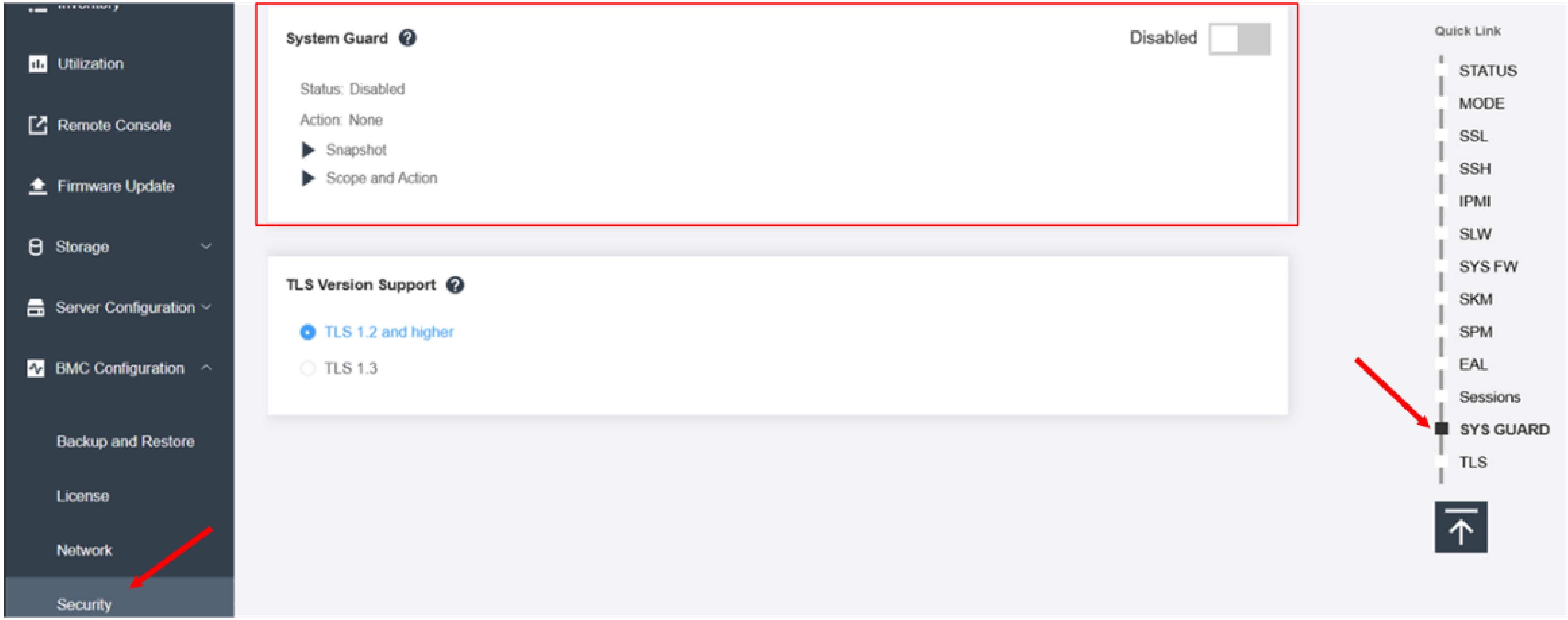
ThinkSystem V3 platform Root of Trust hardware complies with the following PFR guidelines:

- Detection – Measures the firmware and updates for authenticity
- Recovery – Recovers a corrupted image to a known safe image
- Protection – Monitors the system to ensure that known, good firmware is not maliciously written over or erased

System Guard

This feature monitors hardware including CPUs, DIMMs, PCI adapters, and HDDs for unexpected changes and can then log events or prevent booting.

To open this section, go to the **XCC** page and select **BMC Configuration → Security → SYS GUARD**.



System Guard

Disabled

Status: Disabled

Action: None

▶ Snapshot

▶ Scope and Action

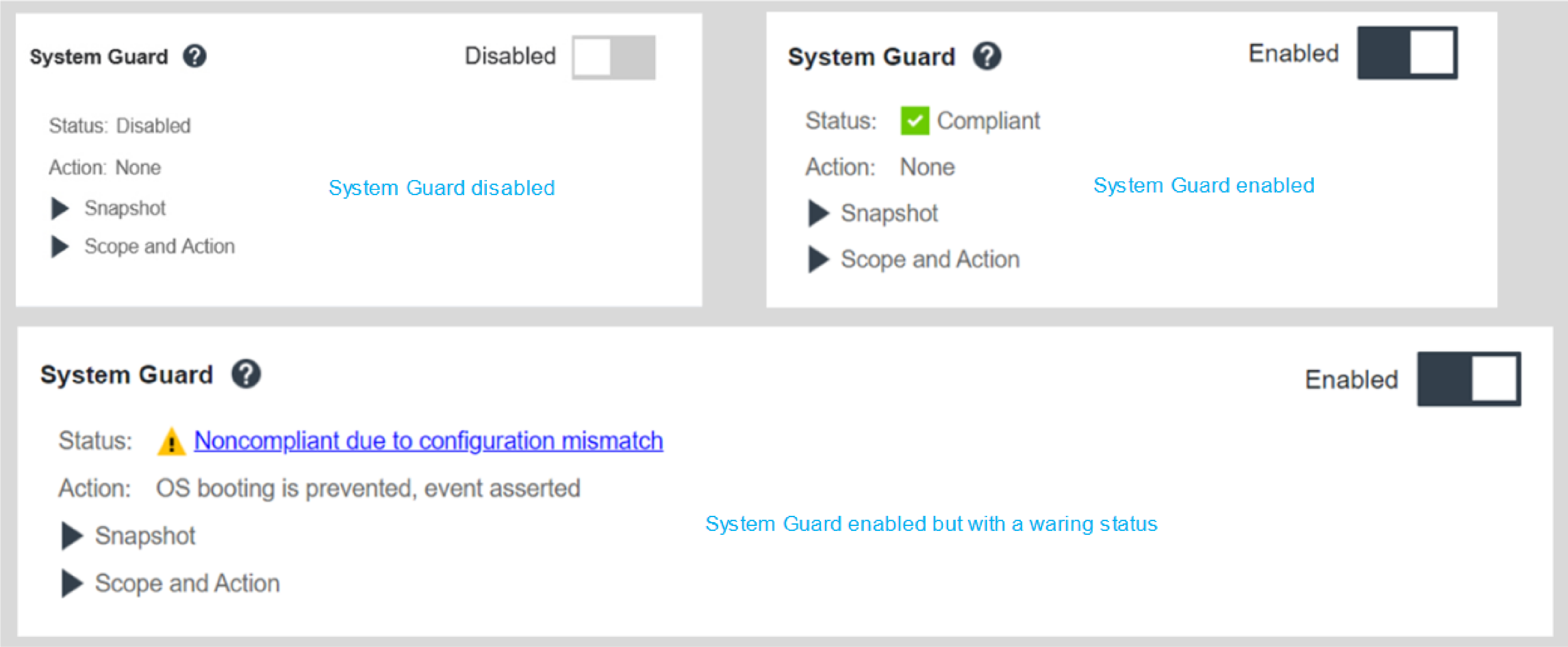
TLS Version Support

● TLS 1.2 and higher

○ TLS 1.3

System Guard behavior examples

The following screen capture shows the different types of System Guard behavior.



System Guard ? Disabled

Status: Disabled

Action: None

▶ Snapshot

▶ Scope and Action

System Guard disabled

System Guard ? Enabled

Status: ✓ Compliant

Action: None

▶ Snapshot

▶ Scope and Action

System Guard enabled

System Guard ? Enabled

Status: ⚠ Noncompliant due to configuration mismatch

Action: OS booting is prevented, event asserted

▶ Snapshot

▶ Scope and Action

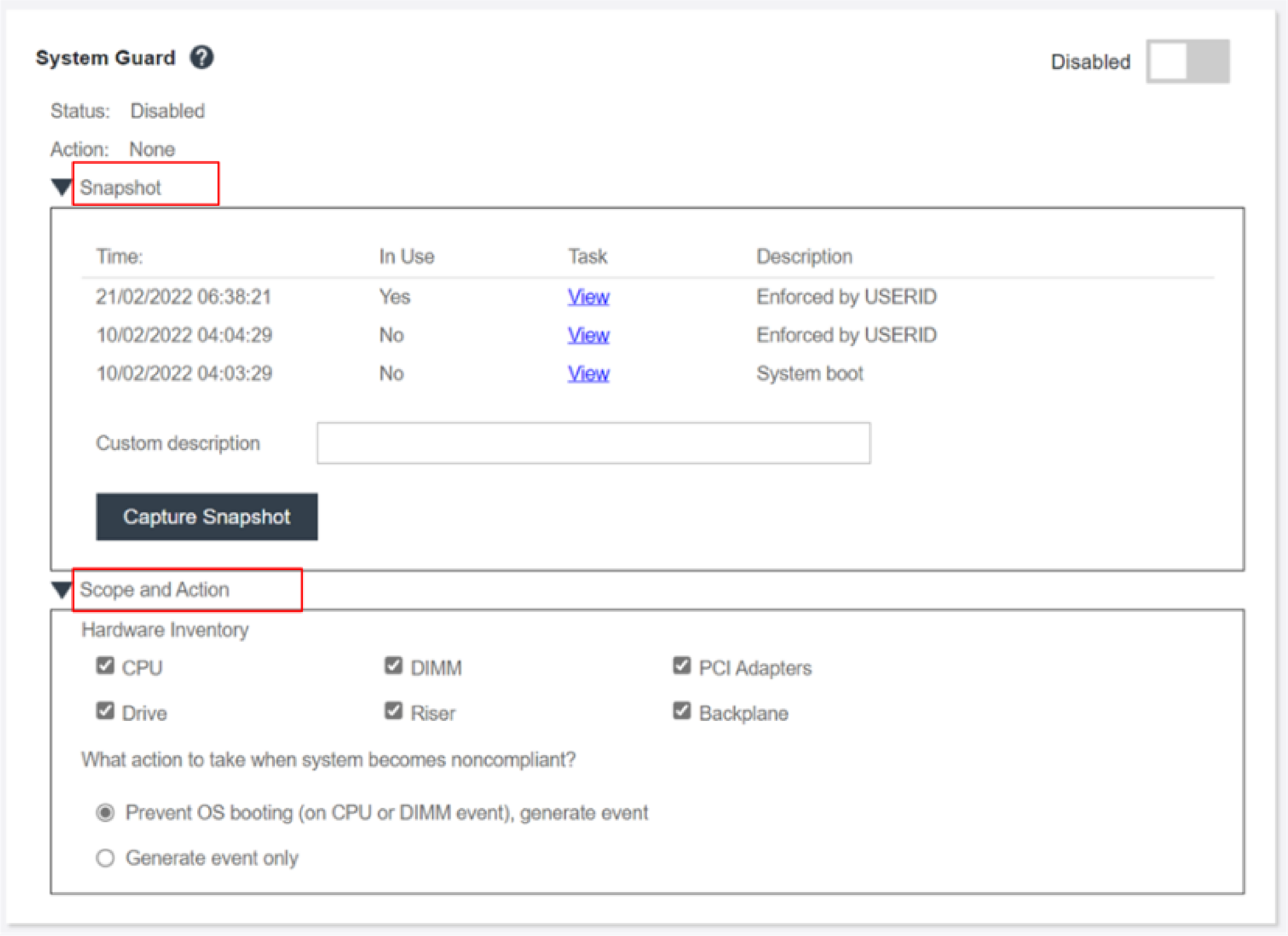
System Guard enabled but with a waring status

Lenovo XClarity Controller 2 on ThinkSystem V3 servers

System Guard – more features

Select **Snapshot** and **Scope and Action** to expand the sections and see more System Guard features for configuration.

In **Scope and Action**, select the hardware to be monitored for unexpected changes, and then select **Prevent OS booting** or **Generate event only**.



System Guard

Disabled

Status: Disabled

Action: None

▼ Snapshot

Time:	In Use	Task	Description
21/02/2022 06:38:21	Yes	View	Enforced by USERID
10/02/2022 04:04:29	No	View	Enforced by USERID
10/02/2022 04:03:29	No	View	System boot

Custom description

Capture Snapshot

▼ Scope and Action

Hardware Inventory

☑ CPU ☑ DIMM ☑ PCI Adapters

☑ Drive ☑ Riser ☑ Backplane

What action to take when system becomes noncompliant?

● Prevent OS booting (on CPU or DIMM event), generate event

○ Generate event only

Lenovo

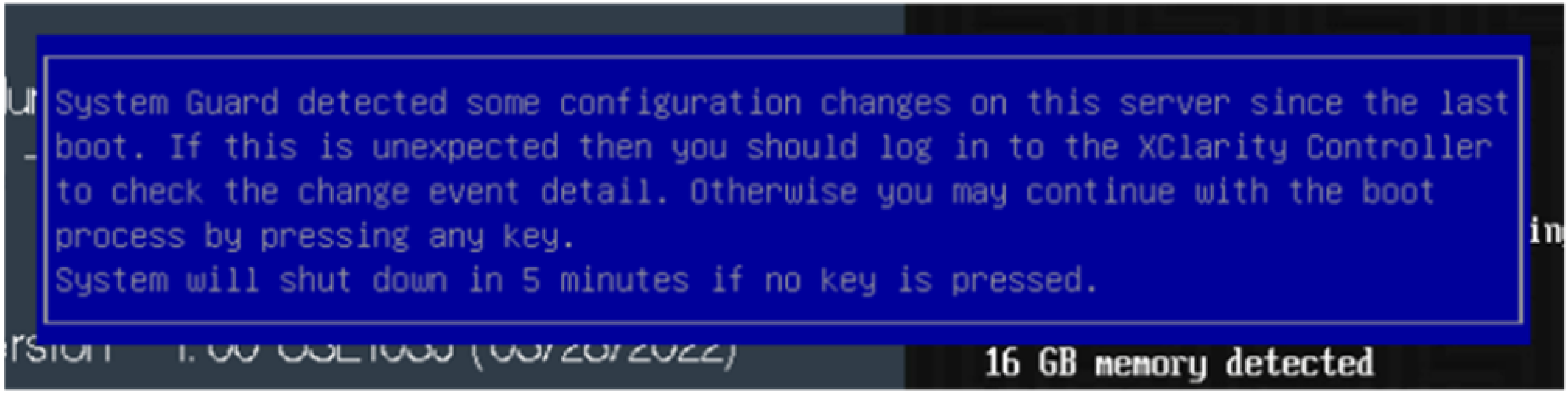
System Guard – scenario study

Question:

If **Prevent OS booting** is enabled, how will this feature impact field replacements and customer upgrades? For example, even if a system suffers a DIMM or disk failure that changes the inventory, they can often still operate. Would System Guard stop the system from booting?

Answer:

If **Prevent OS booting** has been enabled, the OS boot will be impacted and a pop-up UEFI message (as shown below) will be displayed. Users can continue the boot by pressing any key. It is recommended to disable this feature before replacing hardware component.

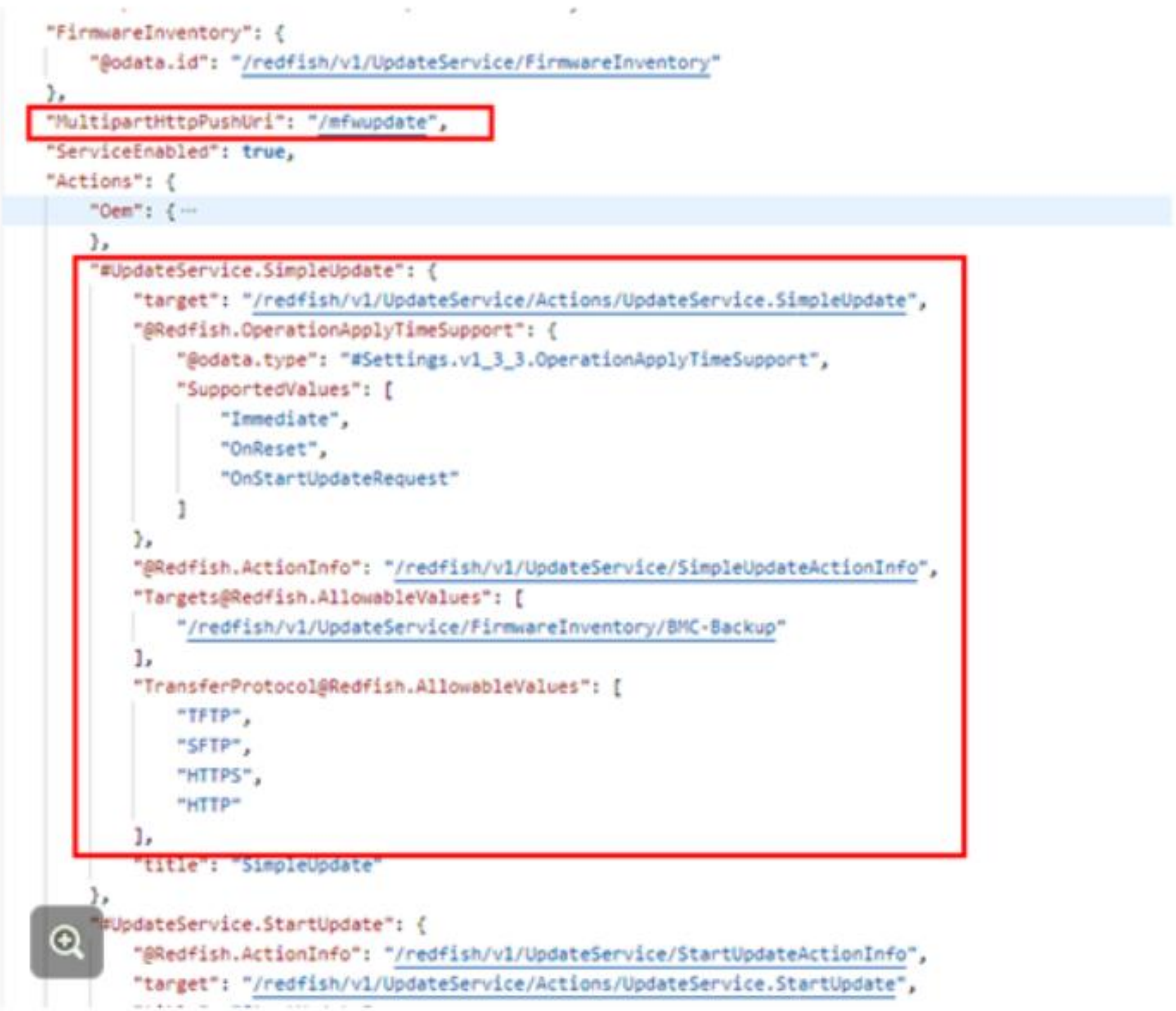


```
System Guard detected some configuration changes on this server since the last
boot. If this is unexpected then you should log in to the XClarity Controller
to check the change event detail. Otherwise you may continue with the boot
process by pressing any key.
System will shut down in 5 minutes if no key is pressed.
```

16 GB memory detected

Redfish standard-based firmware update enhancements

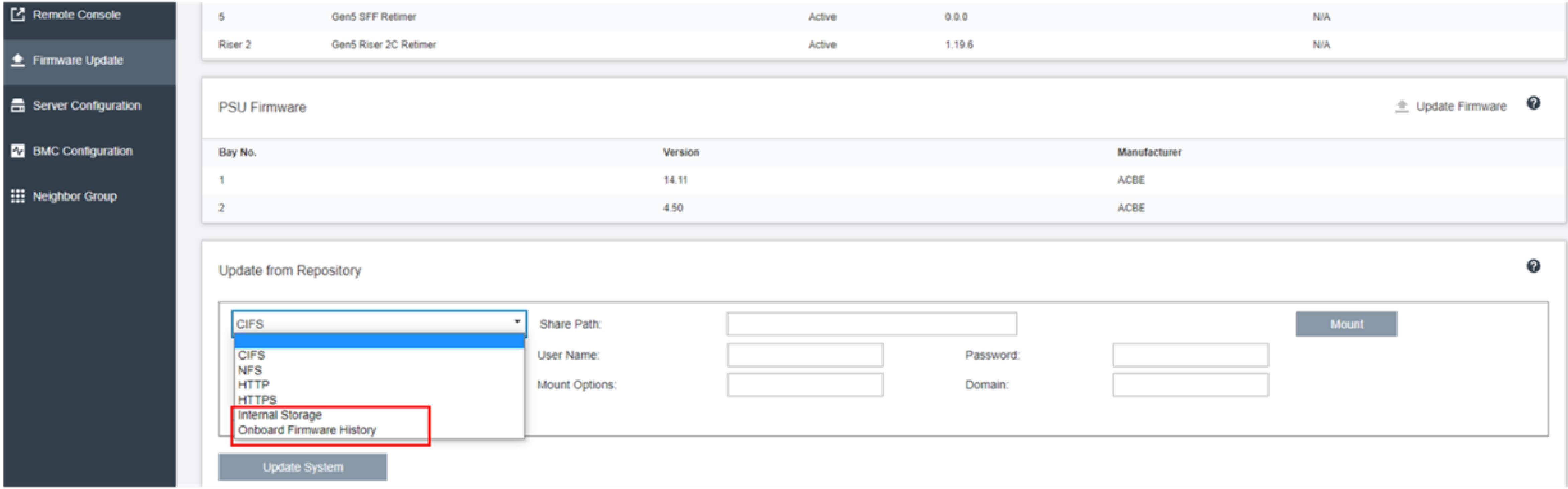
- Follow the new DSP2062 standard to support the standard Redfish update methods
- Support for single firmware as well as firmware bundle updates
- Support for Redfish Job to monitor the update progress/status



```
"FirmwareInventory": {
    "@odata.id": "/redfish/v1/UpdateService/FirmwareInventory"
},
"MultipartHttpPushUri": "/mfwupdate",
"ServiceEnabled": true,
"Actions": {
    "Oem": {⋯
    },
    "#UpdateService.SimpleUpdate": {
        "target": "/redfish/v1/UpdateService/Actions/UpdateService.SimpleUpdate",
        "@Redfish.OperationApplyTimeSupport": {
            "@odata.type": "#Settings.v1_3_3.OperationApplyTimeSupport",
            "SupportedValues": [
                "Immediate",
                "OnReset",
                "OnStartUpdateRequest"
            ]
        },
        "@Redfish.ActionInfo": "/redfish/v1/UpdateService/SimpleUpdateActionInfo",
        "Targets@Redfish.AllowableValues": [
            "/redfish/v1/UpdateService/FirmwareInventory/BMC-Backup"
        ],
        "TransferProtocol@Redfish.AllowableValues": [
            "TFTP",
            "SFTP",
            "HTTPS",
            "HTTP"
        ],
        "title": "SimpleUpdate"
    },
    "#UpdateService.StartUpdate": {
        "@Redfish.ActionInfo": "/redfish/v1/UpdateService/StartUpdateActionInfo",
        "target": "/redfish/v1/UpdateService/Actions/UpdateService.StartUpdate",
```

Support for an SD card option to extend XCC storage

- With an SD card (micro SD format) installed, the virtual media of the Remote Disc On Card (RDOC) can be extended
  - With the previous ThinkSystem platform, RDOC space cannot be extended. For more information, refer to the following Knowledge Base article: HT507561.
- Support for the saving of N-1 firmware history for rollback in the SD card



5	Gen5 SFF Retimer	Active	0.0.0	N/A
Riser 2	Gen5 Riser 2C Retimer	Active	1.19.6	N/A

PSU Firmware

Bay No.	Version	Manufacturer
1	14.11	ACBE
2	4.50	ACBE

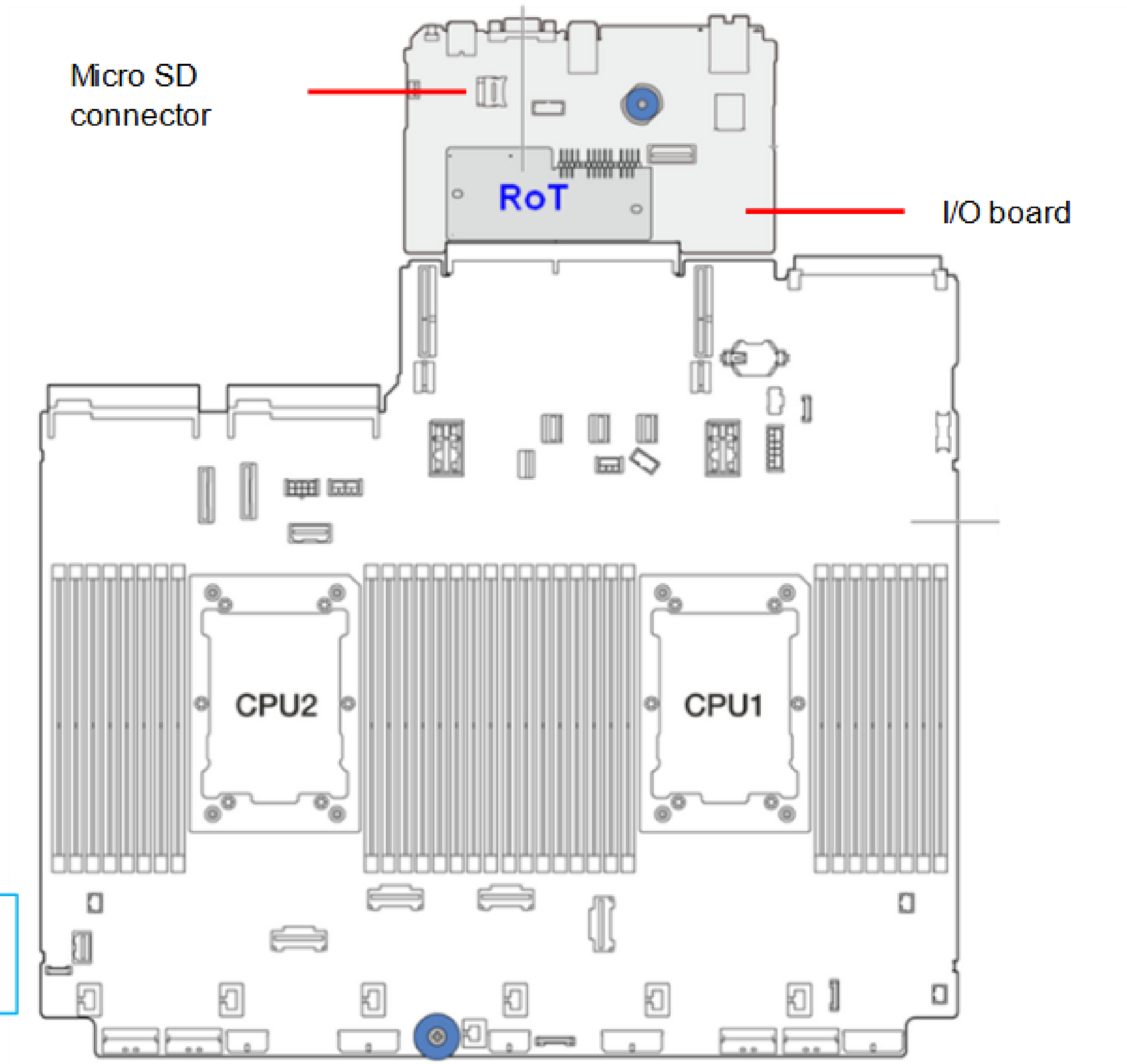
Update from Repository

CIFS

Locating an SD card

This example uses the SR650 V3 system board.

The SD card connector is located on the I/O board. To locate the SD card connecter on a specific V3 server, refer to that server's individual course.



SR650 V3

SD card option - scenario study

Question 1: Will the SD card need to be formatted in a specific way, such as FAT32/EXT4?

Answer: If a card is not formatted before installation, XCC will format it to EXT4.

Question 2: If data is transferred to an SD card after it has been removed from a system, will the data be accessible after the SD card has been reinstalled?

Answer: No.

Question 3: Is it be possible to move an ISO locally or from a network to the local SD card and use that local image to present the ISO to LXPM for guided OS installation?

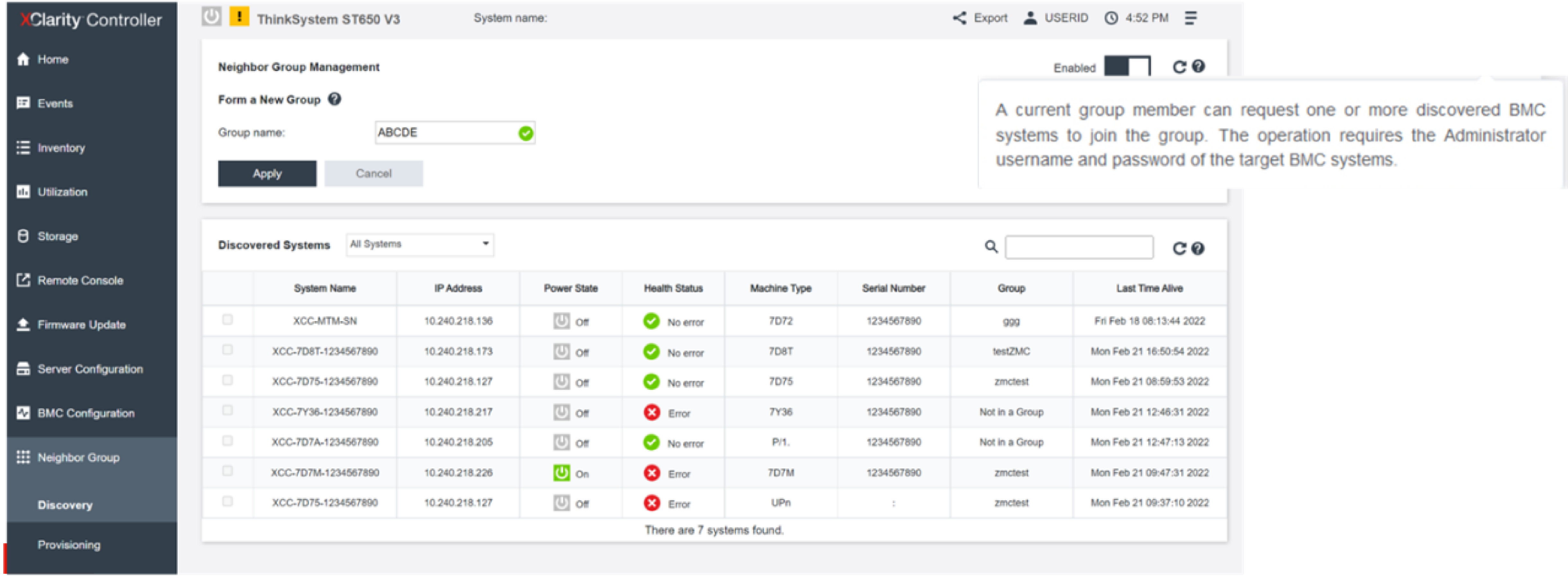
Answer: Yes, the SD card can be used to extend the RDOC space, so you can transfer the image to the SD card and mount it to the host.

Question 4: Will the SD card be presented to the OS, allowing tools such as ONECLI and BOMC to write log data to the SD card, enabling the remote collection of logs without the need to install a USB drive?

Answer: It is not currently supported.

Neighbor Group

Neighbor Group is a new feature of XCC2, and it gives users the ability to see multiple peer instances of XCC from their XCC web UI. After creating a neighbor group, users can monitor the health status of group members. A maximum of 200 peer XCCs are allowed in a group.



Neighbor Group Management

Form a New Group

Group name: ABCDE

Apply Cancel

A current group member can request one or more discovered BMC systems to join the group. The operation requires the Administrator username and password of the target BMC systems.

Discovered Systems All Systems

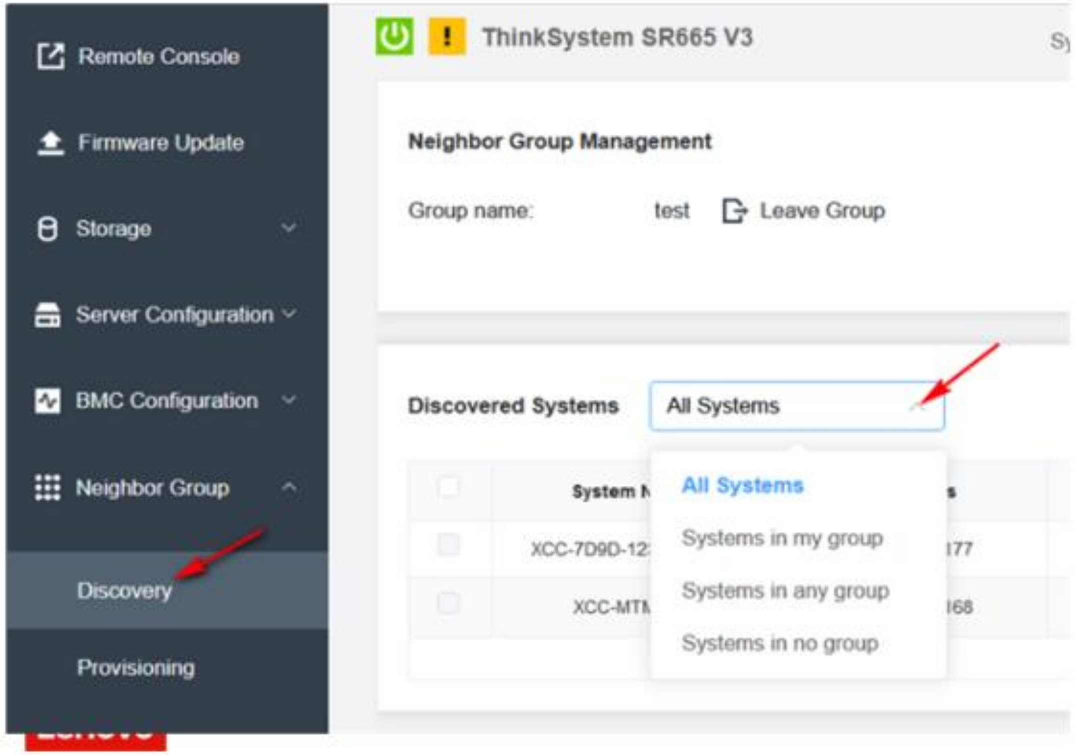
	System Name	IP Address	Power State	Health Status	Machine Type	Serial Number	Group	Last Time Alive
□	XCC-MTM-SN	10.240.218.136	Off	✓ No error	7D72	1234567890	ggg	Fri Feb 18 08:13:44 2022
□	XCC-7D8T-1234567890	10.240.218.173	Off	✓ No error	7D8T	1234567890	testZMC	Mon Feb 21 16:50:54 2022
□	XCC-7D75-1234567890	10.240.218.127	Off	✓ No error	7D75	1234567890	zmctest	Mon Feb 21 08:59:53 2022
□	XCC-7Y36-1234567890	10.240.218.217	Off	✗ Error	7Y36	1234567890	Not in a Group	Mon Feb 21 12:46:31 2022
□	XCC-7D7A-1234567890	10.240.218.205	Off	✓ No error	P/1.	1234567890	Not in a Group	Mon Feb 21 12:47:13 2022
□	XCC-7D7M-1234567890	10.240.218.226	On	✗ Error	7D7M	1234567890	zmctest	Mon Feb 21 09:47:31 2022
□	XCC-7D75-1234567890	10.240.218.127	Off	✗ Error	UPn	:	zmctest	Mon Feb 21 09:37:10 2022

There are 7 systems found.

Neighbor Group – Discovery

Select **Discovered Systems**, and a drop-down menu will be displayed with the following items:

- All Systems
- Systems in my group
- Systems in any group
- Systems in no group



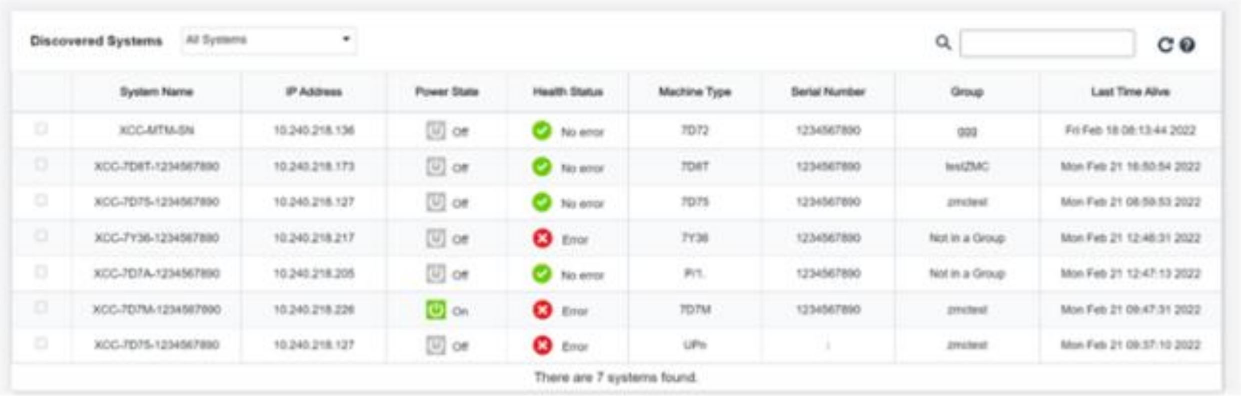
Neighbor Group Management

Group name: test Leave Group

Discovered Systems: All Systems

- All Systems
- Systems in my group
- Systems in any group
- Systems in no group

Example: All systems

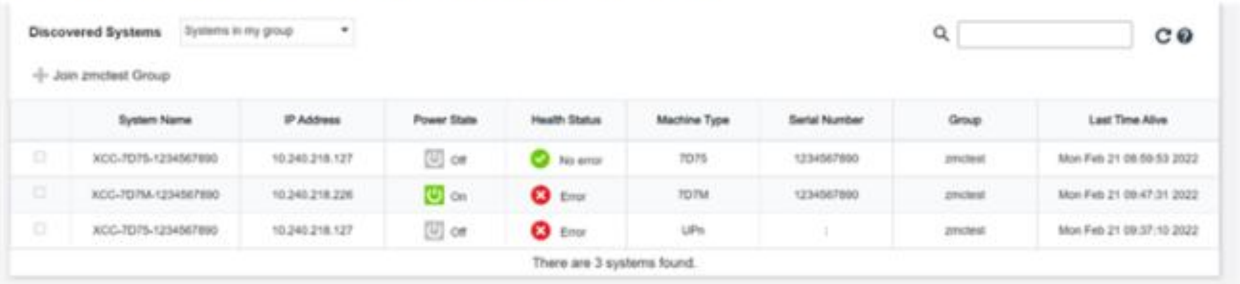


Discovered Systems: All Systems

	System Name	IP Address	Power State	Health Status	Machine Type	Serial Number	Group	Last Time Alive
□	XCC-MTM-SN	10.240.218.136	Off	No error	7D72	1234567890	ggg	Fri Feb 18 08:13:44 2022
□	XCC-7D8T-1234567890	10.240.218.173	Off	No error	7D8T	1234567890	testZMC	Mon Feb 21 16:50:54 2022
□	XCC-7D75-1234567890	10.240.218.127	Off	No error	7D75	1234567890	zmctest	Mon Feb 21 08:59:53 2022
□	XCC-7Y36-1234567890	10.240.218.217	Off	Error	7Y36	1234567890	Not in a Group	Mon Feb 21 12:48:31 2022
□	XCC-7D7A-1234567890	10.240.218.205	Off	No error	P/1.	1234567890	Not in a Group	Mon Feb 21 12:47:13 2022
□	XCC-7D7M-1234567890	10.240.218.226	On	Error	7D7M	1234567890	zmctest	Mon Feb 21 09:47:31 2022
□	XCC-7D75-1234567890	10.240.218.127	Off	Error	UPn	[illegible]	zmctest	Mon Feb 21 09:37:10 2022

There are 7 systems found.

Example: System in my group



Discovered Systems: Systems in my group

+ Join zmctest Group

	System Name	IP Address	Power State	Health Status	Machine Type	Serial Number	Group	Last Time Alive
□	XCC-7D75-1234567890	10.240.218.127	Off	No error	7D75	1234567890	zmctest	Mon Feb 21 08:59:53 2022
□	XCC-7D7M-1234567890	10.240.218.226	On	Error	7D7M	1234567890	zmctest	Mon Feb 21 09:47:31 2022
□	XCC-7D75-1234567890	10.240.218.127	Off	Error	UPn	[illegible]	zmctest	Mon Feb 21 09:37:10 2022

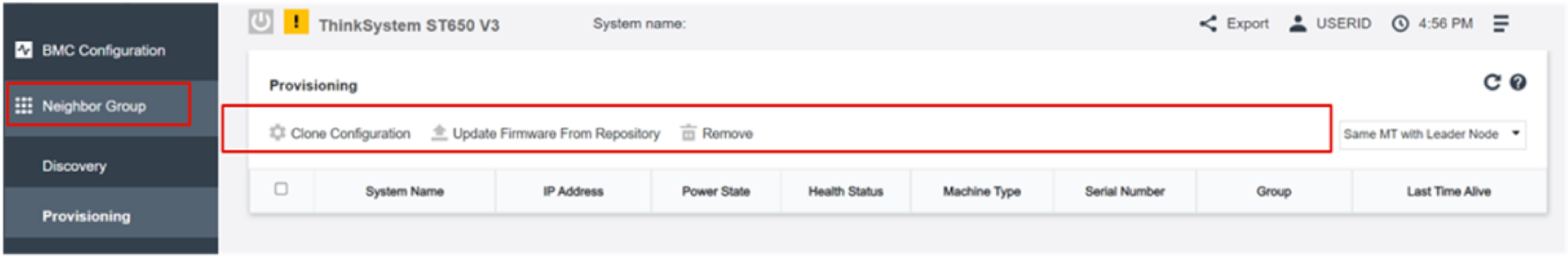
There are 3 systems found.

Lenovo XClarity Controller 2 on ThinkSystem V3 servers

Neighbor Group - Provisioning

- The group master XCC configuration can be cloned to all group member XCCs
- The firmware of all servers in the group can be updated from the group master
- The provisioning feature is not available on group member nodes

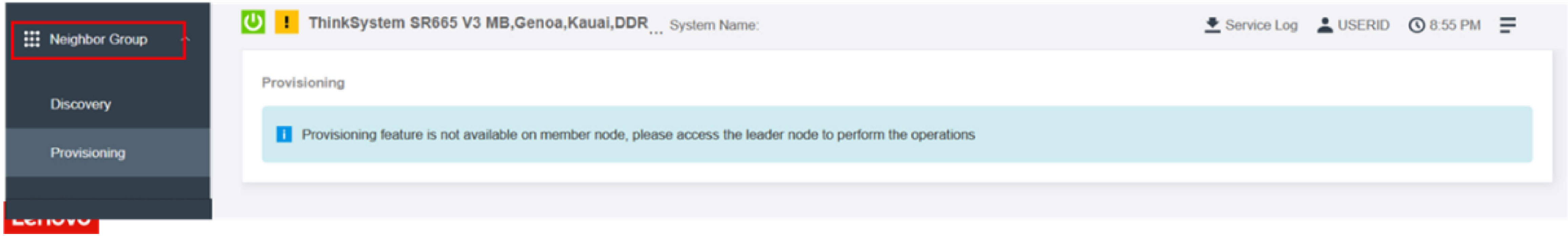
Group master view:



Provisioning

□	System Name	IP Address	Power State	Health Status	Machine Type	Serial Number	Group	Last Time Alive

Group member view:



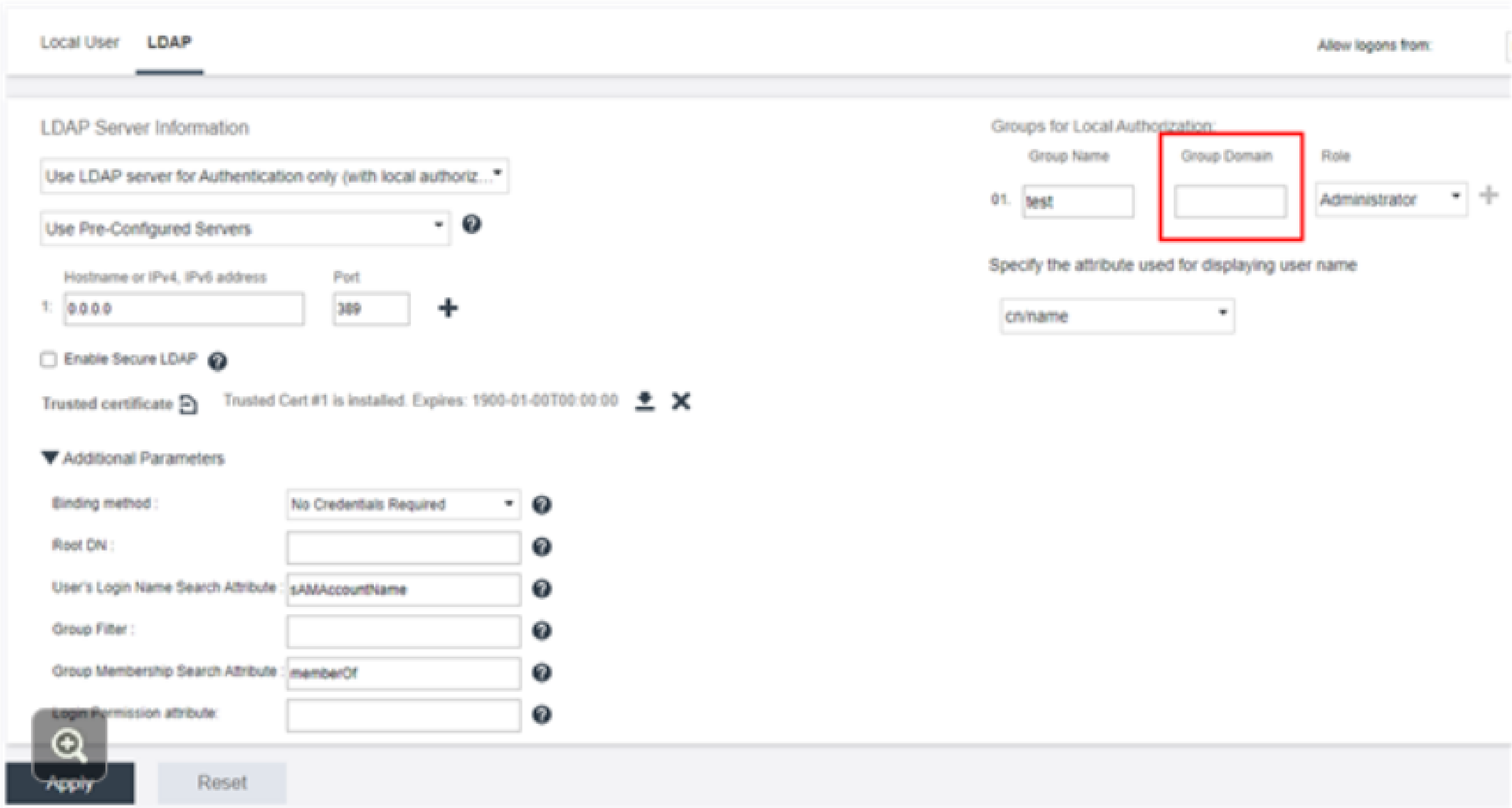
Provisioning

Provisioning feature is not available on member node, please access the leader node to perform the operations

Enhanced LDAP configuration – from the group master

This feature supports the configuration of the domain controller for each group from the group master XCC, and also an enhanced auto search of users and groups from domain controller catalogs.

To go to this page, select **BMC Configuration → User/LDAP** on the **XCC** page.



LDAP Server Information

Use LDAP server for Authentication only (with local authoriz...

Use Pre-Configured Servers

	Hostname or IPv4, IPv6 address	Port
1:	0.0.0.0	389

□ Enable Secure LDAP

Trusted certificate Trusted Cert #1 is installed. Expires: 1900-01-00T00:00:00

▼ Additional Parameters

Binding method : No Credentials Required

Root DN :

User's Login Name Search Attribute : sAMAccountName

Group Filter :

Group Membership Search Attribute : memberOf

Login Permission attribute:

Groups for Local Authorization:

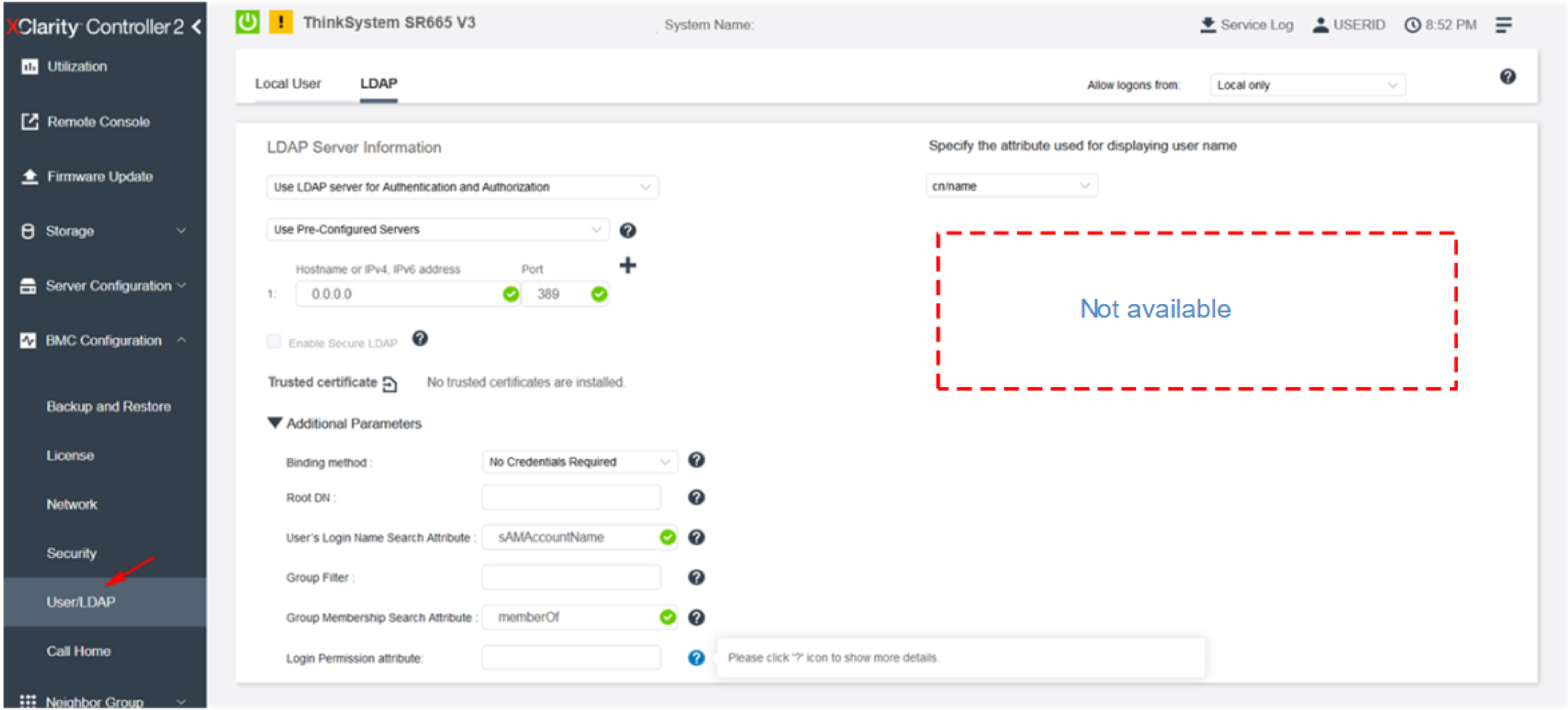
	Group Name	Group Domain	Role
01.	test		Administrator

Specify the attribute used for displaying user name

cn/name

Enhanced LDAP configuration – from a group member

The domain controller configuration field is not available in group member XCCs.



Allow logons from: Local only

LDAP Server Information

Use LDAP server for Authentication and Authorization

Use Pre-Configured Servers

	Hostname or IPv4, IPv6 address	Port
1:	0.0.0.0	389

□ Enable Secure LDAP

Trusted certificate No trusted certificates are installed.

Additional Parameters

Binding method : No Credentials Required

Root DN :

User's Login Name Search Attribute : sAMAccountName

Group Filter :

Group Membership Search Attribute : memberOf

Login Permission attribute:

Please click '?' icon to show more details.

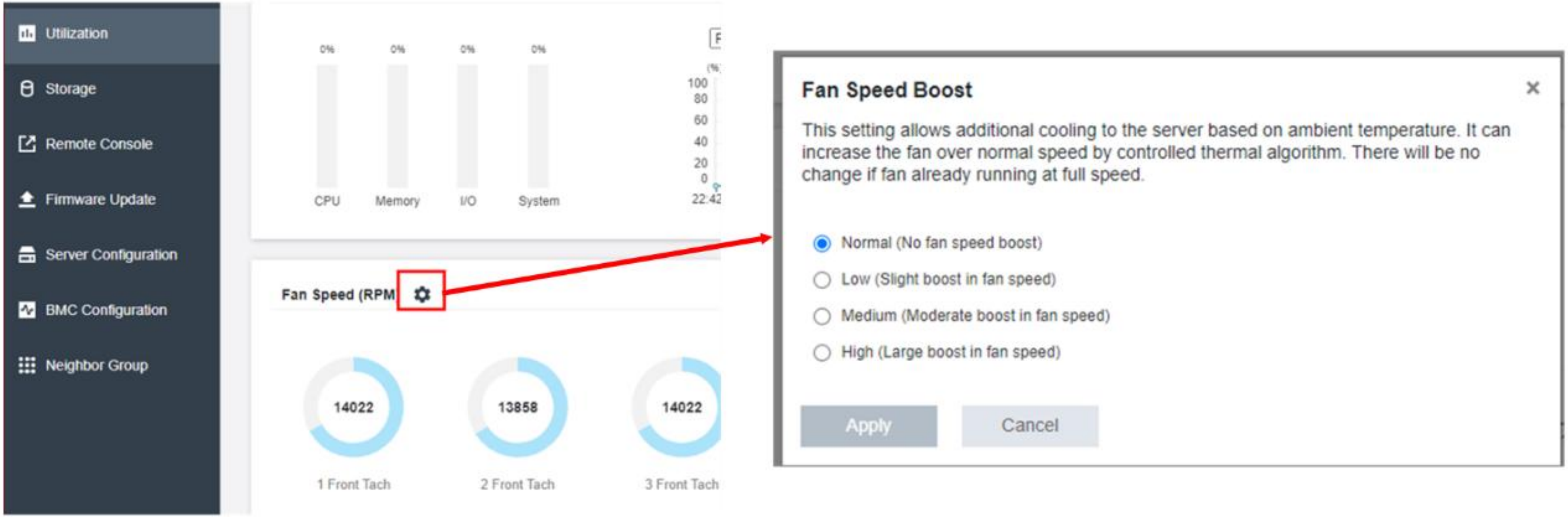
Specify the attribute used for displaying user name

cn/name

Not available

Customer-configurable thermal fan speed profile

With this new feature, users can configure an additional cooling boost that goes beyond normal, automatic cooling. It provides the flexibility to cool custom hardware or add additional cooling for specific environments.



Fan Speed Boost ×

This setting allows additional cooling to the server based on ambient temperature. It can increase the fan over normal speed by controlled thermal algorithm. There will be no change if fan already running at full speed.

● Normal (No fan speed boost)

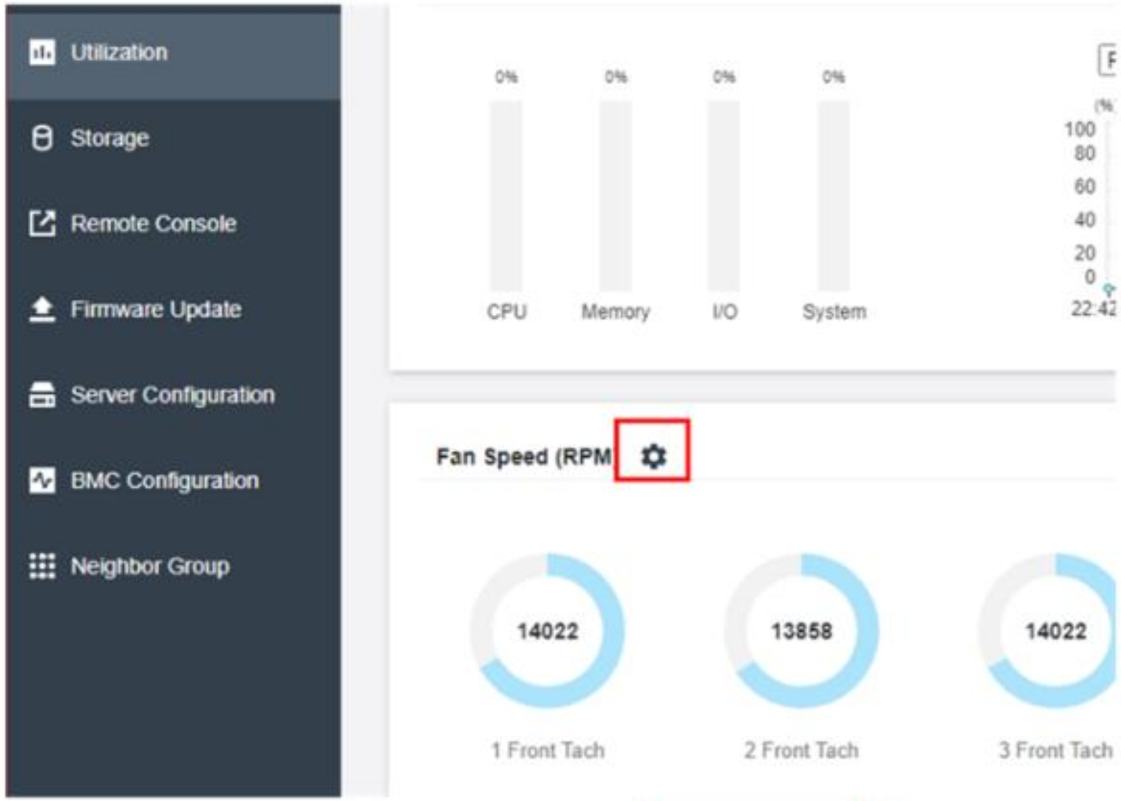
○ Low (Slight boost in fan speed)

○ Medium (Moderate boost in fan speed)

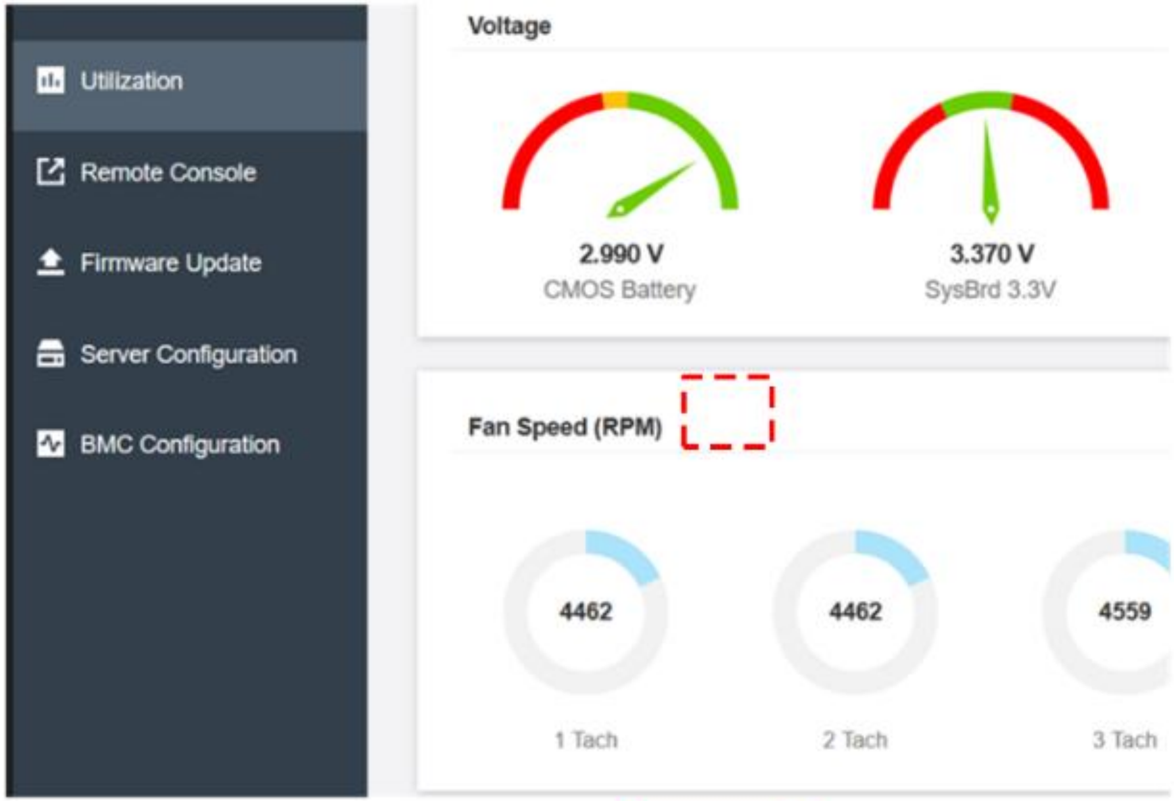
○ High (Large boost in fan speed)

Fan speed configuration on XCC and XCC2

The fan speed configuration feature is not available on the previous version of XCC.



XCC2

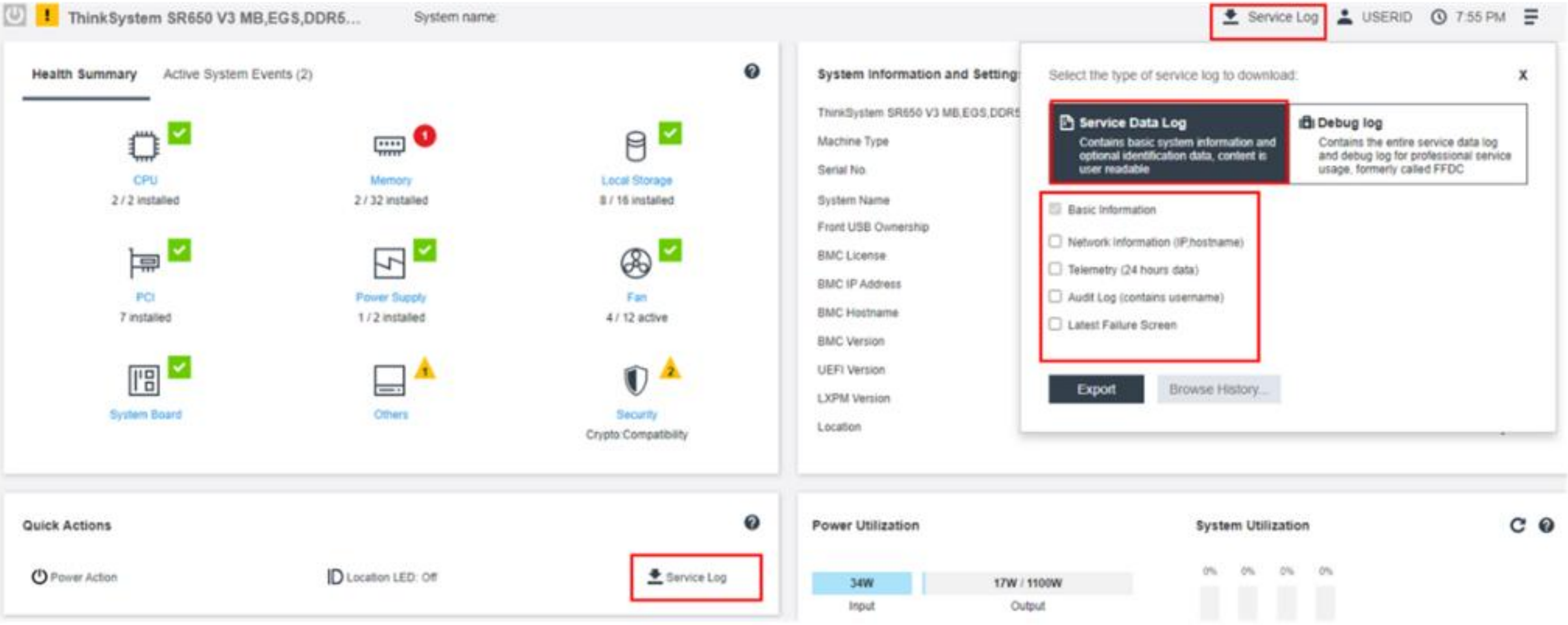


XCC

Service logs

There are two types of XCC2 service logs:

- Service Data Log: Customer-selectable content categories – the content is user readable and contains basic system information and optional identification data
- Debug log: Formerly called FFDC, it contains the entire service data log and debug log for professional servicing – It was named Service Data in the previous version of XCC



Select the type of service log to download:

Service Data Log
Contains basic system information and optional identification data, content is user readable

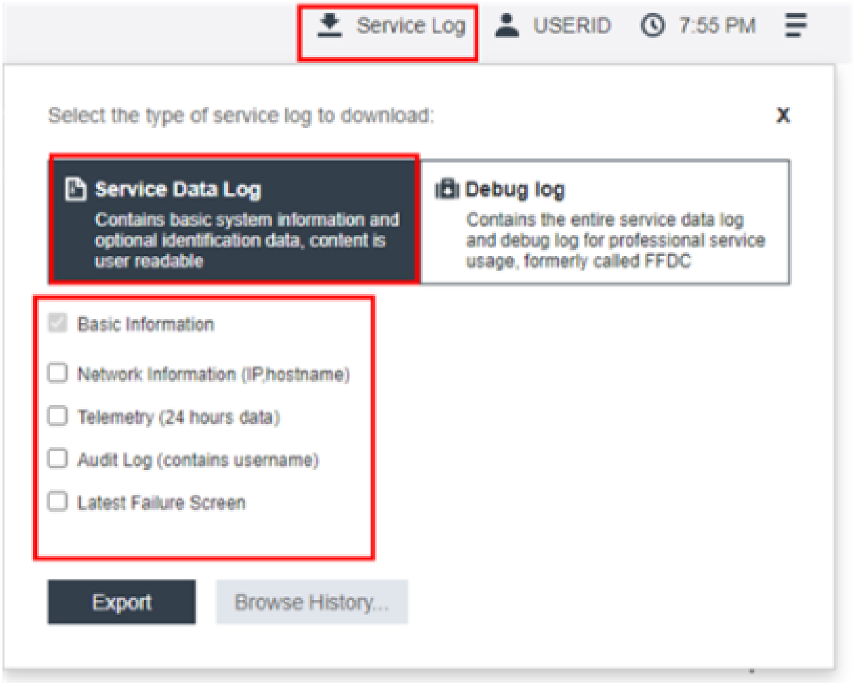
Debug log
Contains the entire service data log and debug log for professional service usage, formerly called FFDC

☑ Basic Information
□ Network information (IP,hostname)
□ Telemetry (24 hours data)
□ Audit Log (contains username)
□ Latest Failure Screen

Export
Browse History...

Service logs on XCC and XCC2

With XCC2, users can download the Service Data Log or the Debug log (FFDC), while with XCC, users can only download Service Data (FFDC).



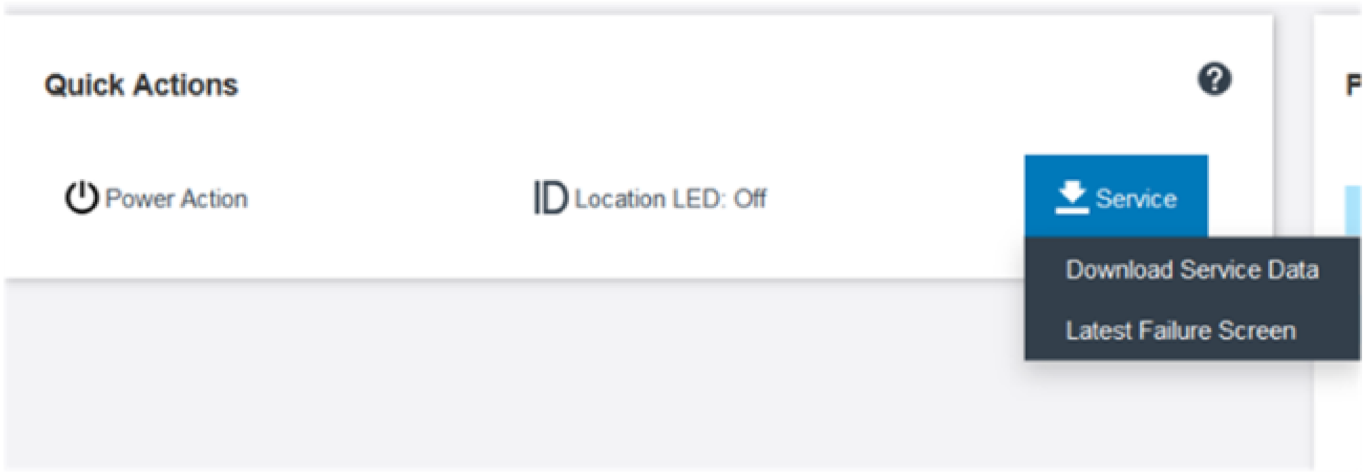
Select the type of service log to download:

Service Data Log Contains basic system information and optional identification data, content is user readable

Debug log Contains the entire service data log and debug log for professional service usage, formerly called FFDC

- ☑ Basic Information
- □ Network Information (IP,hostname)
- □ Telemetry (24 hours data)
- □ Audit Log (contains username)
- □ Latest Failure Screen

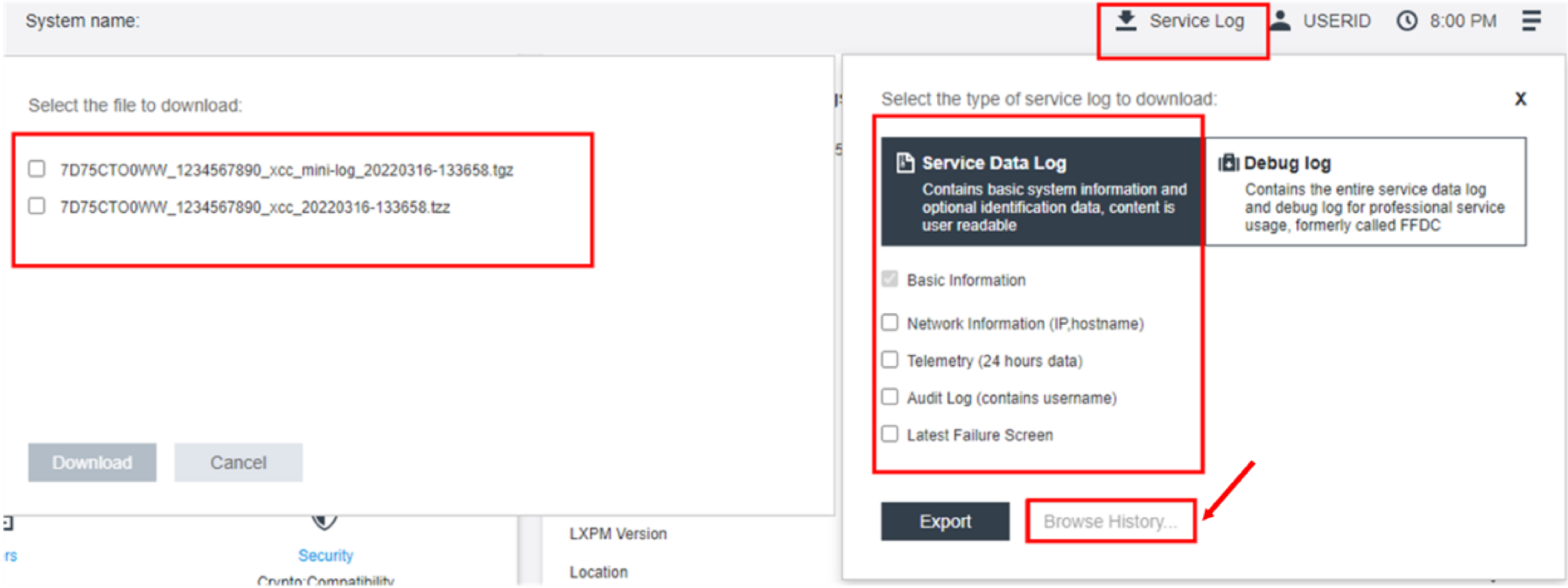
XCC2



XCC

Service Data Log – Browse History

Select **Browse History** to access the entire Service Data Log (mini-log) and the corresponding full FFDC. It is possible to download the full FFDC if a customer case is escalated to PE or development.



Select the file to download:

- □ 7D75CTO0WW_1234567890_xcc_mini-log_20220316-133658.tgz
- □ 7D75CTO0WW_1234567890_xcc_20220316-133658.tzz

Select the type of service log to download:

Service Data Log
Contains basic system information and optional identification data, content is user readable

Debug log
Contains the entire service data log and debug log for professional service usage, formerly called FFDC

- ☑ Basic Information
- □ Network Information (IP,hostname)
- □ Telemetry (24 hours data)
- □ Audit Log (contains username)
- □ Latest Failure Screen

XCC Platinum license key for new XCC2 features

The following new XCC2 features require an XCC Platinum license:

- System Guard – Monitors hardware inventory for unexpected component changes and then logs events or prevents booting
- Enterprise Strict Security mode – Enforces FIPS 140-3 level security and enhanced NIST 800-193 support
- Neighbor Group – Enables administrators to manage and synchronize configurations and firmware levels across multiple servers
- Mini-Log – New service tool that provides XCC first-failure logs in HTML and JSON format

Refer to Lenovo Press for more details about XCC Platinum.

XCC2 – scenario study

Question 1: Which server system boards will be equipped with the XCC2 chip?

Answer: Depending on the machine type, the XCC2 chip will be on the system board or I/O board.

Question 2: Will the service logs (Service Data Log and Debug log) be identical on both AMD-based servers and Intel-based servers?

Answer: The design is the same, but the content will differ due to the differences between AMD and Intel processor/chipset architecture.

Question 3: To update XCC2, does USB over LAN need to enabled?

Answer: USB over LAN only has to be enabled for in-band updates.

Question 4: Do different security levels – for example: Enterprise Strict Security Mode or Standard Security Mode – influence XCC FFDC log collection?

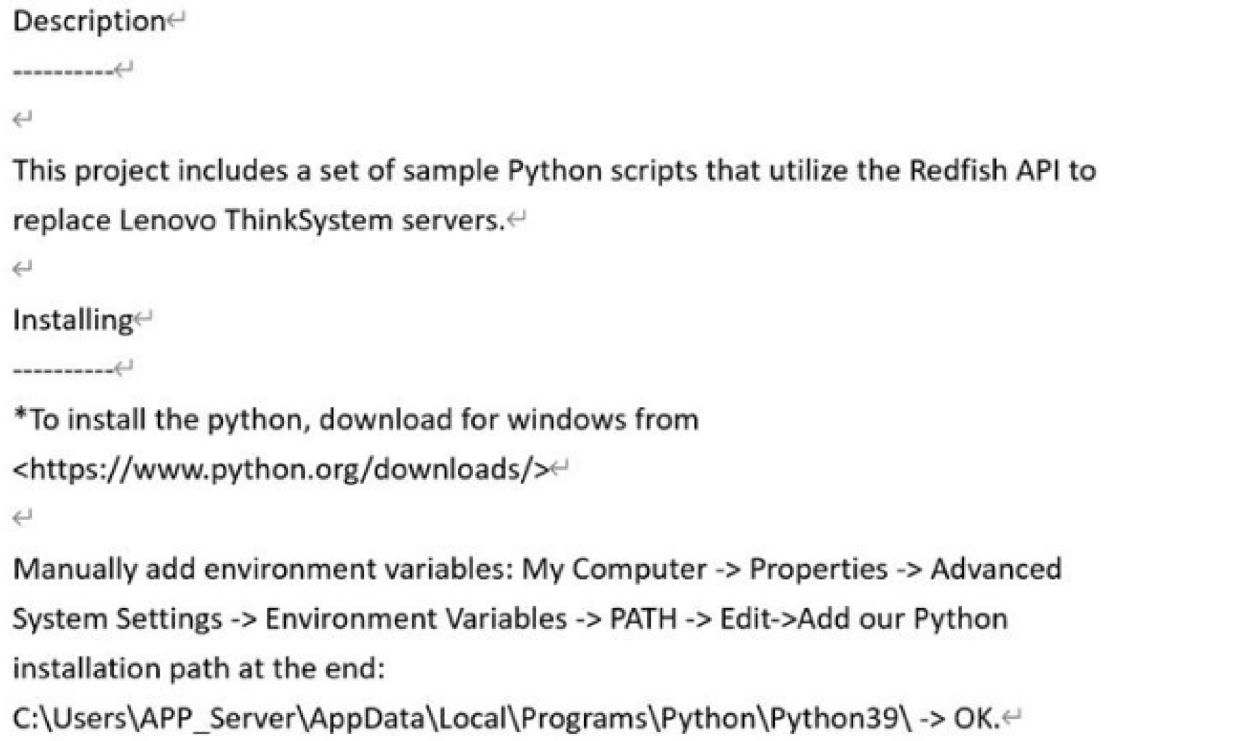
Ans: No. All security levels support FFDC log collection.

XCC tool for XCC2

The XCC tool is a CLI-based tool for XCC2 on the ThinkSystem V3 platform, and it can be used to back up and restore FoD keys, XCC2 configuration, and VPD.

This tool is only available for service engineers - do not share it with customers.

For more information about XCC tool, refer to the following GLOSSE tip page:
TOOL_XCC tool for XCC2



```
Description
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This project includes a set of sample Python scripts that utilize the Redfish API to
replace Lenovo ThinkSystem servers.

Installing
-----------
*To install the python, download for windows from
<https://www.python.org/downloads/>

Manually add environment variables: My Computer -> Properties -> Advanced
System Settings -> Environment Variables -> PATH -> Edit->Add our Python
installation path at the end:
C:\Users\APP_Server\AppData\Local\Programs\Python\Python39\ -> OK.
```