QuantaGrid Series

D51B-/D51BV-2U

Full-Featured Energy Efficient 2-Way Server
Energy Efficient 2-Socket GPU/ Xeon Phi™ Server

User's Guide

Quanta

Version: 1.0

Copyright

Copyright © 2014 Quanta Computer Inc. This publication, including all photographs, illustrations and software, is protected under international copyright laws, with all rights reserved. Neither this technical guide, nor any of the material contained herein, may be reproduced without the express written consent of the manufacturer. All trademarks and logos are copyrights of their respective owners.

Version 1.0 / November 28, 2014

Disclaimer

The information in this document is subject to change without notice. The manufacturer makes no representations or warranties with respect to the contents hereof and specifically disclaims any implied warranties of merchantability or fitness for any particular purpose. Furthermore, the manufacturer reserves the right to revise this publication and to make changes from time to time in the content hereof without obligation of the manufacturer to notify any person of such revision or changes.

For the latest information and updates please see www.QuantaQCT.com

All the illustrations in this technical guide are for reference only and are subject to change without prior notice.

I

TABLE OF CONTENT

About the System

BIOS

BMC

Regulatory and Compliance Information

Conventions

Several different typographic conventions are used throughout this manual. Refer to the following examples for common usage.

Bold type face denotes menu items, buttons and application names.

Italic type face denotes references to other sections, and the names of the folders, menus, programs, and files.

<Enter> type face denotes keyboard keys.

.Warning information appears before the text it references and should not be ignored as the content may prevent damage to the device.

WARNING!

Warning information appears before the text it references and should not be ignored as the content may prevent damage to the device.

CAUTION!

CAUTIONS APPEAR BEFORE THE TEXT IT REFERENCES, SIMILAR TO NOTES AND WARNINGS. CAUTIONS, HOWEVER, APPEAR IN CAPITAL LETTERS AND CONTAIN VITAL HEALTH AND SAFETY INFORMATION.

Note:

Highlights general or useful information and tips.

Precautionary Measures

Read all caution and safety statements in this document before performing any of the instructions. To reduce the risk of bodily injury, electrical shock, fire, and equipment damage, read and observe all warnings and precautions in this chapter before installing or maintaining your system. To avoid personal injury or property damage, before you begin installing the product, read, observe, and adhere to all of the following instructions and information. The following symbols may be used throughout this guide and may be marked on the product and / or the product packaging.

Safety Instructions about your system

In the event of a conflict between the information in this guide and information provided with the product or on the website for a particular product, the product documentation takes precedence.

Your system should be integrated and serviced only by technically qualified persons.

You must adhere to the guidelines in this guide and in related chapters to ensure and maintain compliance with existing product certifications and approvals. Use only the described, regulated components specified in this guide. Use of other products / components will void the UL Listing and other regulatory approvals of the product, and may result in noncompliance with product regulations in the region(s) in which the product is sold.

Table 1: Warning and Cautions

CAUTION	Indicates the presence of a hazard that may cause minor personal injury or property damage if the CAUTION is ignored.
WARNING	Indicates the presence of a hazard that may result in serious personal injury if the WARNING is ignored.
	Indicates potential hazard if indicated information is ignored.
	Indicates shock hazards that result in serious injury or death if safety instructions are not followed.
	Indicates hot components or surfaces.
	Indicates do not touch fan blades, may result in injury.
	Remove the system from the rack to disconnect power system. (Only for certain models)

Table 1: Warning and Cautions (Continued)

	The enclosure is designed to carry only the weight of the system sled. Do not use this equipment as a workspace. Do not place additional load onto any equipment in this system.
	Indicates two people are required to safely handle the system.
	Restricted Access Location: The system is intended for installation only in a Server Room or Computer Room where both these conditions apply: • access can only be gained by SERVICE PERSONS or by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken; and • access is through the use of a TOOL or lock and key, or other means of security, and is controlled by the authority responsible for the location.

Intended Application Uses

This product was evaluated as Information Technology Equipment (ITE), which may be installed in offices, schools, computer rooms, and similar commercial type locations. The suitability of this product for other product categories and environments (such as medical, industrial, residential, alarm systems, and test equipment), other than an ITE application, may require further evaluation.

Site Selection

The system is designed to operate in a typical office environment. Choose a site that is:

- Clean, dry, and free of airborne particles (other than normal room dust).
- Well-ventilated and away from sources of heat including direct sunlight and radiators.
- Away from sources of vibration or physical shock.
- Isolated from strong electromagnetic fields produced by electrical devices.
- In regions that are susceptible to electrical storms, we recommend you plug your system into a surge suppressor and disconnect telecommunication lines to your modem during an electrical storm.
- Provided with a properly grounded wall outlet.
- Provided with sufficient space to access the power system, because they serve as the product's main power disconnect.
- Provided with either two independent DC power system or two independent phases from a single power system.

Equipment Handling Practices

Reduce the risk of personal injury or equipment damage:

- Conform to local occupational health and safety requirements when moving and lifting equipment.
- Use mechanical assistance or other suitable assistance when moving and lifting equipment.
- To reduce the weight for easier handling, remove any easily detachable components.
- Never lift or move your system soley by the handle on the component.

Power and Electrical Warnings

CAUTION!
MAKE SURE THE SYSTEM IS REMOVED FROM THE RACK BEFORE SERVICING ANY NON-HOT PLUG COMPONENTS. THE BUS BAR CLIPS MUST BE DISCONNECTED FROM THE POWER SYSTEM INORDER TO FULLY SEPARATE THE SYSTEM FROM THE POWER SOURCE.

CAUTION!
TO AVOID RISK OF ELECTRIC SHOCK, DISCONNECT ALL CABLING FROM THE SYSTEM AND REMOVE THE SYSTEM FROM THE RACK.

System Access Warnings

CAUTION!
TO AVOID PERSONAL INJURY OR PROPERTY DAMAGE, THE FOLLOWING SAFETY INSTRUCTIONS APPLY WHENEVER ACCESSING THE INSIDE OF THE PRODUCT:

- Disconnect from the power source by removing the system from the rack.
- Disconnect all cabling running into the system.
- Retain all screws or other fasteners when servicing. Upon completion servicing, sercure with original screws or fasteners.

CAUTION!
IF THE SERVER HAS BEEN RUNNING, ANY INSTALLED HDD MODULES MAY BE HOT.

CAUTION!
UNLESS YOU ARE ADDING OR REMOVING A HOT-PLUG COMPONENT, ALLOW THE SYSTEM TO COOL BEFORE SERVICING.

CAUTION!
TO AVOID INJURY DO NOT CONTACT MOVING FAN BLADES. IF YOUR SYSTEM IS SUPPLIED WITH A GUARD OVER THE FAN, DO NOT OPERATE THE SYSTEM WITHOUT THE FAN GUARD IN PLACE.

Rack Mount Warnings

The following installation guidelines are required by UL for maintaining safety compliance when installing your system into a rack.

The equipment rack must be anchored to an unmovable support to prevent it from tipping when your system or piece of equipment is extended from it. The equipment rack must be installed according to the rack manufacturer's instructions.

Install equipment in the rack from the bottom up, with the heaviest equipment at the bottom of the rack.

Extend only one piece of equipment from the rack at a time.

You are responsible for installing a main power disconnect for the entire rack unit. This main disconnect must be readily accessible, and it must be labeled as controlling power to the entire unit, not just to the system(s).

To avoid risk of potential electric shock, a proper safety ground must be implemented for the rack and each piece of equipment installed in it.

Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.

Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained.

Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

Electrostatic Discharge (ESD)

CAUTION!

ESD CAN DAMAGE DRIVES, BOARDS, AND OTHER PARTS. WE RECOMMEND THAT YOU PERFORM ALL PROCEDURES AT AN ESD WORKSTATION. IF ONE IS NOT AVAILABLE, PROVIDE SOME ESD PROTECTION BY WEARING AN ANTI-STATIC WRIST STRAP ATTACHED TO CHASSIS GROUND -- ANY UNPAINTED METAL SURFACE -- ON YOUR SERVER WHEN HANDLING PARTS.

Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges without any component and pin touching. After removing a board from its protective wrapper or from the system, place the board component side up on a grounded, static free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface.

Cooling and Airflow

CAUTION!

CAREFULLY ROUTE CABLES AS DIRECTED TO MINIMIZE AIRFLOW BLOCKAGE AND COOLING PROBLEMS. FOR PROPER COOLING AND AIRFLOW, OPERATE THE SYSTEM ONLY WITH THE CHASSIS COVERS* / AIR DUCT INSTALLED. OPERATING THE SYSTEM WITHOUT THE COVERS / AIR DUCT IN PLACE CAN DAMAGE SYSTEM PARTS . TO INSTALL THE COVERS* / AIR DUCT:

- Check first to make sure you have not left loose tools or parts inside the system.
- Check that cables, add-in cards, and other components are properly installed.

Attach the covers* / air duct to the chassis according to the product instructions.

* May not apply to all systems.

Please be aware that slots and openings on the front and rear side of the chassis are designed for ventilation; to make sure reliable operation of your system and to protect it from overheating, these openings must not be covered or blocked. The openings should never be covered or blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register, or in a built-in installation unless proper ventilation is provided.

Laser Peripherals or Devices

CAUTION!

TO AVOID RISK OF RADIATION EXPOSURE AND / OR PERSONAL INJURY:

- Do not open the enclosure of any laser peripheral or device.
- Laser peripherals or devices are not serviceable.
- Return to manufacturer for servicing.

Use certified and rated Laser Class I for Optical Transceiver product.

Heed safety instructions: Before working with the system, whether using this manual or any other resource as a reference, pay close attention to the safety instructions. Adhere to the assembly instructions in this manual to ensure and maintain compliance with existing product certifications and approvals. Use only the described, regulated components spec-

x

ified in this manual. Use of other products / components will void the UL listing and other regulatory approvals of the product and will most likely result in non-compliance with product regulations in the region(s) in which the product is sold.

System power on/off: To remove power from system, you must remove the system from rack. Make sure the system is removed from the rack before opening the chassis, adding, or removing any non hot-plug components.

Hazardous conditions, devices and cables: Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the system and disconnect the cables attached to the system before opening it. Otherwise, personal injury or equipment damage can result.

Electrostatic discharge (ESD) and ESD protection: ESD can damage drives, boards, and other parts. We recommend that you perform all procedures in this chapter only at an ESD workstation. If one is not available, provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground any unpainted metal surface on the server when handling parts.

ESD and handling boards: Always handle boards carefully. They can be extremely sensitive to electrostatic discharge (ESD). Hold boards only by their edges. After removing a board from its protective wrapper or from the server, place the board component side up on a grounded, static free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface.

Installing or removing jumpers: A jumper is a small plastic encased conductor that slips over two jumper pins. Some jumpers have a small tab on top that can be gripped with fingertips or with a pair of fine needle nosed pliers. If the jumpers do not have such a tab, take care when using needle nosed pliers to remove or install a jumper; grip the narrow sides of the jumper with the pliers, never the wide sides. Gripping the wide sides can damage the contacts inside the jumper, causing intermittent problems with the function controlled by that jumper. Take care to grip with, but not squeeze, the pliers or other tool used to remove a jumper, or the pins on the board may bend or break.
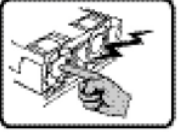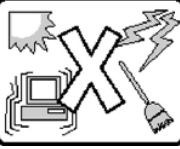
General Information

The information about rack and the wording "rack" in this technical guide supports the organization of Open Compute definition.

The term *Rack* as found in this technical guide referes to the term *Rack* or *Open Rack* as described and used in the Open Compute Project definition.

Before servicing this system, it is recommended to read this technical guide completely to be aware of any safety issues or requirements involved in the servicing of this system.

Assembly Safety Guidelines

	The power system in this product contains no user-serviceable parts. Refer servicing only to qualified personnel.
	The system is designed to operate in a typical office environment. Choose a site that is: ● Clean and free of airborne particles (other than normal room dust). ● Well ventilated and away from sources of heat including direct sunlight. ● Away from sources of vibration or physical shock. ● Isolated from strong electromagnetic fields produced by electrical devices. ● In regions that are susceptible to electrical storms, we recommend you plug your system into a surge suppressor and disconnect telecommunication lines to your modem during an electrical storm. ● Provided with a properly grounded wall outlet. ● Provided with sufficient space to access the power system, because they serve as the product's main power disconnect.
	WARNING! The system is safety certified as rack-mounted equipment for use in a server room or computer room, using an approved customer rack. The enclosure is designed to carry only the weight of the system sled. Do not place additional load onto any equipment.
	Heavy object. Indicates two people are required to safely handle the system.

Structure of this guide

- Chapter 1: About the System

  "This section introduces the system, its different configuration(s) and the main features."

- Chapter 2: BIOS

  "This section provides information regarding the BIOS architecture, BIOS update utility, server management, checkpoints, and error handling found in the system."

- Chapter 3: BMC

  "This section provides information and key features of BMC (Baseboard Management Controller)."

- Chapter 4: Regulatory and Compliance Information

  "This section provides regulatory and compliance information applicable to this system."

About the System

Chapter 1

This section introduces the system, its different configuration(s) and the main features.

1.1 Introduction

QuantaGrid D51B-2U is a general-purpose rackmount server designed for optimal perfor-
mance and power efficiency. It supports up to 1.5 TB highly scalable memory capacity and
up to 12 3.5" or 24 2.5" hot-plug HDD for complex and demanding workloads, such as
mail-server, database, e-commerce and high-performance computing (HPC).

QuantaGrid D51BV-2U is an energy efficient 2-Socket GPU/ Xeon Phi™ server derived from
D51B-2U. It supports up to two PCIe x16 FHFL slots for GPU/ Xeon Phi™ cards. It is ideal for
3D rendering, technical computing, and mission-critical applications.

- Greener and More Powerful (Only for QuantaGrid D51B-2U)

  Powered by the Intel® Xeon® processor E5-2600 v3 product family and DDR4 mem-
  ory technology, the QuantaGrid D51B-2U allows owners to upgrade computing per-
  formance without overextending power consumption. With Quanta's enhanced
  thermal design, the server can operate under ambient temperatures as high as
  40°C. This allows owners to save unnecessary costs associated with datacenter cool-
  ing needs and achieve higher data center infrastructure efficiency (DCIE) value.

- Greener and More Powerful (Only for QuantaGrid D51BV-2U)

  Powered by Intel® Xeon® processor E5-2600 v3 product family and the DDR4 mem-
  ory technology, it allows owners to upgrade computing performance without com-
  promising power consumption. Also with QCT's enhanced thermal and power
  design, the server can operate under 35°C ambient temperature without throttling
  even if a fan rotor fails. This allows you to save unnecessary datacenter cooling cost
  and achieve higher DCIE (Data center infrastructure efficiency) value.

- Double the GPU/ Xeon Phi™ Support for HPC, Mission-Critical Applications (Only for
  QuantaGrid D51BV-2U)

  To succeed in a competitive world, customers need computing results with greater
  precision and speed. The QuantaGrid D51BV-2U supports up to two PCIe x16 FHFL
  slots for GPU/ Xeon Phi™ cards. With nVidia's GPGPU and Intel®'s Xeon Phi™ solu-
  tions, this server offers excellent VDI performance with rapid data accessibility from
  an array of mobile and tablet devices and enables smooth 3D virtual desktop ren-
  dering, which cannot be achieved with traditional VDI.

- Full-Featured Design for Demanding Storage and Computing Workload (Only for
  QuantaGrid D51B-2U)

  With 24 dual in-line memory (DIMM) slots, QuantaGrid D51B-2U offers non-latency
  support to virtualization environments that require the maximum memory capac-
  ity.In addition to 12 3.5" or 24 2.5" front-access, hot-swappable HDDs, the D51B-2U
  also has two optional 2.5" PCIe (NVMe) SSD bays and two optional 2.5" SATA HDD
  bays on the rear side for extra caching or OS support without sacrificing storage
  capacity.

- Full-Featured Design for Demanding Storage and Computing Workload (Only for
  QuantaGrid D51BV-2U)

  With 24 DIMM slots, QuantaGrid D51BV-2U offers non-latency support to virtualiza-
  tion environments which require maximum memory capacity.

● Flexible and Scalable I/O options*

QuantaGrid D51B-/D51BV-2U provides flexible I/O scalability for today's diverse data center application requirements. It features OCP LAN mezzanine card solutions in addition to dual GbE or 10GbE LAN on Motherboard (LoM). With various controller vendors and different speed and technology options, customers can choose from GbE to 56GbE bandwidth, copper to fiber-optic cabling, basic Ethernet function to FCoE and ISCSI SAN connectivity. The onboard SAS controller offers multiple Quanta SAS mezzanine card options with different RAID levels and data transfer bandwidth so customers can tailor the SAS controller for specific application needs.

Specifications

Table 1.1: System Specifications

SPECIFICATIONS	DESCRIPTION
Form factor	2U rack mount
Dimensions (W x H x D)	17.6 x 3.44 x 29.33 inches 447 x 87.5 x 745 mm

Storage	**For QuantaGrid D51B-2U only:**
	● Option 1: 24 x 2.5" hot-plug
	  ● 2x optional rear 2.5" hot-plug SATA/SAS SSD
	  ● 2x optional rear 2.5" hot-plug PCIe SSD
	● Option 2: 12 x 3.5" hot-plug
	  ● 2x optional rear 2.5" hot-plug SATA/SAS SSD
	  ● 2x optional rear 2.5" hot-plug PCIe SSD
	For QuantaGrid D51BV-2U only:
	● Option 1: 10 x 3.5" hot-plug SATA 6Gb/s
	● Option 2: 12 x 3.5" hot-plug (require additional SAS/RAID card)

Expansion slots	**For QuantaGrid D51B-2U only:**
	● Option 1 (default):
	  ● One x 8 PCIe 3.0 SAS mezzanine slot
	  ● Two x 8 PCIe 3.0, LP MD-2
	  ● One x 8 PCIe 3.0 FHHL
	  ● One x16 PCIe 3.0 FHHL
	  ● One x 8 PCIe 3.0 OCP LAN mezzanine slot
	● Option 2:
	  ● One x16 PCIe 3.0, LP MD-2
	  ● One x 8 PCIe 3.0 FHHL
	  ● One x16 PCIe 3.0 FHHL
	  ● One x 8 PCIe 3.0 OCP LAN mezzanine slot
	For QuantaGrid D51BV-2U only:
	● Two x16 PCIe 3.0 double-width FHFL
	● Two x 8 PCIe 3.0, LP MD-2
	● One x 8 PCIe 3.0 OCP LAN mezzanine slot

Front I/O	2x USB 2.0 ports

1-3

Table 1.1: System Specifications (Continued)

SPECIFICATIONS	DESCRIPTION
Power supply	1+1 High efficiency redundant hot-plug PSU (default with one PSU only; detailed PSU options please refer to "ordering info" or "CCL")
Fan	4x dual rotor fans (7+1 redundant)
System management	IPMI v2.0 Compliant, on board "KVM over IP" support
Operating environment	**For QuantaGrid D51B-2U only:** ● Operating temperature: 5℃ to 40℃ (41°F to 104°F) ● Non-operating temperature: -40℃ to 65℃ (-40°F to 149°F) ● Operating relative humidity: 20% to 85%RH. ● Non-operating relative humidity: 10% to 90%RH **For QuantaGrid D51BV-2U only:** ● Operating temperature: 5℃ to 35℃ (41°F to 95°F) ● Non-operating temperature: -40℃ to 65℃ (-40°F to 149°F) ● Operating relative humidity: 20% to 85%RH. ● Non-operating relative humidity: 10% to 90%RH
Processor	**Processor type:** Intel® Xeon® processor E5-2600 v3 product family **Max. TDP support for QuantaGrid D51B-2U only:** 145W **Max. TDP support for QuantaGrid D51BV-2U only:** 135W (145W with limited conditions) **Number of processors:** 2 **Internal Interconnect:** 6.4 / 8.0 / 9.6 GT/s **Last Level Cache (LLC):** Up to 45 MB
Chipset	Intel® C610
Memory	**Total slots:** 24 **Capacity:** Up to 768GB RDIMM / Up to 1536GB LRDIMM **Memory type:** 2133 MHz DDR4 RDIMM / LRDIMM **Memory size:** 32GB, 16 GB, 8 GB RDIMM / 64GB, 32 GB LRDIMM
Networking	**LOM:** ● Option 1: 　● Intel® I350 dual-port 1GbE 　● Dedicated 1 GbE management port ● Option 2: 　● Intel® X540 dual-port 10GbE BASE-T 　● Dedicated 1 GbE management port **Optional NIC:** (more options refer to the CCL) Please refer to Compatible Component List (CCL) for more information
Storage controller	**Onboard** Intel® C610: ● 10x SATA 6Gb/s ports ● SATA RAID 0, 1, 10 **Optional Controller:** (more options refer to the CCL) Please refer to Compatible Component List (CCL) for more information
Onboard Storage	Support 2x SATADOM

Table 1.1: System Specifications (Continued)

SPECIFICATIONS	DESCRIPTION
Onboard storage	2x SATADOM (optional)
Video	Integrated Aspeed AST2400 with 8MB DDR3 video memory
Rear I/O	2x USB 3.0 ports 1x VGA port 1x RS232 serial port 2x 1 GbE or 10G BASE-T RJ45 port 1x GbE RJ45 management port 1x ID LED 1x Port 80 Debug Port (optional)
TPM	Yes (with TPM 1.2/2.0 option)

1.2 Package Contents

- (1) D51B-/D51BV-2U system
- (2) processor heat sinks
- (1) power supply unit
- (1) power cord (optional)
- (1) utility CD (Technical Guide included)
- (1) rail kit

Note:
For exact shipping contents, contact your Quanta sales representative.

1.3 A Tour of the System

System Overview

The server is available as a 2.5″ (*only for QuantaGrid D51B-2U) and 3.5″ HDD configuration.

The 2.5″ HDD configuration system overview (*only for QuantaGrid D51B-2U) is displayed in the following image:
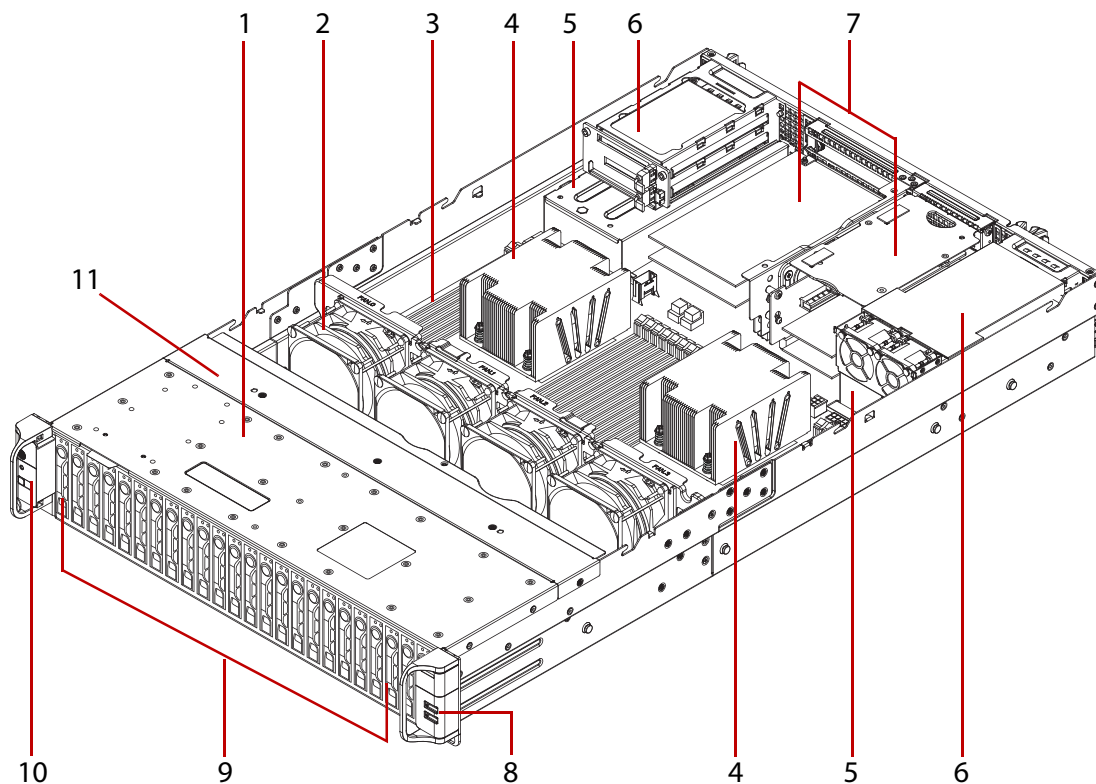
Figure 1-1.   2.5″ System component overview (*only for QuantaGrid D51B-2U)

The 3.5" HDD configuration system overview is displayed in the following image:
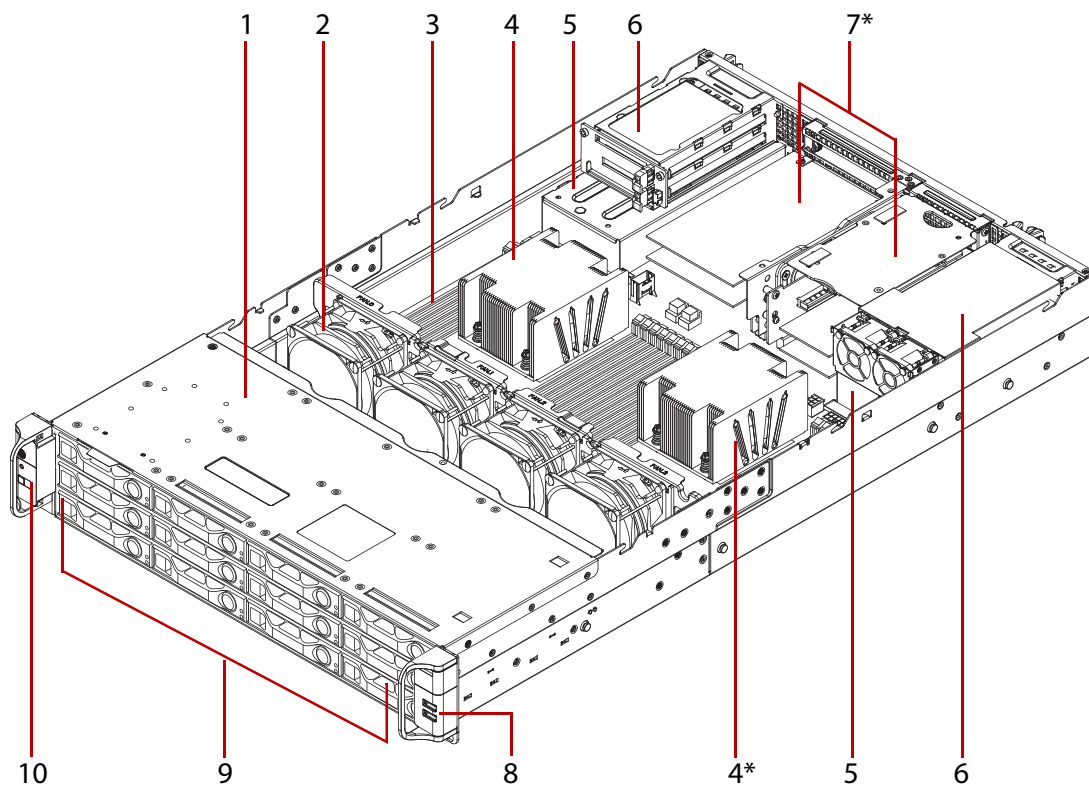
Figure 1-2.   3.5" System component overview*

Table 2: Component Overview

NO.	ITEM	DESCRIPTION
1	Top front cover	Enclosure for hard disk drives bay.
2	Fan modules	System fan modules (x4).
3	DIMM slots	DDR4 DIMM slots, 12 per CPU.
4	Processor	CPU01 and CPU02 processors with heat sinks* on top.
5	PSU assembly	Redundant power supply unit assembly.
6	Expansion slots	SSD optional expansion bay. (*only for QuantaGrid D51B-2U)
7	Expansion slots	PCIe expansion bay*.
8	USB board	USB ports.
9	HDD assembly	● 3.5" model: 12 x hard disk drive assemblies ● 2.5" model: 24 x hard disk drive assemblies (*only for QuantaGrid D51B-2U)
10	Front control panel	On/Off power button and LED.
11	Middle top cover	Only for QuantaGrid D51B-2U, 2.5" model

* CONFIGURATION MAY VARY BY MODELS.

1-9
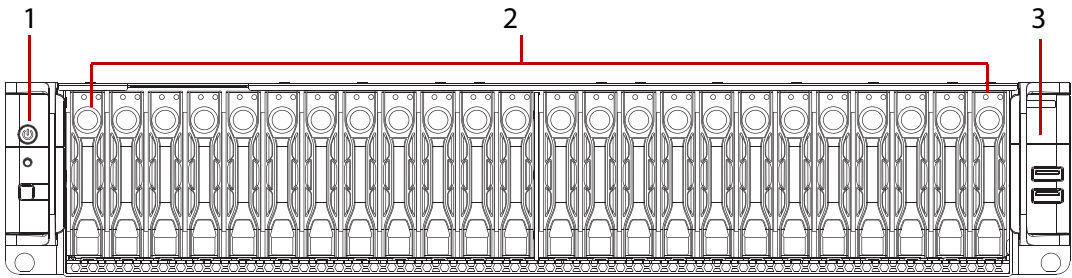
System Front View

Figure 1-3.   2.5" System front view (*only for QuantaGrid D51B-2U)
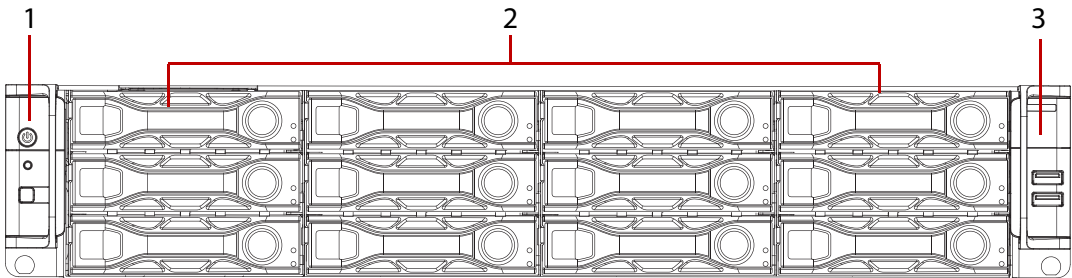
Figure 1-4.   3.5" System front view

Table 3: Front Panel View

No.	NAME	DESCRIPTION
1	Front control panel	On/Off power button and LED.
2	HDD bays	● 12 x 3.5" HDDs ● 24 x 2.5" HDDs (*only for QuantaGrid D51B-2U)
3	USB board	● USB 2.0 ports x 2. ● Front panel USB port.

Front Control Panel
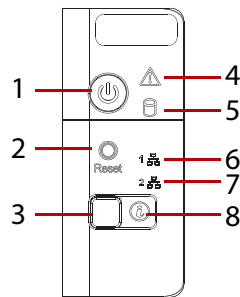
Figure 1-5.   Front Control Panel

Table 4: Front Control Panel Definition

No.	Icon	Name	Description
1		Power button with LED	Power on / off
2		Reset button	Soft reset system function
3		ID button	Activates identification event
4		Fault LED	Provides critical and non-critical failure notification
5		HDD access LED	Hard disk drive access
6		LAN1 LED	LAN access
7		LAN2 LED	LAN access
8		ID LED	Displays when ID button is pressed

1-11
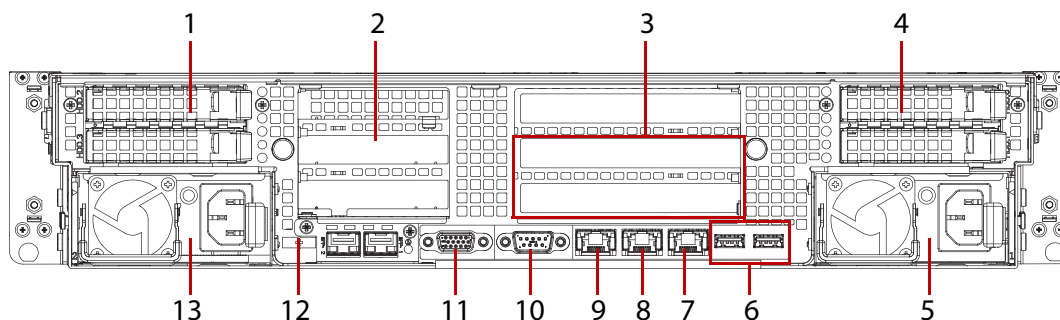
System Rear View

Figure 1-6.   System rear view

Table 5: Rear Panel View

No.	Name	Description
1	Expansion Slot	PCIe SSD optional expansion bay. (*only for QuantaGrid D51B-2U)
2	Expansion Slot	PCIe expansion bay.
3	Expansion Slot	Two PCIe expansion bays.
4	Expansion Slot	SAS/SATA SSD optional expansion bay.
5	Power Sub-system	Primary power supply unit (PSU1).
6	USB ports	USB ports 0 - 1 (2.0 / 3.0)
7	Dedicated NIC	Dedicated RJ45 connector
8	NIC1	RJ45 connector
9	NIC2	RJ45 connector
10	COM port A	DB9 port (Serial_A) for debug or terminal concentrator
11	VGA connector	Maximum display resolution: 1920x1200 32bpp@60Hz (reduced blanking)
12	OCP connector	OCP debug connector (optional)
13	Power Sub-system	Secondary power supply unit (PSU2)

LED Definitions

Front Control Panel LED

Table 6: Front Control Panel LED Behavior

NAME	COLOR	CONDITION	DESCRIPTION
Power LED	Blue	ON	System power on
		OFF	System power off
Identification	Blue	ON	Unit selected for identification
		OFF	No identification request
Fault LED	Amber	Blinking	Critical Failure: critical fan, voltage, temperature state.
			Non-Critical Failure: non-critical fan, voltage, temperature state, CPU thermal trip, DC off
		OFF	SEL cleared
			Last pending warning or error has been de-asserted
HDD Activity	Blue	Blinking	Hard disk drive access (only on board SATA port)
		OFF	No access (non-SAS)
LAN1 LED	Blue	ON	Link
		Blinking	LAN access (off when there is traffic)
LAN2 LED	Blue	ON	Link
		Blinking	LAN access (off when there is traffic)

1-13

LAN Port LEDs

The system mainboard includes an optional 82599EN Ethernet controller and two 1 GbE or one 10 GbE (optional) ports. Each RJ45 connector has two built-in LEDs. See the following illustration and table for details.
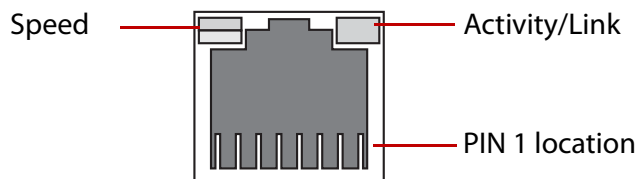
Figure 1-7.   RJ45 LAN port LEDs

Table 7: RJ45 LED Description

CONDITION	LINK	ACTIVITY
Unplugged	Off	Off
1G active link	On amber	Blinking green
100M active link	On green	Blinking green
10M active link	Off	Blinking green

HDD LED

Front HDD LED Status Behavior
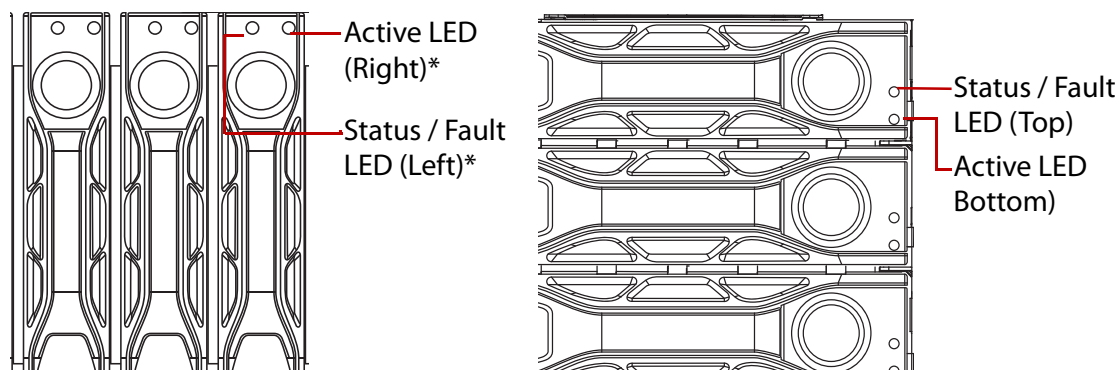
Figure 1-8.   HDD LED Identification (*only for QuantaGrid D51B-2U)

Table 8: HDD Status LED Behavior

INDICATION	STATUS LED	FAULT LED	ACTIVE LED
Drive on-line	On blue	Off	On blue: HDD access active
		On amber: HDD error	RAID fail, Initial at AC on, RAID rebuild

1-14

Rear Storage Device LED Status Behavior

PCIe Storage Device   PCIe Storage Device   SAS/SATA Storage   SAS/SATA Storage
0 Status LED*   1 Status LED*   Device 0 Status LED   Device 1 Status LED

PCIe Storage Device   PCIe Storage Device   SAS/SATA Storage   SAS/SATA Storage
0 Active LED*   1 Active LED*   Device 0 Active LED   Device 1 Active LED
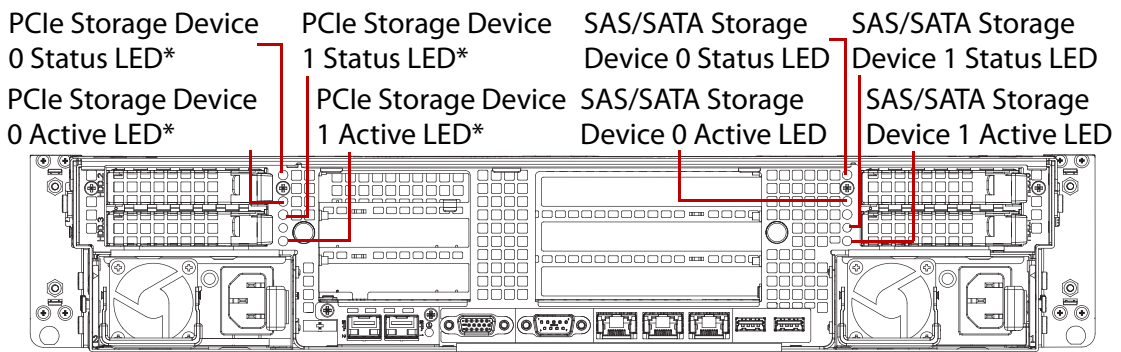
Figure 1-9.   Rear Storage Device View (*only for QuantaGrid D51B-2U)

Table 9: Rear Storage Device LED Behavior

INDICATION	FAULT LED	ACTIVE LED
Drive on-line	Off	On blue: present
	On amber: HDD error	Blinking blue: HDD access active
Slot empty	Off	Off

1-15

BIOS

Chapter 2

This section provides information regarding the BIOS architecture, BIOS update utility, server management, checkpoints, and error handling found in the system.

2.1 BIOS Setup Utility

The BIOS Setup utility is provided to perform system configuration changes and to display current settings and environment information.

The BIOS Setup utility stores configuration settings in system non-volatile storage. Changes affected by BIOS Setup will not take effect until the system is rebooted. The BIOS Setup Utility can be accessed during POST by using the <**DEL**> or <**F2**> key.

The following sections describe the look and behavior for platform Setup.

Operation

BIOS Setup has the following features:

- The server board BIOS will only be available in English.
- BIOS Setup is functional via console redirection over various terminal emulation standards. This may limit some functionality for compatibility, e.g., usage of colors, some keys or key sequences, or support of pointing devices.

Setup Page Layout

The setup page layout is sectioned into functional areas. Each occupies a specific area of the screen and has dedicated functionality. The following table lists and describes each functional area.

Table 1: BIOS Setup Page Layout

FUNCTIONAL AREA	DESCRIPTION
Title Bar	The title bar is located at the top of the screen and displays the title of the form (page) the user is currently viewing. It may also display navigational information.
Setup Item List	The Setup Item List is a set of controllable and informational items. Each item in the list occupies the left column of the screen. A Setup Item may also open a new window with more options for that functionality on the board.
Item Specific Help Area	The Item Specific Help area is located on the right side of the screen and contains help text for the highlighted Setup Item. Help information may include the meaning and usage of the item, allowable values, effects of the options, etc.
Keyboard Command Bar	The Keyboard Command Bar is located at the bottom right of the screen and continuously displays help for keyboard special keys and navigation keys.

Entering BIOS Setup

BIOS Setup is started by pressing <**DEL**> or <**F2**> during boot time when the OEM (Quanta) logo is displayed.

When Quiet Boot is disabled, the message "press <**DEL**> or <**F2**> to enter setup" will be displayed on the diagnostics screen.

Keyboard Commands

The bottom right portion of the Setup screen provides a list of commands that are used to navigate through the Setup utility. These commands are displayed at all times.

Each Setup menu page contains a number of features. Except those used for informative purposes, each feature is associated with a value field. This field contains user-selectable parameters. Depending on the security option chosen and in effect by the password, a menu feature's value may or may not be changeable. If a value is non-changeable, the feature's value field is inaccessible and displays as "grayed out."

Table 2: Keyboard Commands

KEY	OPTION	DESCRIPTION
<**Enter**>	Execute Command	The <**Enter**> key is used to activate sub-menus when the selected feature is a sub-menu, or to display a pick list if a selected option has a value field, or to select a sub-field for multi-valued features like time and date. If a pick list is displayed, the <**Enter**> key will select the currently highlighted item, undo the pick list, and return the focus to the parent menu.
<**Esc**>	Exit	The <**Esc**> key provides a mechanism for backing out of any field. When the <**Esc**> key is pressed while editing any field or selecting features of a menu, the parent menu is re-entered. When the <**Esc**> key is pressed in any sub-menu, the parent menu is re-entered. When the <**Esc**> key is pressed in any major menu, the exit confirmation window is displayed and the user is asked whether changes can be discarded. If "No" is selected and the <**Enter**> key is pressed, or if the <**Esc**> key is pressed, the screen is returned to the one before pressing the <**Esc**> key, without affecting any existing any settings. If "Yes" is selected and the <**Enter**> key is pressed, setup is exited and the BIOS returns to the main System Options Menu screen.
↑	Select Item	The up arrow is used to select the previous value in a pick list, or the previous option in a menu item's option list. The selected item must then be activated by pressing the <**Enter**> key.
↓	Select Item	The down arrow is used to select the next value in a menu item's option list, or a value field's pick list. The selected item must then be activated by pressing the <**Enter**> key.
←—→	Select Menu	The left and right arrow keys are used to move between the major menu pages. The keys have no affect if a sub-menu or pick list is displayed.
<**Tab**>	Select Field	The <**Tab**> key is used to move between fields. For example, <**Tab**> can be used to move from hours to minutes in the time item in the main menu.

Table 2: Keyboard Commands (Continued)

KEY	OPTION	DESCRIPTION
-	Change Value	The minus key on the keypad is used to change the value of the current item to the previous value. This key scrolls through the values in the associated pick list without displaying the full list.
+	Change Value	The plus key on the keypad is used to change the value of the current menu item to the next value. This key scrolls through the values in the associated pick list without displaying the full list. On 106-key Japanese keyboards, the plus key has a different scan code than the plus key on the other keyboard, but will have the same effect.
<**F8**>	Previous Values	Pressing <**F8**> causes the following to appear: Load Optimized Defaults? Yes No If Yes is highlighted and <**Enter**> is pressed, all Setup fields are set to their previous values. If No is highlighted and <**Enter**> is pressed, or if the <**Esc**> key is pressed, the screen is returned to the one before <**F8**> was pressed without affecting any existing field values
<**F9**>	Setup Defaults	Pressing <**F9**> causes the following to appear: Load Optimized Defaults? Yes No If Yes is highlighted and <**Enter**> is pressed, all Setup fields are set to their default values. If No is highlighted and <**Enter**> is pressed, or if the <**Esc**> key is pressed, the screen is returned to the one before <**F9**> was pressed without affecting any existing field values
<**F10**>	Save and Exit	Pressing <**F10**> causes the following message to appear: Save configuration and exit? Yes No If Yes is highlighted and <**Enter**> is pressed, all changes are saved and Setup is exited. If No is highlighted and <**Enter**> is pressed, or the <**Esc**> key is pressed, the screen is returned to the one before <**F10**> was pressed without affecting any existing values.

Menu Selection Bar

The Menu Selection Bar is located at the top of the BIOS Setup Utility screen. It displays the major menu selections available to the user. By using the left and right arrow keys, the user can select the menus listed here.

Server Platform Setup Utility Screens

The sections below describe the screens available for the configuration of a server plat-form. In these sections, tables are used to describe the contents of each screen. These tables follow the following guidelines:

- The text and values in the Setup Item, Options, and Help columns in the tables are displayed on the BIOS Setup screens.

- **Bold text** in the Options column of the tables indicates default values. These values are not displayed in bold on the setup screen. The bold text in this document is to serve as a reference point.

- The Comments column provides additional information where it may be helpful. This information does not appear in the BIOS Setup screens.

- Information in the screen shots that is enclosed in brackets (< >) indicates text that varies, depending on the option(s) installed. For example <Current Date> is replaced by the actual current date.

- Information that is enclosed in square brackets ([ ]) in the tables indicates areas where the user needs to type in text instead of selecting from a provided option.

- Whenever information is changed (except Date and Time) the systems requires a save and reboot to take place. Pressing <**ESC**> will discard the changes and boot the system according to the boot order set from the last boot.

Main Screen

Figure 2-1.   Main Screen

Table 3: Main Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
BIOS Vendor			Information only. Displays the BIOS Vendor.
Core Version	5.009		Information only. Displays the AMI BIOS Core version.
Compliancy	UEFI 2.3.1;PI 1.2		Information only. Displays the BIOS compliancy.
Project Version			Information only. Displays the Project version.
Build Date and Time			Information only. Displays the BIOS build date.
Total Memory			Information only. Displays the Total System Memory Size.
System Date	[Day of week MM/DD/YYYY]	Set the Date. Use Tab to switch between Date elements.	Valid range of year : 1998~2099.
System Time	[HH:MM:SS]	Set the Time. Use Tab to switch between Time elements.	
Access Level			Information only. Displays the Access Level.

Advanced Screen

The Advanced screen provides an access point to configure several options. On this screen, the user selects the option that is to be configured. Configurations are performed on the selected screen, not directly on the Advanced screen.

To access this screen from the Main screen, press the right arrow until the Advanced screen is chosen.

```
  Main  Advanced  IntelRCSetup  Server Mgmt  Boot  Security  Save & Exit
 ┌──────────────────────────────────────────────▲┌──────────────────────┐
 │                                               ││System Super IO Chip  │
 │ Preproduction Debug Option                    ││Parameters.           │
 │ Show Hidden Options     [Disabled]            ││                      │
 │ WARNING: Enabling Hidden Options is not       ││                      │
 │          recommended! User may change these   ││                      │
 │          options at their own risk!!          ││                      │
 │                                               ││                      │
 │▶ Super IO Configuration                       ││                      │
 │▶ SATA Configuration                           ││                      │
 │▶ Serial Port Console Redirection              ││                      │
 │▶ Onboard Device Configuration                 ││──────────────────────│
 │▶ PCI Subsystem Settings                       ││◂▸: Select Screen     │
 │▶ CSM Configuration                            ││↑↓: Select Item       │
 │▶ Trusted Computing                            ││Enter: Select         │
 │▶ USB Configuration                            ││+/-: Change Opt.      │
 │▶ iSCSI Configuration                          ││F1: General Help      │
 │▶ Intel(R) Ethernet Controller X540-AT2 -      ││F8: Previous Values   │
 │   08:9E:01:D9:38:72                           ││F9: Optimized Defaults│
 │                                               ││F10: Save & Reset     │
 │                                               ▼│ESC: Exit             │
 └───────────────────────────────────────────────└──────────────────────┘
```

Figure 2-2.   Advanced Screen

Table 4: Advanced Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Show Hidden Options	[**Disabled**] [Enabled]	Show Hidden Options for debug purpose only.	Will be removed at PVT stage
Super IO Configuration		System Super IO Chip Parameters.	
SATA Configuration		SATA Devices Configuration set.	
Serial Port Console Redirection		Serial Port Console Redirection	
Onboard Device Configuration		Onboard Device Parameters	
PCI Subsystem Settings		PCI, PCI-X and PCI Express Settings.	
CSM Configuration		CSM configuration: Enable/Disable, Option ROM execution settings, etc.	
Trusted Computing		Trusted Computing Settings	
USB Configuration		USB Configuration Parameters	
iSCSI Configuration		Configure the iSCSI Parameters	Dynamic

2-6

Table 4: Advanced Screen Description (Continued)

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Intel(R) Ethernet Controller X540-AT2 -		Configure 10 Gigabit Ethernet device parameters	Dynamic; used for UEFI driver
Intel(R) Ethernet Controller X540-AT2 -		Configure 10 Gigabit Ethernet device parameters	Dynamic; used for UEFI driver

IntelRCSetup Screen

The IntelRCSetup screen provides an access point to configure several options. On this screen, the user selects the option that is to be configured. Configurations are performed on the selected screen, not directly on the IntelRCSetup screen.

To access this screen from the Main screen, press the right arrow until the IntelRCSetup screen is chosen.
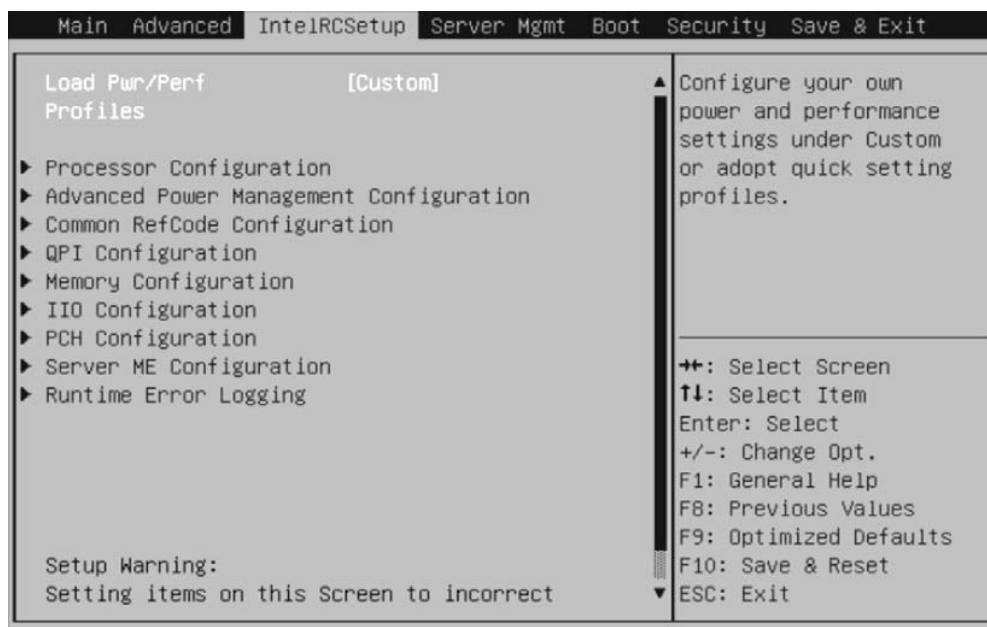
Figure 2-3.   IntelRCSetup Screen

Table 5: IntelRCSetup Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Load Pwr/Perf Profiles	[**Custom**] [Energy-Saving] [Balanced] [Virtualization] [High Performance]	Configure your own power and performance settings under Custom or adopt quick setting profiles.	

Table 5: IntelRCSetup Screen Description (Continued)

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Processor Configuration		Displays and provides option to change the Processor Settings	
Advanced Power Management Configuration		Displays and provides option to change the Power Management Settings	
Common Ref-Code Configuration		Displays and provides option to change the Common RefCode Settings	
QPI Configuration		Displays and provides option to change the QPI Settings	
Memory Configuration		Displays and provides option to change the Memory Settings	
IIO Configuration		Displays and provides option to change the IIO Settings	
PCH Configuration		Displays and provides option to change the PCH Settings	
Server ME Configuration		Configure Server ME Technology Parameters	
Runtime Error Logging		Press <**Enter**> to view or change the runtime error log configuration.	

Server Management Screen

The Server Management screen displays information of the BMC, and allows the user to configure desired settings.

2-8

To access this screen from the Main screen, select Server Mgmt Options.
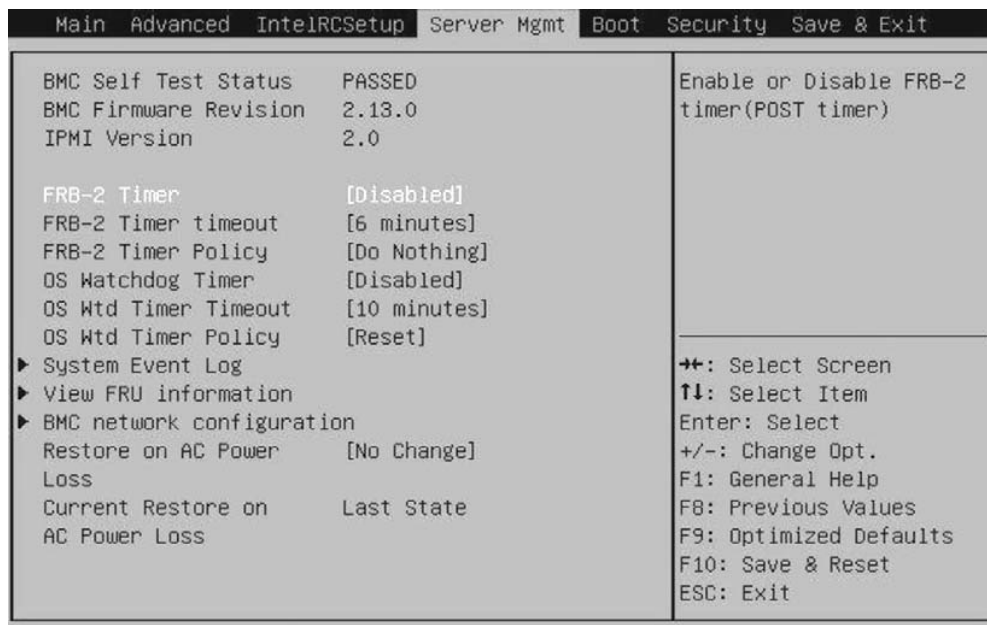
Figure 2-4.   Server Management Screen

Table 6: Server Management Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
BMC Self Test Status			Information only. Displays the BMC Self Test Status.
BMC firmware version			Information only. Displays the BMC firmware version.
IPMI version			Information only. Displays the IPMI version.
FRB-2 Timer	[**Disabled**] [Enabled]	Enable or Disable FRB-2 timer (POST timer)	
FRB-2 Timer timeout	[3 minutes] [4 minutes] [5 minutes] [**6 minutes**]	Enter value Between 3 to 6 min for FRB-2 Timer Expiration value	Not available if FRB2 Timer is disabled.
FRB-2 Timer Policy	[**Do Nothing**] [Reset] [Power Down]	Configure how the system should respond if the FRB-2 Timer expires. Not available if FRB-2 Timer is disabled.	Not available if FRB2 Timer is disabled.
OS Watchdog Timer	[**Disabled**] [Enabled]	If enabled, it determines the success of OS load by following the Watchdog Timer policy to start a BIOS timer (only can be shut off by Intel Management SW) after the OS loads.	

Table 6: Server Management Screen Description (Continued)

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
OS Wtd Timer Timeout	[5 minutes] [**10 minutes**] [15 minutes] [20 minutes]	Configure the length of the OS Boot Watchdog Timer. Not available if OS Boot Watchdog Timer is disabled.	Not available if watchdog Timer is disabled.
OS Wtd Timer Policy	[Do Nothing] [**Reset**] [Power Down]	Configure how the system should respond if the OS Boot Watchdog Timer expires. Not available if OS Boot Watchdog Timer is disabled.	Not available if watchdog Timer is disabled.
System Event Log		Press <**Enter**> to change the SEL event log configuration.	
View FRU information		Press <**Enter**> to view FRU information.	
BMC network configuration		Configure BMC network parameters	
Restore on AC Power Loss	[Power Off] [Power On] [Last State] [**No Change**]	System action to take on AC power loss	
Current Restore on AC Power Loss			Information only. Displays the current action to take on AC power loss.

Boot Options Screen

The Boot Options screen displays any bootable media encountered during POST, and allows the user to configure desired boot device.

If no boot devices are available – for example, both onboard LAN are disabled and no bootable device connected when Boot Mode is set to Legacy – the system will auto boot into BIOS setup menu.

To access this screen from the Main screen, select Boot Options.
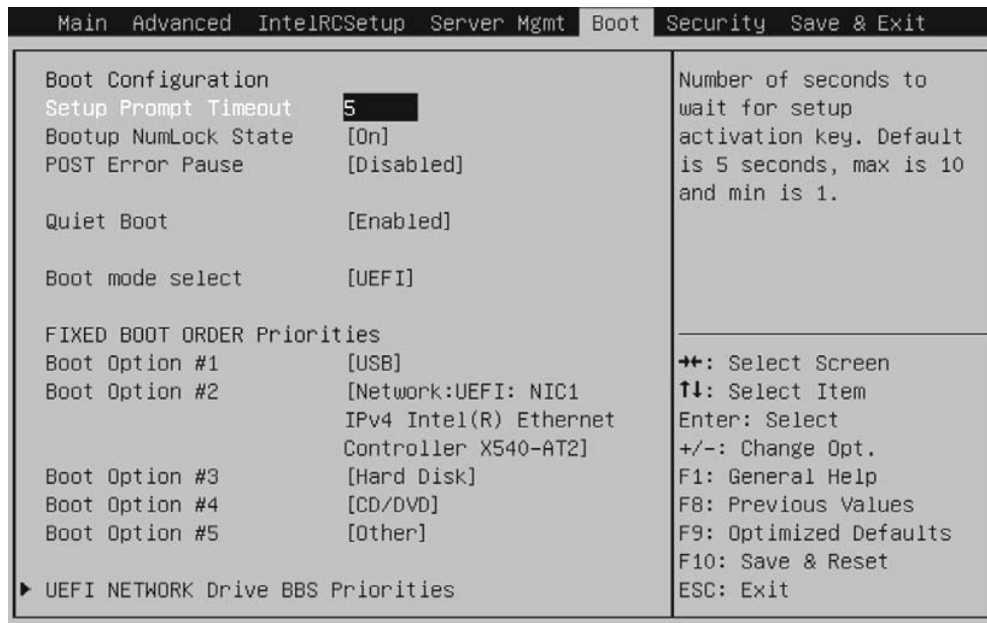
Figure 2-5.   Boot Options Screen

Table 7: Boot Options Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Setup Prompt Timeout	**5**	Number of seconds to wait for setup activation key. Default is 5 seconds, max is 10 and min is 1.	
Bootup Num-Lock State	[**On**] [Off]	Select the keyboard NumLock state	
POST Error Pause	[**Disabled**] [Enabled]	Info Error Message Support Enabled/Disabled	
Quiet Boot	[Disabled] [**Enabled**]	Enables or disables Quiet Boot option	
Boot mode select	[LEGACY] [**UEFI**]	Select boot mode LEGACY/UEFI	This item decides what devices (Legacy or UEFI) BIOS should try to boot when let the system auto boot up without manually select boot device.
Boot Option #1	[<Device String 1>] [<Device String 2>] … [Disabled]	Sets the system boot order	

2-11

Table 7: Boot Options Screen Description (Continued)

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Boot Option #2	[<Device String 1>] [<Device String 2>] … [Disabled]	Sets the system boot order	
Boot Option #3	[<Device String 1>] [<Device String 2>] … [Disabled]	Sets the system boot order	
Boot Option #4	[<Device String 1>] [<Device String 2>] … [Disabled]	Sets the system boot order	
Boot Option #5	[<Device String 1>] [<Device String 2>] … [Disabled]	Sets the system boot order	
UEFI Network Drive BBS Priorities		Specifies the Boot Device Priority sequence from available UEFI NETWORK Drives.	

Security Screen

The Security screen provides fields to enable and set the user and administrative password and to lockout the front panel buttons so they cannot be used.

2-12

To access this screen from the Main screen, select the Security option.

```
 Main  Advanced  IntelRCSetup  Server Mgmt  Boot | Security | Save & Exit

Password Description                          ▲ | Set Administrator
                                                | Password
If ONLY the Administrator's password is set,    |
then this only limits access to Setup and is    |
only asked for when entering Setup.             |
If BOTH the Administrator's password and the    |
User's password are set, then the password      |
is prompted during POST. If the Administrator's |
/User's password is entered, Administrator/User |
privilege is granted in the Setup Menu.         |
The password length must be                     | →←: Select Screen
in the following range:                         | ↑↓: Select Item
Minimum length          3                       | Enter: Select
Maximum length          20                      | +/-: Change Opt.
                                                | F1: General Help
                                                | F8: Previous Values
Administrator Password                          | F9: Optimized Defaults
User Password                                 ▓ | F10: Save & Reset
                                              ▼ | ESC: Exit
```

Figure 2-6.   Security Screen

Table 8: BIOS Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Administrator Password		Set Administrator Password	
User Password		Set User Password	
Secure Boot menu		Customizable Secure Boot settings	

Exit Screen

The Exit screen allows the user to choose to save or discard the configuration changes made on the other screens. It also provides a method to restore the server to the factory defaults or to save or restore a set of user defined default values. If Restore Defaults is selected, the default settings, noted in bold in the tables in this chapter, will be applied. If

Restore User Default Values is selected, the system is restored to the default values that the user saved earlier, instead of being restored to the factory defaults.
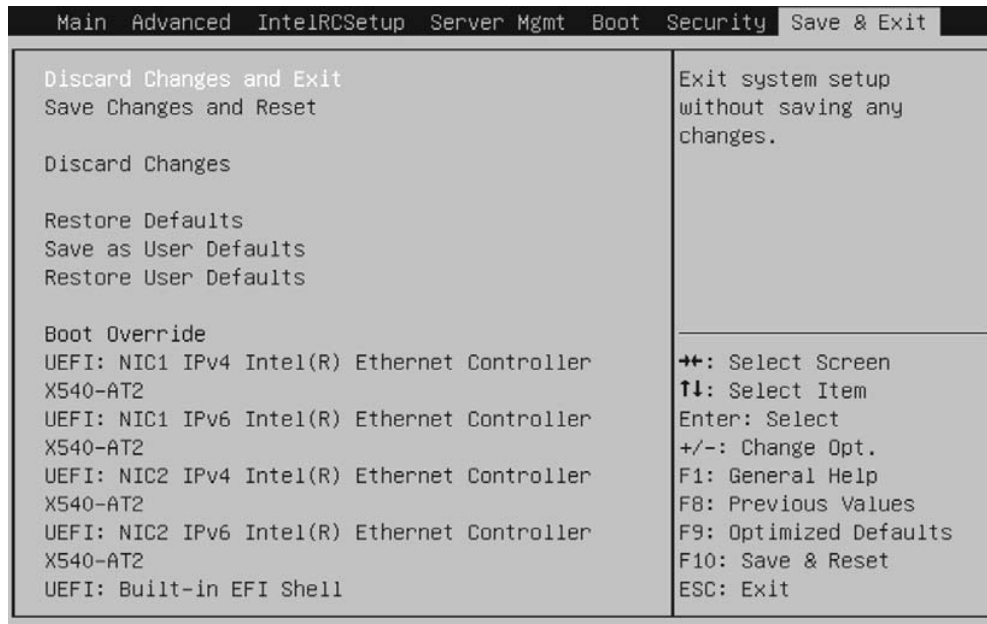
Figure 2-7.   Exit Screen

Table 9: Exit Screen Description

SETUP ITEM	OPTIONS	HELP TEXT	COMMENTS
Discard Changes and Exit		Exit system setup without saving any changes.	
Save Changes and Reset		Reset the system after saving the changes.	
Discard Changes		Discards changes done so far to any of the setup options.	
Restore Defaults		Restore/Load Default values for all the setup options.	
Save as User Defaults		Save the changes done so far as User Defaults.	
Restore User Defaults		Restore the User Defaults to all the setup options.	
[<Device String 1>]			Boot with Device <Device String 1>
[<Device String 2>]			Boot with Device <Device String 2>
[<Device String 3>]			Boot with Device <Device String 3>
[<Device String 4>]			Boot with Device <Device String 4>
[<Device String 5>]			Boot with Device <Device String 5>

2-14

Loading BIOS Defaults

Different mechanisms exist for resetting the system configuration to the default values. When a request to reset the system configuration is detected, the BIOS loads the default system configuration values during the next POST. The request to reset the system to the defaults can be sent in the following ways:

- Pressing <**F9**> from within the BIOS Setup utility

- Load BIOS defaults by jumper as follows:

1. Power down the system.

2. Move CMOS clear jumper from pins 1-2 to pins 2-3 for a few seconds.

3. Move CMOS clear jumper back to pins 1-2.

4. System automatically powers on.

5. Check BIOS defaults are loaded.

2.2 BIOS Update Utility

The flash ROM contains system initialization routines, the BIOS Setup Utility, and runtime support routines. The exact layout is subject to change, as determined by BIOS. The flash ROM also contains initialization code in compressed form for onboard peripherals, like SCSI, NIC and video controllers. The complete ROM is visible, starting at physical address 4 GB minus the size of the flash ROM device.

A 16-KB parameter block in the flash ROM is dedicated to storing configuration data that controls the system configuration (ESCD). Application software must use standard APIs to access these areas; application software cannot access the data directly.

BIOS Update Utility

Server platforms support DOS-based, Windows-based, and Linux-based firmware update utilities. It is very important to follow the rule, and use official provided package to update BIOS under DOS/Linux/ EFI shell environment. Using incorrect flash option to flash BIOS may cause damage to your system. This utility loads a fresh copy of the BIOS into the flash ROM.

The BIOS update may affect the following items:

- The system BIOS, including the setup utility and strings.
- Onboard video BIOS, RAID BIOS, and other option ROMS for the devices embedded on the server board.
- Memory reference code.
- Microcode updates.

AFULNX: v2.39

1. Copy afulnx_26_64, BIOS BIN and Windmill batch file to installed linux OS, execute biosupdate.sh under linux base environment and update finishes automatically.

2. Reboot system then new BIOS runs.

ME Region Update

Update utility also provide ME region update function, please refer to the README.txt that each official release BIOS attached.

The BIOS update may affect the following items:

- The system BIOS, including the setup utility and strings.
- Onboard video BIOS, RAID BIOS, and other option ROMS for the devices embedded on the server board.
- Memory reference code.

- Microcode updates.
- ME Firmware.

BIOS Setting Utility

Use AMISCE to import/export BIOS setting in Linux:

1. Export BIOS setting and generate script file:
   /o /s NVRAM.txt

2. Import BIOS setting with script file:
   /i /s NVRAM.txt

BIOS Revision

The BIOS revision is used to identify the BIOS image and BIOS phase.

Clear CMOS

The following steps will load the BIOS defaults by jumper:

1. Power down the system.
2. Move CMOS clear jumper from pins 1-2 to pins 2-3 for a few seconds.
3. Move CMOS clear jumper back to pins 1-2.
4. System automatically powers on.
5. Check BIOS defaults are loaded.

Clear Password

1. Power down the system.
2. Move password clear jumper from pins 1-2 to pins 2-3.
3. Power on the system.
4. Make sure password is cleared.
5. Power down the system.
6. Move password clear jumper from pins 2-3 back to pins 1-2.
7. Power on the system.
8. Set new password.

2-17

2.3 Server Management

The BIOS supports many standard-based server management features and several propri-etary features. The Intelligent Platform Management Interface (IPMI) is an industry stan-dard and defines standardized, abstracted interfaces to platform management hardware. The BIOS implements many proprietary features that are allowed by the IPMI specification, but these features are outside the scope of the IPMI specification. This section describes the implementation of the standard and proprietary features.

Console Redirection

The BIOS supports redirection of both video and keyboard via a serial link (serial port). When console redirection is enabled, the local, or host server, keyboard input and video output are passed both to the local keyboard and video connections, and to the remote console through the serial link. Keyboard inputs from both sources are considered valid and video is displayed to both outputs.

As an option, the system can be operated without a host keyboard or monitor attached to the system and run entirely via the remote console. Utilities that can be executed remotely include BIOS Setup.

Serial Configuration Settings

The BIOS does not require that the splash logo be turned off for console redirection to function. The BIOS supports multiple consoles, some of which are in graphics mode and some in text mode. The graphics consoles can display the logo and the text consoles receive the redirected text.

Keystroke Mapping

During console redirection, the remote terminal sends keystrokes to the local server. The remote terminal can be a dumb terminal with a direct connection and running a commu-nication program. The keystroke mapping follows VT-UTF8 format with the following extensions.

Table 10: Keystroke Mappings

KEY	ANSI ESCAPE SEQUENCE	WINDOWS PLATFORM DESIGN NOTE
F1	<ESC><Shift>op	<ESC>1
F2	<ESC><Shift>oq	<ESC>2
F3	<ESC><Shift>or	<ESC>3
F4	<ESC><Shift>os	<ESC>4
F5		<ESC>5
F6		<ESC>6
F7		<ESC>7

Table 10: Keystroke Mappings (Continued)

KEY	ANSI ESCAPE SEQUENCE	WINDOWS PLATFORM DESIGN NOTE
F8		<ESC>8
F9		<ESC>9
F10		<ESC>0
F11		<ESC>!
F12		<ESC>@
Home	<ESC>[<Shift>h	<ESC>h
End	<ESC>[<Shift>k	<ESC>k
Ins		<ESC>+
Del		<ESC>-
Page Up		<ESC>?
Page Down		<ESC>/
Reset		<ESC>R<ESC>r<ESC>R

Standalone <Esc> Key for Headless Operation

The Microsoft Headless Design Guidelines describes a specific implementation for the <**Esc**> key as a single standalone keystroke:

To complete an escape sequence, the timeout must be two seconds for entering additional characters following an escape.

- <**Esc**> followed by a two-second pause must be interpreted as a single escape.

- <**Esc**> followed within two seconds by one or more characters that do not form a sequence described in this specification must be interpreted as <**Esc**> plus the character or characters, not as an escape sequence.

The escape sequence in the following table is an input sequence. This means it is sent to the BIOS from the remote terminal.

Reset

BIOS provides another friendly method to reset system from console. User could use <**Ctrl**> + <**Shift**> + '-' to reboot system from remote console.

Limitations

- BIOS Console redirection terminates after an operating system has being loaded. The operating system is responsible for continuing console redirection after that.

- BIOS console redirection is a text console. Graphical data, such as a logo, are not redirected.

2-19

Interface to Server Management (Optional)

If the BIOS determines that console redirection is enabled, it will read the current baud rate and pass this value to the appropriate management controller via the Intelligent Platform Management Bus (IPMB).

Network BIOS Support

PXE Boot

The BIOS supports the EFI PXE implementation. To utilize this, the user must load EFI Simple Network Protocol driver and the UNDI driver specific for the network interface card being used. The UNDI driver should be included with the network interface card. The Simple Network Protocol driver can be obtained from http://developer.intel.com/technology/framework.

The BIOS supports legacy PXE option ROMs in legacy mode and includes the necessary PXE ROMs in the BIOS image for the onboard controllers. The legacy PXE ROM is required to boot a non-EFI operating system over the network.

Checkpoints

A checkpoint is either a byte or word value output to Debug port. The BIOS outputs checkpoints throughout bootblock and Power-On Self Test (POST) to indicate the task the system is currently executing. Checkpoints are very useful in aiding software developers or technicians in debugging problems that occur during the pre-boot process.

Checkpoints can be defined as follow:

- Standard Checkpoint
- ACPI/ASL Checkpoint
- OEM-Reserved Checkpoint
- MRC POST Code Checkpoints

Debug Header

Windmill has one debug header placed in front of the motherboard. Debug card can be plugged in vertically and forward facing. The debug head support functions:

- Support Hot-Plug
- Provide RS232 serial port connector, for use of console redirection
- Two 7-segment LED displays
  a. CheckPoint

   b. Error code (POST Error/ MRC Fatal/Warning Code

- One reset switch (To trigger system reset)

BMC

Chapter 3

This section provides information and key features of BMC (Baseboard Management Controller).

3.1 Server Management Software

Server System Overview

In a server system, BMC is an independent system of the host server system. This independent system has its own processor and memory; the host system can be managed by the BMC system even if the host hardware or OS hangs or is unable to function.

BMC Key Features and Functions

- Supports IPMI v1.5 and v2.0.
- Support SNMP v1,v2c and v3.
- Support SMASH.
- Support delivers alerts such as SNMP traps in the Platform Event Trap (PET) format.
- Out-of-band monitoring and control for sever management over LAN.
- Share NIC for remote management via network.
- The FRU information report includes main board part number, product name, manufacturer, etc.).
- Health status/Hardware monitoring report.
- Events log, view, and clear.
- Event notification via lighting chassis LED indicator and Platform Event Trap (by SNMP trap) or Mail (by Simple Mail Transfer Protocol).
- Platform Event Filtering (PEF) to take selected actions for selected events, including NMI.
- Chassis management includes power control and a status report, front panel buttons and LED control.
- Watchdog and auto server restart and recovery.
- Supports multi-session users, and alert destination for LAN channel.
- Support IPMB connecter that advanced server management card can communicate with BMC.

Power System

BMC controls system power through GPIO pins and IPMI chassis commands.

Front Panel User Interface

The BMC provides control panel interface functionality including indicators (Fault/status and Identify LEDs) and buttons (Power/ID).

Power Button

The Power buttons allow to control the system status.

ID Button

The control panel Chassis Identify button toggles the state of the Chassis ID LED. If the ID LED is off, then a button press will turn the LED on (blinking). If the LED is on, a button press or IPMI Chassis Identify command will turn the LED off.

LEDs

The following table contains information on Status, ID and Heartbeat LED's.

Table 3.1: Status LED, ID LED, and Heartbeat LED

LEDS	COLOR	STATUS	DESCRIPTION
Status LED	Amber (Status LED)	Blinking	System Event (See following Status LED table.)
		Off	Normal status
	Blue	On	Power on
		Off	Power off
ID LED	Blue	Off	Normal status
		Blinking	Identify the system with interval
		Solid ON	Identify the system
Heartbeat LED	Green	On/Off	BMC is not Ready
		Blinking	BMC is Ready

The following table contains information on Status LED when amber blinking.

Table 3.2: Status LED Activity

NO.	STATUS LED ACTIVITY	DESCRIPTION
1	Memory Error	0: Correctable Error 1: Uncorrectable Error 5: Correctable ECC error logging limit reached
2	QPI Error	Defined by BIOS and this sensor logged by BIOS.
3	POST Error	Defined by BIOS and this sensor logged by BIOS.

3-2

Table 3.2: Status LED Activity (Continued)

No.	Status LED Activity	Description
4	PCIe Error	7: Bus Correctable Error 8: Bus Uncorrectable Error A: Bus Fatal
5	Memory Event	0: Correctable Memory Error Logging Disabled
6	Temp_CPU0 Temp_CPU1 Temp_DIMM_AB Temp_DIMM_CD Temp_DIMM_EF Temp_DIMM_GH Temp_HDD_BP0* Temp_HDD_BP1* Temp_Ambient_PCI* Temp_Inlet_MB* Temp_PCI_Area* Temp_PCI_Inlet1* Temp_PCI_Inlet2* Temp_PCH Temp_Outlet Temp_SSD0v Temp_SSD1* * It depends on physical platform	Upper Critical Going High Upper Non-Critical Going High
7	CPU0 CPU1	1: Thermal Trip
8	CPU_DIMM_VRHOT	0: CPU0 VR Hot 1: CPU1 VR Hot 2: DIMM_AB VR Hot 3: DIMM_CD VR Hot 4: DIMM_EF VR Hot 5: DIMM_GH VR Hot
9	DIMM_HOT	0: CPU0 Processor Hot 1: CPU1 Processor Hot 2: DIMM_AB Memory Hot 3: DIMM_CD Memory Hot 4: DIMM_EF Memory Hot 5: DIMM_GH Memory Hot
10	PCH Thermal Trip	1: State Asserted

Table 3.2: Status LED Activity (Continued)

NO.	STATUS LED ACTIVITY	DESCRIPTION
11	FAN_SYS0 FAN_SYS1 FAN_SYS2 FAN_SYS3 FAN_SYS4 FAN_SYS5 Fan_SSD0* Fan_SSD1* * It depends on physical plat-form	Lower Critical Going low Lower Non-Critical Going low
12	Volt_P3V3 Volt_P5V Volt_P12V Volt_P1V05 Volt_P1V8_AUX Volt_P3V3_AUX Volt_P5V_AUX Volt_P3V_BAT	Lower Critical Going low Upper Critical Going High
13	PSU1 Status PSU2 Status	0: Presence detected 1: Power supply failure detected 2: Power supply input lost (AC/DC)
14	PSU Redundancy	1: Redundancy Lost
15	Event Log	4: SEL Full (909 records) 5: SEL almost full (909 x 75% = 681 records)
16	Watchdog	0: Timer Expired 1: Hard Reset 2: Power Down 3: Power cycle
17	System Event	4: PEF Action
18	Critical IRQ	0: Front Panel NMI / Diagnostic Interrupt
19	CATERR	1: State Asserted
20	PSU1 Input PSU2 Input HSC0 Input	Lower Critical Going low
21	PDB Event* * It depends on physical plat-form	0: PDB Abnormal Reset (A, R) 1: PDB Pre-test Failed (A, R) 2: Programming HDD repeater failed (A, R) 3:Linking Board status error 4: Over Current Protection

Table 3.2: Status LED Activity (Continued)

NO.	STATUS LED ACTIVITY	DESCRIPTION
22	HDD	1: Drive Fault 2: Predictive Failure 5: In Critical Array 6: In Failed Array 7: Rebuild/remap in progress 8: Rebuild/remap Aborted

LAN Interface

BMC LAN interface in AST2400 is assigned to its Shared NIC LAN and a dedicated NIC (Default) in the system. IPMI Specification v2.0 defines how IPMI messages, encapsulated in RMCP/RMCP+ packet format, can be sent to and from the BMC. This capability allows a remote console application to access the BMC and perform the following operations:

- Chassis control: obtain chassis status, reset and power-up the chassis
- Obtain system sensor status
- Obtain and Set system boot options
- Obtain Field Replaceable Unit (FRU) information
- Obtain System Event Log (SEL) entries
- Obtain Sensor Data Records (SDR)
- Set Platform Event Filtering (PEF)
- Set LAN configurations

In addition, the BMC supports LAN alerting in the form of SNMP traps that conform to the IPMI Platform Event Trap (PET) format.

Session and User

This BMC supports ten (10) user accounts. Each can have a different user name, password and privilege level. Four accounts can login simultaneously. The available user privilege levels are User, Operator, and Administrator.

Serial Over LAN

BMC supports 1 IPMI (Spec v2.0) specific SOL session. BMC supports redirect data from UART interface.

Time Sync

In BMC design, BMC does not have a local RTC to know what time it is. Each time BMC will get the current time from system PCH after BMC boot. The current time is updated periodically from the PCH. The remote console program interpret this time as pre-initial.

SEL

BMC supports IPMI 1.5/2.0 standard SEL operation. It can keep SEL log. Event happened in BIOS side will be logged by using Add SEL Entry command. BMC will store them in FLASH, the time stamp field will be filled by BMC. When SEL is full, the new SEL won't be logged but will go through PEF as usual. If AC powers off, all SELs will remain in NV.

Platform Event

Platform Event Filter

The BMC implements selectable action on an event or LAN alerting base on event. By default, no any PEF entries or actions exist, applications need to configure it to enable.

- Dedicated and Shared NIC
- The policy to match an event to Platform Event Filter Table entry is IPMI 1.5 standard.
- The action support Power off, Power Reset, Power Cycle and NMI.
- All Platform Event Filter Table is default disabled.
- PEF Startup Delay and Last Processed Event tracking is not supported.
- PEF table lookup isn't correlated to log SEL to SEL Repository.
- Serial Alerting is no support.

BMC Firmware Update

The BMC will allow users to upgrade firmware image on following entities:

- BMC
- All other upgradable entities

The update capability is provided by local and remote interfaces.

DOS Recovery Utility

SOCFLASH Utility.

3-6

3-7

WebUI Update

Remote update can be performed through the remote Web console.

3.2 BMC Recovery

This section provides guidelines on BMC recovery process in DOS and Linux systems.

Recovery Process in DOS System

To recover BMC on a DOS system, do as follows:

1. Copy BMC firmware package to your USB key.
2. Boot into DOS.
3. Run *dos.bat*.

The BMC recovery is complete.

Recovery Process in Linux System

To recover BMC on a Linux system, do as follows:

1. Copy BMC firmware package to your USB drive.
2. Boot into Linux.
3. Run *linux.sh*.

The BMC recovery is complete.

Recovery Process in Windows System

To recover BMC on a Windows system, do as follows:

1. Copy BMC firmware package to your USB key.
2. Boot into Windows.
3. Run win.bat.

The BMC recovery is complete.

Regulatory and Compliance Information

Chapter 4

This section provides regulatory and compliance information applicable to this system.

4.1 Electromagnetic Compatibility Notices

FCC Verification Statement (USA)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver
- Connect the equipment to an outlet on a circuit other than the one to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment. The customer is responsible for ensuring compliance of the modified product.

Only peripherals (computer input/output devices, terminals, printers, etc.) that comply with FCC Class A or B limits may be attached to this computer product. Operation with noncompliant peripherals is likely to result in interference to radio and TV reception.

All cables used to connect to peripherals must be shielded and grounded. Operation with cables, connected to peripherals, that are not shielded and grounded may result in interference to radio and TV reception.

Europe (CE Declaration of Conformity)

This product has been tested in accordance too, and complies with the Low Voltage Directive (73/23/EEC) and EMC Directive (89/336/EEC). The product has been marked with the CE Mark to illustrate its compliance.

VCCI (Japan)

この装置は、情報処理装置等電波障害白主規制協議会（ＶＣＣＩ）の基準
に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波
妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ず
るよう要求されることがあります。

English translation of the notice above:

This is a Class A product based on the standard of the Voluntary Control Council for Inter-ference (VCCI) from Information Technology Equipment. If this is used near a radio or tele-vision receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction guide.

BSMI (Taiwan)

The BSMI Certification Marking and EMC warning is located on the outside rear area of the product.

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，
可能會造成射頻干擾，在這種情況下，使用者會
被要求採取某些適當的對策

Regulated Specified Components

To maintain the UL listing and compliance to other regulatory certifications and/or decla-rations, the following regulated components must be used and conditions adhered to. Interchanging or use of other component will void the UL listing and other product certifi-cations and approvals.

Updated product information for configurations can be found on the site at the following URL: http://www.QuantaQCT.com

If you do not have access to the Web address, please contact your local representative.

- Add-in cards: must have a printed wiring board flammability rating of minimum UL94V-1. Add-in cards containing external power connectors and/or lithium batter-ies must be UL recognized or UL listed. Any add-in card containing modem telecom-munication circuitry must be UL listed. In addition, the modem must have the appropriate telecommunications, safety, and EMC approvals for the region in which it is sold.

- Peripheral Storage Devices: must be UL recognized or UL listed accessory and TUV or VDE licensed. Maximum power rating of any one device is 19 watts. Total server con-figuration is not to exceed the maximum loading conditions of the power supply.

4-2

4-3

Restriction of Hazardous Substances (RoHS) Compliance

Quanta® Computer Inc. has a system in place to restrict the use of banned substances in accordance with the European Directive 2002/95/EC. Compliance is based on declaration that materials banned in the RoHS Directive are either (1) below all applicable threshold limits or (2) an approved / pending RoHS exemption applies.

RoHS implementation details are not fully defined and may change.

Threshold limits and banned substances are noted below:

- Quantity limit of 0.1% by mass (1000 PPM) for:
  - Lead
  - Mercury
  - Hexavalent Chromium
  - Polybrominated Biphenyls Diphenyl Ethers (PBDE)
- Quantity limit of 0.01% by mass (100 PPM) for:
  - Cadmium

End of Life / Product Recycling

Product recycling and end-of-life take-back systems and requirements vary by country. Contact the retailer or distributor of this product for information about product recycling and / or take-back.

4.2 Product Regulatory Compliance Markings

This product is marked with the following product certification markings:

Table 1: Product Regulatory Compliance Markings

REGULATORY COMPLIANCE	REGION	MARKING
cULus Listing Marks	USA / Canada	
CE Mark	Europe	
FCC Marking (Class A)	USA	This device complies with Part 15 of the FCC Rules. Operation of this device is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.
VCCI Marking (Class A)	Japan	この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。VCCI-A
BSMI Certification Number & Class A Warning	Taiwan	R43039 警告使用者： 這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策
ICES	Canada	This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Table 1: Product Regulatory Compliance Markings (Continued)

REGULATORY COMPLIANCE	REGION	MARKING
Recycling Package Mark	Other than China	
GOST-R Marking	Russia	

4-5