Lenovo

# Lenovo Services Education

# Servicing the Lenovo System x3550 M5 and x3650 M5 machine type 5463, 5462, 8869, and 8871

## September 2016
## Study guide

**ES71297C**

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# Preface

## Servicing the Lenovo System x3550 M5 and x3650 M5 machine type 5463, 5462, 8869, and 8871



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# Objectives

After completing this course, you will be able to:

1. Provide an overview of the Lenovo System x3550 M5 and x3650 M5 machine type 5463, 5462, 8869, and 8871.
2. Describe the system's mechanical design.
3. Describe the different subsystems.
4. Describe the troubleshooting steps and explain how to complete the problem determination tasks for the x3550 M5 and 3650 M5 machine type 5463, 5462, 8869, and 8871.

# Servicing the Lenovo x3550 M5 and x3650 M5 machine type 5463, 5462, 8869, and 8871

## Overview

### Lenovo x3550 M5 and x3650 M5 machine type 5463, 5462, 8869, and 8871

The x3550 M5 is a 1U, two socket rack server. The x3650 is a 2U, two processor socket rack server. Both x3550 M5 and x3650 M5 are for corporate data centers running infrastructure applications.

The x3550 M5 machine type 5463 and x3650 M5 machine type 5462 support the Intel Xeon E5-2600 v3 series processor.

The x3550 M5 machine type 8869 and x3650 M5 machine type 8871 support the Intel Xeon E5-2600 v4 series processor.

## Product description

**Figure 1** shows the front of the System x3550 M5 server with up to eight 2.5-inch drive bays and the front I/O cage entry (default).

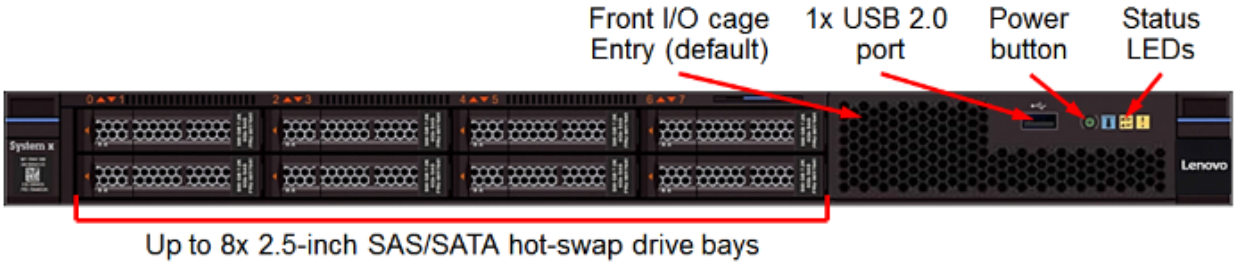


**Figure 1: x3550 M5 with up to eight 2.5-inch drive bays and the front I/O cage entry front view**

**Figure 2** shows the front of the System x3550 M5 server with up to eight 2.5-inch drive bays and the front I/O cage standard (optional).

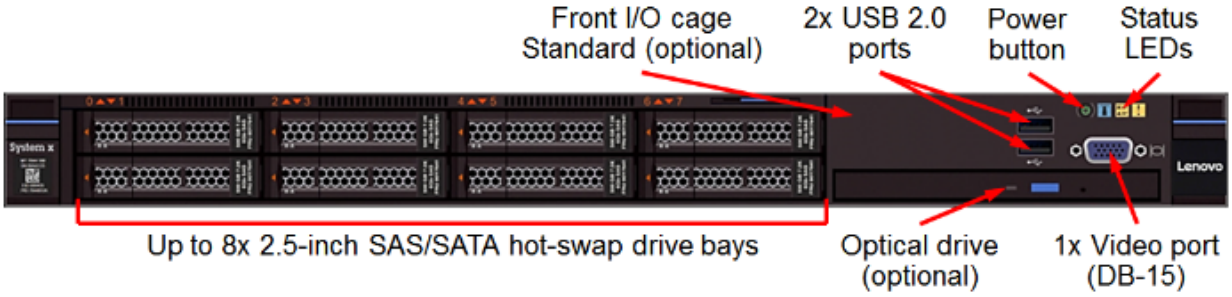


**Figure 2: x3550 M5 with up to eight 2.5-inch drive bays and the front I/O cage standard front view**

**Figure 3** shows the front of the System x3550 M5 server with up to eight 2.5-inch drive bays and the front I/O cage advanced (optional).

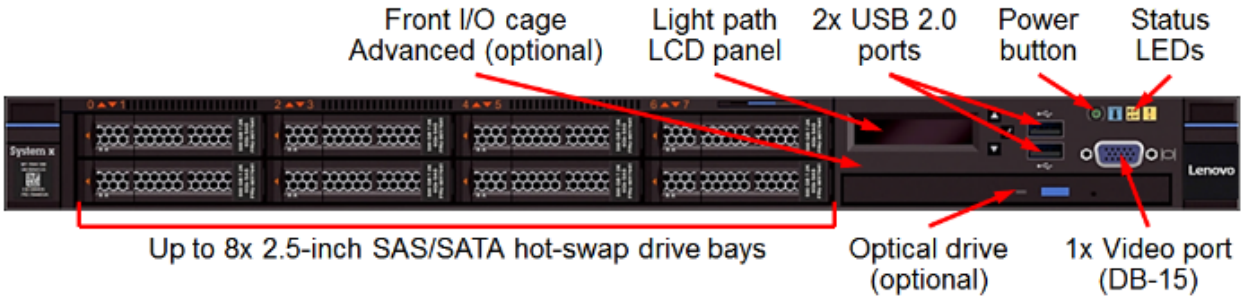


**Figure 3: x3550 M5 with up to eight 2.5-inch drive bays and the front I/O cage advanced front view**

**Figure 4** shows the front of the System x3550 M5 server with ten 2.5-inch drive bays.

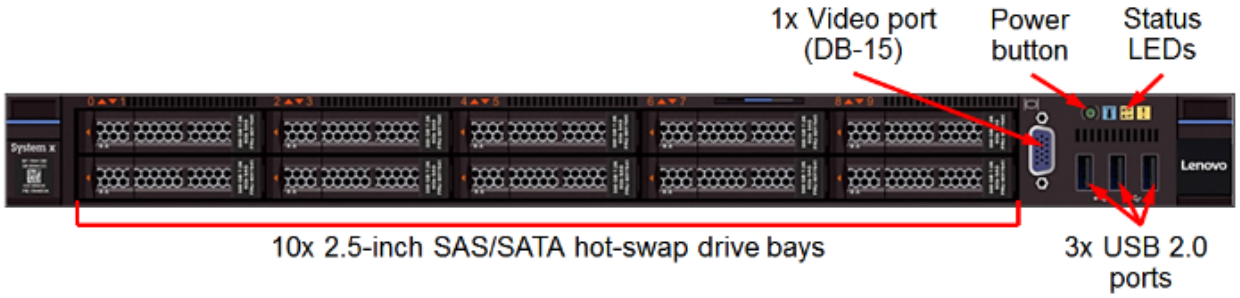


**Figure 4: x3550 M5 with ten 2.5-inch drive bays front view**

**Figure 5** shows the front of the System x3550 M5 server with four 3.5-inch drive bays.

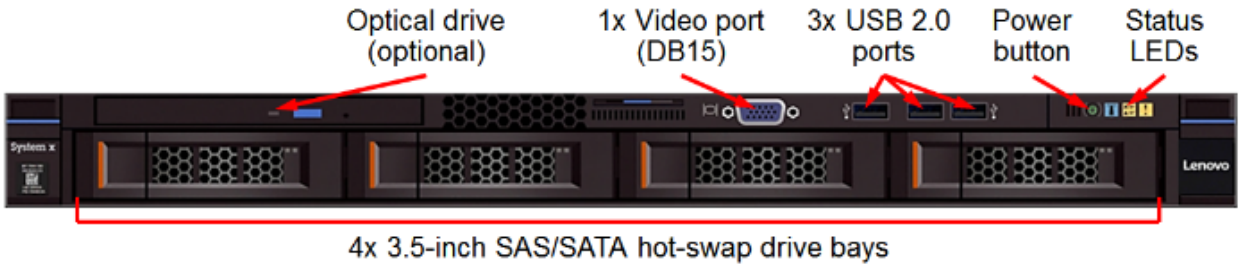


**Figure 5: x3550 M5 with four 3.5-inch drive bays front view**

**Figure 6** shows the rear view of x3550 M5 with three PCIe low profile slots.

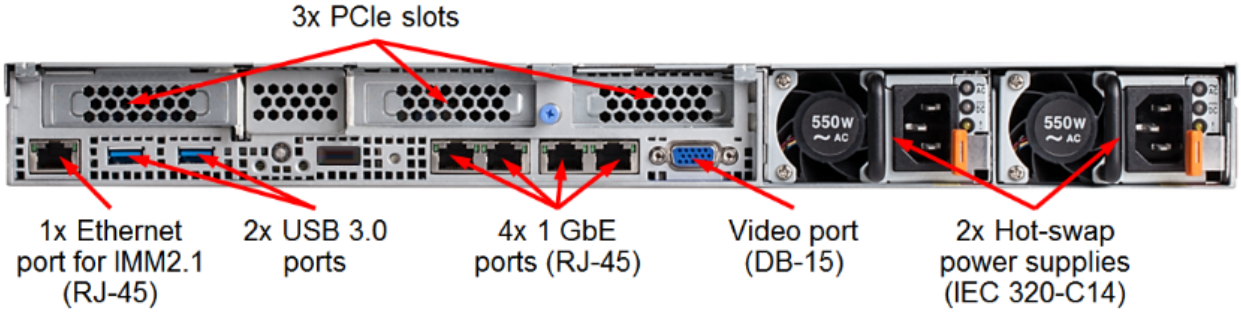


**Figure 6: x3550 M5 rear view**

**Figure 7** shows the inside view of x3550 M5.

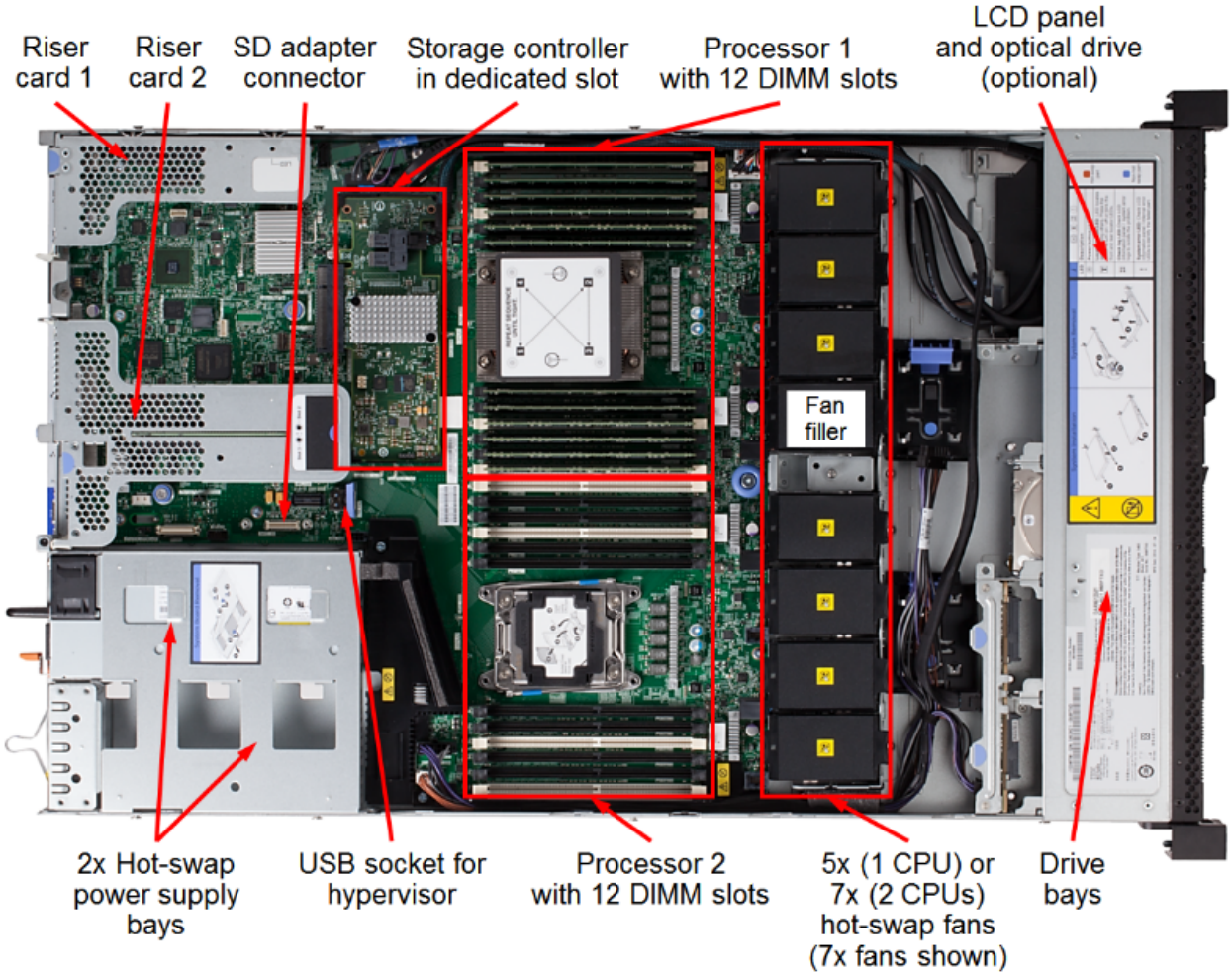


**Figure 7: x3550 M5 inside view**

**Figure 8** shows the front view of x3650 M5 with up to 16x 2.5-inch drive bays and front I/O cage entry (default).

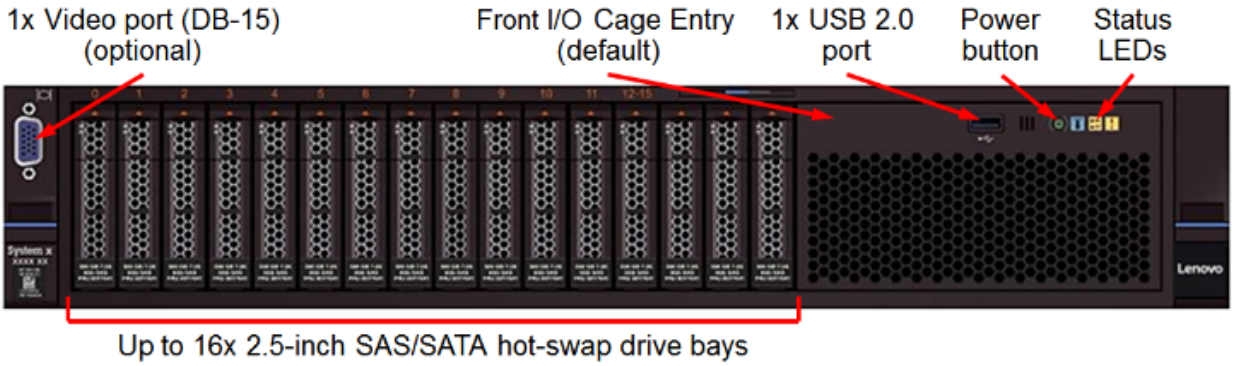


**Figure 8: x3650 M5 with 16x 2.5-inch drive bays and Front I/O Cage Entry front view**

**Figure 9** shows the front view of x3650 M5 with up to 16x 2.5-inch drive bays and front I/O cage standard (optional).

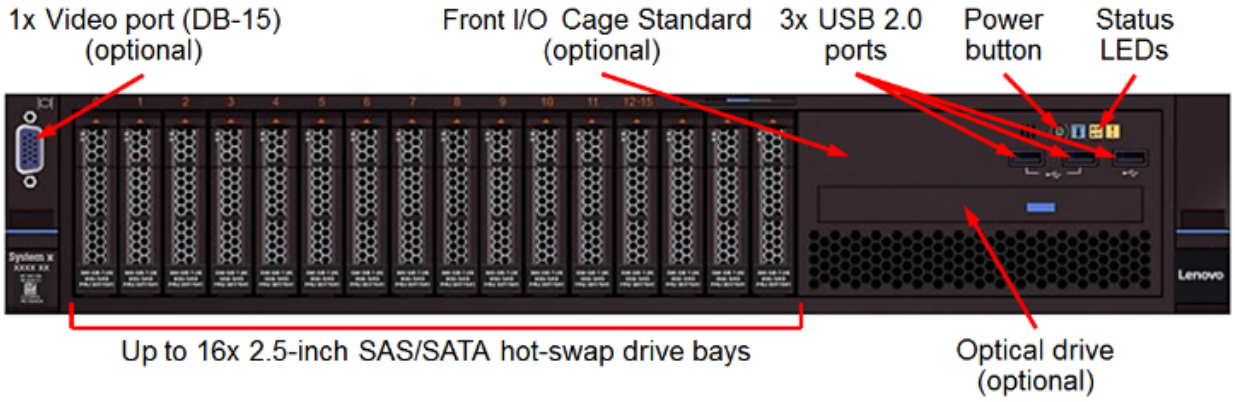


**Figure 9: x3650 M5 with 16x 2.5-inch drive bays and Front I/O Cage Standard front view**

**Figure 10** shows the front view of x3650 M5 with up to 16x 2.5-inch drive bays and front I/O cage advanced (optional).

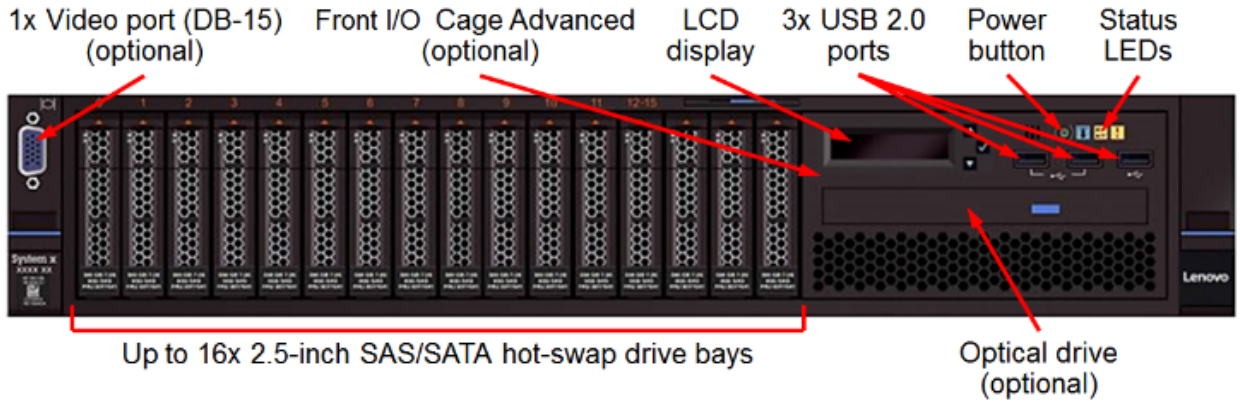


**Figure 10: x3650 M5 with 16x 2.5-inch drive bays and Front I/O Cage Advanced front view**

**Figure 11** shows the front view of x3650 M5 with up to 24x 2.5-inch drive bays.

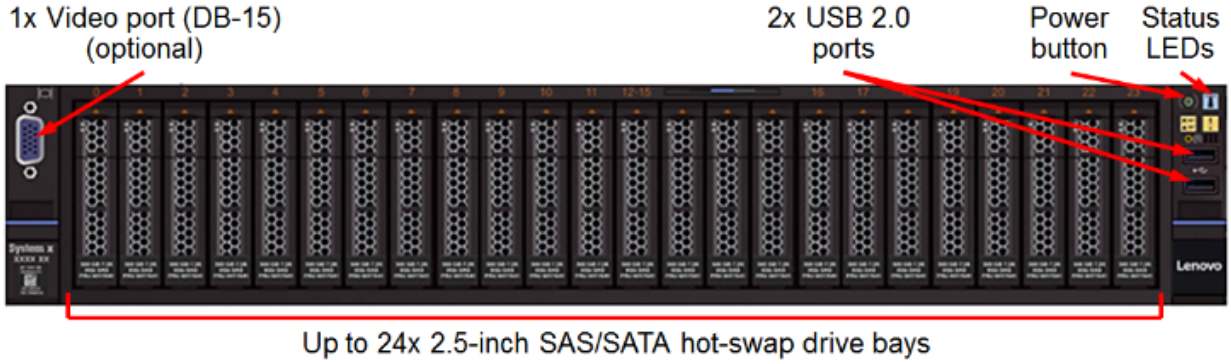


**Figure 11: x3650 M5 with 24x 2.5-inch drive bays front view**

**Figure 12** shows the front view of x3650 M5 with 8x 3.5-inch drive bays.

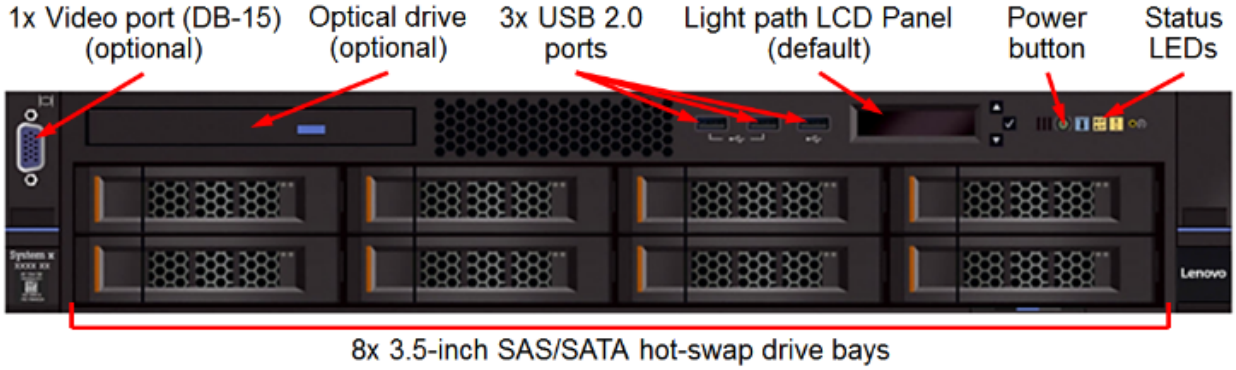


**Figure 12: x3650 M5 with 8x 3.5-inch drive bays front view**

**Figure 13** shows the front view of x3650 M5 with 12x 3.5-inch drive bays.

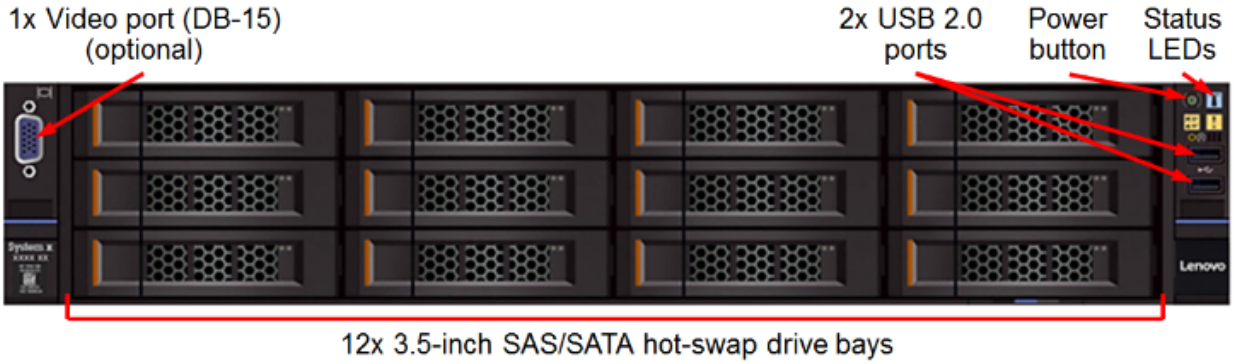


**Figure 13: x3650 M5 with 12x 3.5-inch drive bays front view**

**Figure 14** shows the rear view of x3650 M5 generic machine type 8871.

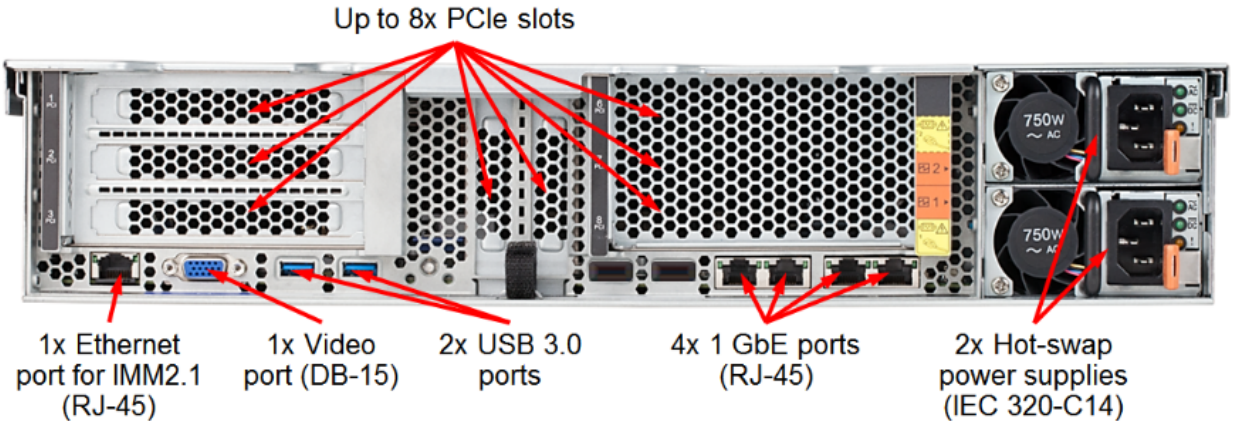


**Figure 14: x3650 M5 generic machine type 8871 rear view**

The x3650 M5 machine type 5462 and machine type 8871-AC3 provide two additional USB 2.0 ports on the rear side. **Figure 15** shows the rear view of x3650 M5 machine type 5462 and machine type 8871-AC3.

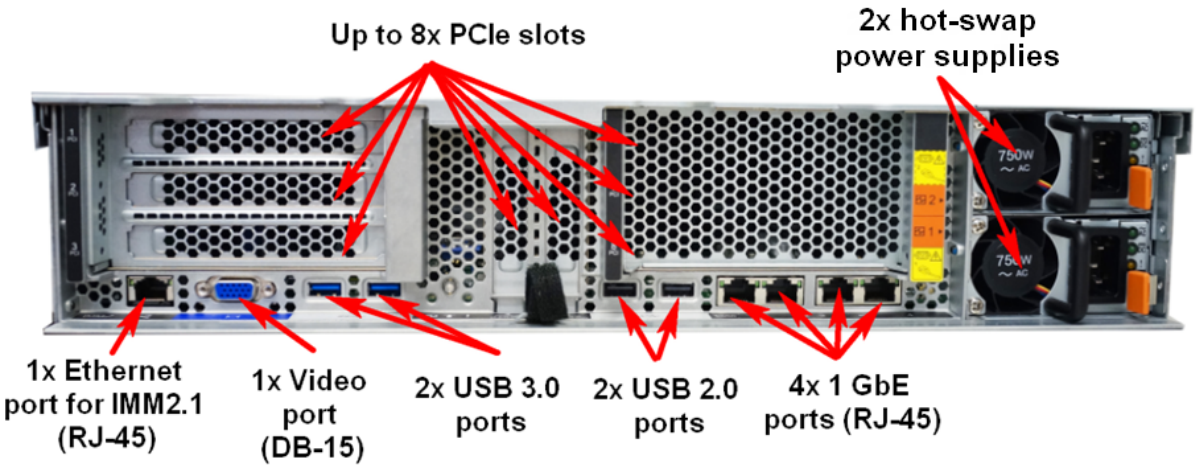


**Figure 15: x3650 M5 machine type 5462 and machine type 8871-AC3 rear view**

**Figure 16** shows the x3650 M5 inside view.

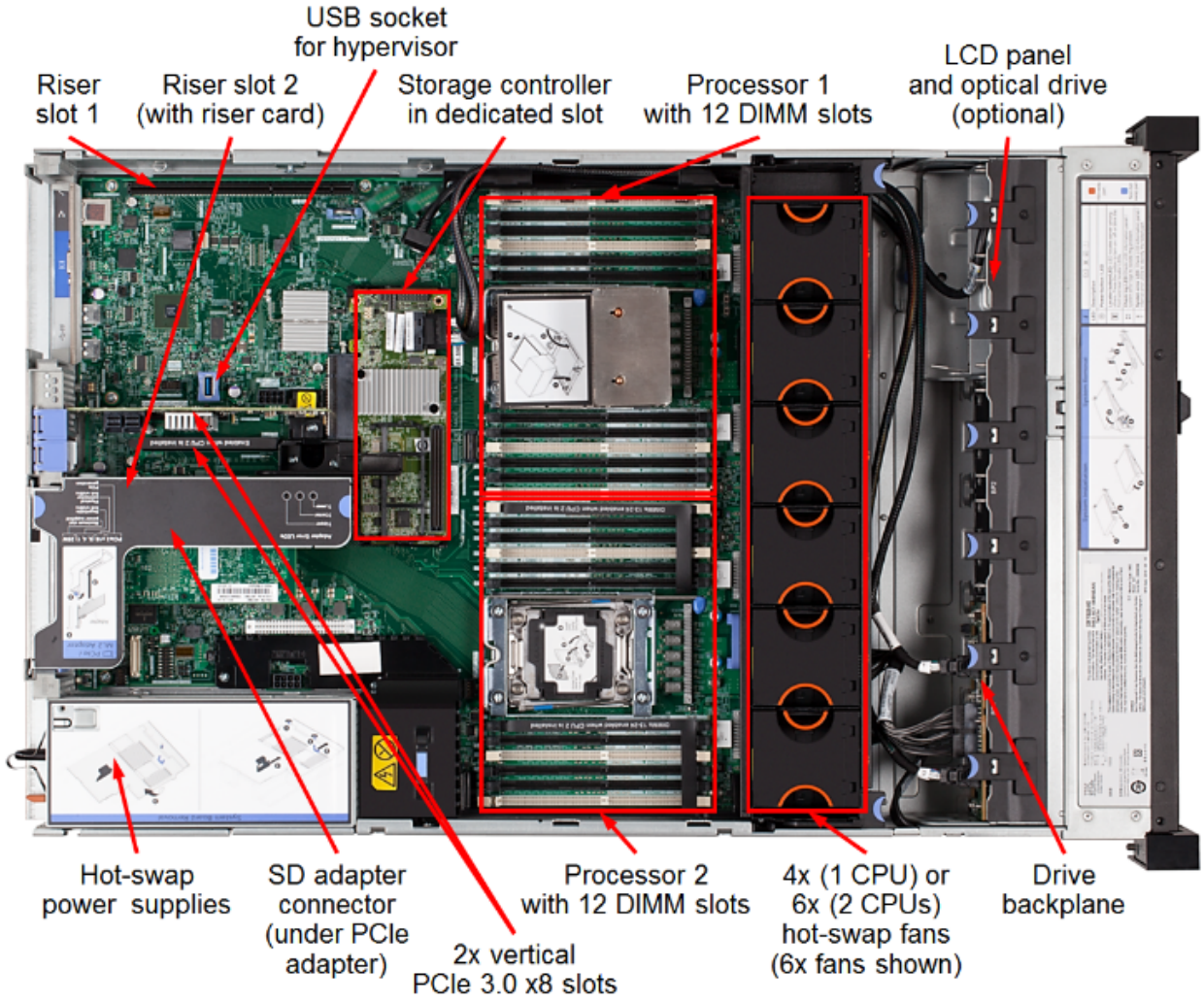


**Figure 16: x3650 M5 inside view**

The x3650 M5 generic machine type 8871 and x3650 M5 machine type 8871-AC3 use different system board. For the x3650 M5 machine type 8871 system board replacement, be sure to use the correct FRU part.

**Table 1** shows the x3650 M5 generic machine type 8871 and 8871-AC3 system board FRU part number and their differences.

**Table 1: x3650 M5 machine type 8871 system board FRU part number**

| Machine type | System board FRU part number | Difference |
|---|---|---|
| Generic 8871 | 01GT443<br>(To replace 00MW385) | Two USB 3.0 ports on the rear side only.<br>All PCIe slots are PCIe 3.0 x8 slots. |
| 8871-AC3 | 00YL909 | Two USB 3.0 ports and two USB 2.0 ports on the rear side.<br>The PCIe slot 5 is a PCIe 3.0 x16 slot. |

**Figure 17** shows the x3650 M5 fan cage and hot-swap fans.

**Figure 17: x3650 M5 fan cage**

**Figure 18** shows the x3650 M5 power paddle module.

**Figure 18: x3650 M5 power paddle module**

**Figure 19** shows the status LEDs of the x3550 M5 and x3650 M5.


**Figure 19: Status LEDs**

## Features and specifications

The x3550 M5 and x3650 M5 key features include:

- Machine type 5463 and 5462 support up to two Intel Xeon E5-2600 v3 series processors with QPI.
- Machine type 8869 and 8871 support up to two Intel Xeon E5-2600 v4 series processors with QPI.
- Twenty-four DDR4 DIMM slots, minimum 4 GB, maximum 1.5 TB (24 x 64 GB LRDIMM).
- Memory supports (depending on the model):
  - 4 GB, 8 GB, 16 GB, and 32 GB registered DIMMs (RDIMMs)
  - 32 GB and 64 GB load reduced DIMM (LRDIMMs)
- Machine type 5463 and 5462 memory speed up to 2133 MHz.
- Machine type 8869 and 8871 memory speed up to 2400 MHz.
- Optional LCD information display panel supports (depending on the model).
- Supports IMM v2.1.
- Supports Lenovo XClarity Administrator.
- Supports up to one optional Mezzanine LAN-on-Motherboard Generation 2 (ML2) network adapter.
- Redundant hot-swap fans.

## The x3550 M5 internal storage configuration

The x3550 M5 supports the following internal storage configurations:

- Up to ten 2.5-inch hot-swap hard disk drive (HDD) bays with the option to add two additional rear 2.5-inch hot-swap hard disk drive bays.
- Up to eight 2.5-inch hot-swap or simple-swap HDD bays.
- Up to four 3.5-inch hot-swap or simple-swap SATA HDD bays.

**Figure 20** shows the x3550 M5 optional rear HDD kit


**Figure 20: x3550 M5 optional rear HDD kit**

**Note:** The x3550 M5 does not support the ten 2.5-inch simple swap HDD configuration.

## The x3650 M5 internal storage configuration

The System x3650 M5 server supports the following configurations:

- Up to sixteen 2.5-inch simple-swap SAS/SATA HDD bays.
- Up to twenty-four 2.5-inch hot-swap SAS/SATA HDD bays with the option to add two additional rear 2.5-inch hot-swap HDD bays.
- Up to eight 3.5-inch simple-swap SAS/SATA HDD bays.
- Up to twelve 3.5-inch hot-swap HDD bays with the option to add two additional rear 2.5-inch hot-swap SAS/SATA HDD bays and another two additional rear 3.5-inch hot-swap SAS/SATA HDD bays.

**Figure 21** shows the x3650 M5 with one rear 2.5-inch hot-swap HDD kit and one rear 3.5-inch hot-swap HDD kit.

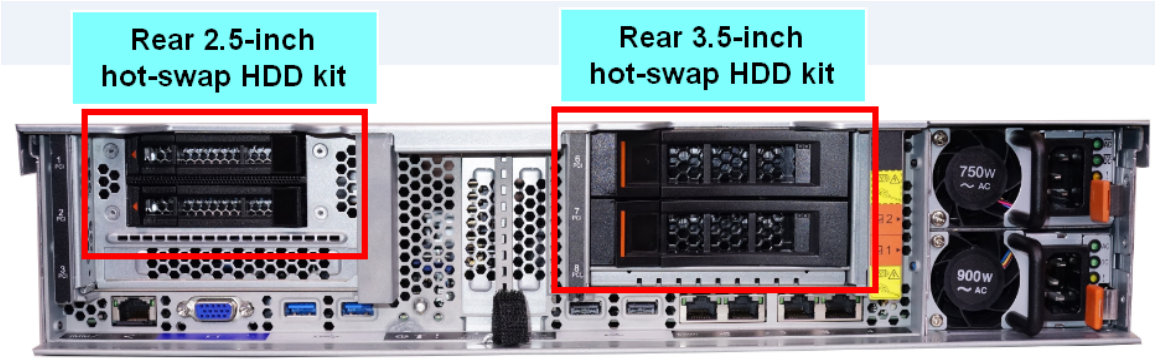


**Figure 21: x3650 M5 with rear 2.5-inch hot-swap HDD and 3.5-inch hot-swap HDD kit**

## LCD system information display panel

The x3550 M5 and x3650 M5 support LCD system information display panel. The LCD panel is attached to the front bezel of the server. This panel enables users to have quick access to system status, firmware, network, and health information.

**Note:** The LCD information display panel is an optional part. Due to the space limitations, it is not available on all of the x3550 M5 and x3650 M5 models.

**Figure 22** shows the LCD system information display panel.


**Figure 22: LCD information display panel**

**Figure 23** shows an example of the information about the LCD system information display panel. This example shows the layout of the information in the main menu when the debug feature is enabled.

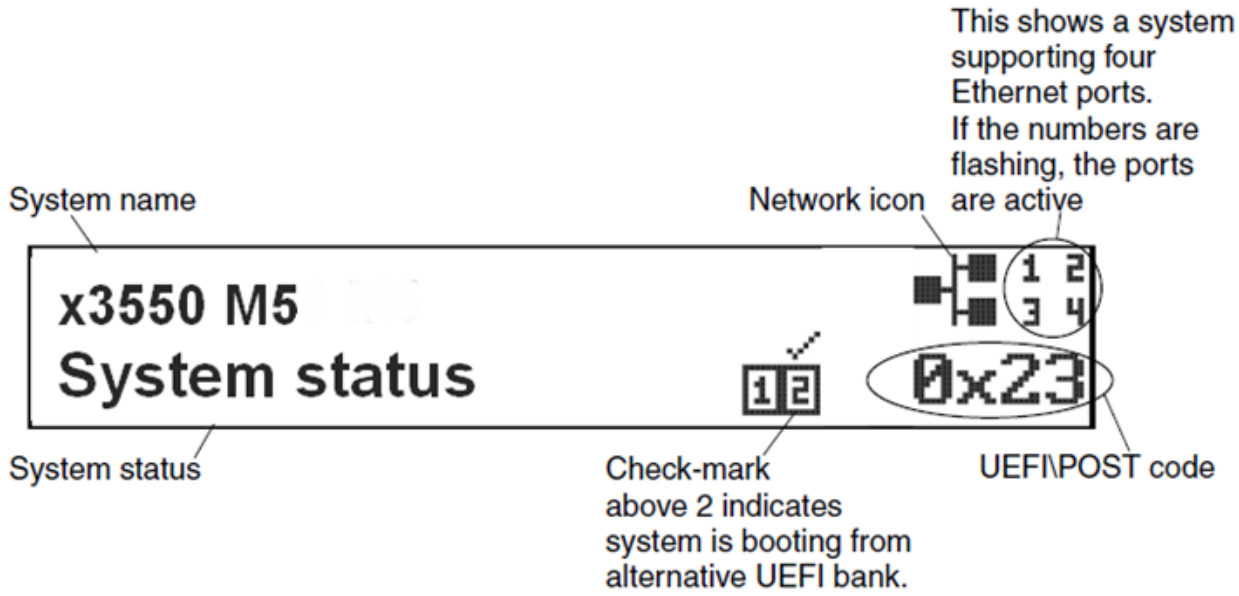


**Figure 23: LCD information display panel layout**

When you navigate through the hierarchy of the menu options on the LCD operating panel assembly, the display panel shows the information for that option and the up and down arrows appear on the side of the display panel. When you get to the bottom of the hierarchy of the menu options, only the up arrow is available. When you are at the top of the hierarchy of the menu options, only the down arrow is available.

**Figure 24** shows the LCD information display panel menu options flow.

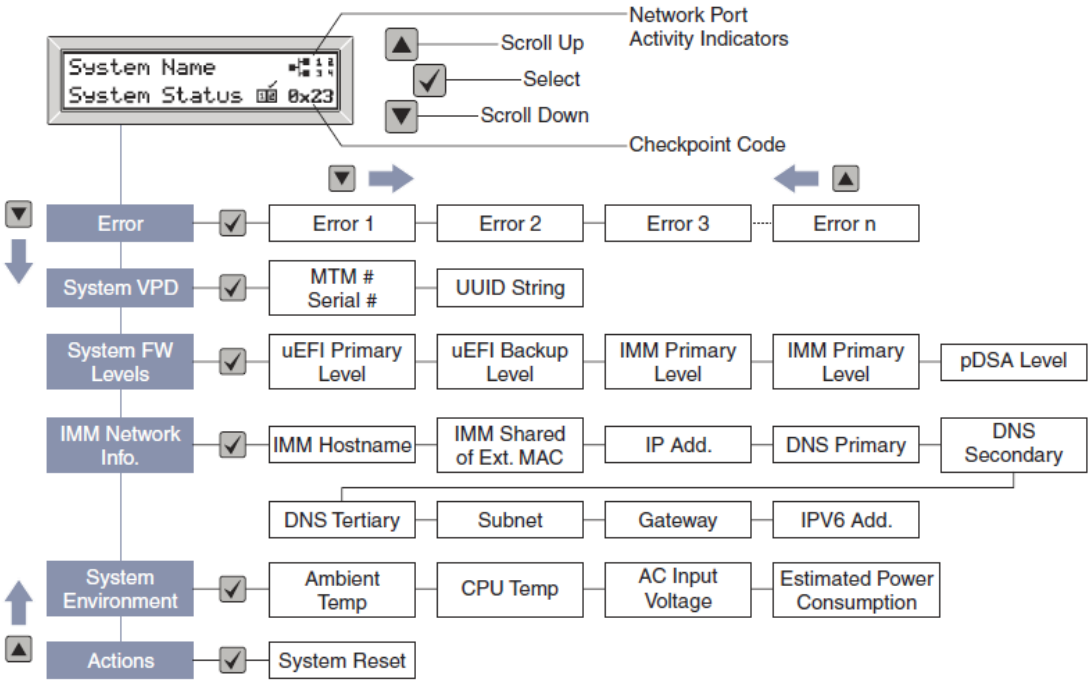


**Figure 24: LCD information display panel menu options flow**

If only one error occurs, the LCD display panel displays that error in the errors submenu set. If more than one error occurs, the LCD display panel displays the number of errors that have occurred. If no errors occur, the no error menu is available for navigation.

To see the system error log (SEL) and get the complete list of errors, go to the IMM Web page.

**Figure 25** shows an example of the system board error message on the system information display panel.


**Figure 25: LCD information display panel**

## Memory

The x3550 M5 and x3650 M5 support many DDR4 DIMM types, including Registered DIMMs (RDIMM), and Load Reduced DIMMs (LRDIMM). The x3550 M5 and x650 M5 supports three sockets per channel for single-rank, dual-rank DIMMs, quad-rank DIMMs, and multirank LRDIMMs. The Intel Haswell-EP processor has a four-channel memory interface. Each channel consists of 64 data and eight error-correcting code (ECC) bits.

The x3550 M5 and x3650 M5 does not support mixing DIMM types. Either the platform is populated with all RDIMMs or all LRDIMMs.

All DIMMs in the server operate at the same speed, which is determined as the lowest value of:

- Memory speed that is supported by the specific processor.
- Memory speed for selected quantity of DIMMs per channel.

A second processor must be installed to use the DIMMs plugged into the memory slots that connect to a second processor.

Even though the system is functional with one memory DIMM, a minimum of four memory DIMMs per each processor is recommended to improve system performance.

**Note:** DDR4 DIMM supports Chipkill on the x4 configuration. DDR4 with the x8 configuration does not provide Chipkill protection. It still has ECC protection.

## The x3550 M5 I/O expansion options

The x3550 M5 server supports up to four PCIe slots: one is on the system board and is dedicated for an internal RAID controller and up to three with different riser cards installed into two riser sockets on the system board (one riser socket supports the installation of one riser card). The slot form factors are listed:

- Slot 1: PCIe 3.0 x16 or ML2; low profile, half-length (not present if the HDD Rear Kit is installed)
- Slot 2: PCIe 3.0 x16 or PCIe 3.0 x8; low profile or full-height, half-length (PCIe 3.0 x16 slot requires the second processor to be installed) (not present if the HDD Rear Kit is installed)
- Slot 3: PCIe 3.0 x16 or PCIe 3.0 x8; low profile, half-length
- Slot 4: PCIe 3.0 x8 (dedicated for an internal RAID controller)

The locations of the PCIe slots of the x3550 M5 are shown in **Figure 26**.

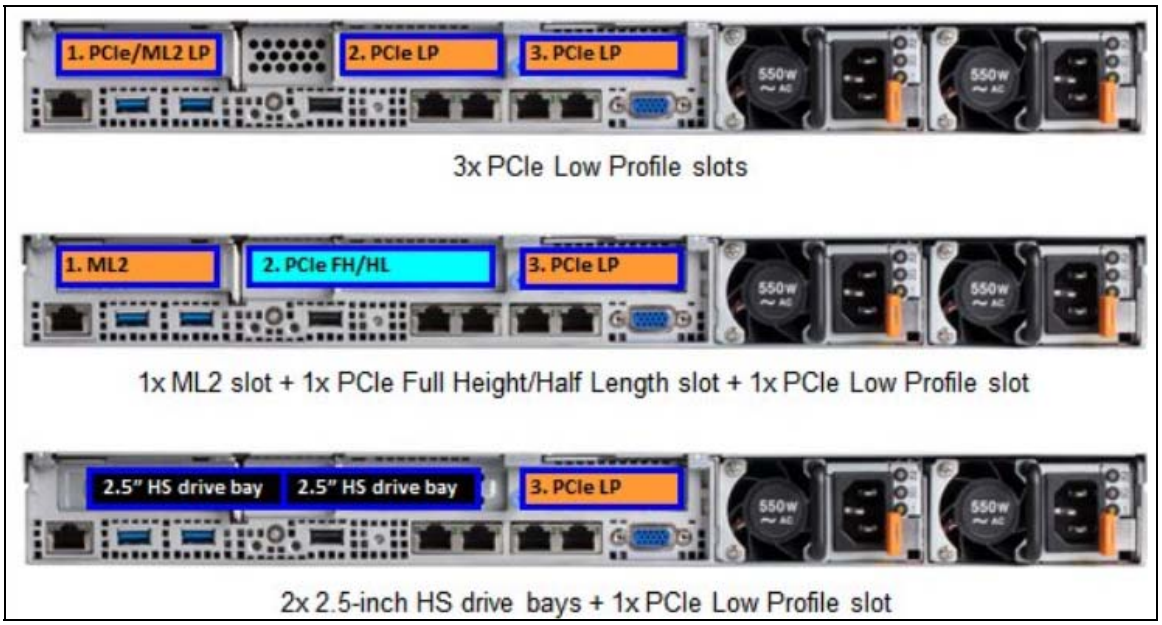


**Figure 26: PCIe slots locations of the x3650 M5**

Riser 1 supplies slot 1, and riser 2 supplies slots 2 and 3. All standard models have one riser card (Riser 1) installed, which provides one low profile PCIe x16 Gen 3 slot.

## The x3650 M5 I/O expansion options

The x3650 M5 supports up to nine PCIe slots: one slot on the system board that is dedicated for an internal RAID controller, two regular PCIe slots on the system board, and up to six PCIe slots with different riser cards installed into two riser sockets on the system board (one riser socket supports installation of one riser card). The slot form factors are as follows:

- Slot 1: PCIe 3.0 x8 (dedicated for an internal RAID controller)
- Slot 1: PCIe 3.0 x16 or PCIe 3.0 x8; full-height, full-length (PCIe x16 slot is double-wide)
- Slot 2: PCIe 3.0 x8; full-height, full-length (not present if the slot 1 is PCIe x16)
- Slot 3: PCIe 3.0 x8 or ML2; full-height, half-length
- Slot 4: PCIe 3.0 x8; low profile (vertical slot on system board)
- Slot 5 for machine type 5462 and machine type 8871-AC3: PCIe 3.0 x16; low profile (vertical slot on system board).
- Slot 5 for generic machine type 8871: PCIe 3.0 x8; low profile (vertical slot on system board).
- Slot 6: PCIe 3.0 x16 or PCIe 3.0 x8; full-height, full-length (PCIe x16 slot is double-wide)
- Slot 7: PCIe 3.0 x8; full-height, full-length (not present if the slot 6 is PCIe x16)
- Slot 8: PCIe 3.0 x8; full-height, half-length

**Figure 27** shows the RAID adapter on the RAID dedicated slot of the x3650 M5.

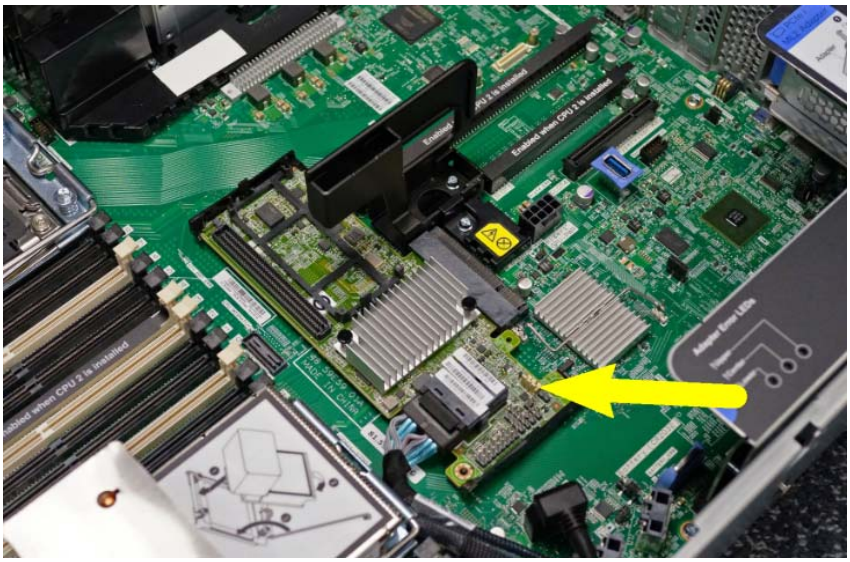

**Figure 27: A RAID adapter on the RAID dedicated slot of the x3650 M5**

**Figure 28** shows the locations of the PCIe slots of the x3650 M5.

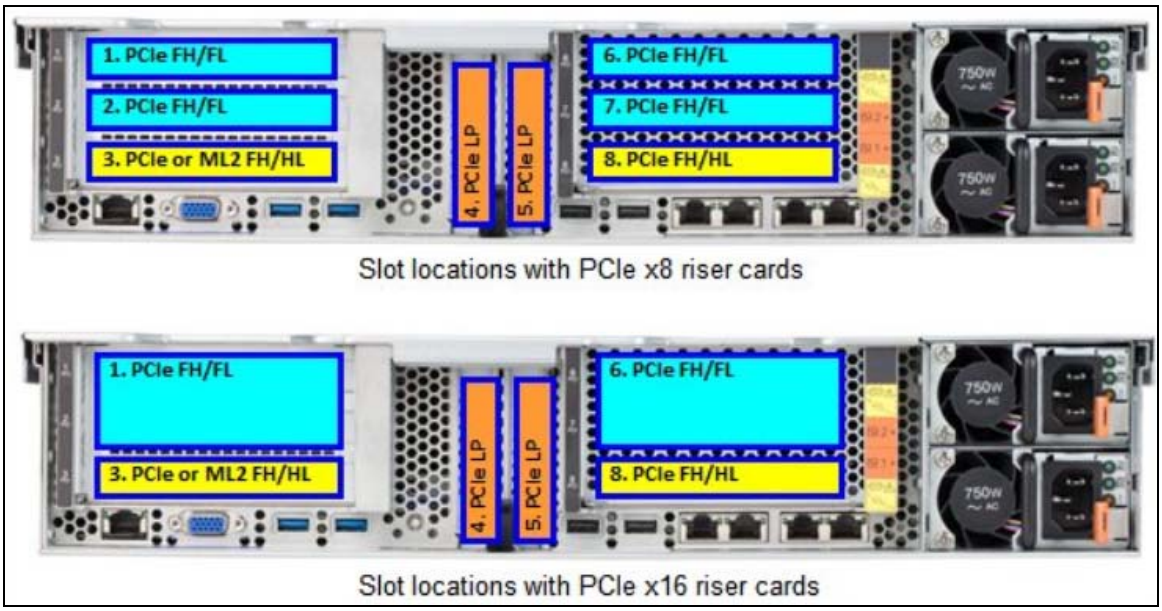


**Figure 28: PCIe slots of the x3650 M5**

**Note:** Slots 5, 6, 7, and 8 require the second processor to be installed.

Riser 1 supplies slots 1, 2, and 3, and Riser 2 supplies slots 6, 7, and 8. Standard models do not include any riser cards.

## SD media adapter

The SD media adapter for System x provides dual SD media slots for removable SD media as an option for select System x servers. Customers can partition the SD media into one or more logical drives individually configured as RAID 1 or non-RAID for use in such applications as bootable hypervisors, fix pack delivery, local tools, log gathering, and whatever else a customer might need.

**Figure 29** shows the SD media adapter with two SD cards.

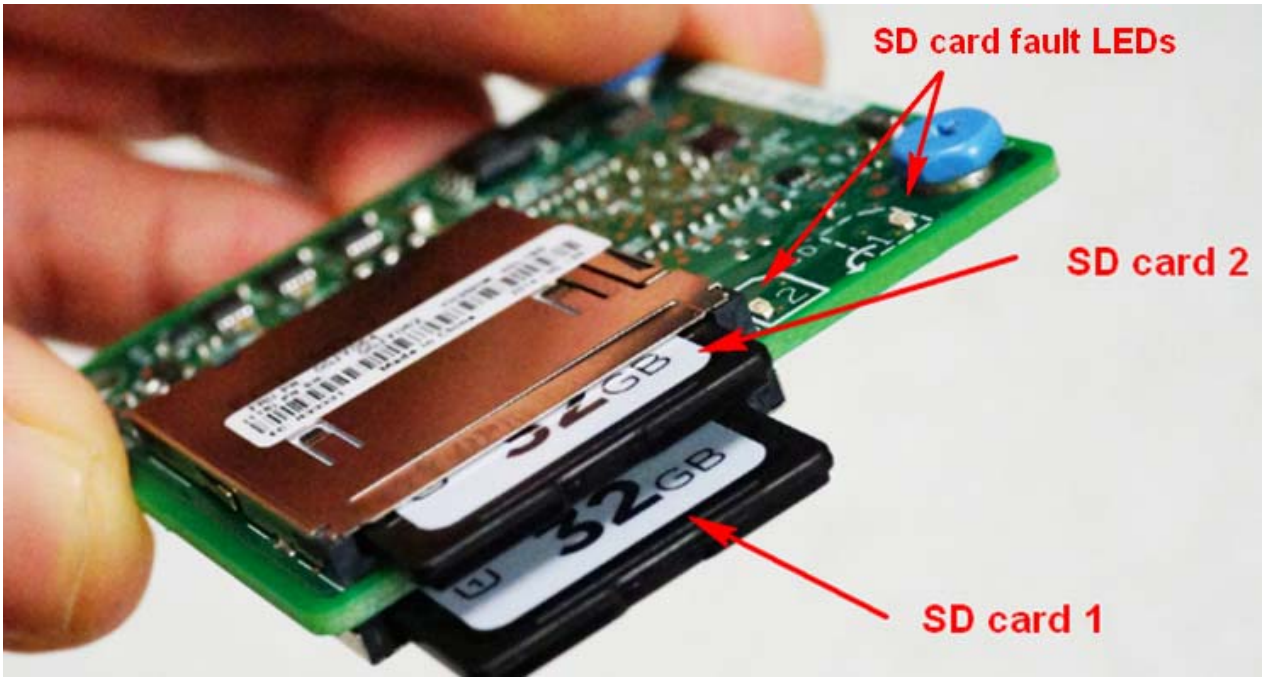


**Figure 29: SD media adapter with two SD cards**

**Figure 30** shows an SD media adapter installed in the x3650 M5.


**Figure 30: SD media adapter installed in the x3650 M5**

Up to 16 non-RAID, eight RAID 1, or a mix of the two types of drives can be created. The maximum number of drives that can be created when one physical SD card is present is eight.

The maximum number of drives that can be created when two physical SD cards are present is 16. These must all be non-RAID, eight drives per physical SD card maximum.

The maximum number of RAID 1 drives that can be created is eight; these RAID partitions span both SD cards. To create eight RAID drives, two SD cards must be present.

The number of possible drives that can be created on the SD media adapter depends on how many physical SD cards are installed, the space used by each drive, and the number of drives remaining (out of eight) per SD card. For example, users could create 14 non-RAID partitions, seven on each SD card, and one RAID 1 partition across both cards, for a total of 15 drives. If, however, users created 14 non-RAID drives, eight on one card and six on the other, then no RAID drives can be created.

The SD media adapter supports the IMM command-line interface (CLI) and graphical user interface (GUI). Use a telnet tool (for example, PuTTY) or a Web browser, and enter the system's IMM IP address, user account, and password to access the IMM CLI or GUI to configure the SD media adapter.

**Note:** Use the `sdraid -h` command to view all available command.

Use the `sdraid` command (as shown in **Figure 31**) to view the SD media adapter's hardware information and its SD cards status.

```
login as: USERID
Using keyboard-interactive authentication.
Password:
Access denied
Using keyboard-interactive authentication.
Password:

system> sdraid
SD Media Adapter for System x
  Hardware Revision      = 4.0
  Firmware Version       = 1.3.2.171
  Serial Number          = 45L161
  FRU Number             = 00JY064
Mode                     = Operational
SDCard1
  Status                 = Healthy
  Capacity               = 30542 MBytes
  FRU Number             = 00
SDCard2
  Status                 = Healthy
  Capacity               = 30542 MBytes
```

You can find the SD card FRU number here

**Figure 31: sdraid command**

**Note:** The SD media adapter allows any SD cards to function, but Lenovo only provides warranty services to its own SD cards. Use the `sdraid` command and verify the SD card's FRU number to determine if the customer is using the Lenovo's SD card or not.

Use the case-sensitive `sdraid -SDCard [card number]` command (shown in **Figure 32**) to see more details about the individual SD card.

```
  Status                = Healthy
  Capacity              = 30542 MBytes
  FRU Number            = 00
SDCard2
  Status                = Healthy
  Capacity              = 30542 MBytes
  FRU Number            = 00
system> sdraid -SDCard 1
SDCard
  Status                  = Healthy
  FRU Number              = 00
  Serial Number           = b539e4a2
  Manufacturer            = Micron
  Is Primary              = true
  Capacity                = 30542 MBytes
  Largest Available Space = 10062 MBytes
  DriveCount              = 5
  Drive 1 Name            = sdraid5
  Drive 2 Name            = sdraid4
  Drive 3 Name            = sdraid3
  Drive 4 Name            = sdraid2
  Drive 5 Name            = sdraid1
ok
system> sdraid -SDCard 2
```

**Figure 32: Use sdraid –SDcard command to check SD card status**

If one of the SD cards failed in the SD media adapter and the customer has the RAID 1 configuration on the SD media adapter, replace the SD card, and enter the following command to rebuild the RAID data to the replaced SD card:

```
-migrateConfig -primaryCard [card number with migrated data] -now
```

For example, if the SD card 2 failed and you replace the SD card 2 and need to migrate the data from SD card 1 to SD card 2, use the following command:

```
sdraid -migrateConfig -primaryCard 1 -now
```

Any existing data on card SD card 2 is lost during this operation. After this operation, any RAID data on SD card 1 will automatically be synchronized to SD card 2.

**Figure 33** video shows the SD card rebuilding process.

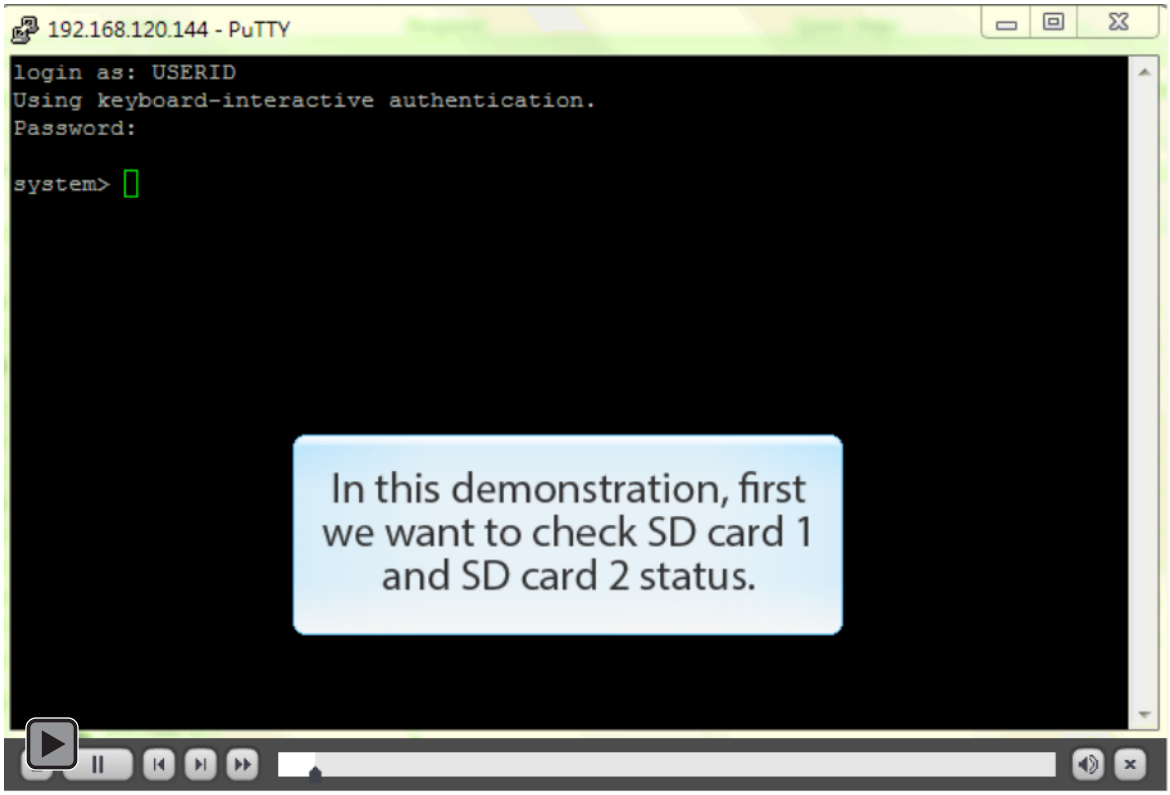


**Figure 33: SD card rebuilding process**

For more information about the SD media adapter with IMM CLI, refer to the *Installation and Configuration guide – SD media adapter for System x* document.

You can also use IMM GUI to set up the SD media adapter configuration. The SD media adapter configuration page is located in **IMM2 GUI > Server Management > Local Storage**.

**Figure 34** shows the SD media adapter page in IMM2.

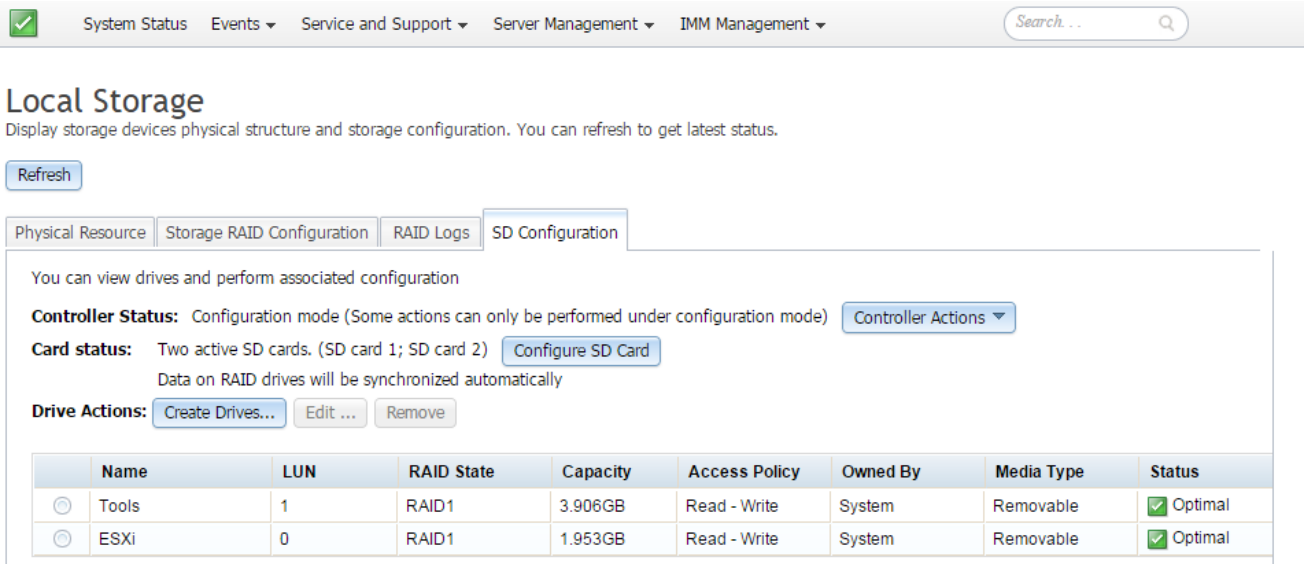


**Figure 34: SD media adapter page in IMM2**

To understand how to create a RAID configuration on the SD media adapter through IMM2, refer to the video *Use GUI to create RAID (SD Media Adapter)* on the landing page of this course.

# System diagrams

**Figure 35** shows the x3550 M5 block diagram.

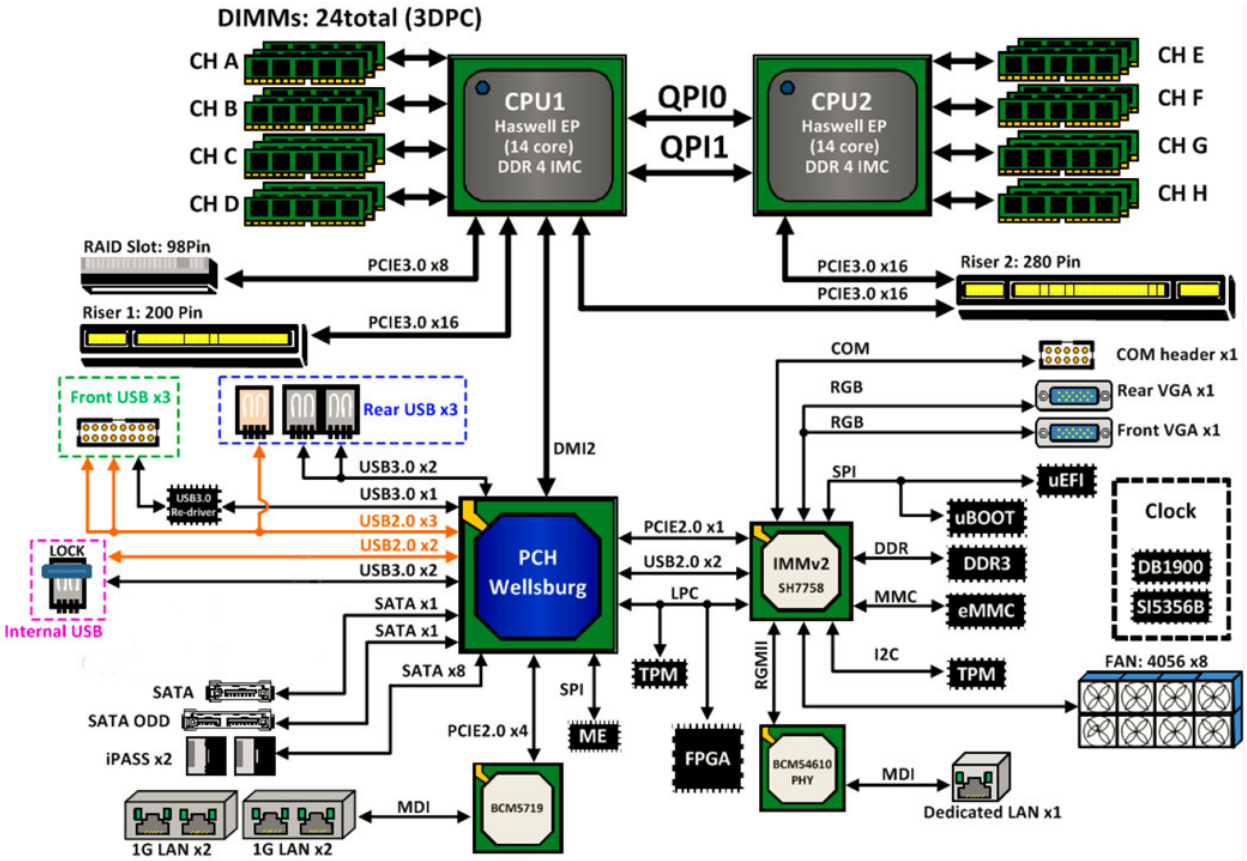


**Figure 35: x3550 M5 block diagram**

**Figure 36** shows the x3650 M5 block diagram.

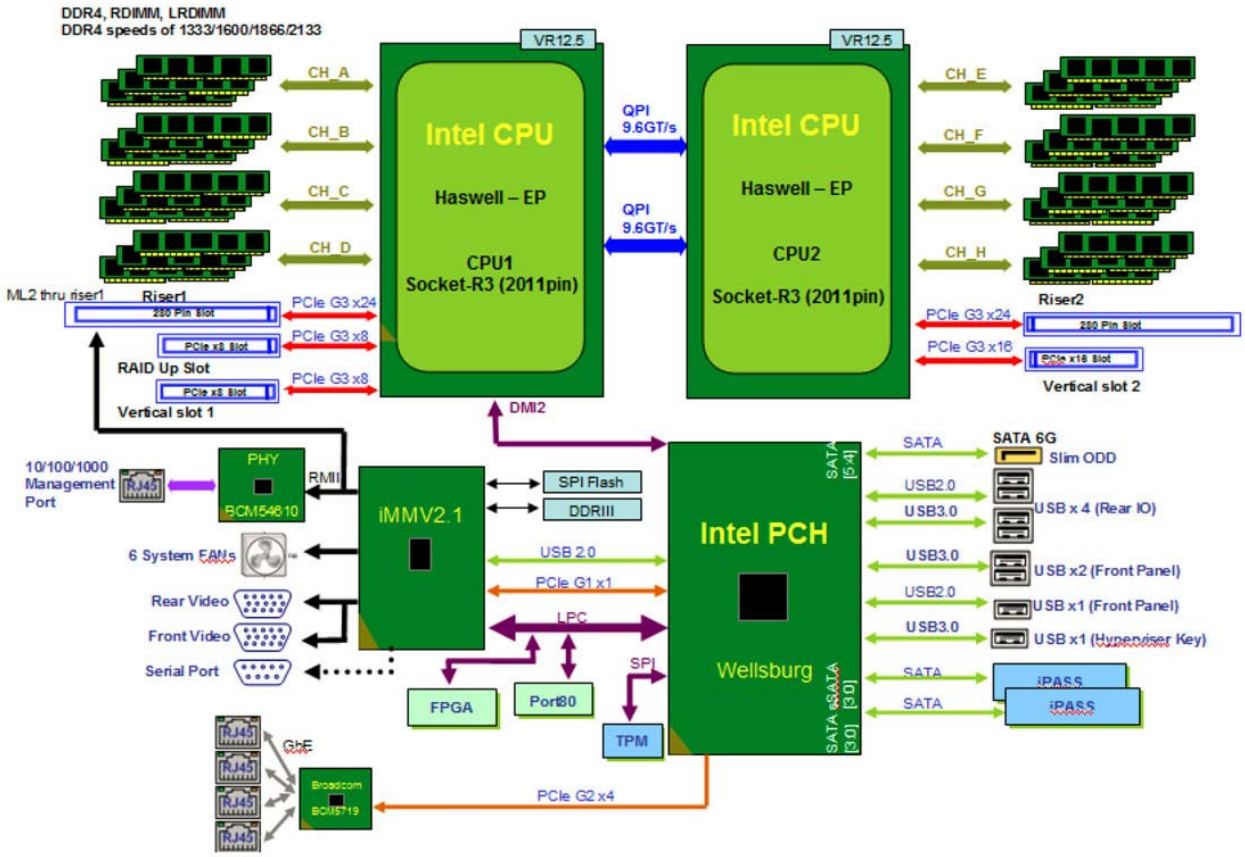


**Figure 36: x3650 M5 block diagram**

The x3550 M5 and x3650 M5 system boards have two Intel Haswell-EP CPU sockets, DDR4 buffered ECC 1866/2133/2133 MHz with 24 DIMM sockets, system I/O functions, and an on-board Broadcom BCM5719 1 Gb Ethernet controller. The memory controller inside the processor can support four channels, mirror mode, or rank spare mode.

## DIMM population sequence

**Table 2** shows the DIMM population sequence of x3550 M5 and x3650 M5 in non-mirroring mode.

| Table 2: DIMM installation sequence in non-mirroring mode | |
|---|---|
| **Title** | **Link to materials** |
| One CPU | 1>4>9>12>2>5>8>11>3>6>7>10 |
| Two CPUs | 1>13>4>16>9>21>12>24>2>14>5>17>8>20>11>23>3>15>6>18>7>19>10>22 |

The x3550 M5 and x3650 M5 supports memory rank sparing. The memory rank sparing feature disables the failed memory from the system configuration and activates a rank-sparing DIMM to replace the dialed active DIMM. The maximum available memory is reduced when memory rank sparing is enabled.

**Table 3** through **Table 5** show the various DIMM population sequence of x3550 M5 and x3650 M5 in rank-spare mode:

| Table 3: DIMM installation sequence in rank spare mode rule A: When installed DIMMs are all quad-rank RDIMM | |
|---|---|
| **CPU quantity** | **DIMM population sequence** |
| One CPU | 1->4->9->12->2->5->8->11 |
| Two CPU | 1->13->4->16->9->21->12->24->2->14->5->17->8->20->11->23 |

| Table 4: DIMM installation sequence in rank-spare mode rule B: When installed DIMMs are mixed single/dual/quad rank and the total number of DIMMs is even | |
|---|---|
| **CPU quantity** | **DIMM population sequence** |
| One CPU | (1,2) > (4,5) > (8,9) > (11,12) > (3,6) > (7,10) |
| Two CPU | (1,2) > (13,14) > (4,5) > (16,17) > (8,9) > (20,21) > (11,12) > (23,24) > (3,6) > (15,18) > (7,10) > (19,22) |

**Table 5: DIMM installation sequence in rank-spare mode rule C: When installed DIMMs are mixed single/dual/quad rank and the total number of DIMMs is odd**

| CPU quantity | DIMM population sequence |
|---|---|
| One CPU | (1,2,3) > (4,5) > (8,9) > (11,12) > (6,7) |
| Two CPU | (1,2,3) > (13,14) > (4,5) > (16,17) > (8,9) > (20,21) > (11,12) > (23,24) > (3,6) > (6,7) > (18,19) > (10,22) |

# Problem determination and troubleshooting

## Before you begin

Before starting any troubleshooting steps on the x3550 M5 or x3650 M5, perform the following actions:

- Inquire about the event that occurred before the suspected system problem. If possible, return the system to the previous state.
- Confirm the supported firmware and device driver levels on the current system.
- Record the symptoms including poor performance and error messages.
- Determine whether the problem is repeatable.
- If the problem occurred during the initial installation of a new option component to x3550 M5 and x3650 M5, check the ServerProven hardware compatibility page for the x3550 M5 at http://www.lenovo.com/us/en/serverproven/xseries/8869.shtml and x3650 M5 at http://www.lenovo.com/us/en/serverproven/xseries/8871.shtml. Make sure that the option component is compatible with the x3550 M5 and x3650 M5.

## Collecting data

Data collection is the primary step in determining the correct service action to perform to resolve a client's issue. Whether the data collected is verbal from the client ("…the front panel LED is flashing…") or a diagnostic data file from a specialized application, all information that is collected is useful toward identifying one of the four available service actions that you can perform. The four actions are:

- Update (firmware, microcode, device drivers, and software)
- Reconfigure (parameter values, cabling, component reseats, and system restarts)
- Replace (hardware)
- Escalate to the next service level

Users can inspect six error report areas to collect objective information for the x3550 M5 and x3650 M5:

- External and internal LEDs on the system
- LCD system information display panel on the front bezel
- IMM2 event log
- DSA Preboot, DSA Portable/Installable, or DSA Bootable
- System Event Log in UEFI
- POST Event Log in UEFI

**Figure 37** shows the x3550 M5 internal LEDs on the system board. **Figure 38** shows the x3650 M5 internal LEDs on the system board. Users can check these internal LEDs to locate the source of the error in the system.

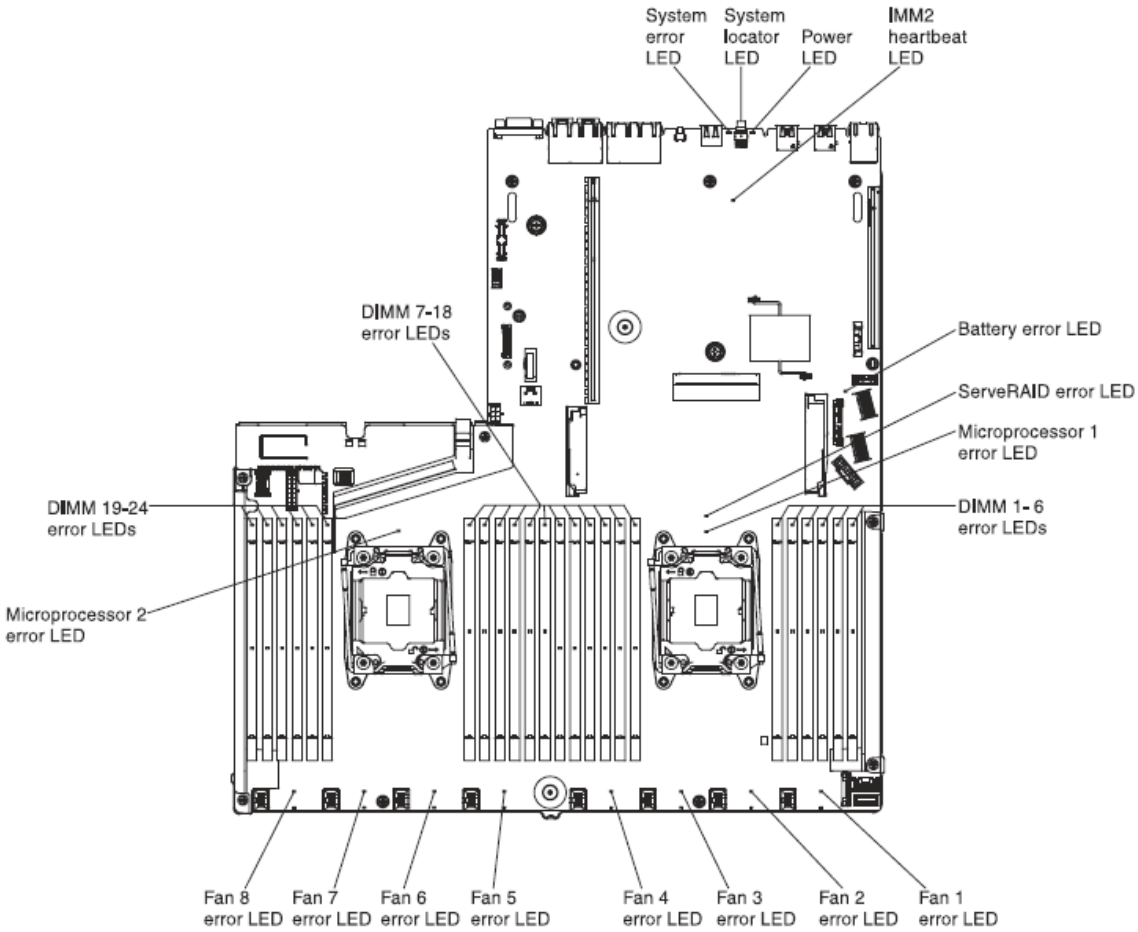


**Figure 37: The x3550 M5 internal LEDs on the system board**

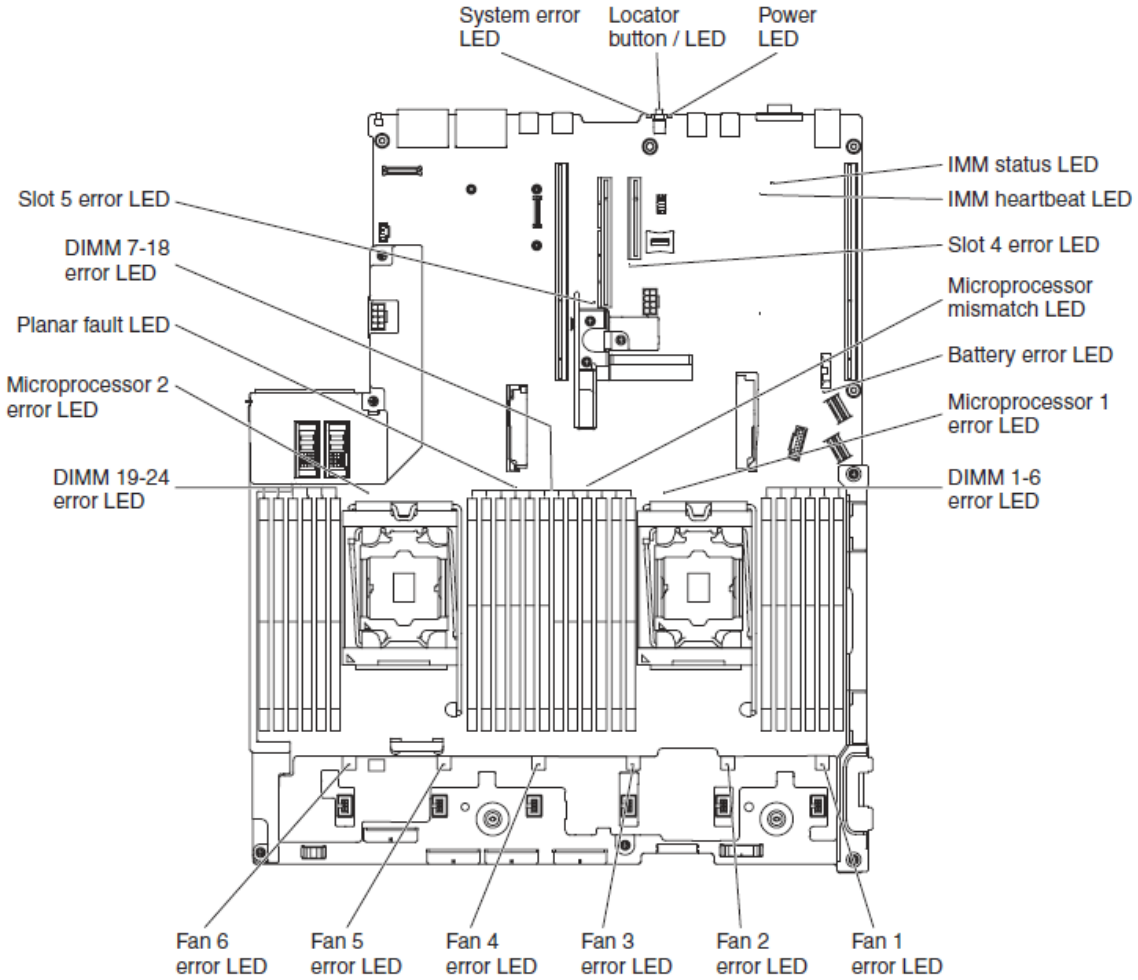


**Figure 38: The x3650 M5 internal LEDs on the system board**

If the power supply is operating correctly, the internal LEDs remain lit when the server is connected to an ac power source, but the system is not powered on. This feature helps users isolate the problem when the operating system is shut down.

**Note:** When users disconnect the power source from the server, users lose the ability to view the LEDs because the LEDs are not lit when the power source is removed. Make a note of which LEDs are lit, including the internal LEDs and the LEDs that are lit on the front panel before you disconnect the power source.

## Hardware failure modes

When you collect service information about all subsystems (such as the memory or microprocessor) on an x3550 M5 or x3650 M5, find out what errors, symptoms, and messages the system is providing. Check the front status LEDs or LCD system information display panel to see if any errors occurred. The error LEDs, symptoms, and log messages help determine where the failure occurs.

## DDR4 DIMM identification

When a DIMM error occurs, check the IMM, UEFI, or DSA logs to identify whether the failed DIMM is a Lenovo qualified DIMM or not. A Lenovo qualified DIMM error log includes its serial number and FRU number. An unqualified DIMM error log does not include serial number or FRU number information. Lenovo does not provide warranty service to unqualified parts.

**Figure 39** shows an unqualified DIMM error log in IMM.

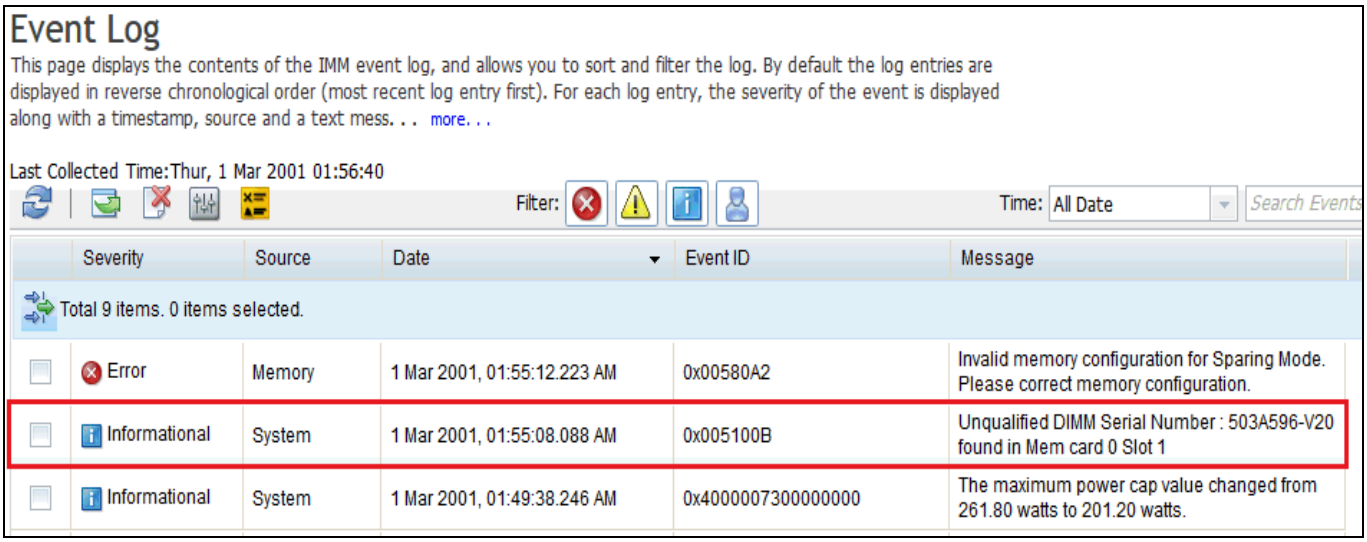


**Figure 39: Lenovo qualified DIMM error log in IMM**

**Figure 40** shows an unqualified DIMM error log in UEFI POST Event Viewer.

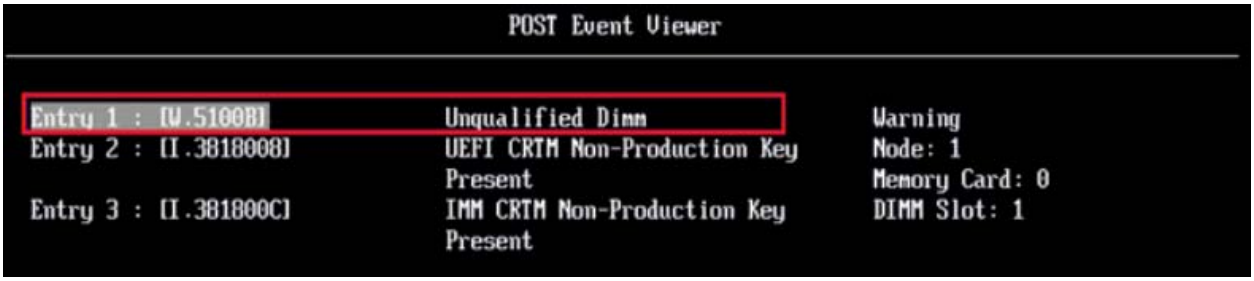


**Figure 40: Non-Lenovo qualified DIMM error log in UEFI POST Event Viewer**

**Figure 41** shows a non-Lenovo qualified DIMM error log in UEFI Firmware Event.

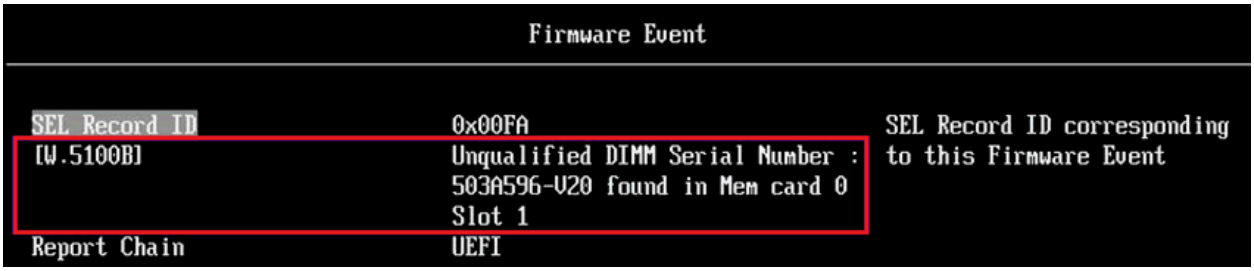


**Figure 41: Non-Lenovo qualified DIMM error log in UEFI Firmware Event**

**Note:** This DIMM identification feature only available on the System x with DDR4 DIMM.

## Removing and replacing server components

For more information about removing and replacing server components, access the Lenovo Support at http://support.lenovo.com/ to download the *System x3550 M5 Type 8869* or *System x3650 M5 type 8871 Installation and Service Guide (ISG)* document.

# Helpful links

| Table 6: Helpful links | |
|---|---|
| **Title** | **Link to materials** |
| Lenovo Support | http://support.lenovo.com/ |
| ServerProven for System x | http://www.lenovo.com/us/en/serverproven/indexsp.shtml |
| System x Information Center | http://publib.boulder.ibm.com/infocenter/systemx/documentation/index.jsp |
| Integrated Management Module II User's Guide | https://www-947.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5086346 |
| SD media adapter installation and configuration guide | https://www-947.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5096845 |

# Summary

This course enabled you to:

1. Provide an overview of the Lenovo System x3550 M5 and x3650 M5 machine type 5463, 5462, 8869 and 8871.
2. Describe the system's mechanical design.
3. Describe the different subsystems.
4. Describe the troubleshooting steps and explain how to complete the problem determination tasks for the x3550 M5 and 3650 M5 machine type 5463, 5462, 8869 and 8871.