



Lenovo Services Education

**Servicing the x3550 M4 Type 7914, x3650
M4 Type 7915/6188, x3650 HD and x3650
BD Type 5460**

**January 2017
Study guide**

ES70765E

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Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Preface

Preface

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460

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Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Prerequisites and objectives

Prerequisite courses

Although there are no specific prerequisites for this course, you should have a fundamental understanding of networking concepts and problem determination or troubleshooting skills. Familiarity with the following is helpful:

- Servicing System x servers
- Unified Extensible Firmware Interface (UEFI) Technology
- Integrated Management Module (IMM) Technology
- Integrated Management Module 2 (IMM2)

Objectives

After completing this course, you will be able to:

- Provide an overview of the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, and x3650 HD Type 5460.
- Describe the systems' mechanical features.
- Describe the different subsystems.
- Describe the problem determination steps and explain how to troubleshoot the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, and x3650 HD Type 5460.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, and x3650 HD Type 5460

Overview

x3550 M4 Type 7914 and x3650 M4 Type 7915

The System x3550 M4 is a follow-on system of the x3550 M3. The x3550 M4 is positioned as an enterprise (1U, two processor sockets, rack optimized) server with high performance, availability, and manageability for corporate data centers running infrastructure applications.

System x3550 M4 is the follow-on system of x3550 M3 and the System x3650 M4 is the follow-on system of x3650 M3.

The x3550 M4 and x3650 M4 systems are self-contained, high performance, rack-optimized, scalable multiprocessor server systems. With improved system reliability, availability, serviceability (RAS), and system management processor, x3550 M4 and x3650 M4 are designed for the Internet application service providers (ASP), thin cluster node, and thin rack system unit server market.

Redundant and high-availability features include.

- Two four-core/six-core/eight-core processor sockets
- DDR3 memory technology (with Chipkill support)
- Online spare memory
- Memory mirroring
- Standard Serial Attached SCSI (SAS) host controller
- Embedded four 1-Gb Ethernet controllers
- PCIe Gen3 slots
- Hot-swappable redundant power supplies
- Integrated Management Module 2 (IMM2)
- Hot-swappable redundant fans

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Figure 1 shows the overview of the system x3550 M4.



Figure 1: x3550 M4 Overview

Figure 2 shows the overview of the system x3650 M4.



Figure 2: x3650 M4 Overview

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Product Front View

Figure 3 shows the front view of the system x3550 M4 with the 2.5-inch hard disk drive (HDD).



Figure 3: x3550 M4 Front View – 2.5-inch HDD

Figure 4 shows the front view of the IBM system x3550 M4 with the 3.5-inch HDD.



Figure 4: x3550 M4 Front View – 3.5-inch HDD

Figure 5 shows the front view of the system x3550 M4 with the 2.5-inch HDD.



Figure 5: x3650 M4 Front View – 2.5-inch HDD

Figure 6 shows the front view of the system x3550 M4 with the 3.5-inch HDD.



Figure 6: x3650 M4 Front View – 3.5-inch HDD

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Product Inside View

Figure 7 shows the inside view of the system x3550 M4.



Figure 7: Inside View of the x3550 M4 Type 7914

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Figure 8 shows the inside view of the system x3650 M4.



Figure 8: Inside View of the x3650 M4 Type 7915

Product Rear View

Figure 9 shows the rear view of the system x3550 M4.



Figure 9: Rear View of the x3550 M4 Type 7914

Figure 10 shows the rear view of the system x3650 M4.



Figure 10: Rear View of the x3650 M4 Type 7915

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Product Overview (x3550 M4)

- Dual-socket and eight-core server
 - Microprocessor:
 - Support for up to two microprocessors
 - SandyBridge efficient performance (EP)
 - Intel Xeon E5-2600 2011 land flip-chip (FC) land grid array (LGA) packaged CPU
 - 20 MB cache
 - 8.0 GHz QPI
 - 800/1067/1333/1600 MHz DDR3
- Thin (1U footprint), rack-optimized
- Hot-swappable drive bays
- Hot-swappable fans
- Hot-plug power supplies
- Chipkill memory
- Hot-swappable SAS/SATA, support both 2.5-inch and 3.5-inch HDDs
- Embedded Voltage Regulator Down (VRD) for each processor and DIMM set
- Memory:
 - 24 DIMM sockets
 - Each processor supports 12 DIMM sockets
 - Maximum: 768 GB with 24 32-GB DDR3 load-reduced DIMMs (LRDIMMs)
 - Sizes: 2 GB, 4 GB, 8 GB, 16 GB, and 32 GB
- Two PCI expansion slots:
 - One low profile
 - One full height, half length (FHHL)
- Four riser cards:
 - Riser1 connector supports:
 - FHHL
 - One PCIe x16 Gen3
 - Riser2 connector supports:

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

- One PCIe x8 Gen3 (linked to CPU1)
- One PCIe x16 Gen3 (linked to CPU2)
- One PCIX slots running at 133 MHz (linked to CPU1)
- Expansion bays
- Three different configurations:
 - Eight 2.5-inch hot-swappable HDDs and optical disk drive (ODD)
 - Three 3.5-inch hot-swappable HDDs
 - Three 3.5-inch simple-swappable HDDs

Table 1 shows adapter card options the system x3550 M4.

Table 1: Adapter Card Part Number for x3550 M4			
Adapter name	L1 Part Number	Option Part Number	FoD Part Number (Fiber channel over Ethernet (FCoE) / Internet small computer system interface (iSCSI) enablement key)
Emulex 10 GB Mezzanine Small Form Factor Pluggable + (SFP+)	90Y6268	90Y6456	90Y5178 Emulex advance storage license FoD for System x
QLogic 10 GB Mezzanine SPF+	90Y6266	90Y6454	90Y5179 QLogic advance storage license FoD for System x

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Product Overview (x3650 M4)

- Dual-socket and eight-core server
- Microprocessor:
 - Intel Xeon E5-2600 2011 land FC-LGA package CPU
 - Support for up to two microprocessors
 - Embedded VRD for each processor and DIMM set
 - SandyBridge-EP
- 20 MB cache
- 8.0 GHz QPI
- 800/1067/1333/1600 MHz DDR3
- Thin (2U footprint), rack-optimized
- Hot-swappable drive bays
- Hot-swappable fans
- Hot-pluggable power supplies
- Chipkill memory
- Tape enablement kit
- Hot-swappable SAS/SATA HDD:
 - 2.5-inch HDD
 - 3.5-inch HDD
- Memory:
 - 24 DIMM sockets
 - Each processor supports 12 DIMM sockets
 - Maximum: 768 GB with 24 32-GB DDR3 LRDIMMs
 - Sizes: 2 GB, 4 GB, 8 GB, 16 GB, and 32 GB
- Six PCI expansion slots:
 - Three full height, full length (FHFL)
 - Three full height, half length (FHHL)
- Three riser cards:
 - Each riser supports one of the following configurations:

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

- Three PCIe x8 Gen3 slots
- One PCIe x16 Gen3 and one PCIe x8 slots
- Two PCIX Slots and one PCIe x16 slots
 - Configure each riser independently from the other
- Expansion bays have three different configurations:
 - Sixteen 2.5-inch hot-swappable HDDs and ODD
 - Tape drive
 - Six 3.5-inch hot-swappable HDDs + ODD + tape drive
 - Six 3.5-inch simple-swappable HDDs + ODD + tape drive
- Hot-swappable fans:
 - Standard: Four dual-motor fans (Fan dimensions: 80 mm x 80 mm x 56 mm)
 - Supports fan redundancy
- Hot-swappable power supplies:
 - 550/750/900 Watts (100 VAC - 240 VAC)
 - One minimum
 - Two maximum for redundant power

Table 2: Adapter Card Part Number for x3650 M4

Adapter name	L1 Part Number	Option Part Number	FoD Part Number (FCoE/iSCSI enablement key)
Emulex 10 GB Mezzanine SFP+	90Y6268	90Y6456	90Y5178 Emulex advance storage license FoD for System x
QLogic 10 GB Mezzanine SPF+	90Y6266	90Y6454	90Y5179 QLogic advance storage license FoD for System x

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Product Overview (x3650 M4 HD)

Innovative design with new features:

- High-density storage server with rich high IOPS SSD support, optimized for cost and performance with 2.5-inch and 1.8-inch SSD support
- Optimized 12 Gb RAID down with flexible design, easy to upsell
- 4 x 1 Gb and 10 Gb selectable LOM
- ¾ TB of memory on board

Improve business environment:

- Richer remote presence with IMM2 including a new mobile interface
- Choice of four power supplies including DC all super-efficient 80 PLUS Platinum
- Redundant and hot-swappable fans and power supplies to support business-critical applications
- Designed to reduce risk of parts on the floor
- Upgrades are easier to install for partners and clients

Where to win:

- Design for high spindle storage server requirement
- Storage server, video/photo sharing, database, Web 2.0, business critical collaboration, virtualization, ERP, or customer unique applications
- Full range of clients, from small business to large enterprise

Microprocessor (depending on the model):

- Supports up to two multi-core microprocessors (one installed)
- Level-3 cache
- Two QPI links speed up to 8.0 GT/s

Note: Use the Setup Utility program to determine the type and speed of the microprocessors. For a list of supported microprocessors, go to:

<http://www.lenovo.com/us/en/serverproven/>

Memory (depending on the model):

- Minimum: 2 GB
- Maximum: 768 GB
 - 64 GB using unbuffered DIMMs (UDIMMs)

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- 384 GB using registered DIMMs (RDIMMs)
- 768 GB using load reduction DIMMs (LRDIMMs)

Type:

- PC3-8500 (DDR3-1066), PC3-10600 (DDR3-1333), PC3-12800 (DDR3-1600), or PC3-14900 (DDR3-1866)
- Single-rank, dual-rank, or quad-rank
- Unbuffered DIMM (UDIMM), registered DIMM (RDIMM), or load reduced DIMM (LRDIMM)

Slots: 24 dual inline

Supports (depending on the model):

- 4 GB UDIMM
- 2 GB, 4 GB, 8 GB, and 16 GB DIMMs

RDIMMs:

- 32 GB LRDIMM

Integrated functions:

- Integrated Management Module II (IMM2), which consolidates multiple management functions in a single chip
- Intel I350AM4 Quad Port Gigabit Ethernet controller with Wake on LAN support

Universal Serial Bus (USB) ports:

- Front (optional): two ports (supported when the video and USB breakout cable is installed)
- Rear: four ports
- Internal: one port for Hypervisor USB key

Six network ports (four 1 Gb Ethernet ports on the system board and two more ports when the optional dual-port network adapter is installed).

One System Management RJ-45 on the rear to connect to a systems management network. This system management connector is dedicated to the IMM2 functions.

One serial port.

Two VGA ports: One is on the rear. The other one is optional when the video and USB breakout cable is installed.

Light path diagnostics panel.

Hard disk drive expansion bays (depending on the model):

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- Sixteen 2.5-inch hot-swappable
- SAS/SATA hard disk drive bays
 - Add eight 2.5-inch hot-swappable
- SAS/SATA hard disk drive bays (front); two 2.5-inch hot-swappable
- SAS/SATA hard disk drive bays (rear)
 - Add sixteen 1.8-inch solid-state drive bays

RAID controllers:

- Supported on-board RAID controllers:
- ServeRAID M5210e

Video controller (integrated into IMM2):

- Matrox G200eR2

Note: The maximum video resolution is 1600 x 1200 at 75 Hz.

- SVGA compatible video controller
- DDR3 528 MHz SDRAM video memory controller
- Avocent Digital Video Compression
- 16 MB of video memory (not expandable)

Size (2U):

- Height: 86.5 mm (3.406 in.)
- Depth: EIA flange to rear - 714 mm (28.110 in.); overall - 746 mm (29.370 in.)
- Width: With top cover - 445 mm (17.520 in.), with front bezel - 482.0 mm (18.976 in.)
- Weight: approximately 25 kg (55 lb) to 30 kg (65 lb)

PCI expansion slots:

- PCI riser-card assembly 1
 - Type 1
 - Slot 1: PCI Express 3.0 x8 (full-height, full-length)
 - Slot 2: PCI Express 3.0 x8 (full-height, half-length)
 - Slot 3: PCI Express 3.0 x8 (full-height, half-length)
 - Type 2
 - Slot 1: PCI Express 3.0 x16 (full-height, full-length)

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- Slot 2: PCI Express 3.0 x8 (full-height, half-length)
 - Slot 3 (not available)
- Type 3
 - Slot 1: PCI-X (full-height, full-length)
 - Slot 2: PCI-X (full-height, half-length)
 - Slot 3: PCI Express 3.0 x16 (full-height, half-length)
- Type 4
 - Slot 1 (not available)
 - Slot 2: PCI Express 3.0 x16 (full-height, half-length)
 - Slot 3: PCI Express 3.0 x8 (full-height, half-length)
- PCI riser-card assembly 2
 - Type 1
 - Slot 4: PCI Express 3.0 x8 (full-height, full-length)
 - Slot 5: PCI Express 3.0 x8 (full-height, full-length)
 - Slot 6: PCI Express 3.0 x8 (full-height, half-length)
 - Type 2
 - Slot 4: PCI Express 3.0 x16 (full-height, full-length)
 - Slot 5: PCI Express 3.0 x8 (full-height, full-length)
 - Slot 6 (not available)
 - Type 3
 - Slot 4: PCI-X (full-height, full-length)
 - Slot 5: PCI-X (full-height, full-length)
 - Slot 6: PCI Express 3.0 x16 (full-height, half-length)
 - Type 4
 - Slot 4 (not available)
 - Slot 5: PCI Express 3.0 x16 (full-height, full-length)
 - Slot 6: PCI Express 3.0 x8 (full-height, half-length)

Hot-swappable fans: support four hot-swappable fans.

Power supply:

- Up to two hot-swappable power supplies for redundancy support

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- 550-watt AC
- 750-watt AC
- 750-watt DC
- 900-watt AC

Note: Power supplies in the server must be the same power rating or wattage.

Electrical input:

- Sine-wave input (50 - 60 Hz) required
- Input voltage low range:
 - Minimum: 100 V AC
 - Maximum: 127 V AC
- Input voltage high range:
 - Minimum: 200 V AC
 - Maximum: 240 V AC
- Input kilovolt-amperes (kVA), approximately:
 - Minimum: 0.14 kVA
 - Maximum: 1.19 kVA

Notes: Power consumption and heat output vary depending on the number and type of optional features that are installed and the power-management optional features in use.

The noise emission level that is stated is the declared (upper limit) sound power level, in bels, for a random sample of machines. All measurements are made in accordance with ISO 7779 and reported in conformance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values that are stated because of room reflections and other nearby noise sources. The noise emission level that is stated in the declared (upper limit) sound-power level, in bels, for a random sample of systems.

Acoustical noise emissions:

- Sound power, idling: 6.3 bels maximum
- Sound power, operating: 7.0 bels maximum

Heat output:

- Approximate heat output:
 - Minimum configuration: 419.68 Btu per hour (AC 123 watts)
 - Maximum configuration: 4054 Btu per hour (AC 1188 watts)

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Environment:

- Server on:
 - Maximum altitude: 3,050 m (10,000 ft.), 5°C to 28°C (41°F to 82°F)
 - Temperature:
 - 5°C to 40°C (41°F to 104°F)
 - Altitude: 0 to 950 m (3,117 ft); decrease the maximum system temperature by 1°C for every 175-m increase in altitude.
 - Humidity:
 - Non-condensing: -12°C dew point (10.4°F)
 - Relative humidity: 8% to 85%
 - Maximum dew point: 24°C (75°F)
 - Maximum rate of temperature change:
 - Hard disk drives: 20°C/hr (68°F/hr)
- Server off:
 - Temperature: 5°C to 45°C (41°F to 113°F)
 - Relative humidity: 8% to 85%
 - Maximum dew point: 27°C (80.6°F)
- Storage (non-operating):
 - Temperature: 1°C to 60°C (33.8°F to 140.0°F)
 - Maximum altitude: 3,050 m (10,000 ft)
 - Relative humidity: 5% to 80%
 - Maximum dew point: 29°C (84.2°F)
- Shipment (non-operating):
 - Temperature: -40°C to 60°C (-40°F to 140.0°F)
 - Maximum altitude: 10,700 m (35,105 ft)
 - Relative humidity: 5% to 100%
 - Maximum dew point: 29°C (84.2°F)
- Particulate contamination: airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

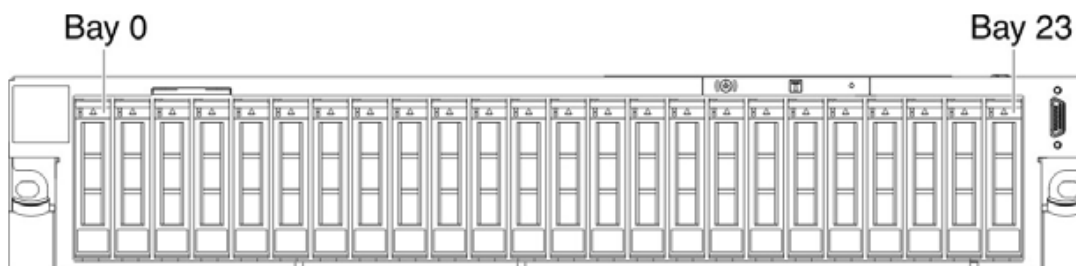


Figure 11: Front View: 2.5-inch Hot-Swap Hard Disk Drive Model



Figure 12: Front View: 2.5-inch Hot-Swap Hard Disk Drive Model

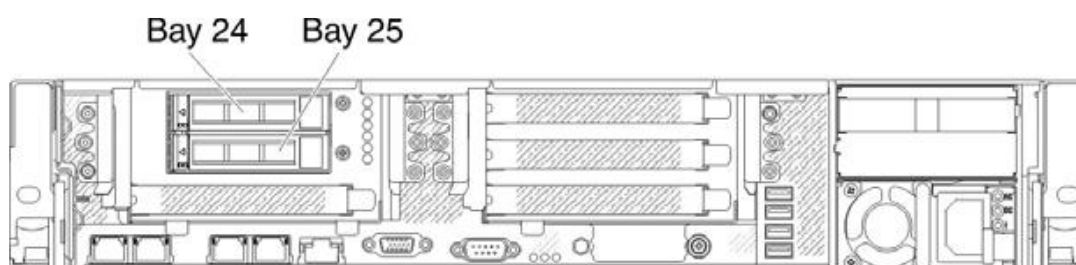


Figure 13: Rear View: 2.5-inch Hot-Swap Hard Disk Drive Model



Figure 14: Rear View: 2.5-inch Hot-Swap Hard Disk Drive Model

Front view

The following illustrations show the controls, LEDs, and connectors on the front of the server model.

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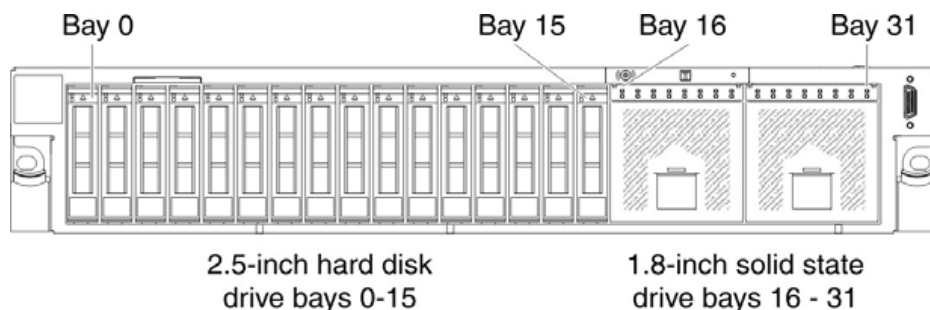


Figure 15: Front View: 2.5-inch Hot-Swap Hard Disk Drive and 1.8-inch Solid State Drive Model

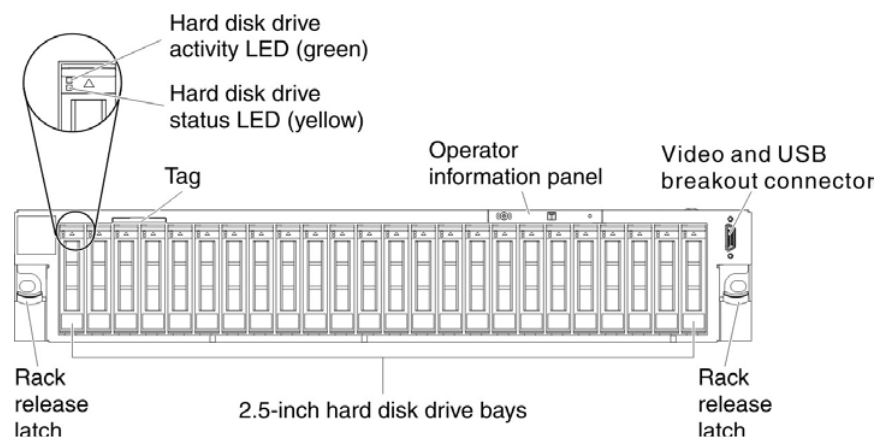


Figure 16: Front View: 2.5-inch Hard Disk Drive Bay Model

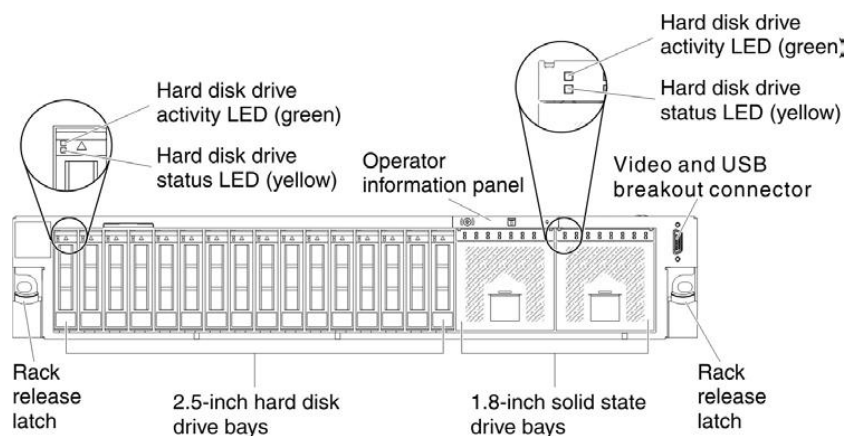


Figure 17: Front View: 2.5-inch Hard Disk Drive Bay and 1.8-inch Solid State Drive Bay Model

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Product Overview (x3650 M4 BD)

- Manages a wide variety and huge volume of data
 - Structured and unstructured data
 - Volume, velocity, variety, veracity
- How does it work
 - Processes Internet scale data
 - Saves costs - distributes workload on a parallel system that is built with many computers
 - HDFS
 - File system crosses a wide range of data type
 - Redundancy (three copies: two copies on two data nodes within one rack, one in another rack)
 - MapReduce
 - Parallel processing



Figure 18: Overview of the x3650 M4 BD System

x3650 M4 BD feature list

Processor (CPU):

- Ivy Bridge-EP processors with quick path, up to 95W
- No DMI switch design in, would not support legacy CPU disable

Processor upgrade:

- Upgrade with second matching same type of Processor

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Features:

- Two processor sockets (Xeon® E5-2600v2 Socket-R LGA2011)
- 16 DIMM sockets (1 DIMMs min. for one CPU, 2 DIMMs min. for 2 CPUs)
- Two PCI riser connectors on Planar
- One Serial Port - external (9-pin) shared with BMC
- Two internal SATA connectors onboard
- No FDD controller connector and No FDD
- No PS/2 Keyboard connector
- No PS/2 Mouse connector
- One Video controller one connector at rear
- One slotless RAID slot for SAS (Serial Attached SCSI) Adaptor or only JBOD (Non-RAID) to be support by Ripley/Racine Card. No external SAS connector. No embedded parallel SCSI Controller onboard.
- Three Ethernet ports onboard (RJ-45) - Intel Powerville chip
- Six external USB Ports (two at front, four at rear of machine)
- Two internal USB ports, one for optional USB Hypervisor key.
- 16 MB Flash ROM
- Integrated Baseboard Management Controller (iBMC)
- One Ethernet port reserved for RSA feature. No RS-485 ports

I/O:

- Video = ISO CAPABLE (SVGA)

Mechanics:

- 2U Rack optimized
- Provide two 750/900 Watt Hot-Swap power supplies for N + 1 redundancy (one standard)

Storage:

- Supporting 14 HDDs
- 12 x 3.5-inch HS SAS/SATA bays in front and 2 x 3.5-inch SAS/SATA in rear, same for SSDs
- Three non-hot-swap fans for redundant cooling

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Exp:

- 4G/8G/16G/32G (when fully qualified) DDR3 memory R-DIMM, supporting 1333/1600/1866 speed
- 4G/8G U-DIMM
- LR-DIMM
- 3.5-inch Gen2 HDD Tray

OS (primary)*

- Red Hat EL 6 (Server) 64-bit (includes KVM)
- Red Hat EL 6 (Server) 32-bit
- Red Hat EL 5 (Server) 64-bit (includes KVM)
- Red Hat EL 5 (Server) 64-bit w/ Xen
- Red Hat EL 5 (Server) 32-bit
- SUSE Linux ES 11 64-bit (includes KVM)
- SUSE Linux ES 10 64-bit w/ Xen
- SUSE Linux ES 10 32-bit
- SUSE Linux ES 11 32-bit
- SUSE Linux ES 11 64-bit w/ Xen
- SUSE Linux ES 10 64-bit

OS (Secondary):

- VMware ESXi 5.0 --- not support LSI SW Raid
- VMware ESX 4.1 --- not support LSI SW Raid
- VMware ESXi 4.1

OS (third):

- Windows Server 2008 R2
- Windows Server 2008 (64-bit) - Web/Std/ent/DC
- Windows Server 2008 (32-bit) - Web/Std/ent/DC
- Windows Small Business Server 2011 - Std/Prem
- Windows Small Business Server 2008 - Std/Prem
- Windows Storage Server 2008 R2
- Windows Server 2012 -- TBD

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

- Windows HPC Server 2008
- Windows Server 2008 HPC Edition 2008

Strategic Compliance:

- ISO 9241, Part 3 AP DBCS Supported
- FCC Class A, CISPR A

Countries:

- World Wide

Notes: Depending on the type of operator information panel that is installed in your server, the Reset button is on the operator information panel or the light path diagnostics panel.

If there is no release latch on your server model, you do not have to pull out the operator information panel to obtain more information.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Front view

The following illustration shows the controls, connectors, and hard disk drive bays on the front of the server.

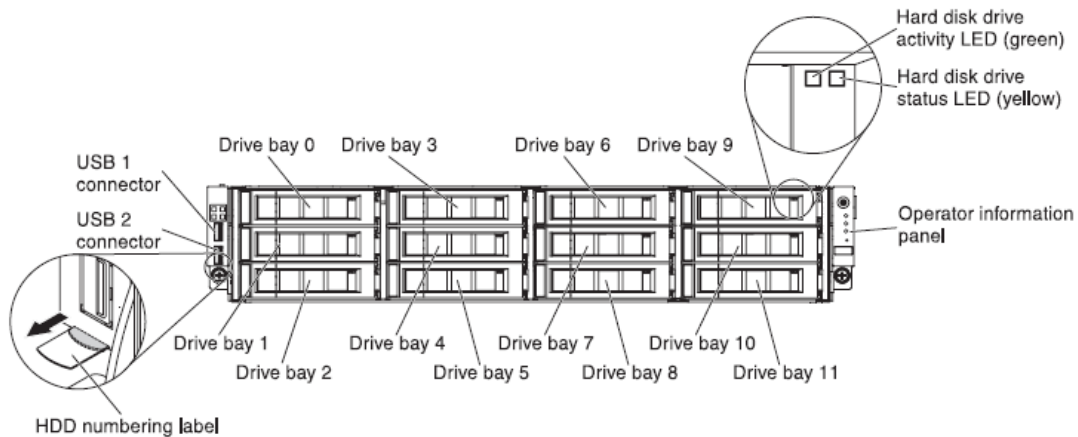


Figure 19: Front View of the 12 hot-swap hard-disk drive configuration

USB connectors: Connect a USB device, such as USB mouse or keyboard to either of these connectors.

Hard disk drive activity LEDs (green): This green LED is used on hot-swap SAS or SATA hard disk drives. Each hot-swap hard disk drive has an activity LED, and when this LED is flashing, it indicates that the drive is in use.

Hard disk drive status LEDs (yellow): This yellow LED is used on hot-swap SAS or SATA hard disk drives. Each hot-swap hard disk drive has a status LED.

When this LED is lit, it indicates that the drive has failed. When this LED is flashing slowly (one flash per second), it indicates that the drive is being rebuilt as part of a RAID configuration. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

EIA USB port and OP panel

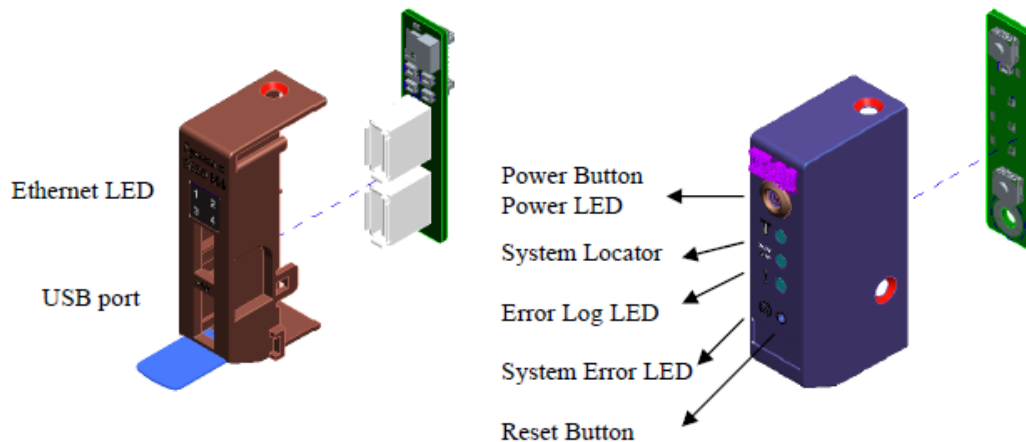


Figure 20: EIA USB port and OP panel

Power-control button and power-on LED: Press this button to turn the server on and off manually. The behaviors and definition of the power-on LED are as follows:

- **Off:** Power is not present or the power supply or the LED itself has failed.
- **Flashing rapidly (four times per second):** The server is turned off and is not ready to be turned on. The power-control button is disabled.
- **Flashing slowly (once per second):** The server is turned off and is ready to be turned on. You can press the power-control button to turn on the server.
- **Lit:** The server is turned on.

Ethernet activity LEDs: When any of these LEDs are lit, they indicate that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port that corresponds to that LED.

System-locator button/LED: Use this blue LED to visually locate the server among other servers. A system-locator LED is also on the rear of the server. This LED is used as a presence detection button as well. You can use IBM Systems Director or IMM2 Web interface to light this LED remotely. This LED is controlled by the IMM2. The locator button is pressed to visually locate the server among the others servers.

Check log LED: When this amber LED is lit, it indicates that a system error has occurred. Check the error log for additional information.

System-error LED: When this amber LED is lit, it indicates that a system error has occurred. A system-error LED is also on the rear of the server. An LED on the light path diagnostics panel on the operator information panel is also lit to help isolate the error. This LED is controlled by the IMM2.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Reset button: Press this button to reset the server and run the power-on self-test (POST). You might have to use a pen or the end of a straightened paper clip to press the button.

Check log LED: When this yellow LED is lit, it indicates that a system error has occurred. Check the event log for additional information.

System-error LED: When this yellow LED is lit, it indicates that a system error has occurred. A system-error LED is also on the rear of the server. An LED on the light path diagnostics panel on the operator information panel or on the system board is also lit to help isolate the error. This LED is controlled by the IMM.

Rear View

The following illustration shows the connectors on the rear of the server.

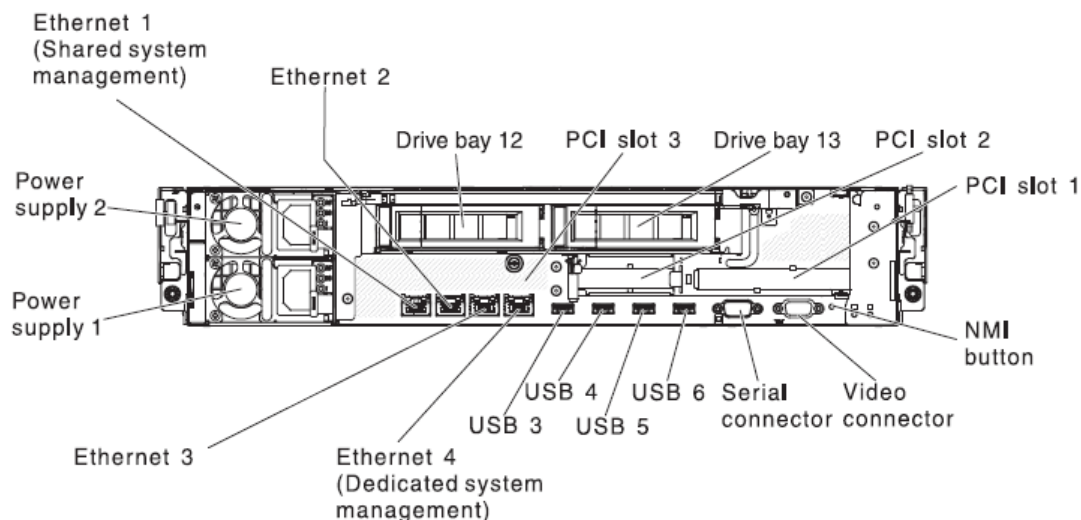


Figure 21: Rear View

NMI button: Press this button to force a nonmaskable interrupt to the microprocessor. It allows you to blue screen the server and take a memory dump (use this button only when directed by Lenovo service support). You might have to use a pen or the end of a straightened paper clip to press the button. The NMI button is in the lower left corner on the rear of the server.

Power connector: Connect the power cord to this connector.

Note: Power supply 1 is the default primary power supply. If power supply 1 fails, replace it immediately.

Video connector: Connect a monitor to this connector. The video connectors on the front and rear of the server can be used simultaneously.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Note: The maximum video resolution is 1600 x 1200 at 75 Hz.

Serial connector: Connect a nine-pin serial device to this connector. The serial port is shared with the integrated management module II (IMM2). The IMM2 can take control of the shared serial port to redirect serial traffic, using Serial over LAN (SOL).

USB connectors: Connect a USB device, such as a USB mouse or keyboard, to any of these connectors.

Systems-management Ethernet connector: Use this connector to connect the server to a network for full systems-management information control. This connector is used only by the integrated management module II (IMM2). A dedicated management network provides extra security by physically separating the management network traffic from the production network. Use the Setup Utility to configure the server to use a dedicated systems management network or a shared network.

Ethernet connectors: Use either of these connectors to connect the server to a network. When you enable shared Ethernet for IMM2 in the Setup Utility, you can access the IMM2 using either the Ethernet 1 or the system-management Ethernet (default) connector. **Figure 22** shows the LEDs on the rear of the server.

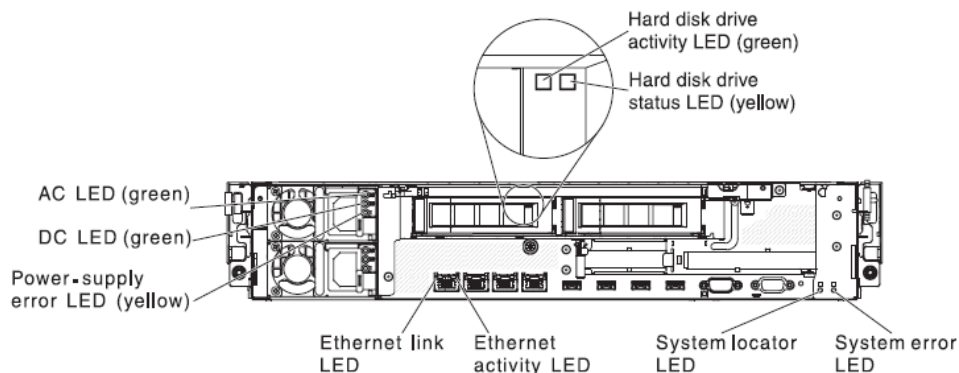


Figure 22: Rear View LEDs

Ethernet activity LEDs: When these LEDs are lit, they indicate that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port.

Ethernet link LEDs: When these LEDs are lit, they indicate that there is an active link connection on the 10BASE-T, 100BASE-TX, or 1000BASE-TX interface for the Ethernet port.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

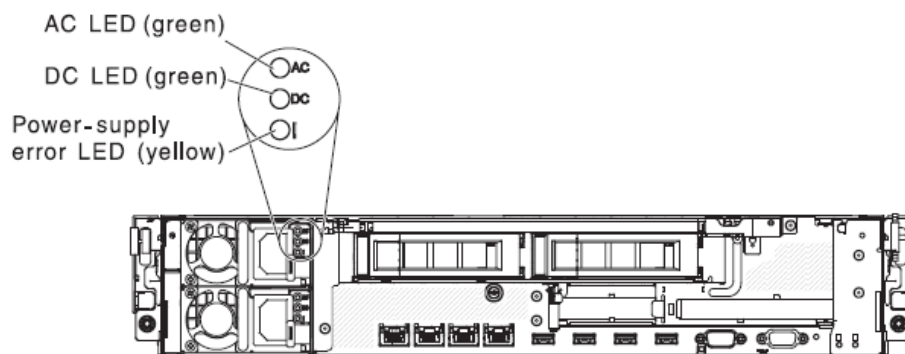


Figure 23: Power Supply LEDs

AC power LED: Each hot-swappable AC power supply has an AC power LED. When the AC power LED is lit, it indicates that sufficient power is coming into the power supply through the power cord. During typical operation, the AC power LED is lit.

DC power LED: Each hot-swappable AC power supply has a DC power LED. When the DC power LED is lit, it indicates that the power supply is supplying adequate DC power to the system. During typical operation, both the AC and DC power LEDs are lit.

IN OK power LED: Each hot-swappable DC power supply has an IN OK power LED. When the IN OK power LED is lit, it indicates that sufficient power is coming into the power supply through the power cord. During typical operation, the IN OK LED is lit.

OUT OK power LED: Each hot-swappable DC power supply has an OUT OK power LED. When the OUT OK power LED is lit, it indicates that the power supply is supplying adequate DC power to the system. During typical operation, the IN OK LED is lit.

Power-supply error LED: When the power-supply error LED is lit, it indicates that the power supply has failed.

Note: Power supply 1 is the default primary power supply. If power supply 1 fails, replace the power supply immediately.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Mechanical Package Description

Rack Drawer Mechanical

The x3650 M4 BD is Restrictions on the Use of Hazardous Substances (RoHS) compliant and can be installed in most industry standard 19-inch server rack enclosures, such as the 9306 PC Server Rack enclosure. It supports two hot swap redundant power supplies, non hot-swap cooling fans, a system board, 14 hot swappable 3.5-inch SAS/SATA HDD bays without an optical drive bay, and a drop-down operational panel.

Major Chipset

Intel Patsburg-J PCH, Intel Powerville Quad-port Ethernet Controller, iBMC (Renasas SH7757), Winbond WPCT201BA0WG (support TPM 1.2). iBMC SH7757 is a Super Baseboard Management Controller with integrated Video controller (Matrox G200eR2). iBMC also includes some Super I/O function (serial port) and Serial Over LAN (SOL) support. All PCI slots do not support hot swap or hot plug capabilities.

PCI Features

The planar has two PCI risers.

Connector 1 (for riser1) is on the left side of the box (when you are looking at the front of the box). Its PCIe signals are linked to the CPU1 PCIe x16 interface.

Connector 2 (for riser2) is on the right side of the box (when you are looking at the front of the box) and is closer to the power supply. The PCIe signals are linked to CPU1 for PCIe x 8 interface and the other 12 PCIe lanes are connected to CPU2.

Depending on what kind of PCI riser card is installed, the system might be able to support different PCI configurations. Legacy 5V only PCI adapters are not supported in this system.

The x3650 M4 BD supports three types of PCI riser cards. The supported PCI interface depends on which PCI riser card is installed in the system and the numbers of processors that are installed.

- Riser1/slots 1 and 2 (two PCIe* 3.0 x8), linked to CPU1
- One FHHL mechanical x16/electrical. x8 PCIe card
- One LP mechanical x16 / electrical x8 PCIe card
- Riser1/slot 1 (PCIe* 3.0 x16), linked to CPU1
- Supports one FHHL type, mechanical x16/electrical x16 PCIe card
- Riser2/slot 3 (PCIe* 3.0 x8), linked to CPU1

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

- Supports one LP type, mechanical x8 /electrical x8 PCIe card for internal slot-less RAID card only

Table 3: PCI Slot Configuration for x3650 M4 BD

Slot #	Configuration # 1 (One or Two CPUs installed)	Configuration # 2 (One or Two CPUs installed)
1	PCIe* 3.0 x16	Two PCIe* 3.0 x8
2	PCIe* 3.0 x8 (slotless RAID)	PCIe* 3.0 x8 (slotless RAID)

Table 4 : PCI Slot

Slot Number	Add-On Card Number
1 (riser1 slot1)	1 (adapter 1)
2 (riser1 slot2)	2 (adapter 2)
3 (riser2 slot1)	3 (RAID card)

Graphic card (VGA card in SPP list) can be installed only for riser1 slot 1 with a full-height bracket (PCIe* 3.0 x16 – riser1 or PCIe* 3.0 x8 – riser2). Performance can be limited if a VGA card is installed with PCIe* 3.0 x8 – riser2.

An internal hardware RAID card should be installed for riser2 slot 1 – slot3. There is a dedicated slot design for a RAID card.

Table 5: PCI Riser Options for x3650 M4 BD

Option	PCI type	Comments
PCIe riser1	One PCIe x16 slot	Supports one PCIe x16 graphic card with full-height bracket.
PCIe riser2	Two PCIe x16 slot	Supports two slots: 1. One Full-Height-Half-Length (FHHL) mechanical x16/electrical x8 PCIe card 2. One low-profile (LP) mechanical x16/electrical x8 PCIe card

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

PCIe riser3	One PCIe x8 Slot	Supports one LP mechanical x8/electricalx8 PCIe card for a slotless RAID card.
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Table 6: Supported PCI Card Form Factor for x3650 M4 BD

Riser Connector	Support PCI form factor
1	One FHHL card for slot 1 on Riser 1 One FHHL card and one low profile card for slot 2 on Riser 1
2	One low profile card for slot 3 on Riser 2

Processor and Processor Options

Both microprocessors' Voltage Regulator Down (VRD 12) is integrated on the planar. A processor option is available to add a second processor in the CPU2 socket.

Processor Population Sequence

The processor must be installed in the CPU1 socket first and in the CPU2 socket next. Processor terminator is not required in this system. Both processors must have the same QPI link speed, Integrated Memory Controller frequency, core frequency, power segment, and internal cache size and type. Mixing processors of different stepping levels but of the same model (per CPUID instruction) is supported. It is not required to install the processor with lowest stepping level and features to the CPU1 socket.

Note: x3650 M4 BD does not support mixing IVY Bridge-EP CPU among different QPI, core speeds, cache size, core quantity, and power segment.

Table 7: FoD Features Supported on x3650 M4 BD

FoD Category	Functional Description
Storage	ServeRAID M1100 Series Zero Cache/RAID 5 Upgrade for System x
Storage	ServeRAID M5100 Series Zero Cache/RAID 5 Upgrade for System x
Storage	ServeRAID M5100 Series RAID 6 Upgrade for System x
IMM2	IMM2 Remote Presence Upgrade Kit

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Table 8: Processor Population Sequence

Number of CPUs	Population Sequence
1	Populate CPU1 socket (Integrated VRD on planar)
2	Populate CPU1 socket, then populate CPU2 socket (Integrated VRD on planar)

Refer to **Figure 24** for processor and DIMM locations:

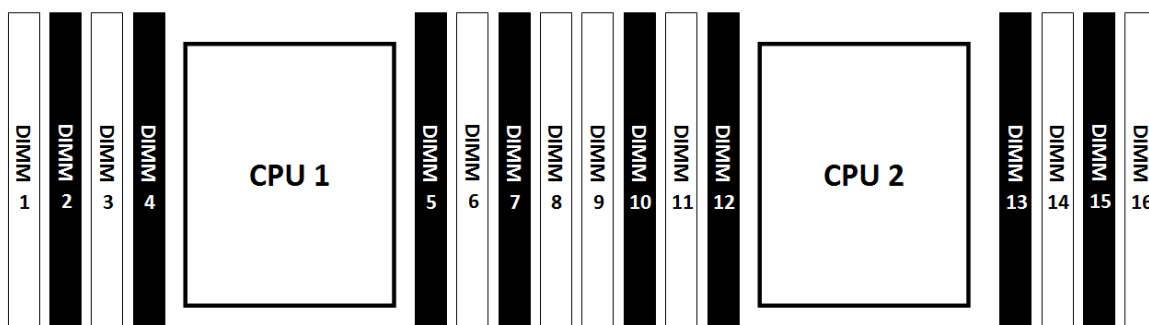


Figure 24: Processor and DIMM location

Table 9: DIMM Population Independent Channel Mode

Installed Processor	Population Sequence
CPU1	DIMM 8 -> 6 -> 1 -> 3 -> 7 -> 5 -> 2 -> 4
CPU1 and CPU2	DIMM 8 -> 16 -> 6 -> 14 -> 1 -> 9 -> 3 -> 11 -> 7 -> 15 -> 5 -> 13 -> 2 -> 10 -> 4 -> 12

Table 10: DIMM Population Sequence Sparing Mode

Installed Processor	Population Sequence
CPU1	DIMM 8,7 -> 1,2 -> 6,5 -> 3,4
CPU1 and CPU2	DIMM 8, 7, 16, 15 -> 6, 5 -> 14, 13 -> 1,2 -> 9, 10 -> 3, 4 -> 11, 12

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Table 11: DIMM Population Mirror Mode

Installed Processor	Population Sequence
CPU1	8, 6 -> 1,3 -> 7,5 -> 2,4
CPU1 and CPU2	8,6,16,14-> 1,3,9,11 -> 7,5,15,13 -> 2,4,10,12

Operator Information Panel

The following illustration shows the controls and LEDs on the operator information panel.

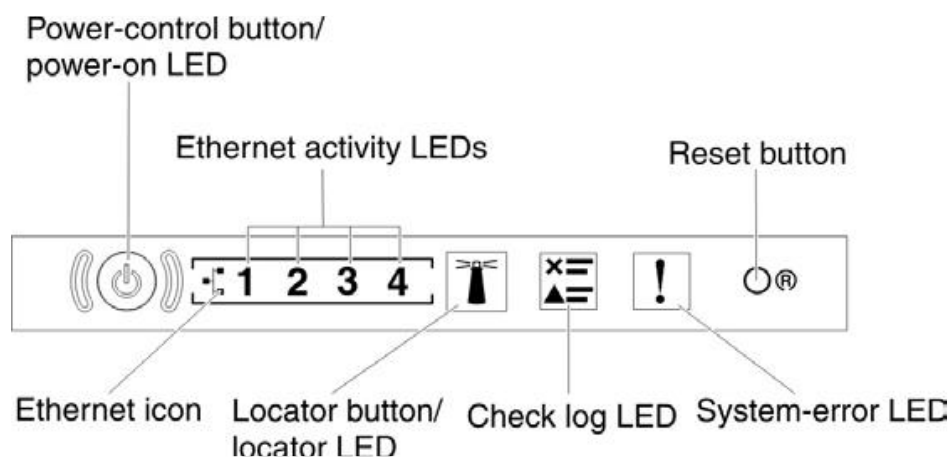


Figure 25: Operator Information Panel

Power-control button and power-on LED: Press this button to turn the server on and off manually. The states of the power-on LED are as follows:

- **Off:** Power is not present or the power supply, or the LED itself has failed.
Flashing rapidly (four times per second): The server is turned off and is not ready to be turned on. The power-control button is disabled. This lasts approximately 5 to 10 seconds.
- **Flashing slowly (once per second):** The server is turned off and is ready to be turned on. Press the power-control button to turn on the server.
- **Lit:** The server is turned on.

Ethernet activity LEDs: When any of these LEDs are lit, it indicates that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port that corresponds to that LED.

System-locator button/LED: Use this blue LED to visually locate the server among other servers. A system-locator LED is also on the rear of the server. This LED is used

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

as a presence detection button as well. Use IBM Systems Director or IMM Web interface to light this LED remotely. This LED is controlled by the IMM. The locator button is pressed to visually locate the server among the others servers.

Check log LED: When this yellow LED is lit, it indicates that a system error has occurred. Check the event log for additional information.

System-error LED: When this yellow LED is lit, it indicates that a system error has occurred. A system-error LED is also on the rear of the server. An LED on the light path diagnostics panel on the operator information panel or on the system board is also lit to help isolate the error. This LED is controlled by the IMM.

Notes: Depending on the type of operator information panel that is installed in your server, the Reset button is on the operator information panel or the light path diagnostics panel.

If there is no release latch on your server model, you do not have to pull out the operator information panel to obtain more information.

Rear View

The following illustration shows the connectors on the rear of the server.

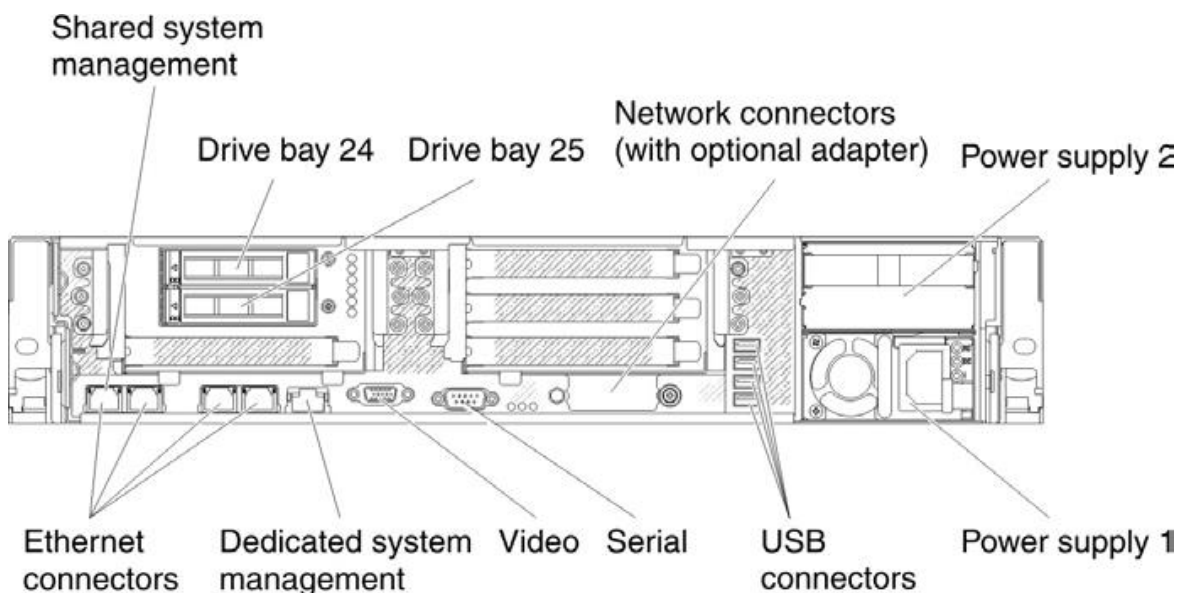


Figure 26: Rear View

NMI button: Press this button to force a nonmaskable interrupt to the microprocessor. It allows you to blue screen the server and take a memory dump (use this button only when directed by the service support). You might have to use a pen or the end of a straightened paper clip to press the button. The NMI button is in the lower left corner at the rear of the server.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Power connector: Connect the power cord to this connector.

Note: Power supply 1 is the default/primary power supply. If power supply 1 fails, replace it immediately.

Video connector: Connect a monitor to this connector. The video connectors on the front and rear of the server can be used simultaneously.

Note: The maximum video resolution is 1600 x 1200 at 75 Hz.

Serial connector: Connect a nine-pin serial device to this connector. The serial port is shared with the integrated management module II (IMM2). The IMM2 can take control of the shared serial port to redirect serial traffic, using Serial over LAN (SOL).

USB connectors: Connect a USB device, such as a USB mouse or keyboard, to any of these connectors.

Systems-management Ethernet connector: Use this connector to connect the server to a network for full systems-management information control. This connector is used only by the integrated management module II (IMM2). A dedicated management network provides extra security by physically separating the management network traffic from the production network. Use the Setup Utility to configure the server to use a dedicated systems management network or a shared network.

Ethernet connectors: Use either of these connectors to connect the server to a network. When you enable shared Ethernet for IMM2 in the Setup Utility, you can access the IMM2 using either the Ethernet 1 or the system-management Ethernet (default) connector. **Figure 27** shows the LEDs on the rear of the server.

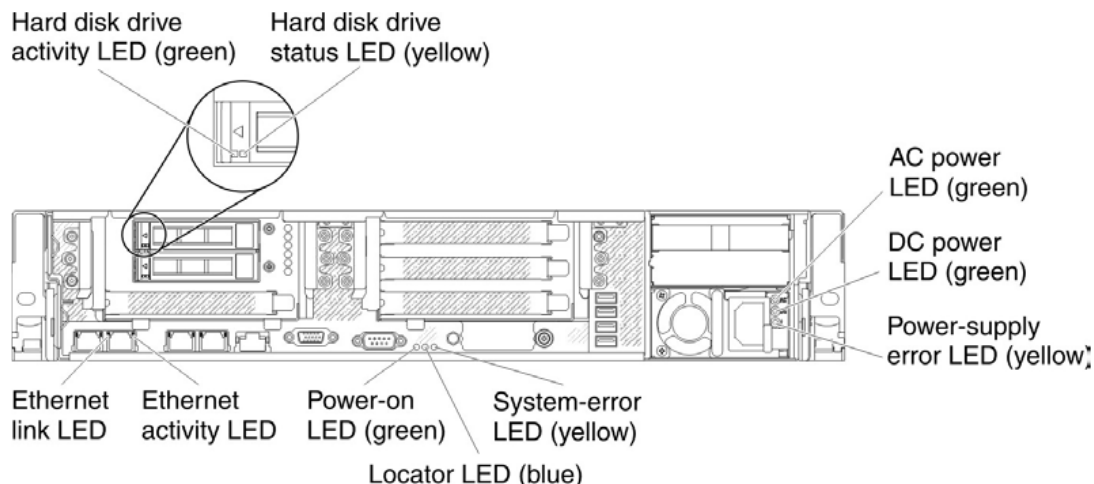


Figure 27: Rear View LEDs

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Figure 28 shows the LEDs on a DC power supply.

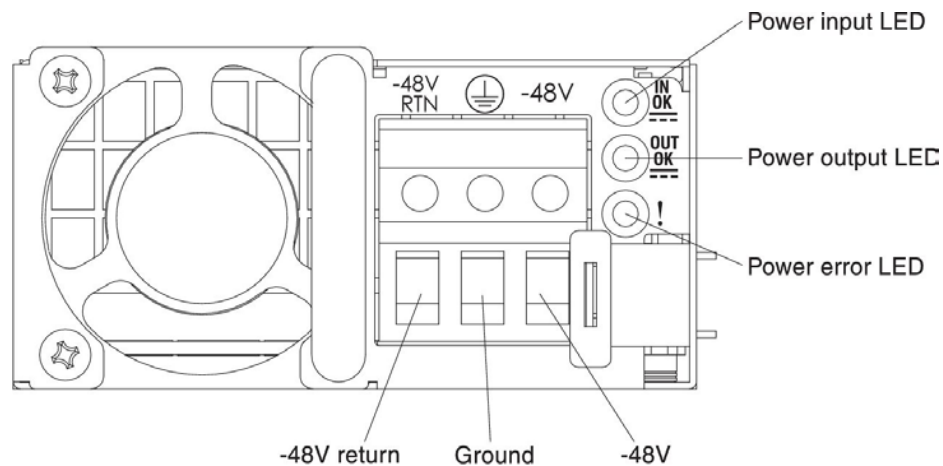


Figure 28: DC Power Supply LEDs

Ethernet activity LEDs: When these LEDs are lit, they indicate that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port.

Ethernet link LEDs: When these LEDs are lit, they indicate that there is an active link connection on the 10BASE-T, 100BASE-TX, or 1000BASE-TX interface for the Ethernet port.

AC power LED: Each hot-swappable AC power supply has an AC power LED. When the AC power LED is lit, it indicates that sufficient power is coming into the power supply through the power cord. During typical operation, the AC power LED is lit.

DC power LED: Each hot-swappable AC power supply has a DC power LED. When the DC power LED is lit, it indicates that the power supply is supplying adequate DC power to the system. During typical operation, both the AC and DC power LEDs are lit.

IN OK power LED: Each hot-swappable DC power supply has an IN OK power LED. When the IN OK power LED is lit, it indicates that sufficient power is coming into the power supply through the power cord. During typical operation, the IN OK power LED is lit.

OUT OK power LED: Each hot-swappable DC power supply has an OUT OK power LED. When the OUT OK power LED is lit, it indicates that the power supply is supplying adequate DC power to the system. During typical operation, the OUT OK power LED is lit.

Power-supply error LED: When the power-supply error LED is lit, it indicates that the power supply has failed.

Note: Power supply 1 is the default primary power supply. If power supply 1 fails, replace the power supply immediately.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Overview

Power-on LED: When this LED is lit and not flashing, it indicates that the server is turned on. The states of the power-on LED are as follows:

- **Off:** Power is not present, or the power supply or the LED itself has failed.
- **Flashing rapidly (four times per second):** The server is turned off and is not ready to be turned on. The power-control button is disabled. This lasts approximately 5 to 10 seconds.
- **Flashing slowly (once per second):** The server is turned off and is ready to be turned on. Press the power-control button to turn on the server.
- **Lit:** The server is turned on.

System-locator LED: Use this LED to visually locate the server among other servers. Use IBM Systems Director or IMM2 Web interface to light this LED remotely.

System-error LED: When this LED is lit, it indicates that a system error has occurred. An LED on the light path diagnostics panel is also lit to help isolate the error.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Features and specifications

x3550 M4 Type 7914 and x3650 M4 Type 7915 features and specifications

Table 12: Functional Comparison of the x3550 M3 and the x3550 M4

Major Function	x3550 M3	x3550 M4
Chassis	1U mechanical chassis	1U mechanical chassis
Processors	Up to two Nehalem/Westmere-EP processors with QPI	Up to two Sandy Bridge processors with QPI
Platform	Intel Tylersburg, I/O controller hub	Romley EP
DIMM slots	18 DIMM slots: 192 GB (12 16-GB) maximum memory Supports DDR3 registered DIMMs (RDIMMs)	24 DIMM slots: 768 GB (24 32-GB) maximum memory Supports DDR3 RDIMMs
DIMMs	DDR-3 1333, 1066, or 800 SDRAM DIMMs/unbuffered DIMMs (UDIMMs)	DDR-3 1333, 1066, or 800 SDRAM RDIMMs/UDIMMs
NIC	BCM 5709 GB Ethernet ports with transmission control protocol offload engine (TOE) Ports on board, two ports on option (dedicated port)	Intel Powerville four-port GB Ethernet on board 10 GB dual-port option (dedicated port)
RAID	ServerRAID1015 SAS RAID 0/1/1E, option RAID 0/1/5/6/10/50/60 upgrade	ServerRAID SAS RAID 0/1/1E, option RAID 0/1/5/6/10/50/60 upgrade
PCI	One PCI half-length slot, additional PCI slot as option	One PCIe x16 slot, one PCIe x8/x16, or PCIx slot
HDD	Up to eight 2.5-inch SAS/SATA hot-swappable bays No internal tape drive support	Up to eight 2.5-inch SAS/SATA hot-swappable bays, three 3.5-inch SAS/SATA hot-swappable bays, or three 3.5-inch SATA simple-swappable bays No internal tape drive support
Light path	Light path diagnostics	Advanced light path diagnostics

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Features and specifications

IMM	IMM integrated baseboard management controller (IMM) No RS-485 ports	IMM2 integrated baseboard management controller 2 (IMM2) No RS-485 ports
IMM upgrade	Optional remote present hardware key	Enable by optional software key
PSU	675 W AC redundant/ hot-swappable power supplies.	550 W AC redundant/ hot-swappable power supplies. 750 W AC redundant/ hot-swappable power supplies.
Fans	Redundant/ hot-swappable fans (up to forty 56 mm, six standard, supports redundancy)	Redundant/hot-swappable fans (up to forty 56 mm, six standard, supports redundancy)
Trusted platform module (TPM)	TPM 1.2	TPM 1.2

Table 13: Functional Comparison of the x3650 M3 and the x3650 M4

Major Function	x3650 M3	x3650 M4	x3650 M4 HD
Chassis	2U mechanical chassis	2U mechanical chassis	2U mechanical chassis
Processor	Westmere (12 cores maximum)	Sandy Bridge (16 cores maximum)	Xeon E5-2600 v2, up to 12 cores
Platform	Tylersburg	Romley EP	Romley EP
Number of DIMM slots	18 RDIMM/UDIMM	24 RDIMM/UDIMM	24 slots (U/R/LR DIMM)
Memory capacity	192 GB	384 GB for one CPU, 768 GB maximum for two CPUs	Up to 2DPC@1866 MHz Up to 768 GB (32 GB LRDIMM)
2.5-inch disk	16 2.5-inch HDD (eight 2.5-inch HDD and tape drive)	16 2.5-inch HDD (16 2.5-inch HDD and tape drive)	24+2 2.5-inch HDD/SSDs or 16 2.5-inch HDD/SSDs + 16 1.8-inch SSDs
3.5-inch simple-swappable disk	Not supported	Six 3.5-inch HDD	Not supported

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Features and specifications

RAID	RAID down	RAID down	1/2/4 GB Flash back and RAID 5/50, 6/60 (FoD)
USB	Two front, two back, one internal	Two front, four back, two internal	Two front (through Dongle)/four back/two internal
Light path	Basic light path	Basic version LED plus advanced version optional	Basic Light path in front
Power supply	675 W	750 W Platinum/900 W Gold/550 W Gold	AC 550W/750W/900W /750W DC Up to 80PLUS Platinum
80+ certification	Does not support 80+ certification	80+ certification	80+ certification
PCIe slot	Four x8 for CPU1 and CPU2, two FHHL	6/5/4 for two CPUs, 3/2 for one CPU, two FHFL and four FHHL	4-6 PCIe ports
Other PCI	4x for 1-Gb NIC, x4 for RAID down	4x for 1 GB NIC, x8 for RAID down and x8 for 10-Gb NIC	4x PCI-X or 2x double width PCIe support
1 Gb NIC	Two 1 GB standard, two 1 GB as option, uses x4 PCI slots	Four 1 GB standard, uses x4 PCI lanes	4x 1GbE
10 GB LAN on system board (LOM) NIC	Not supported	Two optional 10 GB (SFP or BaseT, uses x8 PCI lanes)	2x 10 GbE (Mezz opt.)/TPM

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – System configurations and diagrams

System configurations and diagrams

x3550 M4 System Architecture

Figure 29 shows the architecture block diagram of the system x3550 M4.

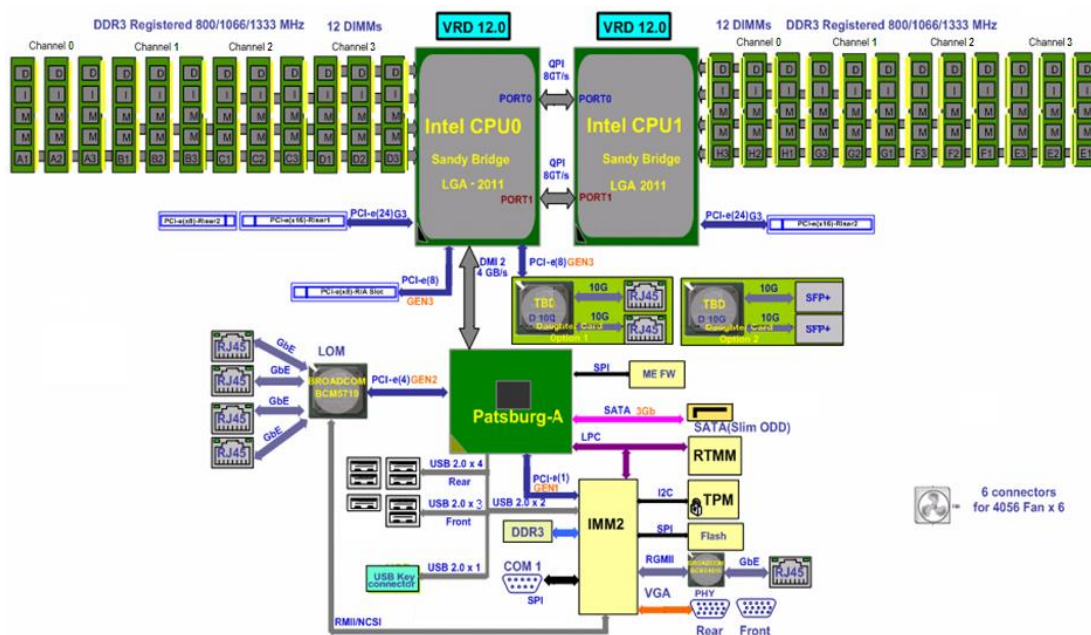


Figure 29: x3550 M4 System Architecture

Figure 30 shows the architecture block diagram of the system x3650 M4.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – System configurations and diagrams

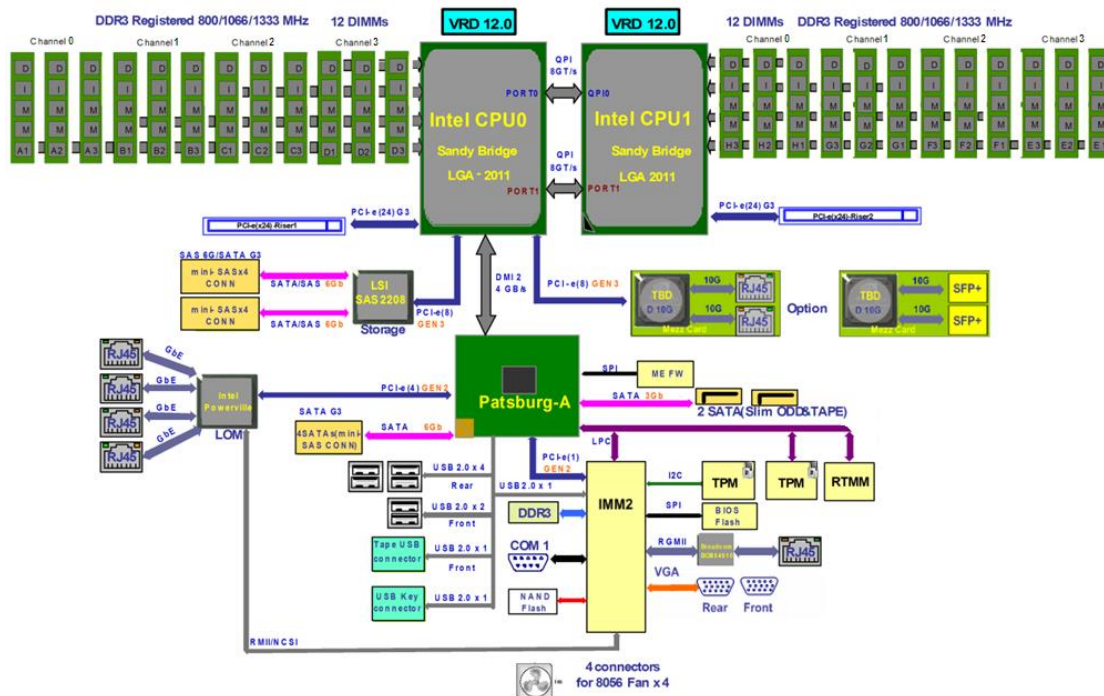


Figure 30: x3650 M4 System Architecture

Processor and Processor Options

The VRD for both microprocessors is integrated on the system board. A processor option is available to add a second processor in the CPU1 socket.

Intel Socket-R Processor

The Intel Sandy Bridge-EP processors are the next generation of 64-bit, multi-core enterprise processors built on 32-nanometer process technology. Based on the lower-power/high performance micro-architecture, the processor is designed for a two-chip platform as opposed to the traditional three-chip platforms (processor, memory controller hub, and I/O controller hub). The two-chip platform consists of a processor and the platform controller hub and enables higher performance, easier validation, and improved x-y footprint.

Table 14: Sandy Bridge-EP Processors with Quick Paath Processor Feature Set Overview

Features	Sandy Bridge-EP Processors with QPI Processor
Cache size	Dedicated Instruction Cache Unit (ICU) and Data Cache Unit (DCU): 32 KB each Mid-level (MLC) per core: 256 KB

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – System configurations and diagrams

	Last level (LLC) per socket: up to 20 MB Each core slice brings 2.5 MB per slice; for example, eight cores provide 20 MB while four cores provide 10 MB.
Data transfer rates	Two full-width Intel QPI links, up to eight GT/s in each direction
Multi-core support	Scale up to eight cores per processor
Simultaneous multi-threading (SMT)	Allows up to 16 threads per processor. Each core supports two threads.
Integrated memory controller	Four channels DDR3 interface
Dual processor support	Up to two processors per platform
Package (socket R)	2011-0 land FC-LGA package
Platform environmental control interface	Thermal monitoring

Processor Population Sequence

Install the first CPU in socket CPU1. Then, install the second CPU in socket CPU2. A processor terminator is not required in this system. Two fan fillers are required when only CPU1 is installed. Both processors must have the same QPI link speed, integrated memory controller frequency, core frequency, power segment, and internal cache size and type. Mixing processors of the same model but of different stepping levels (per CPUID instruction) is supported.

Note: The x3550 M4 and x3650 M4 do not support mixing Sandy Bridge-EP CPUs among different QPI, core speeds, cache size, core quantities, and power segments.

UEFI prints a message to the display on boot and the system event log:

Different CPU speeds found when unsupported mixing processor installed.

POST turns on system error LED, CONFIG, and CPU light path LEDs. CPU1 error LED and CPU2 error LED near CPU sockets are off in this situation.

Table 15: Processor Population Sequence

Number of CPUs	Population Sequence
1	Populate CPU1 socket
2	Populate CPU1 socket, populate CPU2 socket

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – System configurations and diagrams

Major Chip Set

The system uses the chipsets of Intel Patsburg-A PCH, Intel Powerville four-port Ethernet Controller, iBMC (Renasas SH7757), and Winbond WPCT201BA0WG (support TPM 1.2). iBMC SH7757 is a super baseboard management controller with integrated video controller (Matrox G200eR2 for x3550 M4 and Matrox G200eV for x3650 M4). iBMC also includes some of the super I/O function (serial port) and Serial over LAN (SOL) support. All PCI slots do not support hot-swappable or hot plug features.

Memory Subsystem and DIMM

The Romley-EP/EX platforms support many DDR3 DIMM types, including RDIMMs, LRDIMMs, and UDIMMs and memory technologies at DDR3-800, DDR3-1066, DDR3-1333, and DDR3-1600 speeds. In addition, low voltage (1.35 V) DDR3 (DDR3L) at DDR3L-800, 1066, and 1333 speeds are supported. The x3550 M4 supports three DIMMs per channel for single-rank and dual-rank DIMMs and two DIMMs or one DIMM per channel for quad-rank DIMMs. The Sandy Bridge-EP processor has a four-channel memory interface. Each channel consists of 64 data and 8 ECC bits.

The x3550 M4 and x3650 M4 do not support mixing of DIMM types. The platform is populated with all RDIMMs, all LRDIMMs, or all UDIMMs. DIMMs with different timing parameters can be installed on different slots within the same channel, but the timings that support the slowest DIMM are applied to all. The same interface frequency (DDR3-800, DDR3-1066, or DDR3-1333) is applied to all DIMMs on all channels.

The system functions with one memory DIMM; four memory DIMMs minimum per each processor is recommended to improve system performance.

The second processor must be installed to use the DIMMs plugged into the memory slots that are connected to second processor.

Memory RAS Features

The x3550 M4 and x3650 M4 systems support independent channel mode (Chipkill is only on x4 devices), rank sparing mode, memory mirroring, and lockstep channel mode when properly configured. Only one of the RAS modes (independent channel mode, rank sparing mode, lockstep channel mode, and memory mirroring) can be enabled at a time.

The memory controller supports Chipkill memory technology by reordering the data from the DRAM (x4 devices) so that if a DRAM device fails, correctable ECC errors are generated. With correctable ECC errors, the system continues to function with no data being corrupted.

DDR3 DIMM with x8 configuration does not provide Chipkill protection. It still has ECC protection.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – System configurations and diagrams

Rank Sparing Mode

In spare channel mode, one rank is a spare of the other ranks on the same channel. The spare rank is held in reserve and is not available as system memory. The spare rank must have identical or larger memory capacity than all of the other ranks (sparing source ranks) on the same channel. After sparing, the sparing source rank is lost.

In mirrored channel mode, the memory contents are mirrored between Channel0 and Channel2 and also between Channel1 and Channel3. As a result of the mirroring, the total physical memory available to the system is half of what is populated. Mirrored Channel Mode requires that Channel0 and Channel2, and Channel1 and Channel3 are populated identically with regards to size and organization. DIMM slot populations within a channel do not have to be identical, but the same DIMM slot locations across Channel0 and Channel2 and across Channel1 and Channel3 must be identically populated.

Lockstep Channel Mode DIMM Plugging Rules

In lockstep channel mode, each memory access is a 128-bit data access that spans Channel0 and Channel1. Lockstep channel mode supports single device data correction (SDDC) for DRAM devices with 8-bit wide data ports. The same address is used on both channels such that an address error on any channel is detectable by bad ECC. Lockstep channel mode is the only RAS mode that supports x8 SDDC. This mode requires that Channel0 and Channel1 are populated identically. Each DIMM in one channel must have a corresponding DIMM of identical organization such as number of ranks, banks, rows, and/or columns. The DIMMs can be different speed grades, but the integrated memory controller is configured to operate all DIMMs according to the slowest parameters present. DIMM slot populations within a channel do not have to be identical, but the same DIMM slot location across Channel0 and Channel1 and Channel2 and Channel3 must be populated the same.

The SDDC algorithm can recover from an x4/x8 component failure.

Memory Subsystem Overview

The Sandy Bridge-EP processors with QPI have a four-channel memory interface. The x3550 M4 and x3650 M4 implement 12 DIMM slots per processor for a total of 24 DIMM slots. These systems support up to 768 GB maximum memory (24 DIMMs x 32 GB LRDIMM = 768 GB).

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 –
System configurations and diagrams

Table 16: Possible Maximum Memory

Memory Type	Size
RDIMMs	384 GB (24 16-GB)
UDIMMs	64 GB (16 4-GB)
LRDIMMs	768 GB (24 32-GB)
HyperCloud	384 GB

Table 17: RDIMM Population and Interface Frequency

Configuration Number	POR Speed	Slot 3, 6, 10, 7 (15, 18, 22, 19)	Slot 2, 5, 11, 8 (14, 17, 23, 20)	Slot 1, 4, 12, 9 (13, 16, 24, 21)
1	DDR3-1333 and 1066	Empty	Empty	Single-rank
2	DDR3-1333 and 1066	Empty	Empty	Dual-rank
3	DDR3-1066	Empty	Empty	Quad-rank
4	DDR3-1333 and 1066	Empty	Single-rank	Single-rank
5	DDR3-1333 and 1066	Empty	Single-rank	Dual-rank
6	DDR3-1333 and 1066	Empty	Dual-rank	Single-rank
7	DDR3-1333 and 1066	Empty	Dual-rank	Dual-rank
8	DDR3-800	Empty	Single-rank	Quad-rank
9	DDR3-800	Empty	Quad-rank	Single-rank
10	DDR3-800	Empty	Dual-rank	Quad-rank
11	DDR3-800	Empty	Quad-rank	Dual-rank
12	DDR3-800	Empty	Quad-rank	Quad-rank
13	DDR3-800	Single-rank	Single-rank	Single-rank
14	DDR3-800	Single-rank	Single-rank	Dual-rank

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – System configurations and diagrams

15	DDR3-800	Single-rank	Dual-rank	Single-rank
16	DDR3-800	Dual-rank	Single-rank	Single-rank
17	DDR3-800	Single-rank	Dual-rank	Dual-rank
18	DDR3-800	Dual-rank	Single-rank	Dual-rank
19	DDR3-800	Dual-rank	Dual-rank	Single-rank
20	DDR3-800	Dual-rank	Dual-rank	Dual-rank
21	DDR3-800	Single-rank	Single-rank	Quad-rank
22	DDR3-800	Single-rank	Dual-rank	Quad-rank
23	DDR3-800	Dual-rank	Dual-rank	Quad-rank

Note: The same interface frequency (DDR3-800, DDR3-1066, or DDR3-1333) is applied to all DIMMs on all channels.

When populating a quad-rank DIMM with a single- or dual-rank DIMM in the same channel, the quad-rank DIMM must be populated farthest from the processor.

Quad-rank DIMMs and UDIMMs are not allowed in three slots populated configurations. Intel memory reference code (MRC) checks for correct DIMM placement.

Table 18: DIMM Population and Interface Frequency

Configuration Number	POR Speed	Slot 3, 6, 10, 7 (15, 18, 22, 19)	Slot 2, 5, 11, 8 (14, 17, 23, 20)	Slot 1, 4, 12, 9 (13, 16, 24, 21)
1	DDR3-1333 & 1066	Empty	Empty	Single-rank
2	DDR3-1333 & 1066	Empty	Empty	Dual-rank
3	DDR3-1333 & 1066	Empty	Single-rank	Single-rank
4	DDR3-1333 & 1066	Empty	Single-rank	Dual-rank
5	DDR3-1333 & 1066	Empty	Dual-rank	Dual-rank

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – System configurations and diagrams

Table 19: LRDIMM Population and Interface Frequency

Configuration Number	POR Speed	Slot 3, 6, 10, 7 (15, 18, 22, 19)	Slot 2, 5, 11, 8 (14, 17, 23, 20)	Slot 1, 4, 12, 9 (13, 16, 24, 21)
1	DDR31333 & 1066	Empty	Empty	Quad-rank
2	DDR3 1333 & 1066	Empty	Dual-rank	Quad-rank
3	DDR3 800	Quad rank	Quad-rank	Quad-rank
4	DDR3L 1066	Empty	Empty	Quad-rank
5	DDR3L 1066	Empty	Quad-rank	Quad-rank

Table 20: 1.35V RDIMM Population and Interface Frequency

Configuration Number	POR Speed	Slot 3, 6, 10, 7 (15, 18, 22, 19)	Slot 2, 5, 11, 8 (14, 17, 23, 20)	Slot 1, 4, 12, 9 (13, 16, 24, 21)
1	DDR3L-1066	Empty	Empty	Single-rank
2	DDR3L-1066	Empty	Empty	Dual-rank
3	DDR3L-800	Empty	Empty	Quad-rank
4	DDR3L-1066	Empty	Single-rank	Single-rank
5	DDR3L-1066	Empty	Single-rank	Dual-rank
6	DDR3L-1066	Empty	Dual-rank	Dual-rank
7	DDR3L-800	Empty	Quad-rank	Quad-rank

Table 21: 1.35V UDIMM Population and Interface Frequency

Configuration Number	POR Speed	Slot 3, 6, 10, 7 (15, 18, 22, 19)	Slot 2, 5, 11, 8 (14, 17, 23, 20)	Slot 1, 4, 12, 9 (13, 16, 24, 21)
1	DDR3L-1066	Empty	Empty	Single-rank
2	DDR3L-1066	Empty	Empty	Dual-rank
3	DDR3L-1066	Empty	Single-rank	Single-rank

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – System configurations and diagrams

4	DDR3L-1066	Empty	Single-rank	Dual-rank
5	DDR3L-1066	Empty	Dual-rank	Dual-rank

Non-Mirroring Mode DIMM Population Rules

The x3550 M4 and x3650 M4 require DIMMs within a channel to be populated starting with the DIMMs farthest from the processor. All channels must run at the same interface frequency, and individual channels might run at different DIMM timings (RAS latency, Column Address Strobe (CAS) latency, and so on). Populate the DIMMs with the rules in **Table 22** to optimize the system performance.

Figure 31 shows the DIMM slot and the memory installation sequence that needs to be populated when only one CPU is installed.

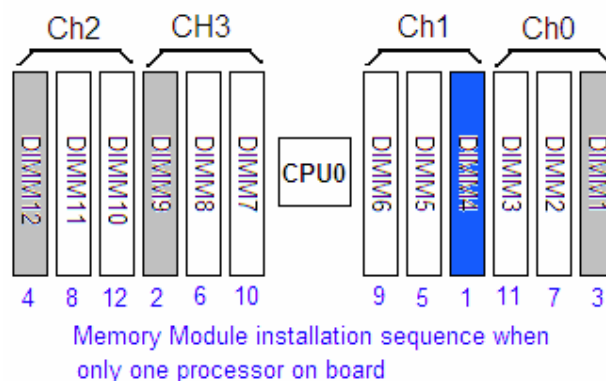


Figure 31: Memory DIMM Assignment and Installation Sequence (one CPU)

Figure 32 shows the DIMM slots and the memory installation sequence that needs to be populated when two CPUs are installed.

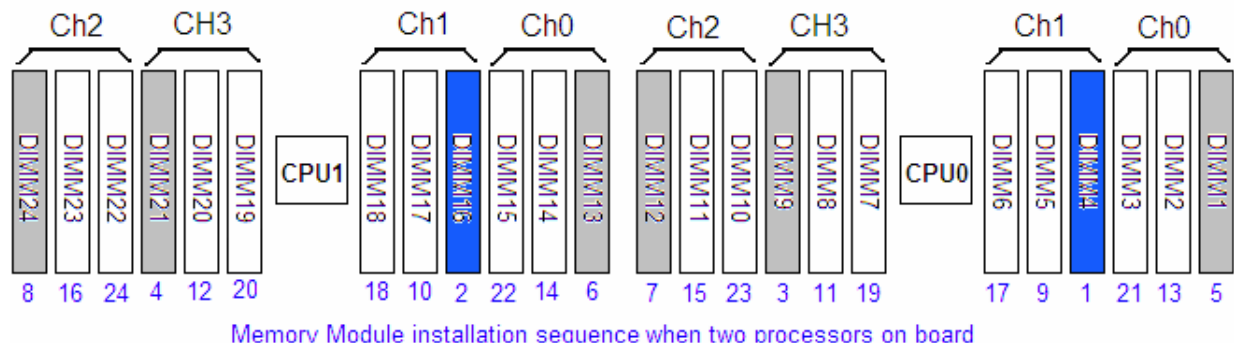


Figure 32: Memory DIMM Assignment and Installation Sequence (two CPUs)

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – System configurations and diagrams

Table 22: Non-Mirroring Mode DIMM Population Rules

CPU Quantity	Sequence to Install DIMMs
One CPU	4, 9, 1, 12, 5, 8, 2, 11, 6, 7, 3, 10
Two CPUs	4, 16, 9, 21, 1, 13, 12, 24, 5, 17, 8, 20, 2, 14, 11, 23, 6, 18, 7, 19, 3, 15, 10, 22

Memory Mirroring Mode DIMM Plugging Rules

Memory mirroring protects against non-correctable memory failures. If a failure occurs in mirror mode, the memory controller switches from the primary memory to the backup memory containing a backup copy. It then takes the failing DIMMs offline and continues to operate with the backup memory now online. Memory mirroring requires a minimum upgrade increment of two DIMMs on Channel0 and Channel1. DIMM slot populations within a channel do not have to be identical, but the same DIMM slot location across Channel0 and Channel1 and Channel2 and Channel3 must be populated by the same pair (same size, same type, same rank, and same organization).

When mirroring is selected, only half of the installed memory is available to the operating system.

Maximum addressable memory is reduced to half of total installed DIMMs.

Figure 33 shows the population rules to enable the memory mirroring mode.

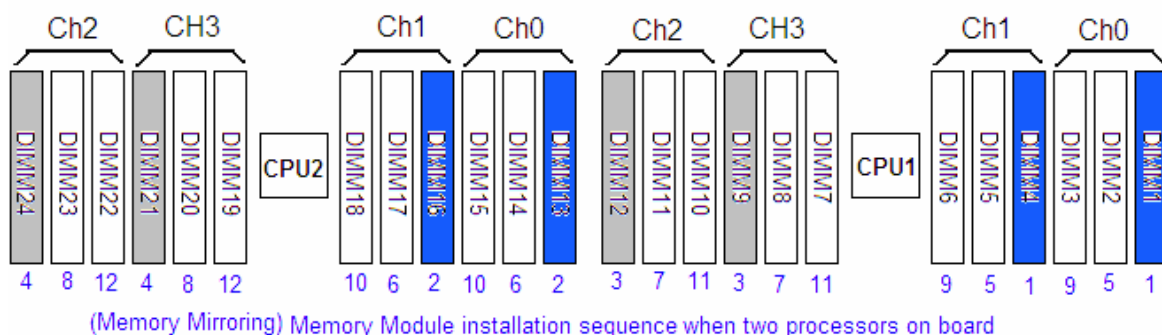


Figure 33: Memory Mirroring Mode DIMM Population Rules

For UDIMM support, each channel can support up to two DIMMs. In memory mirroring mode, each CPU uses only two channels. In memory mirroring mode, the maximum number of UDIMMs is 16: DIMMs 1, 2, 4, 5, 8, 9, 11, 12 for CPU1, and DIMMs 13, 14, 16, 17, 20, 21, 23, and 24 for CPU2.

POST/UEFI displays a message on the screen during POST if it detects an invalid configuration.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – System configurations and diagrams

PCI Features Overview

The system board has two PCI riser connectors.

On the x3550 M4 system:

- Connector1 (for riser1) is the connector on the left of the system (looking from back of the system). Its PCIe signals are linked to the CPU1 PCIe x16 interface.
- Connector2 (for riser2) is the connector in the middle of the system (looking from back of the system) and is closer to power supply. Its PCIe signals are linked to the CPU1 PCIe x8 interface and CPU2 PCIe x16 interface.

On the x3650 M4 system:

- Connector1 (for riser1) is the one on the left of the system (looking from the back). Its pins are linked to CPU1 and provide either three PCIe x8 slots or one x8 plus one x16 PCIe slots.
- Connector2 (for riser2) is the one on the middle of the system (looking from back) and closer to power supply. Its pins are linked to CPU2 and provide either three PCIe x8 slots or one x8 plus one x16 PCIe slots. Therefore, riser2 is enabled when the second CPU is installed.
- The system can support different PCI configurations depending on the kind of PCI riser card installed on the riser card connectors. Legacy 5V PCI adapters are not supported in this system.

x3550 Riser Card Overview

The x3550 M4 supports four types of PCI riser cards. The supported PCI interface depends on the kind of PCI riser card installed in the system and the quantity of the installed processor.

Riser1/slot1 supports a low profile card:

- PCIe Gen3 x16, linked to CPU1

Riser2/slot2 supports FHHL cards:

- PCIe Gen3 x8, linked to CPU1
- PCIe Gen3 x16, linked to CPU2
- PCI-X 64-bit 133 MHz, linked to CPU1

There is another PCIe x8 connector on board for a RAID card, located between the CPU1 and the riser1 connector.

The IMM2 reports a log for any riser card or RAID card that is disconnected from the system.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – System configurations and diagrams

Table 23: PCI Slot Configuration for x3550 M4

Slot Number	Configuration 1 (One CPU installed)	Configuration 2 (Two CPUs installed)	Configuration 3 (Two CPUs installed)
1	PCIe Gen3 x16	PCIe Gen3 x16	PCIe Gen3 x16
2	PCIe Gen3 x8	PCIe Gen3 x16	PCI-X 64-bit 133 MHz

Table 24: PCI Slot Configuration for x3550 M4

Slot Number	Add-on Card Number
1 (riser1 slot1)	1 (adapter1)
2 (riser2 slot2)	2 (adapter2)
3 (on board, dedicated for RAID card)	3 (RAID card)

Table 25: PCI Riser Options for x3550 M4

Option	PCI type	Description
PCIe riser	One PCIe x8 slot	Supports one PCIe Gen3 x8 card with standard bracket
PCIe riser	One PCIe x16 slot	Supports one PCIe Gen3 x16 card with standard bracket
PCI-X riser	One PCI-X 1.0a 64-bit 133 MHz slot	Supports one PCI/PCI-X card with standard bracket

Table 26: Supported PCI Card Form Factor for x3550 M4

Riser connector	Supported PCI Form Factor
1	One low profile card
2 (optional)	One FHHL card

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – System configurations and diagrams

Note: There is no FLFH PCI card supported on x3550 M4.

x3650 Riser Card Overview

x3650 M4 supports three types of PCI riser card. The supported PCI interface depends on the kind of PCI riser card installed in the system and the quantity of installed processor.

Riser1/slot1 supports three riser cards:

- PCIe Gen3 x16 FHFL and PCIe Gen3 x8 FHHL, linked to CPU1
- Three PCIe Gen3 x8 (one FHFL, two FHHL), linked to CPU1
- Two PCI-X slots, one PCIe slot, linked to CPU1

Riser2/slot2 supports FHFL cards:

- PCIe Gen3 x16 FHFL and PCIe Gen3 x8 FHFL, linked to CPU2
- Three PCIe Gen3 x8 (two FHFL, one FHHL), linked to CPU2
- Two PCI-x slot and one PCIe Gen3 x16 slot, linked to CPU1

Table 27: PCI Slot Numbering for X3650 M4

Slot Number	Add-on Card Number
1 (riser1 slot1)	1 (adapter1)
2 (riser1 slot2)	2 (adapter2)
3 (riser1 slot3)	3 (adapter3)
4 (riser2 slot1)	4 (adapter4)
5 (riser2 slot2)	5 (adapter5)
6 (riser2 slot3)	6 (adapter6)

Table 28: PCI Riser Options

Option	PCI Type	Comments
PCIe riser1	Three PCIe x8 slots	Supports three PCIe Gen 3 x8 cards with standard bracket
PCIe riser2	One PCIe x16 slot and one PCIe x8 slot	Supports one PCIe Gen 3 x16 card and one PCIe Gen 3 x8 card
PCI-X riser	Two PCI-X 1.0a 64-bit slots	Supports two PCI/PCI-X cards

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 –
System configurations and diagrams

	and one PCIe x16 slot	and one PCIe Gen3 x16 card
--	-----------------------	----------------------------

Table 29: PCI Slot Configuration

Riser	Riser Slot Number	Support PCI Form Factor
1	1	FHFL card
1	2	FHHL card
1	3	FHHL card
2	1	FHFL card
2	2	FHFL card
2	3	FHHL card

PCI Scan Order

The system POST PCI scan order under UEFI is as follows:

1. Video BIOS (fixed)
2. System board Ethernet1 preboot execution environment (PXE) (fixed)
3. System board Ethernet2 PXE (fixed)
4. System board Ethernet3 PXE (fixed)
5. System board Ethernet4 PXE (fixed)
6. System board SAS (or RAID): Default setting for PCI device boot priority
7. Slot1: Any slot can be selected to run after PXE and before SAS
8. Slot2

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Operator Information Panel

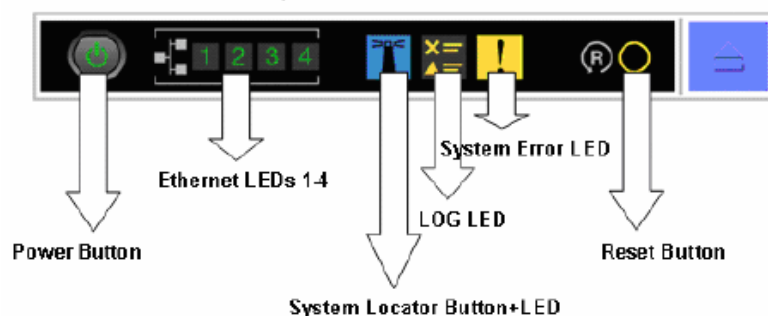
Operator Information Panel

The light path module on the x3550 M4 and x3650 M4 systems contains the following components, viewed from left to right:

- Black power on/off switch with a green Power LED (controlled by the real-time management module (RTMM))
- Four green activity LEDs for Ethernet activity (controlled by the integrated Ethernet controller hardware logic)
- Blue locator button and Locator LED (controlled by the IMM2)
- Amber Log LED (controlled by the IMM2)
- Amber System Error LED (controlled by the IMM2)
- Reset button

Figure 34 shows the level 1 and level 2 light path LED location and information.

Level 1 - Front OP panel Buttons/ LEDs



Note: LOG LED is defined to replace Info LED in previous generation, its definition is not yet determined.

Level 2 - Lightpath Diagnostics

- | | | |
|--------------------|-------------------------|------------------|
| ■ Power Supply LED | ■ Over Spec LED | |
| ■ PCI BUS LED | ■ NMI LED | |
| ■ Config LED | ■ LINK LED (Blade only) | |
| ■ CPU LED | ■ MEM LED | |
| ■ TEMP LED | ■ FAN LED | ■ Boot Code LEDs |
| ■ BOARD LED | ■ HDD LED | ■ Remind Button |



Figure 34: Level 1 and Level 2 Light Path Diagram

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Operator Information Panel

Figure 35 shows the light path diagnostics LED location on the operator information panel.

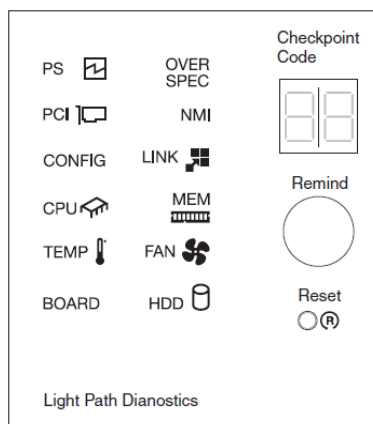


Figure 35: LEDs and Controls on the Light Path Diagnostics Panel

The light path module can also slide out and drop down without opening the top cover for easy viewing. On the slid-out, dropped-down portion of the module are the following LEDs and buttons:

- Light Path LEDs
- Power supply
- PCI bus
- CONFIG
- CPU
- TEMP
- BOARD
- OVERSPEC
- NMI
- MEM
- FAN
- HDD
- System reset

The Power Button LED is controlled by the IMM2 and flashes (at a frequency of about 1 Hz) when AC power is present. It stays on while the system is powered on. There are two seven-segment digital displays for POST check point display. Press the **Locator** button to visually locate the server among other servers. Use the Locator button as the physical presence for TPM.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Operator Information Panel

Figure 36 shows the controls and LEDs on the operator information panel.

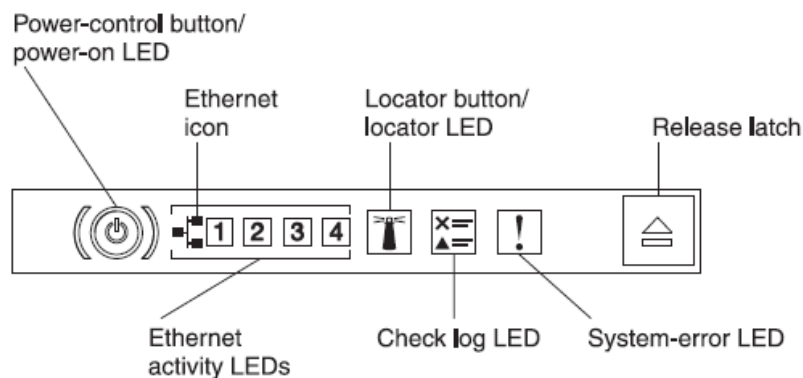


Figure 36: Operator Information Panel Controls and LEDs

Power-control button and power-on LED: Press this button to turn the server on and off manually or to wake the server from a reduced-power state. The states of the power-on LED are as follows:

- **Off:** AC Power is not present or the power supply or the LED itself has failed.
- **Flashing rapidly (four times per second):** The server is turned off and is not ready to be turned on. The power-control button is disabled. This flashing lasts approximately 20 to 40 seconds.
- **Flashing slowly (once per second):** The server is turned off and is ready to be turned on. Press the power-control button to turn on the server.
- **Lit:** The server is turned on.
- **Fading on and off:** The server is in a reduced-power state. To wake the server, press the power-control button or use the IMM2 Web interface.
- **Ethernet activity LEDs:** When any of these LEDs are lit, it indicates that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port for that LED.
- **System-locator button/LED:** Use this blue LED to visually locate the server among other servers. A system-locator LED is also on the rear of the server. This LED is used as a presence detection button as well. You can use IBM Systems Director to light this LED remotely. This LED is controlled by the IMM2. When you press the System-locator button, the LED blinks and it continues to blink until you press it again to turn it off. Press the locator button to visually locate the server among the others servers.
- **Check log LED:** When this amber LED is lit, it indicates that a noncritical event has occurred. Check the error log for additional information. See the Event logs section in the *System x3550 M4 Type 7914 7915 Problem Determination and Service*

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Guide and the *System x3650 M4 Type 7915 Problem Determination and Service Guide* for information about the error logs.

- **System-error LED:** When this amber LED is lit, it indicates that a system error has occurred. A system-error LED is also on the rear of the server. An LED on the light path diagnostics panel on the operator information panel is also lit to help isolate the error. This LED is controlled by the IMM2.
- **HDD activity LED:** When this green LED is lit, it indicates that one of HDDs is in use.

Note: For a SAS drive, a HDD activity LED is shown in two places: on the HDD and on the operator information panel.

For a SATA drive, HDD activity is indicated only by the HDD activity LED on the operator information panel.

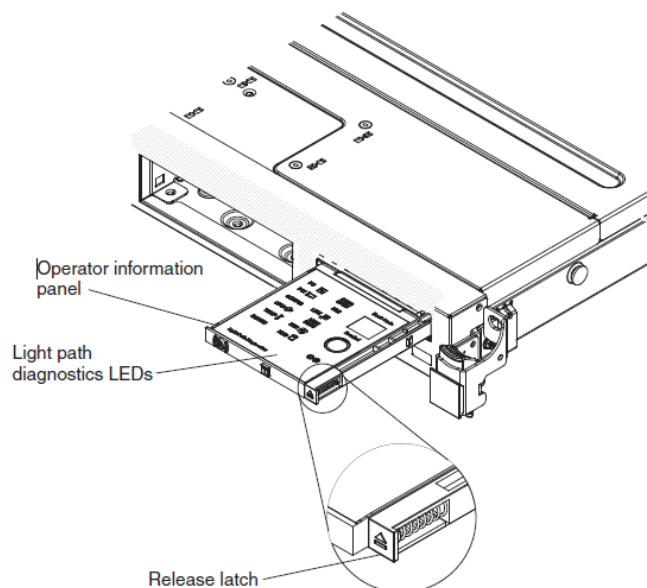
Light Path Diagnostics Panel

The light path diagnostics panel is on the top of the operator information panel.

Note: The system service label on the underside of the cover also provides information about the location of the light path diagnostics LEDs.

To access the light path diagnostics panel, press the blue release latch on the operator information panel. Pull forward on the panel until the hinge of the operator information panel is free of the server chassis. Then, pull the panel down so that you can view the light path diagnostics panel information.

Figure 37 shows the release latch location on the operator information panel.



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Figure 37: Light Path Diagnostics Panel Removal

Checkpoint code display: This display provides a checkpoint code that indicates the point at which the system stopped during the boot block and POST. A checkpoint code is either a byte or a word value that is produced by UEFI. The display does not provide error codes or suggest components to be replaced.

Remind button: This button places the system-error LED/check log LED on the front information panel into Remind mode. In Remind mode, the system-error LED flashes every two seconds until the problem is corrected, the system is restarted, or a new problem occurs. By placing the system-error LED indicator in Remind mode, you acknowledge that you are aware of the last failure but will not take immediate action to correct the problem. The remind function is controlled by the IMM2.

Reset button: Press this button to reset the server and run the power-on self-test (POST). You might have to use a pen or the end of a straightened paper clip to press the button. The Reset button is in the lower right corner of the light path diagnostics panel.

The following table explains the existing LEDs on the light path diagnostics panel.

Table 30: Light Path LEDs

LED	Description
PCI	Error occurred on PCI bus or system board. It is turned on by the IMM based on the information provided by SMI_BIOS when a PCIe or PCI-X device reports an error. An extra LED next to the slot is on to identify possible cause of the problem.
CONFIG	IMM turns on System Error LED, CPU LED, and CONFIG LED when POST detects CPU mismatch. IMM turns on System Error LED, MEM LED, and CONFIG LED when POST detects invalid memory configuration. POST also logs the error. All DIMM error LEDs on the system board should be off in this situation. When installing a second CPU, more memory must be installed to memory connectors that connect to CPU1 socket directly. Otherwise, the IMM turns on System Error LED, MEM LED, and the CONFIG LED.
CPU	CPU LED and CONFIG LED are on when POST detects CPU mismatch. If only the CPU LED is on, then a CPU failure occurred. This LED is turned on by the IMM when either of the two CPU failure LEDs located near the appropriate CPU socket are turned on by the IMM.
TEMP	System temperature exceeded maximum limit. Log entry identifies where over temperature was measured.

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BOARD	BOARD LED turned on when either PLANAR_ERR_LED (VRD bad), 3v_BATTERY_LED, on the system board are illuminated. The BOARD LED on does not mandate board replacement. Check the system board for further indications of failure.
OVERSPEC	If this LED is on, the system was shut down due to the power supply overload condition on one of the power rails (includes one of +12 V power rails). The log entry identifies power supply specific status: P12V1: CPU1 Vregs P12V2: CPU2 Vregs, Vregs, disk drives, fans, CD/DVD P12V3: MEM_AB VDDQ, PCI_riser1, system 3V P12V4: MEM_CD VDDQ, FAN, HDD P12V5: MEM_EF VDDQ, FAN, system 5V P12V6: MEM_GH VDDQ, FAN, PCI_riser2, mezzanine card Where Vreg is the voltage of the VRD regulator.
NMI	Non-maskable interrupt (NMI) occurred or NMI button was pressed.
PS	Power supply one or two fails
SP	iBMC detected an internal error
FAN	A fan failed or is operating slowly. This LED is turned on when any light path LED mounted directly on the fan assemblies is turned on.
MEM	If both the MEM LED and CONFIG LED are on, then the system detected no memory or an invalid memory configuration. All DIMM slot LEDs are off in this situation. If only the MEM LED is on, then a memory failure occurred. This LED is turned on by the IMM when any of the light path LEDs located near the memory DIMMs are turned on. This LED is turned on by the iBMC when any of the following light path LEDs located near the memory DIMMs are turned on: Memory DIMM #1 failure LED Memory DIMM #2 failure LED Memory DIMM #3 failure LED Memory DIMM #4 failure LED Memory DIMM #5 failure LED Memory DIMM #6 failure LED Memory DIMM #7 failure LED Memory DIMM #8 failure LED Memory DIMM #9 failure LED

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Operator Information Panel

	Memory DIMM #10 failure LED Memory DIMM #11 failure LED Memory DIMM #12 failure LED Memory DIMM #13 failure LED Memory DIMM #14 failure LED Memory DIMM #15 failure LED Memory DIMM #16 failure LED Memory DIMM #17 failure LED Memory DIMM #18 failure LED Memory DIMM #19 failure LED Memory DIMM #20 failure LED Memory DIMM #21 failure LED Memory DIMM #22 failure LED Memory DIMM #23 failure LED Memory DIMM #24 failure LED
DASD	Error reported from the SAS backplane. Errors include a missing or bad HDD. The SAS backplane has a light path to the specific drive if there is a bad HDD.
BRD	Turned on when the PLANAR_ERR_LED (VRD bad), 3v_BATTERY_LED, or the PCI_RISER_MISSING_LED on the system board are illuminated. BRD LED on does not mandate system board replacement.

Table 31: Light Path LED Error Notification Table

LED	Problem Description	Actions/Possible FRUs/CRUs
PS	One of the power supplies has failed.	Remove one of two power supplies to isolate failed power supply. Make sure that the power supply is correctly seated and plugged into a known good AC outlet. If the problem remains, replace the failed power supply.
PCI	An error has occurred on a PCI bus or on the system board. An additional LED is lit next to a failing PCI slot.	Check the LEDs on the PCI slots to identify the component that is causing the error. Check the system error log for information about the error.

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		If you cannot isolate the failing adapter through the LEDs and the information in the system error log, remove one adapter at a time from the failing PCI bus, and restart the server after each adapter is removed. If the problem remains, replace the following components, in the order shown, restarting the server each time: 1. PCI riser card 2. System board
CONFIG	A hardware configuration error has occurred.	If the CONFIG and CPU LEDs are lit: 1. Check the newly installed microprocessors to verify that they are compatible with each other. 2. Replace an incompatible microprocessor. 3. Check the system error logs for information about the error. 4. Replace any components that are indicated. 5. If the CONFIG and MEM LEDs are lit: 6. Review the memory configuration and fix the problem.
CPU	When this LED is lit and the CONFIG LED is off, then a microprocessor has failed. When this LED is lit and CONFIG LED is on, an invalid CPU configuration is detected.	If the report is a microprocessor failure, make sure that the failing microprocessor and its heat sink, which is indicated by a lit LED on the system board, are installed correctly. If the problem remains, replace the microprocessor.
TEMP	The system temperature (including the CPU) has exceeded a threshold level. No other LED is lit due to over temperature. A failing fan can cause the TEMP	Determine whether a fan has failed. If it has, replace it. Verify that the room temperature is not too high. Verify that the air vents are not blocked.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Operator Information Panel

	LED to be lit.	
BRD	An error has occurred on the system board.	Check the LEDs on the system board to identify the component that is causing the error. Check the system-error log for information about the error.
OVERSPEC	The power supplies are using more power than their maximum rating.	If the OVER SPEC LED on the light path diagnostics panel is lit, or any of the six 12 V rail error LEDs (A, B, C, D, E, or AUX) on the system board are lit, complete one of the following options: If 12V_A error LED is on: 1. Remove power and the following devices: optical drive, fans, disk drives, disk drive back planes. 2. Restart the server. If the problem remains, replace the system board. 3. Reinstall each device removed in step 1 one at a time, restarting the server each time, to isolate a defective device. 4. Replace any defective device. If 12V_B error LED is on: 1. Remove power and the following devices: PCI riser on riser connector1, all DIMMs, CPU1. 2. Restart the server. If the problem remains, replace the system board 3. Reinstall each device removed in step 1 one at a time, restarting the server each time, to isolate a defective device. 4. Replace any defective device. If 12V_C error LED is on: 1. Remove power and the following devices: internal tape device if

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Operator Information Panel

		installed, SAS riser card, DIMMs (1 through 8), CPU1. - Restart the server. If the problem remains, replace the system board. - Reinstall each device removed in step 1 one at a time, restarting the server each time, to isolate a defective device. - Replace any defective device. If 12V_D error LED is on: - Remove power and CPU1. - Restart the server. If the problem remains, replace the system board. - Reinstall CPU1, restarting the server. If this error LED is on again. Replace processor. If 12V_E error LED is on: - Remove power and devices (such as graphic card): Plug a cable to J154 +12V power connector. - Restart the server. If the problem remains, replace the system board. - Reinstall each device removed in step 1 one at a time, restarting the server each time, to isolate a defective device. - Replace any defective device. If 240VA_AUX fault LED is on: - Remove power and the following devices: all PCI cards, all riser cards, front panel, Ethernet daughter card. - Restart the server. If the problem remains, replace the system
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Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Operator Information Panel

		board. 3. Reinstall each device removed in step 1 one at a time, restarting the server each time, to isolate a defective device. 4. Replace any defective device. The H8 does not allow the box to power on if CPU1 is not present. Toggle the FORCE_PWR_PERMISSION_N switch to power on the server.
NMI	A machine check error has occurred or the NMI button was pressed.	Check the system error log for information about the error.
MEM	When this LED is lit and the CONFIG LED is off, a memory error has occurred. When this LED is lit and the CONFIG LED is on, an invalid memory configuration is detected.	If report is memory error, replace the failing DIMM, which is indicated by the lit LED on the system board. If the report is an invalid memory configuration, then fix the configuration error.
FAN	A fan has failed, is operating too slowly, or has been removed. The TEMP LED might also be lit.	Reseat the fan. If the problem remains, replace the failed fan, as indicated by a lit LED next to the fan.
HDD	An HDD error has occurred.	Check the LEDs on the HDDs and replace the indicated drive. If the problem remains, replace the HDD backplane.
LOG	Information is present in the BMC log and system-error log.	Save the log if necessary and clear. Check the log for possible errors.

For additional information about the light path diagnostics panel LEDs, see the light path diagnostics LEDs section in the *System x3550 M4 Type 7914 Problem Determination and Service Guide* and the *System x3650 M4 Type 7915 Problem Determination and Service Guide*.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – LLM-SM Dual Port 10 GbE SFP+ Adapter

LLM-SM Dual-port 10 GbE SFP+ Adapter

LLM-SM Dual Port 10 GbE SFP+ Adapter Key Features

The low-latency-messaging (LLM)-Session Management (SM) dual-port 10 GbE SFP+ adapter, shown in **Figure 38**, is a low profile PCIe x8, Gen3 card with an Altera Stratix-V field programmable gate array (FPGA) connected to two SFP+ ports and two DDR3 memory channels.



Figure 38: LLM-SM Dual-port 10 GbE SFP+ Adapter

The key features of the LLM-SM dual-port 10 GbE SFP+ adapter include:

- PCIe form factor
- Eight-lane PCIe 3.0 host interface
- Two 10 GB LAN/WAN Ethernet channels accessed via two SFP+ ports
- Two banks of 4 or 8 GB x72 DDR3 SDRAMs
- External clock/synchronization input for nanosecond accurate time-stamping
- User clocks
- User LEDs
- Voltage and temperature monitoring

LLM-SM Dual-port 10 GbE SFP+ Adapter Functional Diagram

Figure 39 shows the key functional features of the LLM-SM dual-port 10 GbE SFP+ adapter. The LLM-SM dual-port 10 GbE SFP+ adapter uses a single dedicated FPGA to implement the PCIe Gen3 interface.

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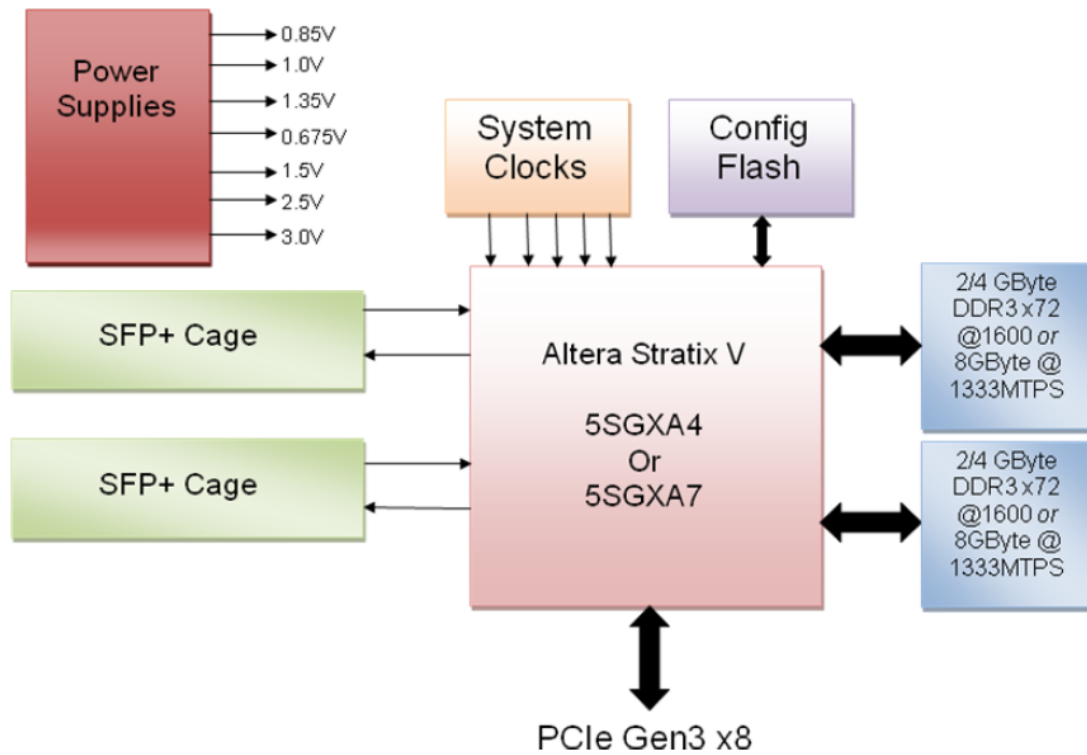


Figure 39: LLM-SM Dual-port 10 GbE SFP+ Adapter Functional Diagram

Configuring the User FPGAs

The LLM-SM dual-port 10 GbE SFP+ adapter supports sophisticated FPGA configuration options that include:

- Fast boot from configuration flash using the Altera parallel flash loader IP (PFL IP).
- Choose between two bitstreams: a golden bitstream (also referred as factory bitstream) and a user bitstream.
- Option to force booting from golden bitstream with jumper on the board automatic configuration failure recovery and reversion to loading the golden bitstream.

FPGA driven reconfiguration using either of both images stored in the flash single bit flag provided to the FPGA identifying which of the two bitstreams is loaded in the FPGA.

Figure 40 shows the physical Layout of the LLM-SM Dual-port 10 GbE SFP+ adapter Top Side

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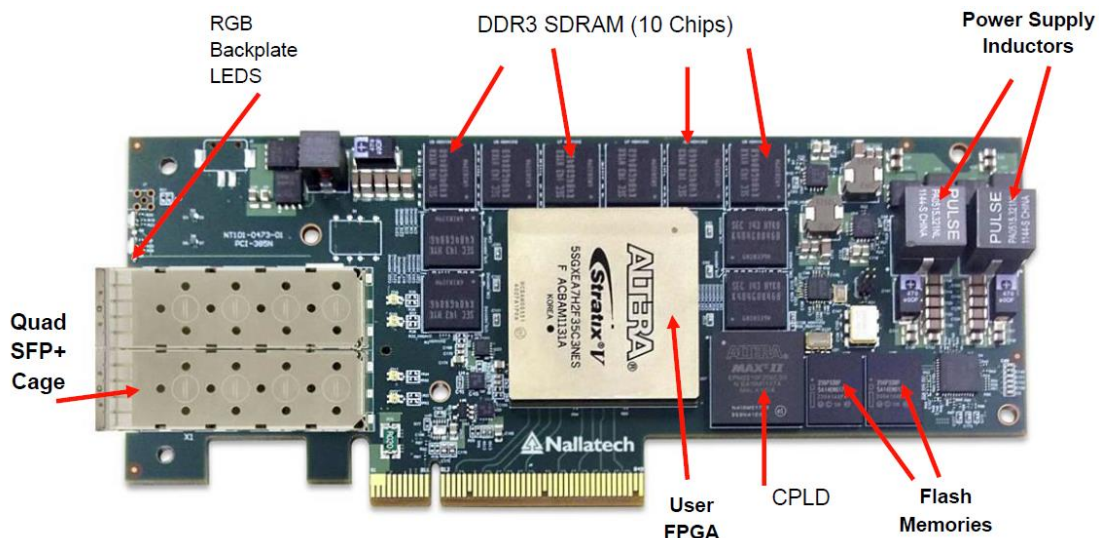


Figure 40: Physical Layout of the LLM-SM Dual-port 10 GbE SFP+ Adapter Top Side

Figure 41 shows the physical Layout of the LLM-SM Dual-port 10 GbE SFP+ Adapter bottom Side

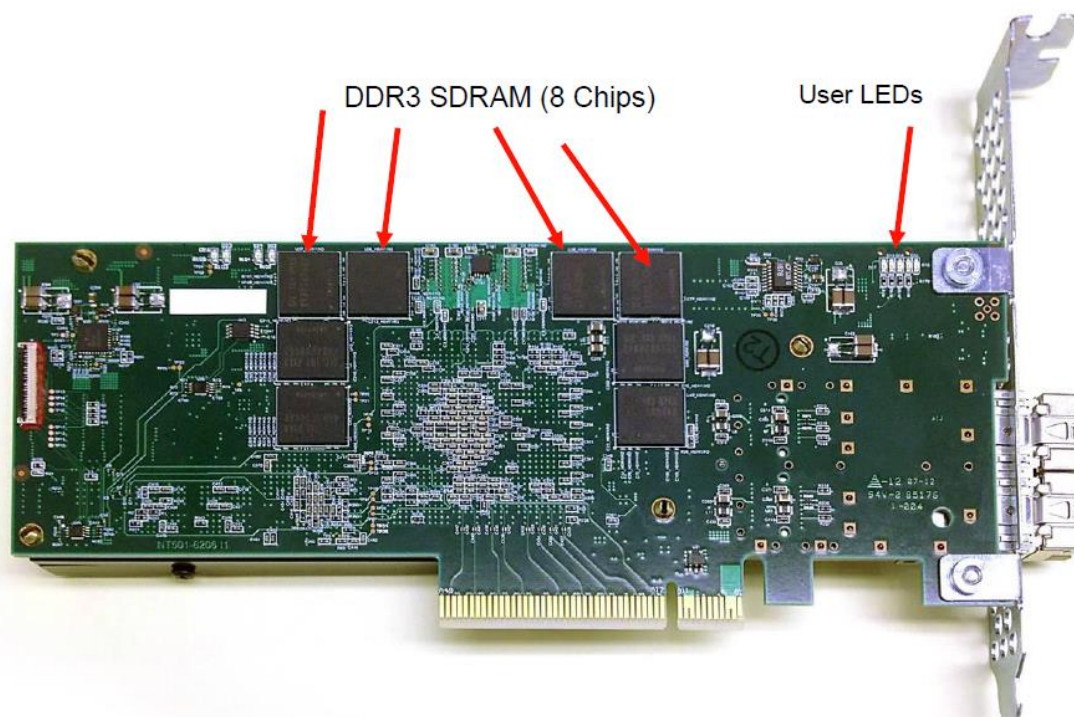


Figure 41: Physical Layout of LLM-SM Dual-port 10 GbE SFP+ Adapter Bottom Side

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – LLM-SM Dual Port 10 GbE SFP+ Adapter

Form Factor

The LLM-SM dual-port 10 GbE SFP+ adapter is a low-profile, single-width PCIe add-on card with an x8 physical and x8 electrical interface. The LLM-SM dual-port 10 GbE SFP+ adapter is 68.90 mm high and 167.65 mm long. The PCIe interface complies with the PCIe 3.0 specification.

10 Gb Ethernet

- The LLM-SM dual-port 10 GbE SFP+ adapter has two 10 GbE ports.
- The 10 GbE interface is implemented using the Altera's 10 GbE IP core.
- The LLM-SM dual-port 10 GbE SFP+ adapter has two SFP+ ports contained in two single cages; each port has two bi-color LEDS directly above each port.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM Messaging Appliance Type 6188

IBM Messaging Appliance Type 6188

Overview

The IBM Messaging Appliance Type 6188 is an integrated solution provided by the software group of IBM using the x3650 M4 Type 7915 system. The hardware of System x3650 M4 is preloaded and configured with applications and three of the major components is installed on the system: The non-volatile DIMMs (nvDIMMs), Supercap trays, and the cables that connect the two.

Addendum to the Problem Determination and Service Guide for System x3650 M4
Service information for: 6188-SM1:

If your x3650 M4 server was purchased as part of a Software Group Appliance, certain information contained in the product documentation may or may not apply to your particular product. Information that can differ is:

1. The warranty period.
2. Parts replacement procedure.
3. Service support call flow.

The information provided below supersedes the *Problem Determination and Service Guide for System x3650 M4 Type 7915*.

Table 32 maps the Software Group Appliance models to the Systems and Technology Group System x models.

Table 32: Appliance and System x Models

Appliance Name	Appliance Model Type	System x Name
IBM Messaging Appliance	6188-SM1	x3650 M4

This addendum provides the supplemental parts listing, UEFI/POST error codes, and IMM2 error messages to System x3650 M4.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM Messaging Appliance Type 6188

Field-Replaceable Unit for the IBM Messaging Appliance Type 6188

Field-replaceable unit (FRU): FRUs must be installed only by trained service technicians, at no additional charge, under the type of warranty service that is designated for your server.

In addition to the list of FRUs below, all structural parts (components such as chassis assembly, top cover, bezel), and Tier 1/Tier 2 parts listed in the *Problem Determination and Service Guide for System x3650 M4* are delegated as FRUs for your IBM Messaging Appliance Type 6188.

Table 33 lists the appliance-specific replaceable components.

Table 33: FRU list	
Description	FRU part number
Mellanox ConnectX-3 VPI dual-port QSFP FDR14/40 GbE HCA	00D9552
x3650 M4 ISM USB memory key	00J6535
x3650 M4 ISM Supercap kit with cable	00J6545
x3650 M4 ISM console cable	46M0494
nvDIMM, 4 GB 1Rx8 1.5V PC3-12800 DDR3-1600 VLP	46W0720
Mellanox QSA adapter (QSFP to SFP+)	46W4232
IBM 10 GBE SW SFP+ transceiver	46W4236

The appliance hardware that has a higher failure rate includes nvDIMMs and the Supercap kit with cables. Supercaps are stored on a 2.5-inch HDD tray, occupying four 2.5-inch HDD trays. nvDIMMs are DIMMs with backup capacitors that provide power to the DIMMs so that when errors occur, the system is still able to bring critical information back online.

When working to determine if a Supercap tray or nvDIMM failed, always check the cables that are connecting the two components. Reseat the cables and see if the DIMMs function correctly. If reseating cables does not work, try swapping cables to figure out what the cause of the error is. If cables function correctly, try to swap the Supercap trays and the nvDIMMs. Be careful when reseating the three components; any errors that are caused by not following the population standards listed in the “Installation steps” subsection in the “nvDIMMs and Supercap Overview” section can permanently damage the DIMMs.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM Messaging Appliance Type 6188

UEFI/POST Error Codes

Table 34 describes the UEFI/POST diagnostic error codes and suggested actions to correct the detected problems.

Table 34: POST/UEFI diagnostic codes

Diagnostic error code	Message	Severity	Description	Action
S.580C0	nvDIMM flash failure	Error	[S.580C0] An nvDIMM flash part failure is detected.	1. Check the Lenovo support Web site for an applicable RETAIN tip or firmware update that applies to this nvDIMM error. (Trained service technician only.) If the problem remains, replace the affected nvDIMM (as indicated by the error LEDs on the system board or the event logs). (Trained service technician only.) If the problem occurs on the same DIMM connector, check the DIMM connector. If the connector contains any foreign material or is damaged, replace the system board. (Trained service technician only.) Replace the affected microprocessor. (Trained service technician only.) Replace the system board.
S.580C1	nvDIMM	Error	[S.580C1] An	1. Check the Lenovo

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM Messaging Appliance Type 6188

	Supercap error		nvDIMM Supercap error is detected.	support Web site for an applicable RETAIN tip or firmware update that applies to this nvDIMM error. See the release notes to find an applicable solution. - If the nvDIMM is newly installed, or the server has recently been moved, reseal all the cables connecting the Supercap to the affected nvDIMM (as indicated by the error LEDs on the system board or the event logs). (Trained service technician only.) Replace the Supercap of the affected nvDIMM. (Trained service technician only.) If the problem remains, replace the affected nvDIMM.
S.580C2	nvDIMM Supercap disconnected	Error	[S.580C2] An nvDIMM is disconnected from its Supercap.	If the nvDIMM is newly installed, or the server has recently been moved, reseal all the cables connecting the Supercap to the affected nvDIMM (as indicated by the error LEDs on the system

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM Messaging Appliance Type 6188

				board or the event logs). 2. (Trained service technician only.) Replace the Supercap of the affected nvDIMM. 3. (Trained service technician only.) If the problem remains, replace the affected nvDIMM.
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Integrated Management Module Error Messages

Table 35 describes the IMM error messages and suggested actions to correct the detected problems.

Table 35: IMM error messages

Diagnostic error code	Message	Severity	Description	Action
8007020f-2201xxxx	Sensor [nvDIMM Flash] has transitioned to critical from a less severe state.	Error	This message is for the use case when an implementation detects that a sensor transitioned to critical from less severe.	1. Check the Lenovo support Web site for an applicable RETAIN tip or firmware update that applies to this nvDIMM error. (Trained service technician only.) If the problem remains, replace the effected nvDIMM (as indicated by the error LEDs on the system board or the event logs). (Trained service technician only.) If the problem occurs

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM Messaging Appliance Type 6188

				on the same DIMM connector, check the DIMM connector. If the connector contains any foreign material or is damaged, replace the system board. (Trained service technician only.) Replace the affected microprocessor. (Trained service technician only.) Replace the system board.
806f011b-2502xxxx 806f011b-2505xxxx 806f011b-2508xxxx 806f011b-250bxxxx	The connector [nvDIMM <i>n</i> Cable] has encountered a configuration error. (<i>n</i> = DIMM number)	Error	This message is for the use case when an implementation detects an interconnect configuration error.	If the nvDIMM is newly installed, or the server has recently been moved, reseal all the cables connecting Supercap of the affected nvDIMM (as indicated by the error LEDs on the system board or the event logs). (Trained service technician only.) Replace the Supercap of the affected nvDIMM. (Trained service technician only.) If the problem remains, replace the affected nvDIMM.
8107020c-2502xxxx	Sensor [nvDIMM <i>n</i>	Info	This message is for the case	No action; information only.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM Messaging Appliance Type 6188

8107020c-2505xxxx 8107020c-2508xxxx 8107020c-250bxxxx	Status] has transitioned to a less severe state from critical. (<i>n</i> = DIMM number)		when an implementation detects a sensor transition to less severe from critical.	
8107020f-2201xxxx	Sensor [nvDIMM Flash] has transitioned to a less severe state from critical.	Info	This message is for the use case when an implementation detects a sensor transition to less severe from critical.	No action; information only.
816f011b-2502xxxx 816f011b-2505xxxx 816f011b-2508xxxx 816f011b-250bxxxx	The connector [nvDIMM <i>n</i> Cable] configuration error has been repaired. (<i>n</i> = DIMM number)	Info	This message is for the use case when an implementation detects that an interconnect configuration was repaired.	No action; information only.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM MessageSight Firmware Reinstallation in the Field

IBM MessageSight Firmware Reinstallation in the Field

This section is for Customer Engineer (CE)/System Service Representative (SSR) field support personnel who need to reinstall the MessageSight appliance firmware in the field at the customer's site after a hardware replacement due to a system planar failure or internal hypervisor key (USB key) failure.

This section describes how to get the firmware and associated key / password needed to install this firmware on the customer's appliance.

Firmware Image

The firmware image for the IBM MessageSight Firmware can be found at: <https://www-945.ibm.com/support/fixcentral/swg/selectFixes?product=ibm%2FOther+software%2FMessageSight&fixids=1.0.0-IMA-Firmware-FP0001&source=dbluesearch&function=fixId&parent=ibm/Other%20software>

You need this to create a bootable USB key to bring with you to the customer's site and reinstall the IBM MessageSight firmware.

The file name of a bootable ISO is usb-flash-<MTMN-DATE>.img, where

'MTMN' is the machine type and model number, for example, 6188SM1

'DATE', is the date and time,

The bootable ISO image file to use is described in **Table 36**.

Table 36: The bootable ISO image file

Machine Type / Model	Bootable ISO Image File
6188-SM1	<usb-flash-6188SM1-20140401-0110.img>

Each bootable ISO image file has an associate 'md5' file that you will use to verify the integrity of the file after you download it.

Firmware Password

After creating the bootable USB flash key (when you are at the customer's site and use it to boot the appliance), you will need a key/password to unlock the firmware and proceed with installation.

Firmware Reinstallation Instructions

Use the bootable ISO image file and the associated password and follow the firmware reinstallation instructions listed in the Problem Determination Service Guide (PDSG).

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM MessageSight Firmware Reinstallation in the Field

Introduction

The firmware for the IBM MessageSight appliance resides on the special USB flash key inside the appliance called a 'hypervisor' key. The hypervisor USB key is encrypted when the appliance is manufactured by the IBM CSC in Guadalajara, and the decryption key to unlock the hypervisor USB key is stored on the TPM hardware module on the system planar. Because of this, if the planar fails you cannot move that hypervisor USB key and the firmware to a new planar. After replacing these failed hardware components, you will need to reinstall the appliance firmware onto the hypervisor key using a second, bootable USB key that you will create. (Refer to the Create Bootable USB Key section below.)

Part 1 - Preparation before going to the customer site

You need to prepare for everything mentioned the following Prerequisites list before going to the customer's site when replacing the system planar and/or hypervisor USB key.

Prerequisites

- Order replacement FRUs for failed hardware components. The firmware reinstall needs to be done only if you are replacing the system planar, internal hypervisor key, or both.
- Order USB Key FRU P/N 41Y8279 to create a bootable USB key containing the MessageSight firmware, which you will bring with you to install on the customer's appliance.
- For a computer with Windows or Linux, you need a notebook to create the bootable USB key. You do NOT need a notebook when onsite with the customer.
- For a VGA Display and USB Keyboard or KVM Switch, verify that the customer has either a VGA display or USB keyboard available to attach to the appliance or a KVM switch.
- Bootable ISO image file and associated password: refer to the README file.

Create Bootable USB Key

Use the USB key (FRU P/N 41Y8279) to create a bootable USB key containing a 'Bootable ISO' image of the MessageSight appliance firmware. This is separate from the internal hypervisor USB key, which is a FRU part inside the appliance. Once created, take this bootable USB key with you to the customer's site, and use it to install the MessageSight firmware onto the appliance's internal hypervisor USB key.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM MessageSight Firmware Reinstallation in the Field

Get the Bootable ISO image file

Download the appropriate bootable ISO image file for the machine type (M/T) and model of the MessageSight appliance you are servicing.

The file name of a bootable ISO is `usb-flash-<MTMN-DATE>.img`. 'MTMN' is the machine type and model number, e.g., 6188SM1, and 'DATE', is the date and time. So an example of the bootable ISO image file name is `usb-flash-6188SM1-20140401-0110.img`.

Also, download the file with the same name and extension of '*.md5', using the example above it would be: `usb-flash-6188SM1-20140401-0110.img.md5`.

Transfer the Bootable ISO Image to the USB Flash key

You can use a Linux or Windows computer to transfer the image to the key.

Linux:

Plug the USB key into a USB port on your computer.

Verify the `usb-flash-<MTMN-DATE>.img` file was downloaded successfully and

Run the following command: `md5sum usb-flash-<MTMN-DATE>.img`

Compare the result to the value in `usb-flash-<MTMN-DATE>.img.md5`. They should match.

Enter the following commands to move the bootable ISO image to the USB key, where:

'if=' specifies the name of the bootable ISO image file you just downloaded, for example `'usb-flash-<MTMN-DATE>.img'`

'of=' specifies the device name of the USB flash drive, for example `'/dev/sdb'`.

Note: Be careful to verify the device name for the USB flash drive after you plug it into your computer. Specifying the wrong device for 'of=' could have catastrophic results.

```
dd if=usb-flash-<MTMN-DATE>.img of=/dev/sdb bs=3936256c count=509 sync; sync
```

Remove the USB key from the USB port on your computer.

The bootable USB key is created.

Windows:

For Windows, you need to use the Wind32ImageWriter tool or another tool that can create a bootable USB key.

1. Install Win32ImageWriter Tool.
2. Plug the hypervisor USB key into a USB port on your computer.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM MessageSight Firmware Reinstallation in the Field

3. Start the Win32ImageWriter application.
4. Win32ImageWriter should recognize the USB Key's Drive in the 'Device' field.
5. Select the `usb-flash-6188SM1-<MTMN-DATE>.img` file for the 'Image file'
6. Check the box 'MD5 Hash' and compare the results to value shown in `usb-flash-img-<MTMN-DATE>.md5`
7. If the md5 value matches, Press <Write>
8. Use Windows tool to <Eject> the USB Key before you remove it from the USB port.
9. The bootable USB key has been created.

Obtain Password for the Bootable USB Key

You need a firmware password to unlock the bootable USB key at the customer's site when booting the appliance from this key. You need to bring this firmware password along with the bootable USB key to the customer site.

The README file documents and how to obtain the firmware password are at:

http://ausgsa.ibm.com/projects/i/ima_support/downloads/bootableISOs/README.txt

You can obtain the password by going to this Web site and logging in with your IBM intranet ID and password:

http://ausgsa.ibm.com/projects/i/ima_support/downloads/bootableISOs/ISOAccess.htm

Part 2 - At the customer site

Replace hardware FRUs

Follow the documented service procedures for the hardware to replace the system planar and the internal hypervisor USB key on the MessageSight appliance.

More references and information can be found in the following publication:

Problem Determination and Service Guide for System x3650 M4 Type 7915. The IBM MessageSight Appliance M/T 6188-SM1 is based on an x3650 M4 7915-AC1:

<http://www-947.ibm.com/support/entry/portal/docdisplay?lnocid=MIGR-5089517&brandind=5000008>

The PDSG Addendum for the IBM MessageSight appliance is hosted on the IBM support portal. Login with your IBM ID to access this.

Access VGA Display and Keyboard

Ensure that a VGA display and USB keyboard are attached to the corresponding ports on the appliance or that they are attached with a KVM switch.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM MessageSight Firmware Reinstallation in the Field

Plug in Bootable USB Key

With the appliance powered off, insert the bootable USB key (the key you created) into the front top USB slot on the appliance

Power On and Setup

To boot the bootable USB key, complete the following items:

Set UEFI Boot Settings

Set the correct boot setting in the UEFI to boot from the internal hypervisor USB key.

1. Power on the appliance
2. Press <F1> when you see the System x startup screen (the usual splash screen with the IBM logo and the words 'IBM System X Server Firmware') to access the UEFI settings'.
3. Change the UEFI Boot Manager settings to:
 - Select: **Boot Manager**
 - **>> Add Boot Option**
 - + Physically Present Boot Option: USB1:Storage
 - + 'Commit Changes'!!!
 - **>> Delete Boot Option**
 - + remove all options from Boot Order except the option added above.
 - + 'Commit Changes'!!!
 - **Change Boot Order**
 - + Change the Order to: USB1:Storage (NO other Boot Options should be listed)
 - + 'Commit Changes'!!!
 - **>> Add WOL Boot Option**
 - + Generic Boot Option: USB Storage
 - + 'Commit Changes'!!!
 - **>> Delete WOL Boot Option**
 - + remove all options from Boot Order except the option added above.
 - + 'Commit Changes'!!!

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM MessageSight Firmware Reinstallation in the Field

- >> **Change WOL Boot Order**
 - + Change the Order to: USB Storage (NO other Boot Options should be listed)
 - + 'Commit Changes'!!!

Set UEFI Admin Password

- Select: **User Security >> Set Admin Password**
 - Enter the password 'xtrmisma' (Provide Twice, press <ENTER>)

Note: This is not the same password as the password for the bootable USB key. This is a fixed password for the IBM MessageSight appliance and should be known only to IBM support personnel. The MessageSight appliance firmware depends on specific UEFI settings, which are set automatically during the installation process after you boot from the bootable USB key.

Ensure that there are no DIMM errors

If you see an error at the bottom of the screen similar to '[S.580008] DIMM Failed Memory Test.', the following steps are required to correct the DIMM status failure.

1. Select: **System Settings >> Memory >> System Memory Details >> DIMM Details for Processor 1**
 - Any DIMM with status of <Disable> needs to be selected and have the status set to <Enable>
2. Repeat the DIMM status check on 'DIMM Details for Processor 2'.

Save UEFI Settings

1. Return to the Main UEFI Menu and Select:
 - >> Save Settings
 - >> Restore Settings
 - >> Exit Setup
2. Press: **Y** to confirm Exit Setup Utility.

Note: This step ensures that the backup copy of the UEFI settings is as same as the primary UEFI settings. This is a precaution in the event a UEFI failure reverts to the backup copy.

Boot from Bootable USB Key

After exiting the UEFI in the step 'Save UEFI Settings', the appliance will reboot.

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1. Press <F12> when you get to the System x startup screen to access the UEFI settings.
2. Press <ENTER> and provide the UEFI Admin Password you set in the '**Set UEFI Admin Password**' section.
3. Select 'USB2:Hypervisor - USB Port 1 Front', or something very similar if you used the bottom USB Front Port. Mainly you want one that says 'Front'.
4. Press <ENTER>

The Front USB Key will be booted and you will eventually be seeing the 'Welcome to Bedrock Installer' with the only option of 'Install Bedrock'. Wait a few more minutes and the following prompt appears:

```
-----  
Welcome to the Bedrock manufacturing script.  
Replace the bootable manufacturing ISO in the internal USB slot with the  
USB key to be manufactured.  
1) To continue  
2) Reboot  
Type: land press <Enter> to continue.  
Key:
```

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM MessageSight Firmware Reinstallation in the Field

Enter Key

You must enter a key (password) to continue and install the MessageSight software onto the internal hypervisor USB key. This is the password for the bootable hypervisor USB key you obtained in '**Set UEFI Admin Password**' above.

Type the eight-character key/password and press <Enter> to continue.

If you enter the password incorrectly, you will see 'Authentication failed' and the boot attempt will be aborted with a Kernel Panic. You have to power off and power on the appliance again to return to the 'Welcome to the Bedrock Manufacturing script' prompts.

Installing MessageSight Firmware

From this point, the MessageSight firmware installs automatically and you will see many messages scroll on the screen. The installation uses the asu64 tool to automatically customize UEFI settings for the MessageSight appliance, and also update device firmware for the UEFI itself, IMM, serverRAID, Mellanox high-speed network cards, and nvDIMMs if necessary.

This process could take an hour or more, especially if there is device firmware updates are needed. The appliance may also restart several times during this process.

Completing Installation

The installation is complete when you see the IBM MessageSight login prompt. However, do not login to the appliance at this time.

The installation set the UEFI configuration for this appliance to work optimally and these changes need to be saved.

1. Remove the bootable USB Key from the front top USB port.
2. Reboot the appliance.
3. Press <F1> when you get to the System startup screen to access the UEFI settings.
4. Press <ENTER> and provide the UEFI Admin Password you set in the '**set UEFI Admin Password**' section.

Save the IBM MessageSight UEFI Settings

At the main UEFI Menu and Select:

1. >> **Save Settings**
2. >> **Restore Settings**
3. >> **Exit Setup**

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM MessageSight Firmware Reinstallation in the Field

- Press: 'Y' to confirm Exit Setup Utility

Note: Saving the IBM MessageSight UFI settings will ensure that the backup copy of the UEFI settings is as same as the primary UEFI settings. This is a precaution in the event a UEFI failure reverts to the backup copy.

Verify IBM MessageSight Appliance Operation

The IBM MessageSight appliance boots and prompt the user to log in. The default user ID and password are both 'admin' at the conclusion of install process.

To verify the appliance operation, the customer needs to follow the steps in the Quick Start Guide for the IBM MessageSight appliance to get access to the appliance. These include the following two tasks:

1. Configuring the first network management interface (mgt0).
2. Accepting the IBM MessageSight License.

Note: Only the customer, not the CE, should accept the license. This needs to be done even if the customer previously accepted the license.

Once completed, the customer should log in to the appliance console (if they are not already logged in) and from the '<Console>' prompt run the command 'status imaserver'. A successful install will result in an operation IBM MessageSight server that returns this information:

1. Console> status imaserver
2. Status = Running
3. HARole = HADISABLED

The customer may now want to restore a backup of their MessageSight appliance configuration, which they created before the hardware failure. Refer the customers to the IBM MessageSight InfoCenter for information on how to restore from a backup.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – IBM MessageSight Firmware Reinstallation in the Field

Troubleshooting and Reference Information

InfoCenter

InfoCenter for IBM MessageSight V1:

<https://pic.dhe.ibm.com/infocenter/ism/v1r0m0/index.jsp>

nvDIMMs

The IBM MessageSight appliance may not operate if the nvDIMMs were not inserted into the exact same slots. To resolve this, use the following commands from the appliance console:

1. Stop the IBM MessageSight server:

- o `Console>imaserver stop`
- o `imaserver is stopped`

Check if the nvDIMMS are operational:

2. `Console>advanced-pd-options _nvcheck`

- o `nvDIMM in socket 2 is ready`
- o `nvDIMM in socket 5 is ready`
- o `nvDIMM in socket 8 is ready`
- o `nvDIMM in socket 11 is ready`

Clear the nvDIMM contents:

3. `Console> device nvdim clear`

- o Are you sure you want to clear the nvDIMM volume labels
 - `yes/no:yes`
 - Volume labels cleared

Start the IBM MessageSight server:

4. `Console>imaserver start`

- o `imaserver is started`

If these steps cannot be completed, refer to the **PDSG Addendum** for the IBM MessageSight appliance to troubleshoot the nvDIMM modules in the appliance.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – NVDIMMs and Supercap Overview

NVDIMMs and Supercap Overview

This section describes the correct installation process of an AgigA Tech nvDIMM and the Supercap into a typical server or storage system. The nvDIMM is a 2 GB or 4 GB memory module that comes in a standard JEDEC 240-pin RDIMM form factor (with a height of 22 mm). The Supercap is designed to fit into a standard 2.5-inch drive carrier. When connected together in-system, they provide an nvDIMM that can plug into a standard DIMM socket.

Figure 42 is the overview of the nvDIMMs.

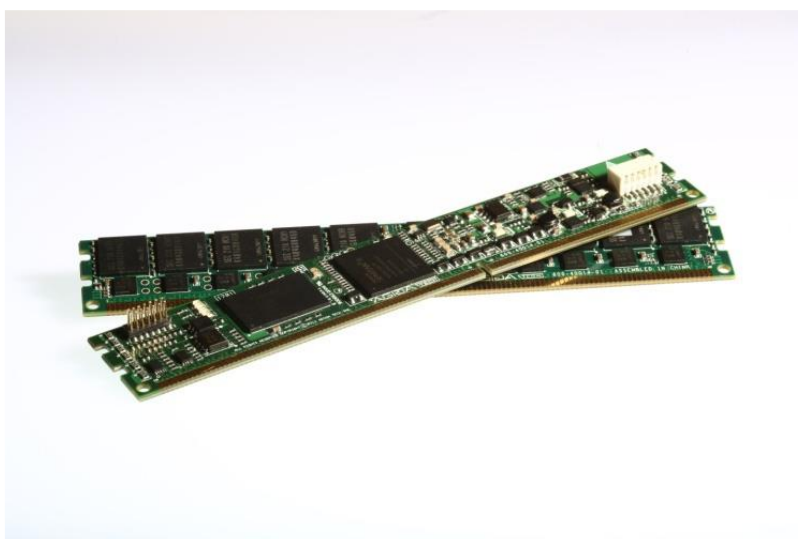


Figure 42: nvDIMMs

Figure 43 is the overview of the supercap tray.

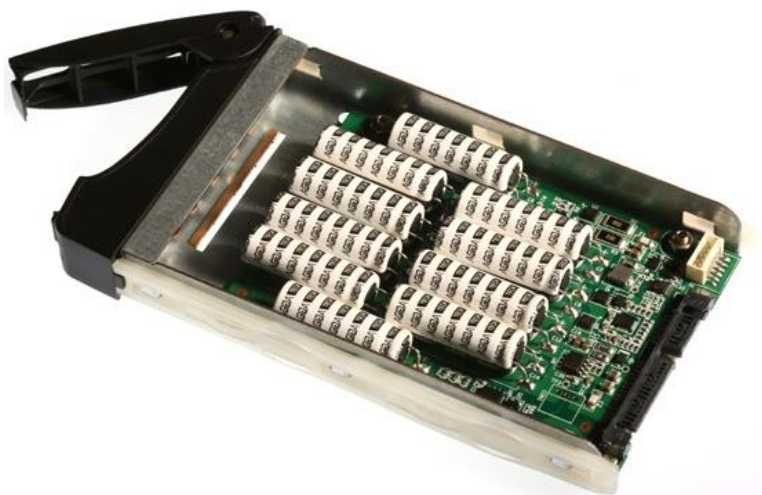


Figure 43: Supercap Tray

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 –
NVDIMMs and Supercap Overview

Installation Steps

For each nvNVDIMM and Supercap pair, there is a six-pin cable that must be connected between the two. The Supercap must also be connected to an external 12 V power source (typically a SATA power cable) as shown in **Figure 44**.

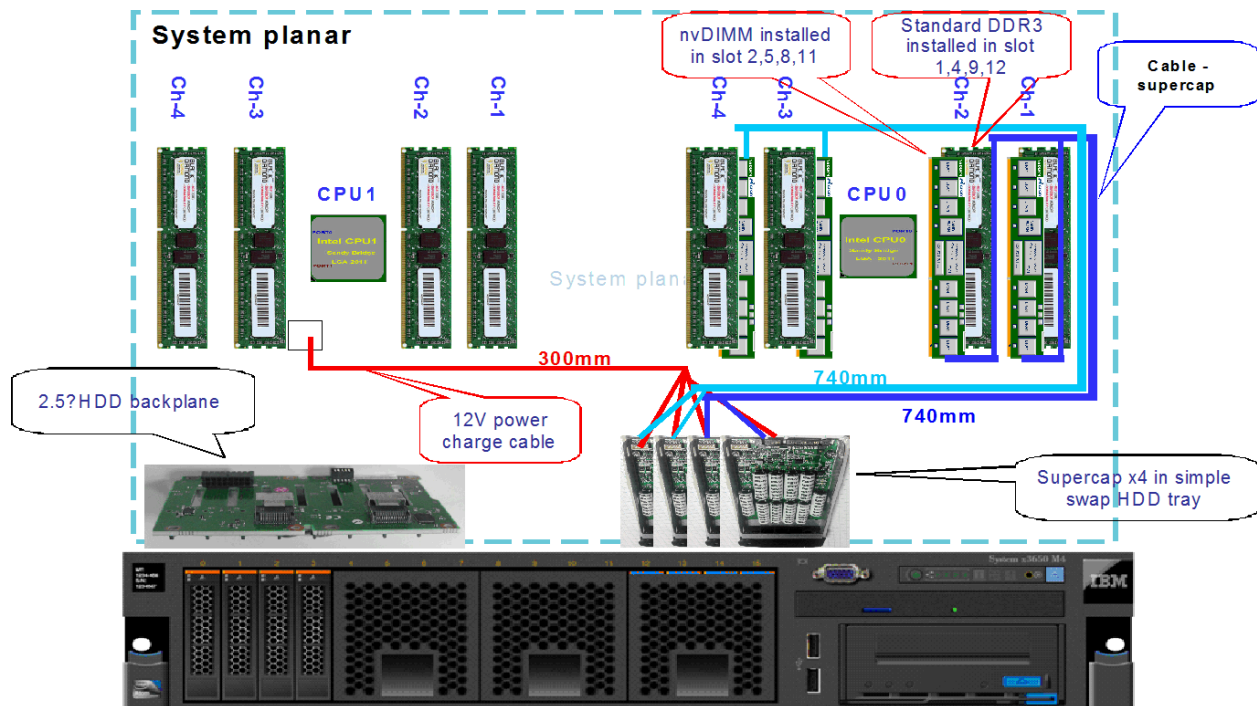


Figure 44: nvDIMMs and Supercap Installation Guide

Note: Improper installation can damage the nvDIMM. Carefully follow the installation steps in the next section.

Installation

To install the nvDIMM and Supercap, complete the following steps:

1. Power off the system, and insert the nvDIMMs into the desired DIMM socket.
2. Connect the nvDIMMs to the Supercaps using the six-pin cable.
3. Connect the Supercaps to the 12 V power cable on the mainboard.
4. Power on the system.

Note: Common errors that occur when the installation process is incorrect:

Completing step 2 before step 1 when the Supercap still has some charge on the ultracaps.

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NVDIMMs and Supercap Overview

Reason: Supercap still has residual power that is being applied to the nvDIMMs, which can damage the nvDIMMs.

Skipping step 3.

Reason: If 12 V is not supplied to the Supercaps, the Supercaps cannot get the I2C configuration instructions, which can cause it to not work correctly. The charger cannot charge the utracaps. If you attempt to measure the Supercaps, it is easy to blow the fuse (easy to shorten fuse power and GND).

Completing step 4 before step 3.

Reason: In this scenario, the Supercap is not able to get the I2C configuration instructions, causing it to not function properly.

Recovery: Power off the system, complete step 3 and step 4 in order.

Removal

To remove the nvDIMM and Supercap, complete the following steps:

1. Ensure that all LEDs on the nvDIMMs are completely off.
2. Remove the cable between the nvDIMMs and the Supercap trays.
3. Now it is safe to remove the nvDIMMs from the DIMM socket. Remove the nvDIMMs.

Common errors that occur when the removal process is incorrect:

Removing the nvDIMMs from the DIMM socket when the LEDs are on, especially when the blue LED is blinking.

Reason: Before removing the cable between the nvDIMMs and the Supercap, there is still some power on the nvDIMMs, and the DIMMs can be damaged during the removal process.

Do not use an ATX power supply to provide 12 V to Supercaps, especially when this power source never powers off.

Reason: The nvDIMMs and the Supercap power must be on at the same time. If they use different power sources, there may be a power sequencing problem. If the ATX power supply is never powered off, the Supercaps are charged with more power and can be easily broken when improper operation occurs.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Problem Determination and Troubleshooting

Problem Determination and Troubleshooting

Collecting Data

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

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

There are five error reporting areas that can be used to collect objective information for the x3550 M4 Type 7914 and x3650 M4 Type 7915:

1. External LEDs on the server chassis.
2. Internal LEDs inside the server.
3. IBM pDSA, DSA Portable/Installable, or DSA Bootable.
4. x3550 M4 Type 7914 and x3650 M4 Type 7915 System Event Log.
5. x3550 M4 Type 7914 and x3650 M4 Type 7915 POST Event Log.

For more information about removing and replacing server components, refer to the *System x3550 M4 Type 7914 Problem Determination and Service Guide* and the *System x3650 M4 Type 7915 Problem Determination and Service Guide* at:

http://systemx.lenovofiles.com/help/index.jsp?topic=%2Fcom.lenovo.sysx.7914.doc%2Fkh9_t_diagprob.html

or from the following GLOSSE wiki:

https://apps.na.collabserv.com/wikis/home?lang=en-us#!/wiki/W98391fd1617a_4a79_a25c_95a7e78132dd/page/REFM_x3550%20M4

Hardware Failure Modes

When collecting service information about all subsystems (such as the memory or processor) on an x3550 M4 and x3650 M4, find out what errors, symptoms, and messages the machine is providing. Check the front panel for indicator lights to see if any errors occurred. The error LEDs, symptoms, and log messages help determine where the failure occurs.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Hints and Tips

Hints and Tips

1. On the x3650 M4 system, one CPU system requires only three fan modules. Install the fourth fan module for the second CPU.
2. On the x3550 M4 system, one CPU system requires only four fan modules, in FAN 1, 2, 3, 5. Install extra two FAN modules for the second CPU.
3. On the x3650 M4 system, without a second CPU installed, do not install memory on DIMM slots 13-24 and adapters on riser2.
4. On the x3550 M4 system, without a second CPU installed, do not install memory on DIMM slots 13-24 and do not install PCIe x16 on riser2.
5. The operator panel can be slid out of the system to see the light path LEDs for short durations. The operator panel must be pushed back into place after viewing the LEDs to maintain continuous operation on the system.
6. One fan pack has two motors, and each motor has individual tachometer signal.
7. The machine considers the removal of one fan pack as two missing fans; the systems lost fan redundancy.
8. The user must perform the hot-swap operation for defective fans within a 30 second time frame to avoid potential system hard shutdown.
9. To ensure proper system cooling, do not remove the top cover for more than 30 minutes while the systems are operating.

Hints and Tips for x3650 HD Type 5460

The x3650 HD Type 5460 has included a new KVM connector as shown in **Figure 46** in the front panel, and the connection used now is a new flat cable as shown in **Figure 47**. The cable connector is as shown in **Figure 48**. The cable is extremely fragile. Be extra careful when handling the cables during the removal and replacement procedure. The flat cable is hidden under various hard drive cables, operator panel cables, and backplane power cables. Always remove as many components as you can to get better visibility of the KVM flat cable, and carefully disconnect the connectors attached to the KVM panel and the connector on the system board. Then, carefully lift the cable to prevent breaking the flat cable.

Figure 45 shows the overview of the location of the connector on the hard drive backplane and the KVM flat cable placement.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Hints and Tips



Figure 45: Overview of the Connector on the Hard Drive Backplane



Figure 46: KVM Connector on the Front Panel

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Hints and Tips



Figure 47: Flat Cable Connecting the Front KVM Panel to the System Board

Be very careful with the flat cable connector that is attached to the system board as shown in **Figure 48**.

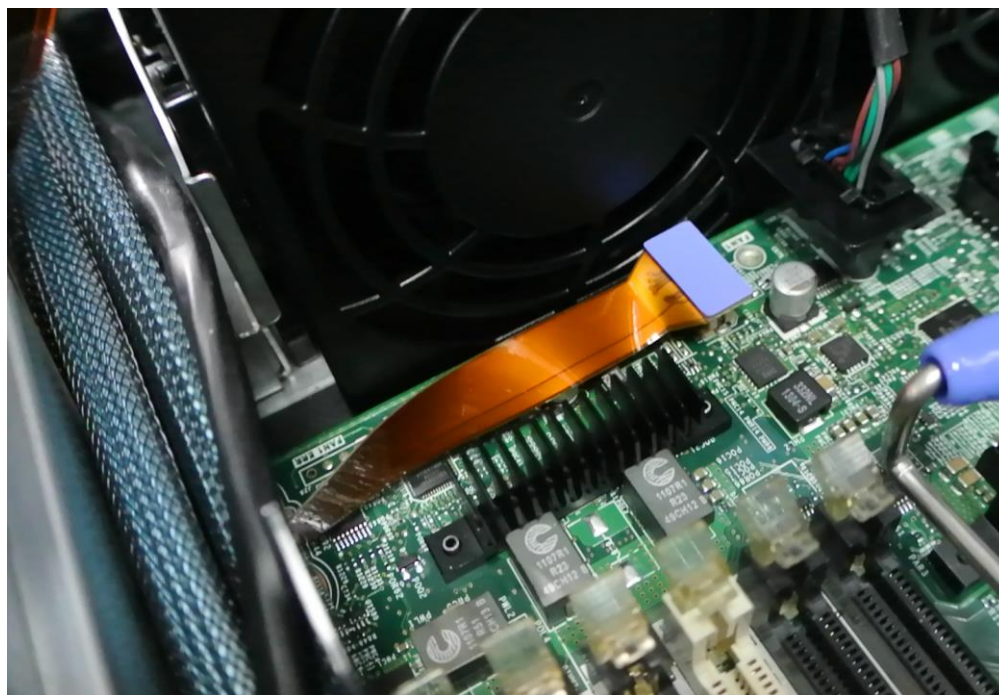


Figure 48: Connector on the Flat Cable Connected to the System Board

Figure 49 shows the connector that is connected to the operator information panel. Pay extra attention when removing the connector from the operator panel. The cables and

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Hints and Tips

the connector are fragile. When servicing the cable, look to see the ideal direction to release the connector.



Figure 49: Cable Connected to the Operator Panel

Figure 50 is the overview of the backplane, the number of backplanes, and the placements of each backplane.

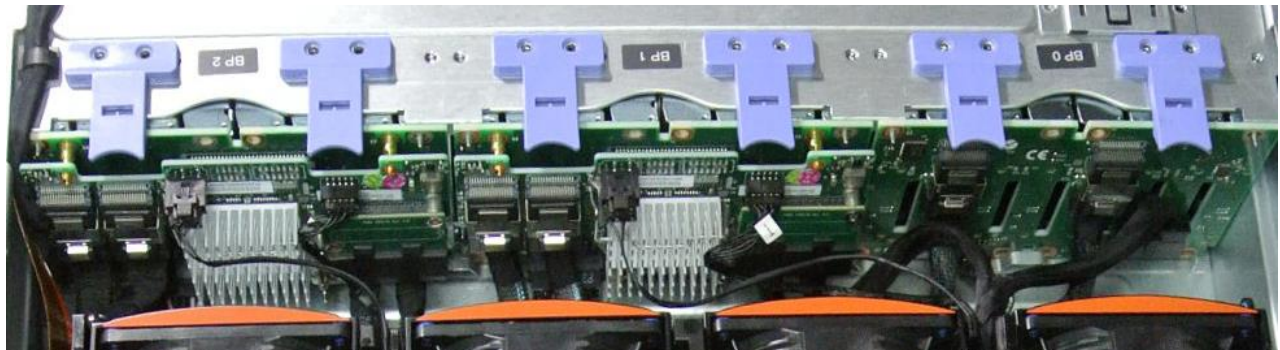


Figure 50: Overview of the Location of the Backplanes and How They are Connected on the System

Figure 51 shows the power connectors on the backplane. Note that the connector on the right with a red circle is a solid connector that will not break easily. The connector on the left inside the red circle has longer connection points that break off easily if too much pressure is applied. Always press the small latch on the connector to correctly release the cable from the connector. Once the latch is pressed down, carefully pull the cable to release it from the connector. When installing the cable, be careful not to break the connector. A broken connector results in backplane replacements.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Hints and Tips

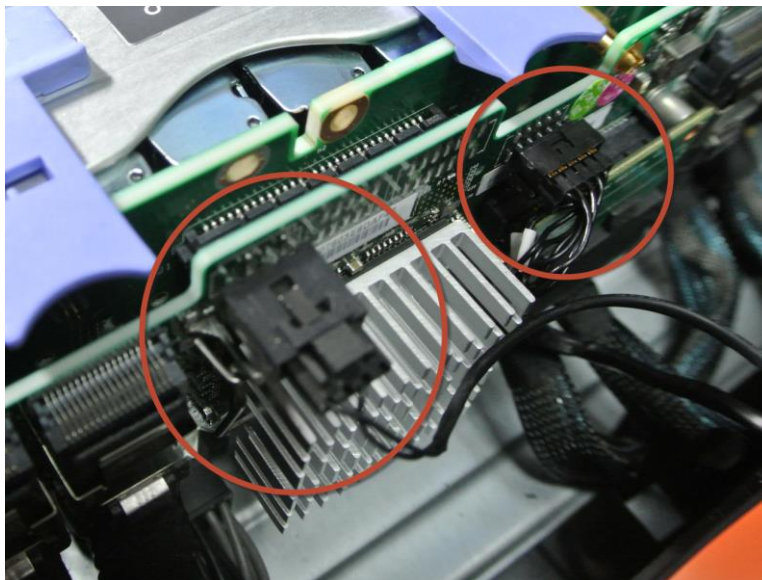


Figure 51: Power Cable Connectors on the Hard Drive Backplanes

Figure 52 shows the cable routing of the fan cables. Make sure that the fan cables are routed in between fans and that they are tucked in securely. If the cables cannot be routed correctly, the top cover applies too much pressure and damage the fan cables.

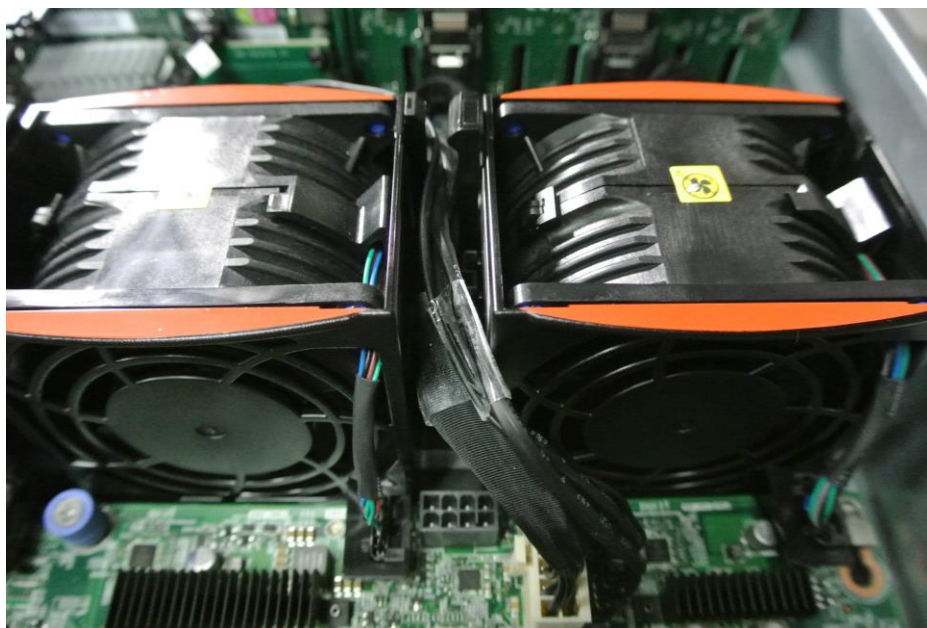


Figure 52: Cable Routing of the Fan Cables

Figure 53 shows the two riser card assemblies in the x3650 M4 Type 5460. The two riser card assemblies are not interchangeable, so do not switch the riser card

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Hints and Tips

assemblies around. Switching the two riser card assemblies will result in the machine's failure to boot up.



Figure 53: Riser Card Assemblies in the x3650 M4 Type 5460

Figure 54 shows the inside view of the newly integrated riser card assembly.

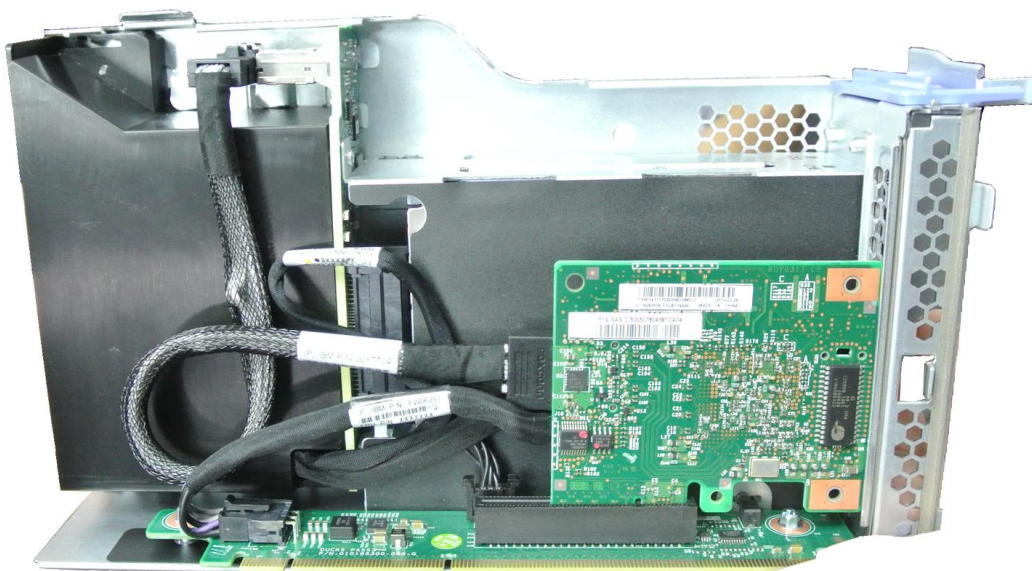


Figure 54: Inside View of the Newly Integrated Riser Card Assembly

Figure 55 shows the rear view of the newly integrated riser card assembly. It holds two hard disk drives.

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Hints and Tips



Figure 55: Rear View of the Newly Integrated Riser Card Assembly

Servicing the x3550 M4 Type 7914, x3650 M4 Type 7915/6188, x3650 HD and x3650 BD Type 5460 – Summary

Summary

This course has enabled you to:

1. Provide an overview of the x3550 M4 Type 7914, x3650 M4 Type 7915/6188 and x3650 HD Type 5460.
2. Describe the systems' mechanical and cosmetic views.
3. Describe the different subsystems.
4. Describe the problem determination activities and explain how to troubleshoot the IBM x3550 M4 Type 7914, x3650 M4 Type 7915/6188, and x3650 HD Type 5460.