PS2

Dual Display Portable GPU Server

USER MANUAL

User's Manual

Revision Date: Apr. 22. 2022

Safety Information

Electrical safety

- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.
- Before connecting or removing signal cables from the motherboard, ensure that all power cables are unplugged.
- Seek professional assistance before using an adapter or extension cord. These devices could interrupt the grounding circuit.
- Make sure that your power supply is set to the correct voltage in your area.
- If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your local distributor.

Operation safety

- Before installing the motherboard and adding devices on it, carefully read all the manuals that came with the package.
- Before using the product, make sure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
- Place the product on a stable surface.
- If you encounter any technical problems with the product, contact your local distributor

Statement

- All rights reserved. No part of this publication may be reproduced in any form or by any means, without prior written permission from the publisher.
- All trademarks are the properties of the respective owners.
- All product specifications are subject to change without prior notice

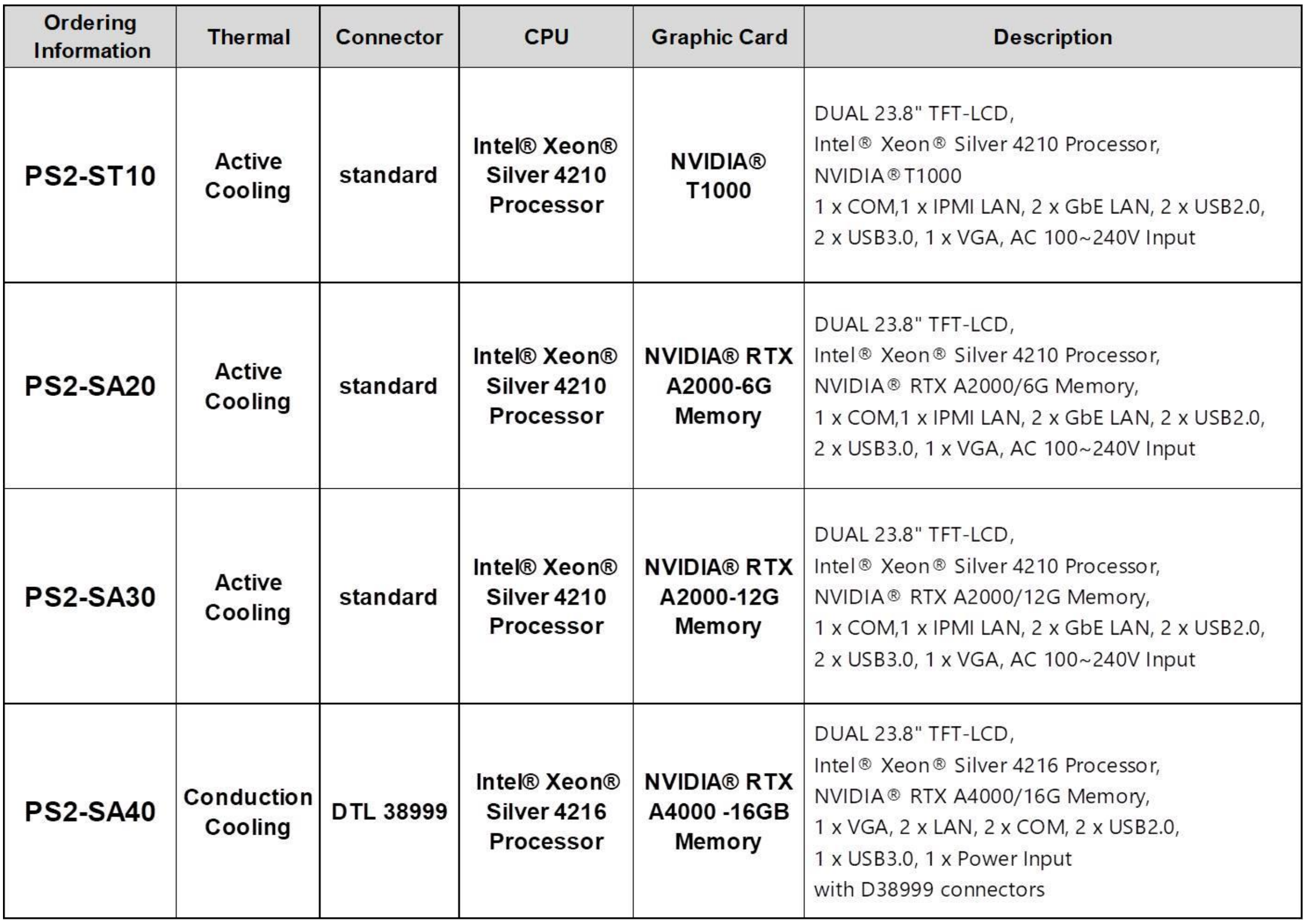
Revision History

Revision	Date (yyyy/mm/dd)	Changes
V1.0	2022/04/22	First release

Packing List

Item	Description	Q'ty
1	PS2-ST10 or PS2-SA20 or PS2-SA30 or PS2-SA40	1
2	Driver CD	1

Ordering Information



Ordering Information	Thermal	Connector	CPU	Graphic Card	Description
PS2-ST10	Active Cooling	standard	Intel® Xeon® Silver 4210 Processor	NVIDIA® T1000	DUAL 23.8" TFT-LCD, Intel® Xeon® Silver 4210 Processor, NVIDIA® T1000 1 x COM,1 x IPMI LAN, 2 x GbE LAN, 2 x USB2.0, 2 x USB3.0, 1 x VGA, AC 100~240V Input
PS2-SA20	Active Cooling	standard	Intel® Xeon® Silver 4210 Processor	NVIDIA® RTX A2000-6G Memory	DUAL 23.8" TFT-LCD, Intel® Xeon® Silver 4210 Processor, NVIDIA® RTX A2000/6G Memory, 1 x COM,1 x IPMI LAN, 2 x GbE LAN, 2 x USB2.0, 2 x USB3.0, 1 x VGA, AC 100~240V Input
PS2-SA30	Active Cooling	standard	Intel® Xeon® Silver 4210 Processor	NVIDIA® RTX A2000-12G Memory	DUAL 23.8" TFT-LCD, Intel® Xeon® Silver 4210 Processor, NVIDIA® RTX A2000/12G Memory, 1 x COM,1 x IPMI LAN, 2 x GbE LAN, 2 x USB2.0, 2 x USB3.0, 1 x VGA, AC 100~240V Input
PS2-SA40	Conduction Cooling	DTL 38999	Intel® Xeon® Silver 4216 Processor	NVIDIA® RTX A4000 -16GB Memory	DUAL 23.8" TFT-LCD, Intel® Xeon® Silver 4216 Processor, NVIDIA® RTX A4000/16G Memory, 1 x VGA, 2 x LAN, 2 x COM, 2 x USB2.0, 1 x USB3.0, 1 x Power Input with D38999 connectors

RoHS

7Starlake RoHS Environmental Policy and Status Update

7Starlake is a global citizen for building the digital infrastructure. We are committed to providing green products and services, which are compliant with

European Union RoHS (Restriction on Use of Hazardous Substance in Electronic Equipment) directive 2011/65/EU, to be your trusted green partner and to protect our environment.

In order to meet the RoHS compliant directives, 7Starlake has established an engineering and manufacturing task force to implement the introduction of green products. The task force will ensure that we follow the standard 7Starlake development procedure and that all the new RoHS components and new manufacturing processes maintain the highest industry quality levels for which 7Starlake are renowned.

The model selection criteria will be based on market demand. Vendors and suppliers will ensure that all designed components will be RoHS compliant.

Index

Chapter 1 : Product Introduction

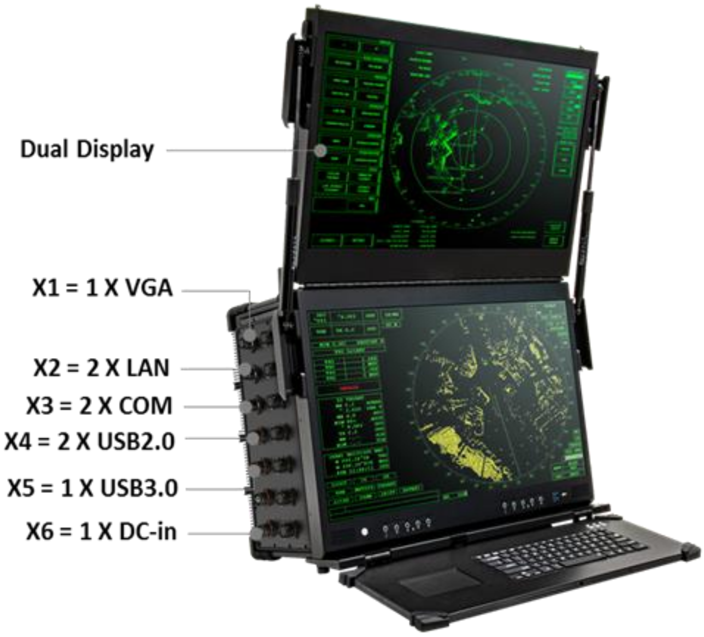
1.1 System specification

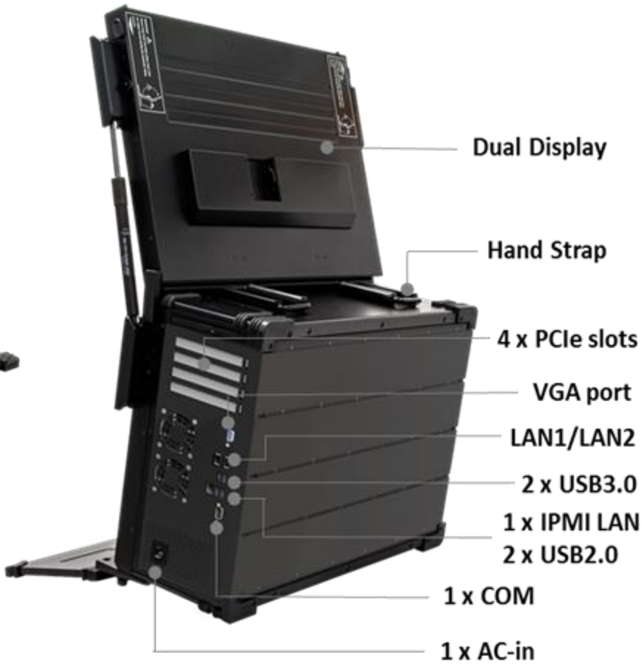
SYSTEM	
DISPLAY	DUAL 23.8" TFT-LCD , LCM, FULL HD 1920X1080- 250 NITS (Brightness : up to 1000nits for option)
CPU	Intel® Xeon® Scalable Processor, Single Socket LGA-3647 (Socket P) supported, - Xeon® Silver 4210 Processor,(10 cores, 13.75M Cache, 2.20 GHz),TDP 85W - Xeon® Silver 4216 Processor,(16 cores, 22M Cache, 2.10 GHz) ,TDP 100W
Memory type	6 DIMM slots Up to 1.5TB 3DS ECC LRDIMM, DDR4-2933MHz; Up to 1.5TB 3DS ECC RDIMM,
DIMM Sizes	LRDIMM: 32GB, 64GB, 128GB RDIMM: 8GB, 16GB, 32GB, 64GB
Chipset	Intel® C621
Graphics	ASPEED AST2500 BMC
GPU (option)	- NVIDIA® RTX A4000 Ampere GPU architecture 6,144 CUDA® Cores, 16GB GDDR6 Memory with ECC Max. Power Consumption: 140W - NVIDIA® RTX A2000 Ampere GPU architecture 3,328 CUDA® Cores, 6GB /12GB GDDR6 Memory with ECC Max. Power Consumption: 70W
Expansion Slot (PCI-E)	2 PCI-E 3.0 x16, 1 PCI-E 3.0 x8
Expansion Slot (M.2)	M.2 Interface: PCI-E 3.0 x4 Form Factor: 2280, 2242 Key: M-Key
BIOS	AMI UEFI, ACPI 6.0 RTC (Real Time Clock) Wakeup
STORAGE	

SATA	2 x SATA3 SSD (6Gbps) port(s) (Max 12 SATA3)	
Ethernet		
Ethernet (Internal)	Dual LAN ,with 1GbE with Intel® X722 + Marvell 88E1512	
I/O		
X1	1 x VGA , with D38999 connector	
X2	2 x Giga LAN , with D38999 connector	
X3	2 x COM , with D38999 connector	
X4	2 x USB2.0 , with D38999 connector	
X5	1 x USB3.0 , with D38999 connector	
X6	1 x Power Input , with D38999 connector	
Power		
Power input	AC 100 ~ 240V Input	
Operating System		
OS	Windows® 10 64-bit / Linux (support by request)	
Physical		
Dimension	HEIGHT: 16.31" (414MM) WIDTH: 24.58" (624MM) DEPTH: 10.56" (268MM)	
Weight	Active Cooled 15 Kg Conduction Cooled 20 Kg	
Chassis	SECC	
Heatsink	Heat sink Aluminum Alloy with Fan	
Environmental		
Green Product	RoHS, WEEE compliance	
Operating Temp.	-20 to 60°C	
Storage Temp.	-40 to 85°C	
Relative Humidity	5% to 95%, non-condensing	
MIL-STD-810 Specifications (Operating)		
Method 502.5	Low Temperature	-20°C, 4 hours, ±3°C
Procedure 2		
Method 501.5	High Temperature	+60°C, 4 hours, ±3°C
Procedure 2		
Method 507.5	Humidity	85%-95% RH without condensation,

		24 hours/ cycle, conduct 10 cycles.
Method 514.6	Vibration 3axis.	5-500Hz, Vertical 2.20Grms, 40mins x
Method 516.6	Shock	20 Grms, 11ms, 3 axes.
MIL-STD-810 Specifications (None-Operating)		
Method 502.5	Low Temperature	-33°C, 4 hours, change rate:≦20°C/
Procedure 1	Hour Storage	-15°C, 72hours (By request)
Method 501.5	High Temperature	+71°C, 4 hours, change rate:≦20°C/
Procedure 1	Hour Storage	+63°C, 240 hours (By request)
Method 514.6	Vibration 3axis.	5-500Hz, Vertical 2.20Grms, 40mins x
Method 516.6	Shock	20 Grms, 11ms, 3 axes.
Physical		
Dimension	301 x 315 x 86 mm (W x D x H)	
Weight	5.5kg	
Chassis	SECC	
Heatsink	Aluminum Alloy, Corrosion Resistant	
Finish	Anodic aluminum oxide	
Environmental		
Compliance	MIL-STD-810G, IEC-61850-3, IEEE-1613, CE and FCC, RoHS	
Operating Temp.	-20 to 55°C	
Storage Temp.	-40 to 85°C	
Relative Humidity	5% to 95%, non-condensing	

1.2 Front Panel I/O Placement





1.3 Mechanical Dimensions

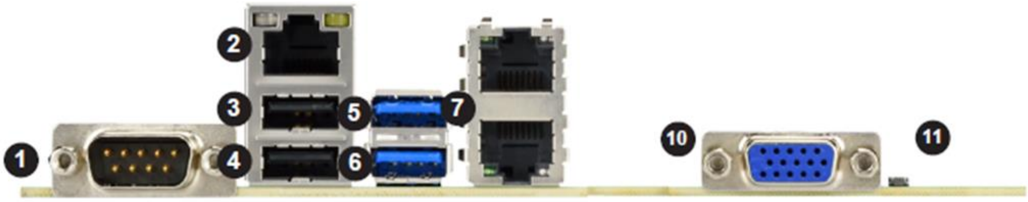
HEIGHT: 16.31" (414MM)

WIDTH: 24.58" (624MM)

DEPTH: 10.56" (268MM)

(TBD)

Chapter 2 : I/O Ports



#	Description	#	Description	#	Description
1	COM Port 1	5	USB7 (3.0)	11	UID Switch
2	Dedicated IPMI LAN	6	USB6 (3.0)		
3	USB1	7	LAN1/2 (-F only)		
4	USB0	10	VGA Port		

Serial Ports

There is one COM port (COM1) on the I/O back panel and one COM header (COM2) on the motherboard. Refer to the table below for pin definitions.

COM Port Pin Definitions			
Pin#	Definition	Pin#	Definition
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI
5	Ground	10	N/A

VGA Port

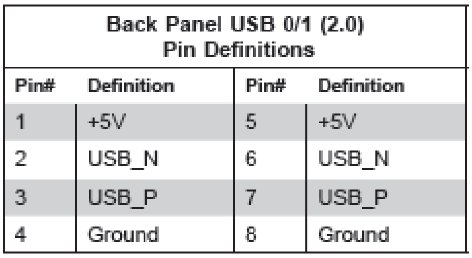
The onboard VGA port is located next to LAN Port 1 and 2 on the I/O back panel. Use this connection for VGA display.

LAN Ports

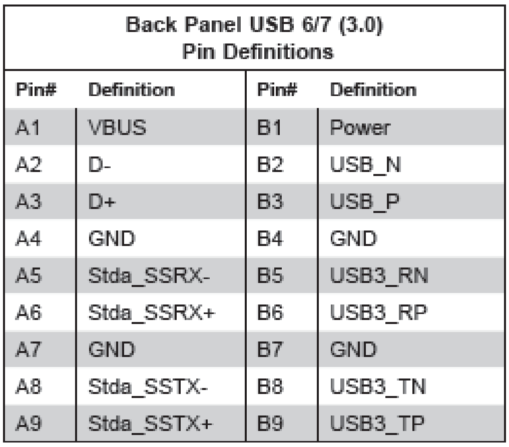
Two LAN ports (LAN1, LAN2) are located on the I/O back panel. There is also a dedicated IPMI LAN port above the USB0/1 ports on the I/O back panel. These ports accept RJ45 type cables. Please refer to the LED Indicator section for LAN LED information.

Universal Serial Bus (USB) Ports

There are two USB 2.0 ports (USB0/1) and two USB 3.0 ports (USB6/7) on the I/O back panel.



Back Panel USB 0/1 (2.0) Pin Definitions			
Pin#	Definition	Pin#	Definition
1	+5V	5	+5V
2	USB_N	6	USB_N
3	USB_P	7	USB_P
4	Ground	8	Ground



Back Panel USB 6/7 (3.0) Pin Definitions			
Pin#	Definition	Pin#	Definition
A1	VBUS	B1	Power
A2	D-	B2	USB_N
A3	D+	B3	USB_P
A4	GND	B4	GND
A5	Stda_SSRX-	B5	USB3_RN
A6	Stda_SSRX+	B6	USB3_RP
A7	GND	B7	GND
A8	Stda_SSTX-	B8	USB3_TN
A9	Stda_SSTX+	B9	USB3_TP

Chapter 3: AMI BIOS UTILITY

This chapter provides users with detailed descriptions on how to set up a basic system configuration through the AMI BIOS setup utility.

3.1 Starting

This chapter describes the AMIBIOS™ Setup utility for the motherboard. The BIOS is stored on a chip and can be easily upgraded using a flash program.

Starting the Setup Utility

To enter the BIOS Setup Utility, hit the <Delete> key while the system is booting-up. (In most cases, the <Delete> key is used to invoke the BIOS setup screen. There are a few cases when other keys are used, such as <F1>, <F2>, etc.) Each main BIOS menu option is described in this manual.

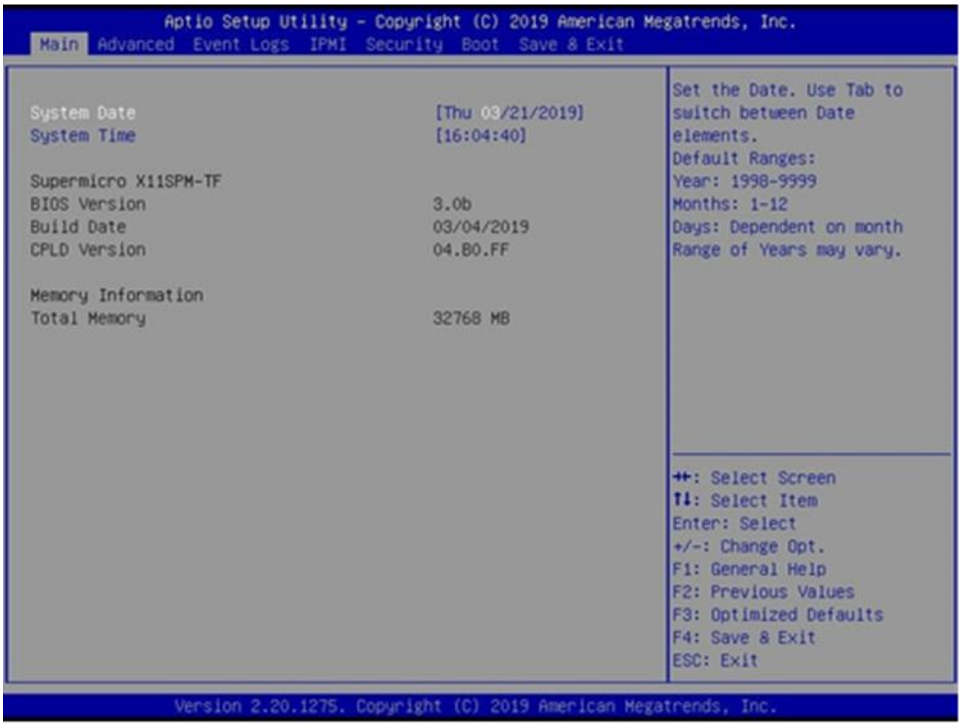
The Main BIOS screen has two main frames. The left frame displays all the options that can be configured. “Grayed-out” options cannot be configured. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it. (Note that the BIOS has default text messages built in. We retain the option to include, omit, or change any of these text messages.) Settings printed in **Bold** are the default values.

A " u" indicates a submenu. Highlighting such an item and pressing the <Enter> key will open the list of settings within that submenu.

The BIOS setup utility uses a key-based navigation system called hot keys. Most of these hot keys (<F1>, <F2>, <F3>, <Enter>, <ESC>, <Arrow> keys, etc.) can be used at any time during the setup navigation process.

3.2 Main Setup

When you first enter the AMI BIOS setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab on the top of the screen. The Main BIOS setup screen is shown below and the following items will be displayed:



```
           Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
  Main  Advanced  Event Logs  IPMI  Security  Boot  Save & Exit

  System Date                        [Thu 03/21/2019]   Set the Date. Use Tab to
  System Time                        [16:04:40]         switch between Date
                                                        elements.
  Supermicro X11SPM-TF                                  Default Ranges:
  BIOS Version                       3.0b               Year: 1998-9999
  Build Date                         03/04/2019         Months: 1-12
  CPLD Version                       04.B0.FF           Days: Dependent on month
                                                        Range of Years may vary.
  Memory Information
  Total Memory                       32768 MB

                                                        ↔: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit

           Version 2.20.1275. Copyright (C) 2019 American Megatrends, Inc.
```

System Date/System Time

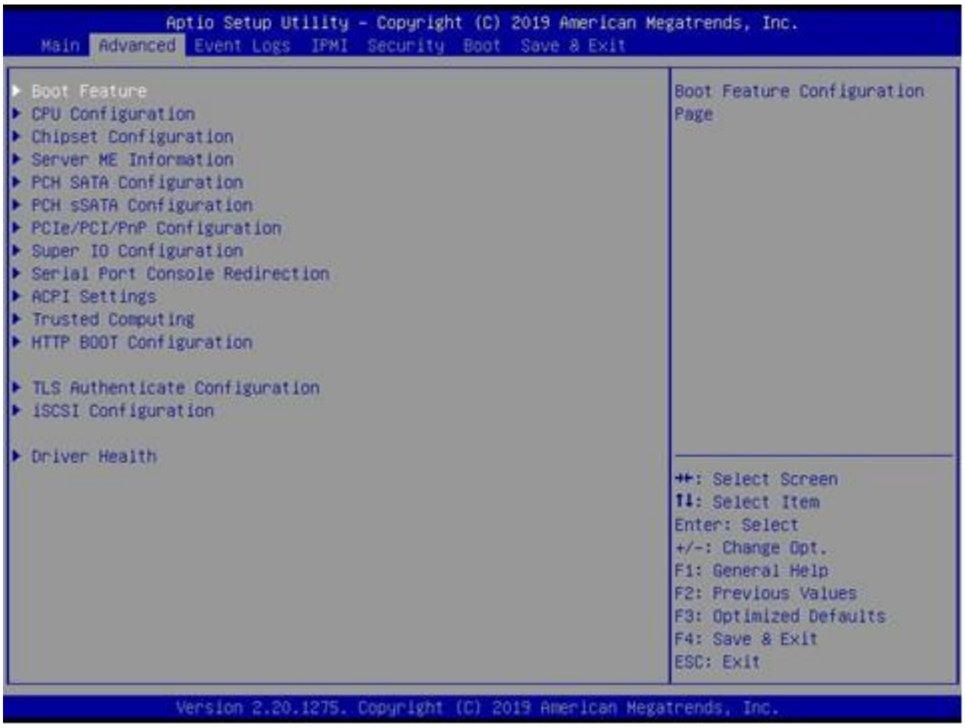
Use this option to change the system date and time. Highlight *System Date* or *System Time* using the arrow keys. Enter new values using the keyboard. Press the <Tab> key or the arrow keys to move between fields. The date must be entered in MM/DD/YYYY format. The time is entered in HH:MM:SS format.

(**Note:** The time is in the 24-hour format. For example, 5:30 P.M. appears as 17:30:00. The date's default value is the BIOS build date after RTC reset)

3.3 Advanced Setup Configurations

Use the arrow keys to select the Advanced menu and press <Enter> to access the submenu items:

(**Warning**: Take caution when changing the Advanced settings. An incorrect value, a very high DRAM frequency, or an incorrect DRAM timing setting may make the system unstable. When this occurs, revert to default manufacturer settings)



```
Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
   Main  Advanced  Event Logs  IPMI  Security  Boot  Save & Exit

▶ Boot Feature                                 Boot Feature Configuration
▶ CPU Configuration                            Page
▶ Chipset Configuration
▶ Server ME Information
▶ PCH SATA Configuration
▶ PCH sSATA Configuration
▶ PCIe/PCI/PnP Configuration
▶ Super IO Configuration
▶ Serial Port Console Redirection
▶ ACPI Settings
▶ Trusted Computing
▶ HTTP BOOT Configuration

▶ TLS Authenticate Configuration
▶ iSCSI Configuration

▶ Driver Health
                                               ←→: Select Screen
                                               ↑↓: Select Item
                                               Enter: Select
                                               +/-: Change Opt.
                                               F1: General Help
                                               F2: Previous Values
                                               F3: Optimized Defaults
                                               F4: Save & Exit
                                               ESC: Exit

      Version 2.20.1275. Copyright (C) 2019 American Megatrends, Inc.
```

Boot Feature

Quiet Boot

Use this feature to select the screen display between the POST messages and the OEM logo upon bootup. Select Disabled to display the POST messages. Select Enabled to display the OEM logo instead of the normal POST messages. The options are Disabled and **Enabled**.

Option ROM Messages

Use this feature to set the display mode for the Option ROM. Select Keep Current to display the current AddOn ROM setting. Select Force BIOS to use the Option ROM display set by the system BIOS. The options are **Force BIOS** and Keep Current.

Bootup NumLock State

Use this feature to set the Power-on state for the <Numlock> key. The options are **On** and Off

Wait For "F1" If Error

Use this feature to force the system to wait until the "F1" key is pressed if an error occurs. The options are Disabled and **Enabled**.

INT19 (Interrupt 19) Trap Response

Interrupt 19 is the software interrupt that handles the boot disk function. When this item is set to Immediate, the ROM BIOS of the host adaptors will "capture" Interrupt 19 at bootup immediately and allow the drives that are attached to these host adaptors to function as bootable disks. If this item is set to Postponed, the ROM BIOS of the host adaptors will not capture Interrupt 19 immediately and allow the drives attached to these adaptors to function as bootable devices at bootup. The options are **Immediate** and Postponed.

Re-try Boot

If this item is enabled, the BIOS will automatically reboot the system from a specified boot device after its initial boot failure. The options are **Disabled**, Legacy Boot, and EFI Boot.

Install Windows 7 USB Support

Enable this feature to use the USB keyboard and mouse during the Windows 7 installation since the native XHCI driver support is unavailable. Use a SATA optical drive as a USB drive, and USB CD/DVD drives are not supted. Disable this feature after the XHCI driver has been installed in Windows. The options are **Disabled** and Enabled.

Port 61h Bit-4 Emulation

Select Enabled to enable the emulation of Port 61h bit-4 toggling in SMM (System Management Mode). The options are **Disabled** and Enabled.

Power Configuration

Watch Dog Function

If enabled, the Watch Dog Timer will allow the system to reset or generate NMI based on jumper settings when it is expired for more than five minutes. The options are **Disabled** and Enabled**.**

Restore on AC Power Loss

Use this feature to set the power state after a power outage. Select Stay Off for the system power to remain off after a power loss. Select Power On for the system power to be turned on after a power loss. Select Last State to allow the system to resume its last power state before a power loss. The options are Stay Off, Power On, and Last State.

Power Button Function

This feature controls how the system shuts down when the power button is pressed. Select 4 Seconds Override for the user to power off the system after pressing and holding the power button for 4 seconds or longer. Select Instant Off to instantly power off the system as soon as the user presses the power button. The options are **Instant Off** and 4 Seconds Override**.**

CPU Configuration

The following CPU information will display:

- Processor BSP Revision
- Processor Socket
- Processor ID
- Processor Frequency
- Processor Max Ratio
- Processor Min Ratio
- Microcode Revision
- L1 Cache RAM
- L2 Cache RAM
- L3 Cache RAM
- Processor 0 Version

Hyper-Threading (ALL) (Available when supported by the CPU)

Select Enable to support Intel Hyper-threading Technology to enhance CPU performance. The options are Disable and **Enable**.

Cores Enabled

Set a numeric value to enable the number of cores. (Please refer to the Intel website for more information.) Enter **0** to enable all cores.

Monitor/Mwait

Select Enabled to enable the Monitor/Mwait instructions. The Monitor instructions monitors a region of memory for writes, and Mwait instructions instruct the CPU to stop until the monitored region begins to write. The options are **Auto**, Disable, and Enable.

Execute Disable Bit (Available if supported by the OS & the CPU)

Select Enable to enable the Execute-Disable Bit, which will allow the processor to designate areas in the system memory where an application code can execute and where it cannot, thus preventing a worm or a virus from flooding illegal codes to overwhelm the processor or damage the system during an attack. The options are Disable and **Enable**. (Refer to the Intel® and Microsoft® websites for more information.)

Intel Virtualization Technology

Use feature to enable the Vanderpool Technology. This technology allows the system to run several operating systems simultaneously. The options are Disable and **Enable**.

PPIN Control

Select Unlock/Enable to use the Protected Processor Inventory Number (PPIN) in the system. The options are Unlock/Disable and **Unlock/Enable**.

Hardware Prefetcher (Available when supported by the CPU)

If set to Enable, the hardware prefetcher will prefetch streams of data and instructions from the main memory to the L2 cache to improve CPU performance. The options are Disable and **Enable**.

Adjacent Cache Prefetch (Available when supported by the CPU)

The CPU prefetches the cache line for 64 bytes if this feature is set to Disabled. The CPU prefetches both cache lines for 128 bytes as comprised if this feature is set to Enable. The options are **Enable** and Disable.

DCU Streamer Prefetcher (Available when supported by the CPU)

Select Enable to enable the DCU (Data Cache Unit) Streamer Prefetcher which will stream and prefetch data and send it to the Level 1 data cache to improve data processing and system performance. The options are Disable and **Enable**.

DCU IP Prefetcher (Available when supported by the CPU)

Select Enable for DCU (Data Cache Unit) IP Prefetcher support, which will prefetch IP addresses to improve network connectivity and system performance. The options are **Enable** and Disable.

LLC Prefetch

If set to Enable, the hardware prefetcher will prefetch streams of data and instructions from the main memory to the L3 cache to improve CPU performance. The options are **Disable** and Enable.

Extended APIC

Select Enable to activate APIC (Advanced Programmable Interrupt Controller) support. The options are **Disable** and Enable.

AES-NI

Select Enable to use the Intel Advanced Encryption Standard (AES) New Instructions (NI) to ensure data security. The options are Disable and **Enable**.

Advanced Power Management Configuration

Power Technology

Select Energy Effiency to support power-saving mode. Select Custom to customize system power settings. Select Disable to disable power-saving settings. The options are Disable, **Energy Efficient**, and Custom.

If the feature above is set to Custom, the following features will become available for configuration:

Power Performance Tuning

This feature allows the user to select whether the BIOS or Operating System chooses en- ergy performance bias tuning. The options are **OS Controls EPB** or BIOS Controls EPB.

If Power Technology is set to BIOS Control EFB, the following features will become available for configuration:

ENERGY_PERF_BIAS CFG mode

This feature allows the user to set Energy Performance bias The options are Maximum Performance, Performance, **Balanced Performance**, Balanced Power, and Power.

CPU P State Control

This feature allows the user to configure the following CPU power settings:

SpeedStep (Pstates)

Intel SpeedStep Technology allows the system to automatically adjust processor voltage and core frequency to reduce power consumption and heat dissipation. The options are Disable and **Enable**.

EIST PSD Funtion

This feature allows the user to choose between Hardware and Software to control the processor's frequency and performance (P-state). In HW_ALL mode, the processor hard- ware is responsible for coordinating the P-state, and the OS is responsible for keeping the P-state request up to date on all Logical Processors. In SW_ALL mode, the OS Power Manager is responsible for coordinating the

P-state, and must initiate the transition on all Logical Processors. In SW_ANY mode, the OS Power Manager is responsible for coordinating the P-state and may initiate the transition on any Logical Processors. The options are **HW_ALL**, SW_ALL, and SW_ANY.

Turbo Mode

This feature will enable dynamic control of the processor, allowing it to run above stock frequency. The options are Disable and **Enable**.

Hardware PM State Control

Hardware P-States

This setting allows the user to select between OS and hardware-controlled P-states. Selecting Native Mode allows the OS to choose a P-state. Selecting Out of Band Mode allows the hardware to autonomously choose a P-state without OS guidance. Selecting Native Mode with No Legacy Support functions as Native Mode with no support for older hardware. The options are **Disable**, Native Mode, Out of Band Mode, and Native Mode with No Legacy Support.

CPU C State Control

Autonomous Core C-State

Enabling this setting allows the hardware to autonomously choose to enter a C-state based on power consumption and clock speed. The options are **Disable** and Enable.

CPU C6 Report

Select Enable to allow the BIOS to report the CPU C6 State (ACPI C3) to the operating system. During the CPU C6 State, the power to all cache is turned off. The options are Disable, Enable, and **Auto**.

Enhanced Halt State (C1E)

Select Enable to use Enhanced Halt State technology, which will significantly reduce the CPU's power consumption by reducing its clock cycle and voltage during a Halt state. The options are Disable and **Enable**.

Package C State Control

Package C State

This feature allows the user to set the limit on the C State package register. The options are C0/C1 State, C2 State, C6 (Non Retention) State**,** C6 (Retention) State, No Limit, and **Auto.**

CPU T State Control

Software Controlled T-States

Use this feature to enable Software Controlled T-States. The options are Disable and **Enable**.

■ Chipset Configuration

Warning: Setting the wrong values in the following features may cause the system to malfunction.

■ North Bridge

This feature allows the user to configure the following North Bridge settings.

■ UPI Configuration

The following UPI information will display:

- Number of CPU
- Number of Active UPI Link
- Current UPI Link Speed
- Current UPI Link Frequency
- UPI Global MMIO Low Base / Limit
- UPI Global MMIO High Base / Limit
- UPI Pci-e Configuration Base / Size

Degrade Precedence

Use this feature to set degrade precedence when system settings are in conflict. Select Topology Precedence to degrade Features. Select Feature Precedence to degrade Topol- ogy. The options are **Topology Precedence** and Feature Precedence.

Link L0p Enable

Select Enable for the QPI to enter the L0p state for power saving. The options are Dis- able, Enable, and **Auto**.

Link L1 Enable

Select Enable for the QPI to enter the L1 state for power saving. The options are Dis- able, Enable, and **Auto**.

IO Directory Cache (IODC)

IO Directory Cache is an 8-entry cache that stores the directory state of remote IIO writes and memory lookups, and saves directory updates. Use this feature to lower cache to cache (C2C) transfer latencies. The options are Disable, **Auto**, Enable for Remote InvItoM Hybrid Push, InvItoM AllocFlow, Enable for Remote InvItoM Hybrid AllocNonAlloc, and Enable for Remote InvItoM and Remote WViLF.

SNC

Sub NUMA Clustering (SNC) is a feature that breaks up the Last Level Cache (LLC) into clusters based on address range. Each cluster is connected to a subset of the memory controller. Enabling SNC improves average latency and reduces memory access conges- tion to achieve higher performance. Select Auto for 1-cluster or 2-clusters depending on IMC interleave. Select Enable for Full SNC (2-clusters and 1-way IMC interleave). The options are **Disable**, Enable, and Auto.

XPT Prefetch

XPT Prefetch speculatively makes a copy to the memory controller of a reader request being sent to the LLC. IF the read request maps to the local memory address and the recent memory reads are likely to miss the LLC, a speculative read is sent to the local memory controller. The options are **Disable** and Enable.

KTI Prefetch

XPT Prefetch enables memory read to start early on a DDR bus, where the KTI Rx path will directly create a Memory Speculative Read command to the memory controller. The options are Disable and **Enable**.

Local/Remote Threshold

This feature allows the user to set the threshold for the Interrupt Request (IRQ) signal, which handles hardware interruptions. The options are Disable, **Auto**, Low, Medium, and High.

Stale AtoS

This feature optimizes A to S directory. When all snoop responses found in directory A are found to be Rspl, then all data is moved to directory S and is returned in S-state. The options are Disable, Enable, and **Auto**.

LLC Dead Line Alloc

Select Enable to optimally fill dead lines in LLC. Select Disable to never fill dead lines in LLC. The options are Disable, **Enable**, and Auto.

Isoc Mode

Isochronous (Isoc) mode allows time-sensitive processes to be given priority. The options are Disable, Enable, and **Auto**.

■ Memory Configuration

Enforce POR

Select POR (Plan of Record) to enforce POR restrictions on DDR4 frequency and volt- age programming. The options are **POR** and Disable.

PPR Type

Use this feature to set the Post Package Repair type. The options are **Auto**, Hard PPR, Soft PPR, and PPR Disabled.

Memory Frequency

Use this feature to set the maximum memory frequency for onboard memory modules. The options are **Auto**, 1866, 2000, 2133, 2400, 2600, 2666, and 2933.

Data Scrambling for DDR4

Use this feature to enable or disable data scrambling for DDR4 memory. The options are **Auto**, Disable, and Enable.

tCCD_L Relaxation

Select Enable to get TCDD settings from SPD (Serial Presence Detect) and implement into memory RC code to improve system reliability. Select Disable for TCCD to follow Intel POR. The options are Disable and **Auto**.

2X REFRESH

Use this feature to select the memory controller refresh rate to 2x refresh mode. The options are **Auto** and Enable.

Page Policy

Use this feature to set the page policy for onboard memory support. The options are

Closed, Adaptive, and **Auto**.

IMC Interleaving

Use this feature to configure interleaving settings for the IMC (Intergrated Memory Con- troller), which will improve memory performance. The options are 1-way Interleave, 2-way Interleave, and **Auto**.

■ Memory Topology

This item displays the information of onboard memory modules as detected by the BIOS.

■ Memory RAS Configuration

Static Virtual Lockstep Mode

Select Enable to run the system's memory channels in lockstep mode to minimize memory access latency. The options are **Disable** and Enable.

Mirror Mode

This feature allows memory to be mirrored between two channels, providing 100% redundancy. The options are **Disable**, Mirror Mode 1LM, and Mirror Mode 2LM.

Memory Rank Sparing

Select Enable to enable memory-sparing support for memory ranks to improve memory performance. The options are **Disable** and Enable.

Correctable Error Threshold

Use this item to specify the threshold value for correctable memory error logging, which sets a limit on the maximum number of events that can be logged in the memory-error log at a given time. The default setting is **100**

SDDC

Single device data correction organizes data in a single bundle (x4/x8 DRAM). If any or all the bits become corrupted, corrections occur. The x4 condition is corrected on all cases. The x8 condition is corrected only if the system is in Lockstep Mode. The options are **Disable** and Enable.

ADDDC Sparing

Adaptive Double Device Data Correction (ADDDC) Sparing detects when the prede- termined threshold for correctable errors is reached, copying the contents of the failing DIMM to spare memory. The failing DIMM or memory rank will then be disabled. The options are **Disable** and

Enable.

Patrol Scrub

Patrol Scrubbing is a process that allows the CPU to correct correctable memory errors detected on a memory module and send the correction to the requestor (the original source). When this item is set to Enable, the IO hub will read and write back one cache line every 16K cycles if there is no delay caused by internal processing. By using this method, roughly 64 GB of memory behind the IO hub will be scrubbed every day. The options are Disable and **Enable**.

Patrol Scrub Interval

This feature allows you to decide how many hours the system should wait before the next complete patrol scrub is performed. Use the keyboard to enter a value from 0-24. The default setting is **24**.

IIO Configuration

EV DFX Features

When this feature is set to Enable, the EV_DFX Lock Bits that are located on a proces- sor will always remain clear during electric tuning. The options are **Disable** and Enable.

■ CPU1 Configuration

IOU0 (II0 PCIe Br1)

This item configures the PCI-E port Bifuraction setting for a PCI-E port specified by the user. The options are x4x4x4x4, x4x4x8, x8x4x4, x8x8, x16, and **Auto**.

IOU1 (II0 PCIe Br2)

This item configures the PCI-E port Bifuraction setting for a PCI-E port specified by the user. The options are x4x4x4x4, x4x4x8, x8x4x4, x8x8, x16, and **Auto**

IOU2 (II0 PCIe Br3)

This item configures the PCI-E port Bifuraction setting for a PCI-E port specified by the user. The options are x4x4x4x4, x4x4x8, x8x4x4, x8x8, x16, and **Auto**.

■ CPU1 SLOT4 PCI-E 3.0 X16 / CPU1 SLOT6 PCI-E 3.0 X16 / CPU1 SLOT7 PCI-E 3.0 X8

Link Speed

Use this item to select the link speed for the PCI-E port specified by the user. The options are **Auto,** Gen 1 (2.5 GT/s), Gen 2 (5 GT/s), and Gen 3 (8 GT/s). The following information will also be displayed:

- PCI-E Port Link Status
- PCI-E Port Link Max
- PCI-E Port Link Speed

PCI-E Port Max Payload Size

Selecting **Auto** for this feature will enable the motherboard to automatically detect the maximum Transaction Layer Packet (TLP) size for the connected PCI-E device, allowing for maximum I/O efficiency. Selecting 128B or 256B will designate maximum packet size of 128 or 256. The options are 128B, 256B, and **Auto.**

■ IOAT Configuration

Disable TPH

Transparent Huge Pages (TPH) is a Linux memory management system that enables communication in larger blocks (pages). Enabling this feature will increase perfor- mance. The options are **No** and Yes.

Prioritize TPH

Use this feature to enable Prioritize TPH support. The options are Enable and **Disable.**

Relaxed Ordering

Select Enable to enable Relaxed Ordering support, which will allow certain transac- tions to violate the strict-ordering rules of PCI bus for a transaction to be completed prior to other transactions that have already been enqueued. The options are **Disable** and Enable.

■ Intel® VT for Directed I/O (VT-d)

Intel® VT for Directed I/O (VT-d)

Select Enable to use Intel Virtualization Technology for Direct I/O VT-d support by reporting the I/O device assignments to the VMM (Virtual Machine Monitor) through the DMAR ACPI tables. This feature offers fully-protected I/O resource sharing across Intel platforms, providing greater reliability, security and availability in networking and data-sharing. The options are **Enable** and Disable.

ACS Control

Select Enable for Access Control Services (ACS) extended capability support to en- hance system performance. The options are **Enable** and Disable.

Interrupt Remapping

Use this feature to enable Interrupt Remapping support, which detects and controls external interrupt requests. The options are **Enable** and Disable.

PassThrough DMA

Use this feature to allow devices such as network cards to access the system memory without using a processor. Select Enable to use the Non-Isoch VT_D Engine Pass Through Direct Memory Access (DMA) support. The options are **Enable** and Disable.

ATS

Use this feature to enable Non-Isoch VT-d Engine Address Translation Services (ATS) support. ATS translates virtual addresses to physical addresses. The options are **En- able** and Disable.

Posted Interrupt

Use this feature to enable VT_D Posted Interrupt. The options are **Enable** and Disable.

Coherency Support (Non-Isoch)

Use this feature to maintain setting coherency between processors or other devices. Select Enable for the Non-Isoch VT-d engine to pass through DMA to enhance system performance. The options are **Enable** and Disable.

Intel® VMD for Volume Management Device on CPU

VMD Config for PStack0

Intel® VMD for Volume Management Device

Select Enable to use the Intel Volume Management Device Technology for this stack. The options are **Disable** and Enable.

**If the item above is set to Enable, the following items will become available for configuration:*

CPU SLOT4 PCI-E 3.0 X16 VMD (Available when the device is detected by the system)

Select Enable to use the Intel Volume Management Device Technology for this specific root port. The options are **Disable** and Enable.

Hot Plug Capable (Available when the device is detected by the system)

Use this feature to enable hot plug support for PCIe root ports 1A~1D. The options are **Disable** and Enable.

VMD Config for PStack1

Intel® VMD for Volume Management Device

Select Enable to use the Intel Volume Management Device Technology for this stack. The options are **Disable** and Enable.

If the item above is set to Enable, the following items will become available for configuration:

CPU SLOT6 PCI-E 3.0 X16 VMD (Available when the device is detected by the system)

Select Enable to use the Intel Volume Management Device Technology for this specific root port. The options are **Disable** and Enable.

Hot Plug Capable (Available when the device is detected by the system)

Use this feature to enable hot plug support for PCIe root ports 2A~2D. The options are **Disable** and Enable.

VMD Config for PStack2

Intel® VMD for Volume Management Device

Select Enable to use the Intel Volume Management Device Technology for this stack. The options are **Disable** and Enable.

If the item above is set to Enable, the following items will become available for configuration:

CPU SLOT7 PCI-E 3.0 X8 VMD (Available when the device is detected by the system)

Hot Plug Capable (Available when the device is detected by the system)

Use this feature to enable hot plug support for PCIe root ports 3A~3D. The options are **Disable** and Enable.

PCI-E Completion Timeout Disable

Use this feature to enable PCI-E Completion Timeout support for electric tuning. The options are Yes, **No**, and Per-Port.

South Bridge

The following USB information will display:

- USB Module Version
- USB Devices

Legacy USB Support

This feature enables support for USB 2.0 and older. The options are **Enabled,** Disabled, and Auto.

XHCI Hand-off

When this feature is disabled, the motherboard will not support USB 3.0. The options are **Enabled** and Disabled.

Port 60/64 Emulation

This feature allows legacy I/O support for USB devices like mice and keyboards. The options are **Enabled** and Disabled.

PCIe PLL SSC

Use this feature to enable PCI-E Phase-locked Loop (PLL) SPread Spectrum Clocking (SSC). The options are **Disable** and Enable.

Server ME Configuration

The following General ME Configuration will display:

- Oper. Firmware Version
- Backup Firmware Version
- Recovery Firmware Version
- ME Firmware Status #1
- ME Firmware Status #2
- Current State
- Error Code

PCH SATA Configuration

When this submenu is selected, the AMI BIOS automatically detects the presence of the SATA devices that are supported by the Intel PCH chip and displays the following items:

SATA Controller

This item enables or disables the onboard SATA controller supported by the Intel PCH chip. The options are Disable and **Enable**.

Configure SATA as

Select AHCI to configure a SATA drive specified by the user as an AHCI drive. Select RAID to configure a SATA drive specified by the user as a RAID drive. The options are **AHCI** and RAID.

SATA HDD Unlock

This feature allows the user to remove any password-protected SATA disk drives. The options are **Enable** and Disable.

Aggressive Link Power Management

When this item is set to Enable, the SATA AHCI controller manages the power usage of the SATA link. The controller will put the link in a low power mode during extended periods of I/O inactivity, and will return the link to an active state when I/O activity resumes. The options are **Disable** and Enable.

If the item "Configure SATA as" above is set to RAID, the following items will become available for configuration:

SATA RSTe Boot Info

Select Enable to provide full int13h support for the devices attached to SATA controller. The options are Disable and **Enable**.

SATA RAID Option ROM/UEFI Driver

Select UEFI to load the EFI driver for system boot. Select Legacy to load a legacy driver for system boot. The options are Disable, EFI, and **Legacy**.

SATA Port 0 ~ Port 7

This item displays the information detected on the installed SATA drive on the particular SATA port.

- Model number of drive and capacity
- Software Preserve Support

Port 0 ~ Port 7 Hot Plug

Set this item to Enable for hot plug support, which will allow the user to replace a SATA drive without shutting down the system. The options are Disable and **Enable**.

Port 0 ~ Port 7 Spin Up Device

On an edge detect from 0 to 1, set this item to allow the PCH to initialize the device. The options are **Disable** and Enable.

Port 0 ~ Port 7 SATA Device Type

Use this item to specify if the SATA port specified by the user should be connected to a Solid State drive or a Hard Disk Drive. The options are **Hard Disk Drive** and Solid State Drive.

PCH sSATA Configuration

When this submenu is selected, the AMI BIOS automatically detects the presence of the SATA devices that are supported by the Intel PCH chip and displays the following items:

sSATA Controller

This item enables or disables the onboard sSATA controller supported by the Intel PCH chip. The options are **Enable** and Disable.

Configure sSATA as

Select AHCI to configure an sSATA drive specified by the user as an AHCI drive. Select RAID to configure an sSATA drive specified by the user as a RAID drive. The options are **AHCI** and RAID.

SATA HDD Unlock

This feature allows the user to remove any password-protected SATA disk drives. The options are Disable and **Enable**.

Aggressive Link Power Management

When this item is set to Enable, the SATA AHCI controller manages the power usage of the SATA link. The controller will put the link in a low power mode during extended periods of I/O inactivity, and will return the link to an active state when I/O activity resumes. The options are **Disable** and Enable.

If the item "Configure sSATA as" above is set to RAID, the following items will become available for configuration:

sSATA RSTe Boot Info

Select Enable to provide full int13h support for the devices attached to sSATA controller. The options are Disable and **Enable**.

sSATA RAID Option ROM/UEFI Driver

Select UEFI to load the EFI driver for system boot. Select Legacy to load a legacy driver for system boot. The options are Disable, EFI, and **Legacy**.

sSATA Port 0 ~ Port 3

This item displays the information detected on the installed sSATA drive on the particular sSATA port.

- Model number of drive and capacity
- Software Preserve Support

Port 0 ~ Port 3 Hot Plug

Set this item to Enable for hot plug support, which will allow the user to replace a SATA drive without shutting down the system. The options are Disable and **Enable**.

Port 0 ~ Port 3 Spin Up Device

On an edge detect from 0 to 1, set this item to allow the PCH to initialize the device. The options are **Disable** and Enable.

■ PCIe/PCI/PnP Configuration

The following information will display:

- PCI Bus Driver Version
- PCI Devices Common Settings:

Above 4G Decoding (Available if the system supports 64-bit PCI decoding)

Select Enabled to decode a PCI device that supports 64-bit in the space above 4G Address. The options are Disabled and **Enabled**.

SR-IOV Support

Use this feature to enable or disable Single Root IO Virtualization Support. The options are **Disabled** and Enabled.

MMIO High Base

Use this item to select the base memory size according to memory-address mapping for the IO hub. The options are **56T**, 40T, 24T, 16T, 4T, 2T, and 1T.

MMIO High Granularity Size

Use this item to select the high memory size according to memory-address mapping for the IO hub. The options are 1G, 4G, 16G, 64G, **256G**, and 1024G.

Maximum Read Request

Use this item to select the Maximum Read Request size of the PCI-Express device, or select Auto to allow the System BIOS to determine the value. The options are **Auto**, 128 Bytes, 256 Bytes, 512 Bytes, 1024 Bytes, 2048 Bytes, and 4096 Bytes.

MMCFG Base

Use this item to select the low base address for PCIE adapters to increase base memory. The options are 1G, 1.5G, 1.75G, **2G**, 2.25G. and 3G.

NVMe Firmware Source

Use this item to select the NVMe firmware to support booting. The options are **Vendor Defined**

Firmware and AMI Native Support. The default option, Vendor Defined Firmware, is pre-installed on the drive and may resolve errata or enable innovative functions for the drive. The other option, AMI Native Support, is offered by the BIOS with a generic method

VGA Priority

Use this feature to select VGA priority when multiple VGA devices are detected. Select On- board to give priority to your onboard video device. Select Offboard to give priority to your graphics card. The options are **Onboard** and Offboard.

CPU1 SLOT4 PCI-E 3.0 X16 OPROM

Use this feature to select which firmware type to be loaded for the add-on card in this slot. The options are Disabled, **Legacy**, and EFI.

CPU1 SLOT6 PCI-E 3.0 X16 OPROM

Use this feature to select which firmware type to be loaded for the add-on card in this slot. The options are Disabled, **Legacy**, and EFI.

CPU1 SLOT7 PCI-E 3.0 X8 OPROM

Use this feature to select which firmware type to be loaded for the add-on card in this slot. The options are Disabled, **Legacy**, and EFI.

PCI-E 3.0 X4 OPROM

Use this feature to select which firmware type to be loaded for the add-on card in this slot. The options are Disabled, **Legacy**, and EFI.

Bus Master Enable

This feature enables a device connected to the bus to intiate Direct Memory Access (DMA) transactions. When DIsabled is selected, the PCI Bus Driver disables Bus Master Attribute for Pre-Boot DMA Protection. When Enabled is selected, the PCI Bus Driver enables BUs Master Atribute for DMA transactions. Some devices request Bus Master to be enabled for operations. The options are Disabled and **Enabled**.

Onboard LAN Device

Select Enabled to enable the Onboard LAN device. The options are **Enabled** and Disabled

Onboard LAN1 Option ROM

Use this feature to select which firmware function to be loaded for LAN Port1 used for system boot. The options are Disabled, **Legacy**, and EFI.

Onboard LAN2 Option ROM

Use this feature to select which firmware function to be loaded for LAN Port2 used for system boot. The options are **Disabled**, Legacy, and EFI.

Onboard Video Option ROM

Use this item to select the Onboard Video Option ROM type. The options are Disabled, **Legacy**, and EFI.

■ Network Stack Configuration

Network Stack

Select Enabled to enable PXE (Preboot Execution Environment) or UEFI (Unified Extensible Firmware Interface) for network stack support. The options are **Enabled** and Disabled.

IPv4 PXE Support

Select Enabled to enable IPv4 PXE boot support. The options are Disabled and **Enabled**.

IPv4 HTTP Support

Select Enabled to enable IPv4 HTTP boot support. The options are **Disabled** and Enabled.

IPv6 PXE Support

Select Enabled to enable IPv6 PXE boot support. The options are Disabled and **Enabled**.

IPv6 HTTP Support

Select Enabled to enable IPv6 HTTP boot support. The options are **Disabled** and Enabled.

PXE Boot Wait Time

Use this option to specify the wait time to press the ESC key to abort the PXE boot. Press "+" or "-" on your keyboard to change the value. The default setting is **0**.

Media Detect Count

Use this option to specify the number of times media will be checked. Press "+" or "-" on your keyboard to change the value. The default setting is **1**.

■ Super IO Configuration

The following Super IO information will display:

- Super IO Chip AST2500

- **Serial Port 1 Configuration**

This submenu allows the user to configure the settings of Serial Port 1.

Serial Port 1

Select Enabled to enable the selected onboard serial port. The options are Disabled and **Enabled**.

Device Settings

This item displays the status of a serial part specified by the user.

Change Settings

This feature specifies the base I/O port address and the Interrupt Request address of a serial port specified by the user. Select Auto to allow the BIOS to automatically assign the base I/O and IRQ address.

The options for Serial Port 1 are **Auto**, (IO=3F8h; IRQ=4;), (IO=2F8h; IRQ=4;), (IO=3E8h; IRQ=4;), and (IO=2E8h; IRQ=4;).

- **Serial Port 2 Configuration**

This submenu allows the user to configure the settings of Serial Port 2.

Serial Port 2

Select Enabled to enable the selected onboard serial port. The options are Disabled and **Enabled**.

Device Settings

This item displays the status of a serial part specified by the user.

Change Settings

This feature specifies the base I/O port address and the Interrupt Request address of a serial port specified by the user. Select Auto to allow the BIOS to automatically assign the base I/O and IRQ address.

The options for Serial Port 2 are **Auto**, (IO=2F8h; IRQ=3;), (IO=3F8h; IRQ=3;), (IO=3E8h; IRQ=3;), and (IO=2E8h; IRQ=3;).

Serial Port 2 Attribute (Available for Serial Port 2 only)

Select SOL to use COM Port 2 as a Serial Over LAN (SOL) port for console redirection. The options are **SOL** and COM.

■ Serial Port Console Redirection

COM1 Console Redirection

Select Enabled to enable console redirection support for a serial port specified by the user.

The options are Enabled and **Disabled**.

If the item above is set to Enabled, the following items will become available forbconfiguration:

■ COM1 Console Redirection Settings

Use this feature to specify how the host computer will exchange data with the client computer, which is the remote computer used by the user.

COM1 Terminal Type

This feature allows the user to select the target terminal emulation type for Console Redirection. Select VT100 to use the ASCII Character set. Select VT100+ to add color and function key support. Select ANSI to use the Extended ASCII Character Set. Select VT-UTF8 to use UTF8 encoding to map Unicode characters into one or more bytes. The options are VT100, **VT100+**, VT-UTF8, and ANSI.

COM1 Bits Per Second

Use this feature to set the transmission speed for a serial port used in Console Redirection. Make sure that the same speed is used in the host computer and the client computer. A lower transmission speed may be required for long and busy lines. The options are 9600, 19200, 38400, 57600 and **115200** (bits per second).

COM1 Data Bits

Use this feature to set the data transmission size for Console Redirection. The options are 7 Bits and **8 Bits**.

COM1 Parity

A parity bit can be sent along with regular data bits to detect data transmission errors. Select Even if the parity bit is set to 0, and the number of 1's in data bits is even. Select Odd if the parity bit is set to 0, and the number of 1's in data bits is odd. Select None if you do not want to send a parity bit with your data bits in transmission. Select Mark to add a mark as a parity bit to be sent along with the data bits. Select Space to add a Space as a parity bit to be sent with your data bits. The options are **None**, Even, Odd, Mark, and Space.

COM1 Stop Bits

A stop bit indicates the end of a serial data packet. Select 1 Stop Bit for standard serial data communication. Select 2 Stop Bits if slower devices are used. The options are **1** and 2.

COM1 Flow Control

Use this feature to set the flow control for Console Redirection to prevent data loss caused by buffer overflow. Send a "Stop" signal to stop sending data when the receiving buffer is full. Send a "Start" signal to start sending data when the receiving buffer is empty. The options are **None** and Hardware RTS/CTS.

COM1 VT-UTF8 Combo Key Support

Select Enabled to enable VT-UTF8 Combination Key support for ANSI/VT100 terminals. The options are Disabled and **Enabled.**

COM1 Recorder Mode

Select Enabled to capture the data displayed on a terminal and send it as text messages to a remote server. The options are **Disabled** and Enabled.

COM1 Resolution 100x31

Select Enabled for extended-terminal resolution support. The options are Disabled and **Enabled**.

COM1 Legacy OS Redirection Resolution

Use this feature to select the number of rows and columns used in Console Redirection for legacy OS support. The options are 80x24 and **80x25**.

COM1 Putty KeyPad

This feature selects the settings for Function Keys and KeyPad used for Putty, which is a terminal emulator designed for the Windows OS. The options are **VT100**, LINUX, XTERMR6, SC0, ESCN, and VT400.

COM1 Redirection After BIOS POST

Use this feature to enable or disable legacy console redirection after BIOS POST. When set to Bootloader, legacy console redirection is disabled before booting the OS. When set to Always Enable, legacy console redirection remains enabled when booting the OS. The options are **Always Enable** and Bootloader.

SOL/COM2 Console Redirection

Select Enabled to use the SOL port for Console Redirection. The options are Disabled and **Enabled.**

EMS Console Redirection Settings

This feature allows the user to specify how the host computer will exchange data with the client computer, which is the remote computer used by the user.

Out-of-Band Mgmt Port

The feature selects a serial port in a client server to be used by the Microsoft Windows Emergency Management Services (EMS) to communicate with a remote host server. The options are **COM1** and SOL/COM2.

Terminal Type

Use this feature to select the target terminal emulation type for Console Redirection. Select VT100 to use the ASCII character set. Select VT100+ to add color and function key support. Select ANSI to use the extended ASCII character set. Select VT-UTF8 to use UTF8 encoding to map Unicode characters into one or more bytes. The options are VT100, VT100+, **VT-UTF8**, and ANSI.

Bits Per Second

This item sets the transmission speed for a serial port used in Console Redirection. Make sure that the same speed is used in the host computer and the client computer. A lower transmission speed may be required for long and busy lines. The options are 9600, 19200,
57600, and **115200** (bits per second).

Flow Control

Use this item to set the flow control for Console Redirection to prevent data loss caused by buffer overflow. Send a "Stop" signal to stop sending data when the receiving buffer is full. Send a "Start" signal to start sending data when the receiving buffer is empty. The options are **None,** Hardware RTS/CTS, and Software Xon/Xoff.

Data Bits, Parity, Stop Bits

■ ACPI Settings

WHEA Support

Select Enabled to support the Windows Hardware Error Architecture (WHEA) platform and provide a common infrastructure for the system to handle hardware errors within the Windows OS environment to reduce system crashes and to enhance system recovery and health monitoring. The options are Disabled and **Enabled**.

High Precision Event Timer

Select Enabled to activate the High Precision Event Timer (HPET) that produces periodic interrupts at a much higher frequency than a Real-time Clock (RTC) does in synchronizing multimedia streams, providing smooth playback and reducing the dependency on other timestamp calculation devices, such as an x86 RDTSC Instruction embedded in the CPU. The High Performance Event Timer is used to replace the 8254 Programmable Interval Timer. The options are Disabled and **Enabled**.

■ Trusted Computing

The PS2 supports TPM 1.2 and 2.0. The following Trusted Platform Module (TPM) information will display if a TPM 2.0 module is detected:

- Vendor Name
- Firmware Version

Security Device Support

If this feature and the TPM jumper on the motherboard are both set to Enabled, onboard security devices will be enabled for TPM (Trusted Platform Module) support to enhance data integrity and network security. Please reboot the system for a change on this setting to take effect. The options are Disable and **Enable**.

- Active PCR Bank
- SHA256 PCR Bank

If the item above is set to Enable, "SHA256 PCR Bank" will become available for configuration:

SHA256 PCR Bank

Use this item to disable or enable the SHA256 Platform Configuration Register (PCR) bank for the installed TPM device. The options are Disabled and **Enabled**.

Pending Operation

Use this item to schedule a TPM-related operation to be performed by a security device for system data integrity. Your system will reboot to carry out a pending TPM operation. The options are **None** and TPM Clear.

Platform Hierarchy

Use this item to disable or enable platform hierarchy for platform protection. The options are Disabled and **Enabled**.

Storage Hierarchy

Use this item to disable or enable storage hieararchy for cryptographic protection. The options are

Disabled and **Enabled**.

Endorsement Hierarchy

Use this item to disable or enable endorsement hierarchy for privacy control. The options are Disabled and **Enabled**.

PH Randomization

Use this item to disable or enable Platform Hiearchy (PH) Randomization. The options are **Disabled** and Enabled.

TXT Support

Intel Trusted Execution Technology (TXT) helps protect against software-based attacks and ensures protection, confidentiality, and integrity of data stored or created on the system. Use this feature to enable or disable TXT Suppport. The options are Disable and Enable.

■ HTTP Boot Configuration

HTTP BOOT Configuration

Http Boot One Time

Use this feature to create the HTTP boot option. The options are **Disabled** and Enable.

Input the description

Highlight the feature and press enter to create a description.

Boot URI

Highlight the feature and press enter to create a boot URI.

■ TLS Authentication Configuration

This submenu allows the user to configure Transport Layer Security (TLS) settings.

■ Server CA Configuration

- ➢ **Enroll Certification**
  - ➢ **Enroll Certification Using File**

Use this feature to enroll certification from a file.

Certification GUID

Use this feature to enroll to input the certification GUID.

Commit Changes and Exit

Use this feature to enroll to save all changes and exit TLS settings.

Discard Changes and Exit

Use this feature to enroll to discard all changes and exit TLS settings.

Delete Certification

Use this feature to delete certification

■ Intel(R) Virtual RAID on CPU

Intel(R) VROC with VMD Technology 5.1.0.1007

RAID volumes and Intel VMD Controllers information will be displayed if they are detected by the system.

■ iSCSI Configuration

iSCSI Initiator Name

This feature allows the user to enter the unique name of the iSCSI Initiator in IQN format. Once the name of the iSCSI Initiator is entered into the system, configure the proper settings for the following items.

- **Add an Attempt**
- **Delete Attempts**
- **Change Attempt Order**

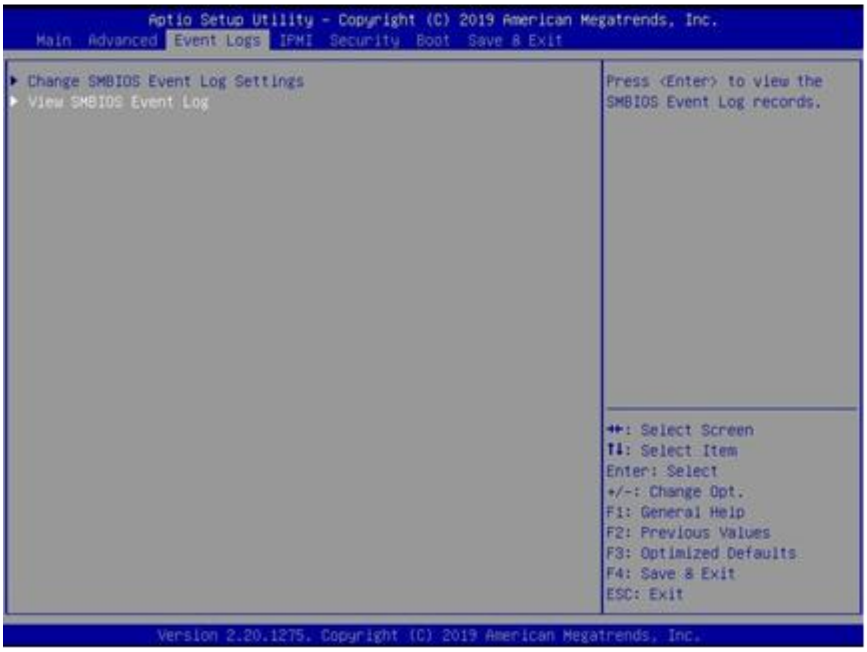
■ Driver Health

Intel® DCPMM 1.0.0 3429 Driver

This feature provides health status for the drivers and controllers.

3.4 Event Logs

Use this feature to configure Event Log settings.



```
▶ Change SMBIOS Event Log Settings
▶ View SMBIOS Event Log
```

Press <Enter> to view the SMBIOS Event Log records.

■ Change SMBIOS Event Log Settings

Enabling/Disabling Options

SMBIOS Event Log

Change this item to enable or disable all features of the SMBIOS Event Logging during system boot. The options are **Enabled** and Disabled.

Erasing Settings

Erase Event Log

If No is selected, data stored in the event log will not be erased. Select Yes, Next Reset, data in the event log will be erased upon next system reboot. Select Yes, Every Reset, data in the event log will be erased upon every system reboot. The options are **No**, Yes, Next reset, and Yes, Every reset.

When Log is Full

Select Erase Immediately for all messages to be automatically erased from the event log when the event log memory is full. The options are **Do Nothing** and Erase Immediately.

SMBIOS Event Log Standard Settings

Log System Boot Event

This option toggles the System Boot Event logging to enabled or disabled. The options are **Disabled** and Enabled.

MECI

The Multiple Event Count Increment (MECI) counter counts the number of occurences that a duplicate event must happen before the MECI counter is incremented. This is a numeric value. The default value is **1**.

METW

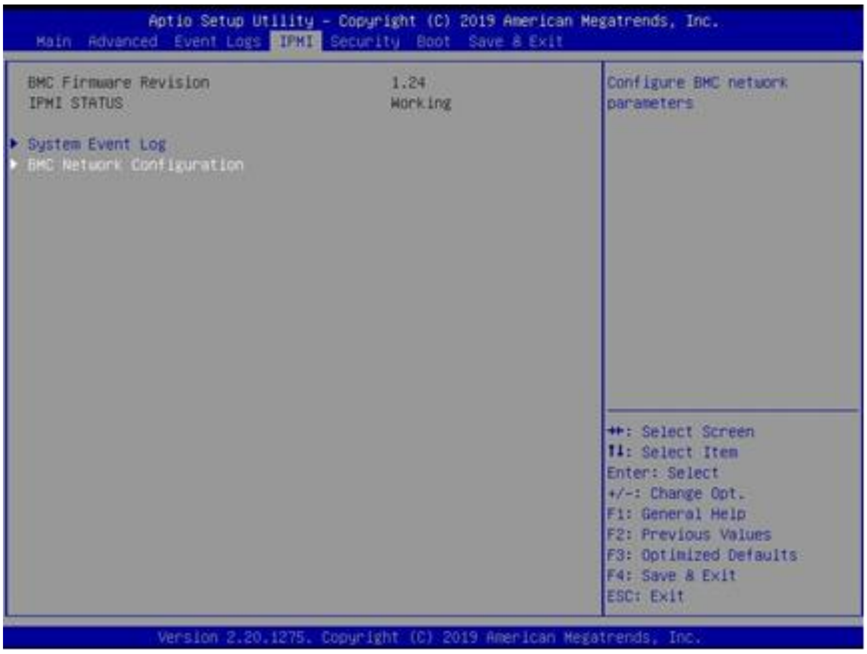
The Multiple Event Time Window (METW) defines the number of minutes that must pass between duplicate log events before MECI is incremented. This is in minutes, from 0 to 99. The default value is **60**.

■ View SMBIOS Event Log

Select this submenu and press enter to see the contents of the SMBIOS event log. The following categories will be displayed: Date/Time/Error Code/Severity

3.5 IPMI

Use this feature to configure Intelligent Platform Management Interface (IPMI) settings



```
            Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
   Main  Advanced  Event Logs  IPMI  Security  Boot  Save & Exit

  BMC Firmware Revision                    1.24          Configure BMC network
  IPMI STATUS                              Working       parameters

▶ System Event Log
▶ BMC Network Configuration

                                                         →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit

            Version 2.20.1275. Copyright (C) 2019 American Megatrends, Inc.
```

BMC Firmware Revision

This item indicates the IPMI firmware revision used in your system.

IPMI Status (Baseboard Management Controller)

This item indicates the status of the IPMI firmware installed in your system.

■ System Event Log

Enabling/Disabling Options

SEL Components

Select Enabled for all system event logging at bootup. The options are **Enabled** and Disabled.

Erasing Settings

Erase SEL

Select Yes, On next reset to erase all system event logs upon next system reboot. Select Yes, On every reset to erase all system event logs upon each system reboot. Select No to keep all system event logs after each system reboot. The options are **No,** Yes, On next reset, and Yes, On every reset.

When SEL is Full

This feature allows the user to decide what the BIOS should do when the system event log is full. Select Erase Immediately to erase all events in the log when the system event log is full. The options are **Do Nothing** and Erase Immediately.

■ BMC Network Configuration

BMC Network Configuration

Configure IPV4 Support

This section displays configuration features for IPV4 support.

IPMI LAN Selection

This item displays the IPMI LAN setting. The default setting is **Failover**.

IPMI Network Link Status

This item displays the IPMI Network Link status. The default setting is **Shared LAN**.

Update IPMI LAN Configuration

Select Yes for the BIOS to implement all IP/MAC address changes at the next system boot. The options are **No** and Yes.

If the item above is set to Yes, the following item will become available for configuration:

Configuration Address Source

This feature allows the user to select the source of the IP address for this computer. If Static is selected, you will need to know the IP address of this computer and enter it to the system manually in the field. If DHCP is selected, the BIOS will search for a DHCP (Dynamic Host Configuration Protocol) server in the network that is attached to and request the next available IP address for this computer. The options are **DHCP** and Static.

If the item above is set to Static, the following items will become available for configuration:

Station IP Address

This item displays the Station IP address for this computer. This should be in decimal and in dotted quad form (i.e., 192.168.10.253).

Subnet Mask

This item displays the sub-network that this computer belongs to. The value of each three- digit number separated by dots should not exceed 255.

Station MAC Address

This item displays the Station MAC address for this computer. Mac addresses are 6 two-digit hexadecimal numbers.

Gateway IP Address

This item displays the Gateway IP address for this computer. This should be in decimal and in dotted quad form (i.e., 172.31.0.1).

VLAN

This item displays the virtual LAN settings. The options are **Disable** and Enable.

Configure IPV6 Support

This section displays configuration features for IPV6 support.

LAN Channel 1

IPV6 Support

Use this feature to enable IPV6 support. The options are **Enabled** and Disabled.

Configuration Address Source

This feature allows the user to select the source of the IP address for this computer. If Static is selected, you will need to know the IP address of this computer and enter it to the system manually in the field. If DHCP is selected, the BIOS will search for a DHCP (Dynamic Host Configuration Protocol) server in the network that is attached to and request the next available IP address for this computer. The options are Static and **DHCP**.

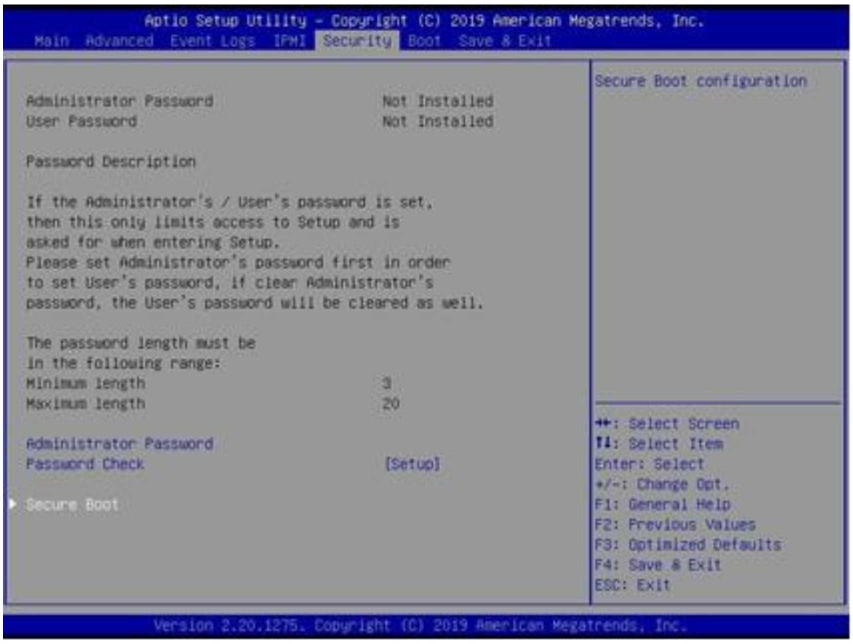
If the item above is set to Static, the following items will become available for configuration:

- Station IPV6 Address

- Prefix Length
- IPV6 Router1 IP Address

3.6 Security

This menu allows the user to configure the following security settings for the system.



```
Administrator Password                          Not Installed
User Password                                   Not Installed

Password Description

If the Administrator's / User's password is set,
then this only limits access to Setup and is
asked for when entering Setup.
Please set Administrator's password first in order
to set User's password, if clear Administrator's
password, the User's password will be cleared as well.

The password length must be
in the following range:
Minimum length                                  3
Maximum length                                  20

Administrator Password
Password Check                                  [Setup]

▶ Secure Boot
```

Administrator Password

Press Enter to create a new, or change an existing, Administrator password.

User Password

Press Enter to create a new, or change an existing, User password.

Password Check

Select Setup for the system to check for a password at Setup. Select Always for the system to check for a password at bootup or upon entering the BIOS Setup utility. The options are **Setup** and Always.

u**Secure Boot**

This section displays the contents of the following secure boot features:

- System Mode
- Vendor Keys

- Secure Boot

Secure Boot

Use this item to enable secure boot. The options are **Disabled** and Enabled.

Secure Boot Mode

Use this item to configure Secure Boot variables without authentication. The options are Standard and **Custom**.

CSM Support

Select Enabled to support the EFI Compatibility Support Module (CSM), which provides compatibility support for traditional legacy BIOS for system boot. The options are **Enabled** and Disabled.

Provision Factory Default Keys

Select Enabled to install the default Secure Boot keys set by the manufacturer. The options are **Disabled** and Enabled.

■ **Key Management**

This submenu allows the user to configure the following Key Management settings.

■ **Restore Factory Keys**

Select Yes to force system to install factory default keys. The options are **Yes** and No.

■ u**Reset to Setup Mode**

Select Yes to delete all erase all Secure Boot key databases from NVRAM. The options are **Yes** and No.

■ **Export All Secure Boot Variables**

This feature allows the user to copy all variables onto a file on a separate device.

■ **Enroll EFI Image**

This feature allows the image to run in Secure Boot Mode. Enroll SHA256 Hash Certifi- cate of the image into the Authorized Signature Database.

Device Guard Ready

■ **Remove 'UEFI CA' from DB**

Use this feature to remove the Microsoft UEFI CA certificate from the database. The options are Yes and No.

- **Restore DB defaults**

Select Yes to restore the DB defaults.

- **Platform Key (PK)**

This feature allows the user to configure the settings of the platform keys.

Update

Select Yes to load the new Platform Keys (PK) from the manufacturer's defaults. Select No to load the Platform Keys from a file. The options are Yes and No.

- **Key Exchange Keys**

Update

Select Yes to load the KEK from the manufacturer's defaults. Select No to load the KEK from a file. The options are Yes and No.

Append

Select Yes to add the KEK from the manufacturer's defaults list to the existing KEK. Select No to load the KEK from a file. The options are Yes and No.

- **Authorized Signatures**

Update

Select Yes to load the factory default DB. Select No to load the DB from a external file. The options are Yes and No.

Append

Select Yes to add the database from the manufacturer's defaults to the existing DB. Select No to load the DB from a file. The options are Yes and No.

- **Forbidden Signatures**

Update

Select Yes to load the DBX factory default 'dbx.' Select No to load it from an external file. The options are Yes and No.

Append

Select Yes to add the DBX from the manufacturer's defaults to the existing DBX. Select No to load the DBX from a file. The options are Yes and No.

- **Authorized TimeStamps**

Update

Select Yes to load the DBT from the manufacturer's defaults. Select No to load the DBT from a file. The options are Yes and No.

Append

Select Yes to add the DBT from the manufacturer's defaults list to the existing DBT. Select No to load the DBT from a file. The options are Yes and No.

- **OsRecovery Signature**

This item uploads and installs an OSRecovery Signature. You may insert a factory default key or load from a file. The file formats accepted are:

1) Public Key Certificate
a. EFI Signature List
b. EFI CERT X509 (DER Encoded)
c. EFI CERT RSA2048 (bin)
d. EFI SERT SHA256 (bin)
2) EFI Time Based Authenticated Variable
When prompted, select "Yes" to load Factory Defaults or "No" to load from a file.

Update

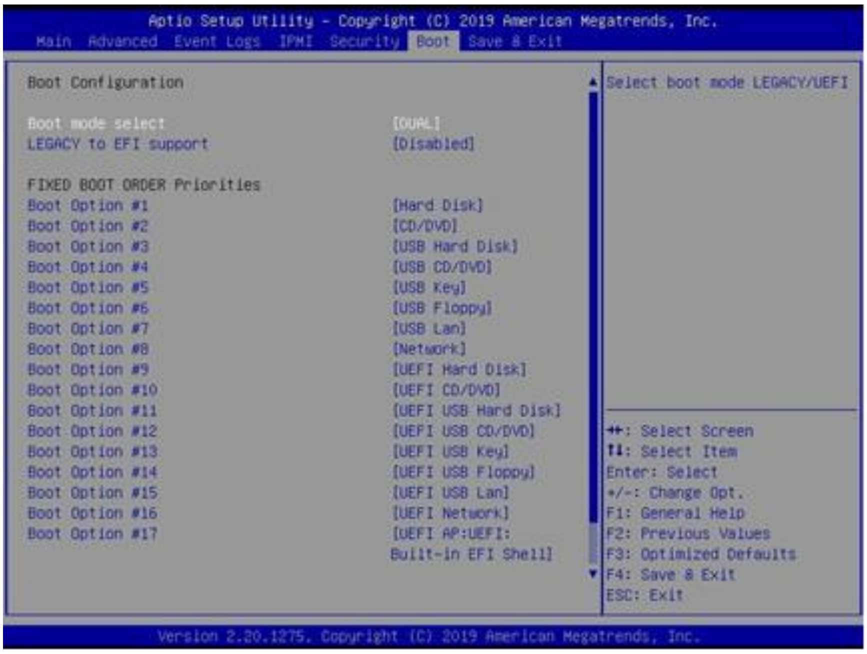
Select Yes to load the DBR from the manufacturer's defaults. Select No to load the DBR from a file. The options are Yes and No.

Append

This feature uploads and adds an OsRecovery Signature into the Key Management. You may insert a factory default key or load from a file. When prompted, select "Yes" to load Factory Defaults or "No" to load from a file.

3.7 Boot

Use this feature to configure Boot settings



```
                 Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
   Main  Advanced  Event Logs  IPMI  Security  Boot  Save & Exit

  Boot Configuration                                    Select boot mode LEGACY/UEFI

  Boot mode select                  [DUAL]
  LEGACY to EFI support             [Disabled]

  FIXED BOOT ORDER Priorities
  Boot Option #1                    [Hard Disk]
  Boot Option #2                    [CD/DVD]
  Boot Option #3                    [USB Hard Disk]
  Boot Option #4                    [USB CD/DVD]
  Boot Option #5                    [USB Key]
  Boot Option #6                    [USB Floppy]
  Boot Option #7                    [USB Lan]
  Boot Option #8                    [Network]
  Boot Option #9                    [UEFI Hard Disk]
  Boot Option #10                   [UEFI CD/DVD]
  Boot Option #11                   [UEFI USB Hard Disk]
  Boot Option #12                   [UEFI USB CD/DVD]     ++: Select Screen
  Boot Option #13                   [UEFI USB Key]        ↑↓: Select Item
  Boot Option #14                   [UEFI USB Floppy]     Enter: Select
  Boot Option #15                   [UEFI USB Lan]        +/-: Change Opt.
  Boot Option #16                   [UEFI Network]        F1: General Help
  Boot Option #17                   [UEFI AP:UEFI:        F2: Previous Values
                                    Built-in EFI Shell]   F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit
              Version 2.20.1275. Copyright (C) 2019 American Megatrends, Inc.
```

Boot Mode Select

Use this item to select the type of device that the system is going to boot from. The options are Legacy, UEFI, and **DUAL.**

Legacy to EFI Support

Select Enabled to boot EFI OS support after Legacy boot order has failed. The options are **Disabled** and Enabled.

Fixed Boot Order Priorities

This option prioritizes the order of bootable devices that the system boots from. Press <Enter> on each entry from top to bottom to select devices.

If the item "Boot Mode Select" above is set to Legacy, UEFI, or Dual, the following items will be displayed:

- Legacy/UEFI/Dual Boot Option #1
- Legacy/UEFI/Dual Boot Option #2
- Legacy/UEFI/Dual Boot Option #3
- Legacy/UEFI/Dual Boot Option #4
- Legacy/UEFI/Dual Boot Option #5
- Legacy/UEFI/Dual Boot Option #6

- Legacy/UEFI/Dual Boot Option #7
- Legacy/UEFI/Dual Boot Option #8
- UEFI/Dual Boot Option #9
- Dual Boot Option #10

- Dual Boot Option #11
- Dual Boot Option #12
- Dual Boot Option #13
- Dual Boot Option #14
- Dual Boot Option #15
- Dual Boot Option #16
- Dual Boot Option #17

■ **Delete Boot Option**

This feature allows the user to select a boot device to delete from the boot priority list.

■ **Delete Boot Option**

Use this item to remove an EFI boot option from the boot priority list.

■ **UEFI Application Boot Priorities**

This feature allows the user to specify which UEFI devices are boot devices.

- UEFI Boot Option #1

If any storage media is detected, the following items will become available for configuration:

■ **Add New Boot Option**

This feature allows the user to add a new boot option to the boot priority features for your system.

Add Boot Option

Use this item to specify the name for the new boot option.

Path for Boot Option

Use this item to enter the path for the new boot option in the format fsx:\path\filename.efi.

Boot Option File Path

Use this item to specify the file path for the new boot option.

Create

Use this item to set the name and the file path of the new boot option.

■ **UEFI USB Key Drive BBS Priorities**

This feature sets the system boot order of detected devices.

- Boot Option #1

- **USB Key Drive BBS Priorities**

This feature sets the system boot order of detected devices.

- Boot Option #1

- **UEFI Hard Disk Drive BBS Priorities**

This feature sets the system boot order of detected devices.

- Boot Option #1

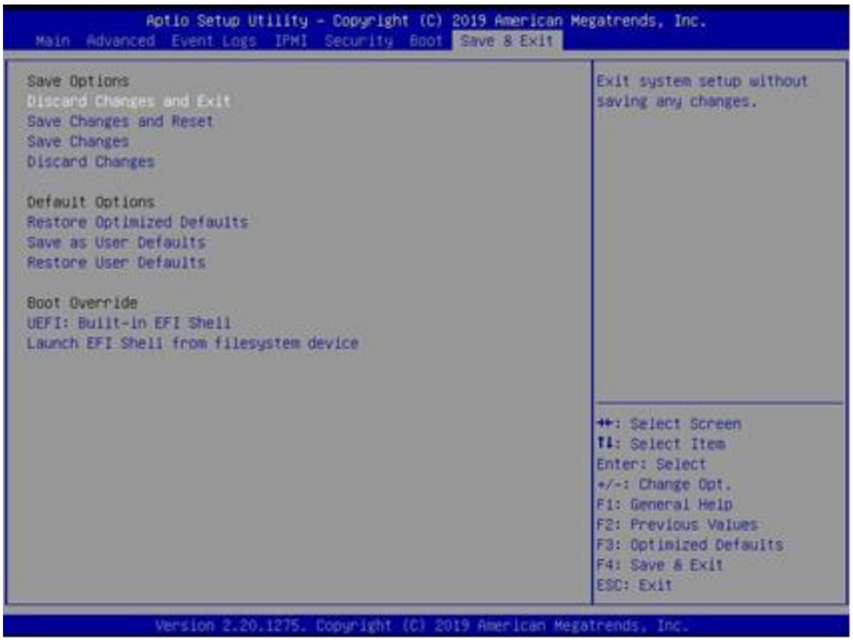
- **Hard Disk Drive BBS Priorities**

This feature sets the system boot order of detected devices.

- Boot Option #1

3.8 Save & Exit

Select the Save & Exit tab from the BIOS setup screen to configure the settings below:



```
          Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
   Main  Advanced  Event Logs  IPMI  Security  Boot  Save & Exit

  Save Options                                    Exit system setup without
  Discard Changes and Exit                        saving any changes.
  Save Changes and Reset
  Save Changes
  Discard Changes

  Default Options
  Restore Optimized Defaults
  Save as User Defaults
  Restore User Defaults

  Boot Override
  UEFI: Built-in EFI Shell
  Launch EFI Shell from filesystem device

                                                  →←: Select Screen
                                                  ↑↓: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F3: Optimized Defaults
                                                  F4: Save & Exit
                                                  ESC: Exit

          Version 2.20.1275. Copyright (C) 2019 American Megatrends, Inc.
```

Save Options

Discard Changes and Exit

Select this option to quit the BIOS Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>.

Save Changes and Reset

After completing the system configuration changes, select this option to save the changes you have made. This will not reset (reboot) the system.

Save Changes

When you have completed the system configuration changes, select this option to leave the BIOS setup utility and reboot the computer for the new system configuration parameters to take effect. Select Save Changes from the Save & Exit menu and press <Enter>.

Discard Changes

Select this option and press <Enter> to discard all the changes and return to the AMI BIOS utility program

Default Options

Restore Optimized Defaults

To set this feature, select Restore Defaults from the Save & Exit menu and press <Enter>. These are factory settings designed for maximum system stability, but not for maximum performance.

Save As User Defaults

To set this feature, select Save as User Defaults from the Save & Exit menu and press <Enter>. This enables the user to save any changes to the BIOS setup for future use.

Restore User Defaults

To set this feature, select Restore User Defaults from the Save & Exit menu and press <Enter>. Use this feature to retrieve user-defined settings that were saved previously.

Boot Override

Listed in this section are other boot options for the system (i.e., Built-in EFI shell). Select an option and press <Enter>. Your system will boot to the selected boot option