Lanner

Edge Computing Appliance Platform

Hardware Platforms for Edge Computing

ECA-4035
User Manual

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About this Document

This manual describes the overview of the various functionalities of this product, and the information you need to get it ready for operation. It is intended for those who are:

- responsible for installing, administering and troubleshooting this system or Information Technology professionals.
- assumed to be qualified in the servicing of computer equipment, such as professional system integrators, or service personnel and technicians.

The latest version of this document can be found on Lanner's official website, available either through the product page or through the Lanner Download Center page with a login account and password.

Conventions & Icons

The icons are used in the manual to serve as an indication of interest topics or important messages.

Icon	Usage
 **Note or Information**	This mark indicates that there is something you should pay special attention to while using the product.
 **Warning or Important**	This mark indicates that there is a caution or warning and it is something that could damage your property or product.

Online Resources

To obtain additional documentation resources and software updates for your system, please visit the Lanner Download Center. As certain categories of documents are only available to users who are logged in, please be registered for a Lanner Account at http://www.lannerinc.com/ to access published documents and downloadable resources.

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Documentation Feedback

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Contact Information

Taiwan Corporate Headquarters

Lanner Electronics Inc.

7F, No.173, Sec.2, Datong Rd.

Xizhi District, New Taipei City 22184,

Taiwan

立端科技股份有限公司

221 新北市汐止區

大同路二段 173 號 7 樓

T: +886-2-8692-6060

F: +886-2-8692-6101

E: contact@lannerinc.com

China

Beijing L&S Lancom Platform Tech. Co., Ltd.

Guodong LOFT 9 Layer No. 9 Huinan Road,

Huilongguan Town, Changping District, Beijing

102208 China

T: +86 010-82795600

F: +86 010-62963250

E: service@ls-china.com.cn

USA

Lanner Electronics Inc.

47790 Westinghouse Drive

Fremont, CA 94539

T: +1-855-852-6637

F: +1-510-979-0689

E: sales_us@lannerinc.com

Canada

Lanner Electronics Canada Ltd

3160A Orlando Drive

Mississauga, ON

L4V 1R5 Canada

T: +1 877-813-2132

F: +1 905-362-2369

E: sales_ca@lannerinc.com

Europe

Lanner Europe B.V.

Wilhelmina van Pruisenweg 104

2595 AN The Hague

The Netherlands

T: +31 70 701 3256

E: sales_eu@lannerinc.com

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Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of 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 instruction, 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 receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution

- Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Note

1. An unshielded-type power cord is required in order to meet FCC emission limits and also to prevent interference to the nearby radio and television reception. It is essential that only the supplied power cord be used.
2. Use only shielded cables to connect I/O devices to this equipment.
3. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Important

1. Operations in the 5.15-5.25GHz band are restricted to indoor usage only.
2. This device meets all the other requirements specified in Part 15E, Section 15.407 of the FCC Rules.

Safety Guidelines

Follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.
- Do not wear loose clothing or jewelry that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses if you are working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Disconnect all power by turning off the power and unplugging the power cord before installing or removing a chassis or working near power supplies
- Do not work alone if potentially hazardous conditions exist.
- Never assume that power is disconnected from a circuit; always check the circuit.

Consignes de sécurité

Suivez ces consignes pour assurer la sécurité générale :

- Laissez la zone du châssis propre et sans poussière pendant et après l'installation.
- Ne portez pas de vêtements amples ou de bijoux qui pourraient être pris dans le châssis. Attachez votre cravate ou écharpe et remontez vos manches.
- Portez des lunettes de sécurité pour protéger vos yeux.
- N'effectuez aucune action qui pourrait créer un danger pour d'autres ou rendre l'équipement dangereux.
- Coupez complètement l'alimentation en éteignant l'alimentation et en débranchant le cordon d'alimentation avant d'installer ou de retirer un châssis ou de travailler à proximité de sources d'alimentation.
- Ne travaillez pas seul si des conditions dangereuses sont présentes.
- Ne considérez jamais que l'alimentation est coupée d'un circuit, vérifiez toujours le circuit. Cet appareil génère, utilise et émet une énergie radiofréquence et, s'il n'est pas installé et utilisé conformément aux instructions des fournisseurs de composants sans fil, il risque de provoquer des interférences dans les communications radio.

Lithium Battery Caution

- There is risk of explosion if the battery is replaced by an incorrect type.
- Dispose of used batteries according to the instructions.
- Installation should be conducted only by a trained electrician or only by an electrically trained person who knows all installation procedures and device specifications which are to be applied.
- Do not carry the handle of power supplies when moving to another place.
- Please conform to your local laws and regulations regarding safe disposal of lithium battery.
- Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery can result in an explosion.
- Leaving a battery in an extremely high temperature environment can result in an explosion or the leakage of flammable liquid or gas.
- A battery subjected to extremely low air pressure may result in an explosion or the leakage of flammable liquid or gas.
- CAUTION: Risk of Explosion if Battery is replaced by an Incorrect Type. Dispose of Used Batteries According to the Instructions."

Avertissement concernant la pile au lithium

- Risque d'explosion si la pile est remplacée par une autre d'un mauvais type.
- Jetez les piles usagées conformément aux instructions.
- L'installation doit être effectuée par un électricien formé ou une personne formée à l'électricité connaissant toutes les spécifications d'installation et d'appareil du produit.
- Ne transportez pas l'unité en la tenant par le câble d'alimentation lorsque vous déplacez l'appareil.
- ATTENTION: Risque d'explosion si la batterie est remplacée par un type incorrect. Mettre au rebus les batteries usagées selon les instructions."

Operating Safety

- Electrical equipment generates heat. Ambient air temperature may not be adequate to cool equipment to acceptable operating temperatures without adequate circulation. Be sure that the room in which you choose to operate your system has adequate air circulation.
- Ensure that the chassis cover is secure. The chassis design allows cooling air to circulate effectively. An open chassis permits air leaks, which may interrupt and redirect the flow of cooling air from internal components.
- Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD damage occurs when electronic components are improperly handled and can result in complete or intermittent failures. Be sure to follow ESD-prevention procedures when removing and replacing components to avoid these problems.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. If no wrist strap is available, ground yourself by touching the metal part of the chassis.
- Periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms (Mohms).
- Product shall be used with Class 1 laser device modules.
- The unit is only for Skilled person to install and maintenance
- The device can only be used in a fixed location such as a lab or a machine room. When you install the device, ensure that the protective earthing connection of the socket-outlet is verified by a skilled person.

Sécurité de fonctionnement

- L'équipement électrique génère de la chaleur. La température ambiante peut ne pas être adéquate pour refroidir l'équipement à une température de fonctionnement acceptable sans circulation adaptée. Vérifiez que votre site propose une circulation d'air adéquate.
- Vérifiez que le couvercle du châssis est bien fixé. La conception du châssis permet à l'air de refroidissement de bien circuler. Un châssis ouvert laisse l'air s'échapper, ce qui peut interrompre et rediriger le flux d'air frais destiné aux composants internes.
- Les décharges électrostatiques (ESD) peuvent endommager l'équipement et gêner les circuits électriques. Des dégâts d'ESD surviennent lorsque des composants électroniques sont mal manipulés et peuvent causer des pannes totales ou intermittentes. Suivez les procédures de prévention d'ESD lors du retrait et du remplacement de composants.
- Portez un bracelet anti-ESD et veillez à ce qu'il soit bien au contact de la peau. Si aucun bracelet n'est disponible, reliez votre corps à la terre en touchant la partie métallique du châssis.
- Vérifiez régulièrement la valeur de résistance du bracelet antistatique, qui doit être comprise entre 1 et 10 mégohms (Mohms).
- Le produit doit être utilisé avec des modules de dispositifs laser de classe 1.
- Cette machine est réservée aux techniciens à installer et à entretenir
- L'appareil ne peut être utilisé que dans un lieu fixe, tel qu'un laboratoire ou une salle de machines. Lorsque vous installez l'appareil, assurez-vous que le raccordement à la terre de protection de la prise de courant a fait l'objet d'une vérification par une personne qualifiée.

Mounting Installation Precautions

The following should be put into consideration for rack-mount or similar mounting installations:

- Do not install and/or operate this unit in any place that flammable objects are stored or used in.
- The installation of this product must be performed by trained specialists; otherwise, a non-specialist might create the risk of the system's falling to the ground or other damages.
- Lanner Electronics Inc. shall not be held liable for any losses resulting from insufficient strength for supporting the system or use of inappropriate installation components.
- 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 airflow 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 overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- Reliable Grounding - Reliable grounding 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).

Installation & Operation

- This equipment must be grounded. The power cord for product should be connected to a socket-outlet with earthing connection.
  Cet équipement doit être mis à la terre. La fiche d'alimentation doit être connectée à une prise de terre correctement câblée

- Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.
  Peut être installé dans des salles de matériel de traitement de l'information conformément à l'article 645 du National Electrical Code et à la NFPA 75.

- The machine can only be used in a restricted access location and must be installed by a skilled person.
  Les matériels sont destinés à être installés dans des EMPLACEMENTS À ACCÈS RESTREINT.

Warning

- Class I Equipment. This equipment must be earthed. The power plug must be connected to a properly wired earth ground socket outlet. An improperly wired socket outlet could place hazardous voltages on accessible metal parts.
- Product shall be used with Class 1 laser device modules.

Avertissement

- Équipement de classe I. Ce matériel doit être relié à la terre. La fiche d'alimentation doit être raccordée à une prise de terre correctement câblée. Une prise de courant mal câblée pourrait induire des tensions dangereuses sur des parties métalliques accessibles.
- Le produit doit être utilisé avec des modules de dispositifs laser de classe 1.

Electrical Safety Instructions

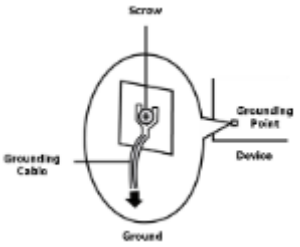
Before turning on the device, ground the grounding cable of the equipment. Proper grounding (grounding) is very important to protect the equipment against the harmful effects of external noise and to reduce the risk of electrocution in the event of a lightning strike. To uninstall the equipment, disconnect the ground wire after turning off the power. A ground wire is required and the part connecting the conductor must be greater than 4 mm2 or 10 AWG.

Consignes de sécurité électrique

- Avant d'allumer l'appareil, reliez le câble de mise à la terre de l'équipement à la terre.
- Une bonne mise à la terre (connexion à la terre) est très importante pour protéger l'équipement contre les effets néfastes du bruit externe et réduire les risques d'électrocution en cas de foudre.
- Pour désinstaller l'équipement, débranchez le câble de mise à la terre après avoir éteint l'appareil.
- Un câble de mise à la terre est requis et la zone reliant les sections du conducteur doit faire plus de 4 mm2 ou 10 AWG.

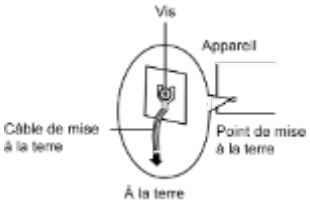
Grounding Procedure for DC Power Source

- Connect the grounding cable to the ground.
- The protection device for the DC power source must provide 30 A current.
- This protection device must be connected to the power source before DC power.



Procédure de mise à la terre pour source d'alimentation CC

- Branchez le câble de mise à la terre à la terre.
- L'appareil de protection pour la source d'alimentation CC doit fournir 30 A de courant.
- Cet appareil de protection doit être branché à la source d'alimentation avant l'alimentation CC.



Important

1. For DC power supply, TQ LB In=12, Wiring rage= 22-16AWG, Wire Type= Cu
2. The unit is intended to be supplied by a UL/IEC 62368-1 certified DC power source with ES1 output rated -57 V DC to -40 V DC, minimum 7-10 A with Maximum ambient temperature 65 °C or higher and altitude 5000 m.
3. This equipment must be grounded and the power cord for the equipment should be connected to a socket-outlet with earthing connection.

Instruction for the installation of the conductor to building earth by a skilled person.

Table of Contents

CHAPTER 1: PRODUCT OVERVIEW

The ECA-4035 offers 8~22 cores of computing power and comes with 1x OCP 3.0 and 1x PCIe*16; the ECA-4035 is designed for deployment either as edge AI servers for smart city applications, or as multi-access edge computing (MEC) servers for 5G edge cloud and vRAN/O-RAN platform for distributed units.

Main Features

- Intel® Xeon D2700/2800 8~22 Cores Processor
- 4x DDR4 3200/2933MHz REG RDIMM, Max. 256GB
- 8x 10G SFP+, 2x 25G SFP28, 2x GbE RJ45 Ports, 2x USB 3.0 Ports
- 1x RJ45 Console, 2x M.2 2280 (1x NVMe & 1x SATA)
- -40C~65C Operating Temperature (SKU B/C/E)
- 1x OCP 3.0 NIC Slot, 1x PCIe*16 FH 3/4L

Package Content

Your package contains the following items:

- 1x ECA-4035 Edge Computing Platform
- 1x RJ45 Console Cable
- 2x Power Supply Unit
- M.2 Screw Packet
- 1x Short Ear Rack Mount Kit with screws

Ordering Information

SKU No.	Description
ECA-4035A	Intel® Xeon® 20C, D2798NT with QAT, 4x DDR4 3200MHz, 2x GbE RJ45, 8x 10G SFP+, 2x 25G SFP28, 1x PCIe Slot, 1x OCP3.0 NIC, 2x 2280 M.2, 2 x 2.5" SATA Storage, 600W PSU, 0~40 Operating Temp
ECA-4035B	Intel® Xeon® 18C, D2786NTE with QAT, 2x DDR4 2933MHz, 2x GbE RJ45, 8x 10G SFP+, 2x 25G SFP28, 1x PCIe Slot, 1x OCP3.0 NIC, 2x 22880 M.2, 600W PSU, -40~65 Operating Temp
ECA-4035C	Intel® Xeon® 20C, D2896TER, 2x DDR4 2933MHz, 2x GbE RJ45, 8x 10G SFP+, 2x 25G SFP28, 1 x PCIe Slot, 1x OCP3.0 NIC, 2x 2280 M.2, 600W PSU, -40~65 Operating Temp
ECA-4035D	Intel® Xeon® 22C, D2899NT with QAT, 4x DDR4 3200MHz, 2x GbE RJ45, 8x 10G SFP+, 2x 25G SFP28, 1x OCP3.0 NIC, 2x 2280 M.2, 2x 2.5" SATA Storage, 600W PSU, 0~40 Operating Temp
ECA-4035E	Intel® Xeon® 20C, D2896TER, 2x DDR4 2933MHz, 2x GbE RJ45, 8x 10G SFP+, 2x 25G SFP28, 1x PCIe Slot, 1x OCP3.0 NIC, 2x 2280 M.2, 800W DC Input, -40~65 Operating Temp

Optional Accessories

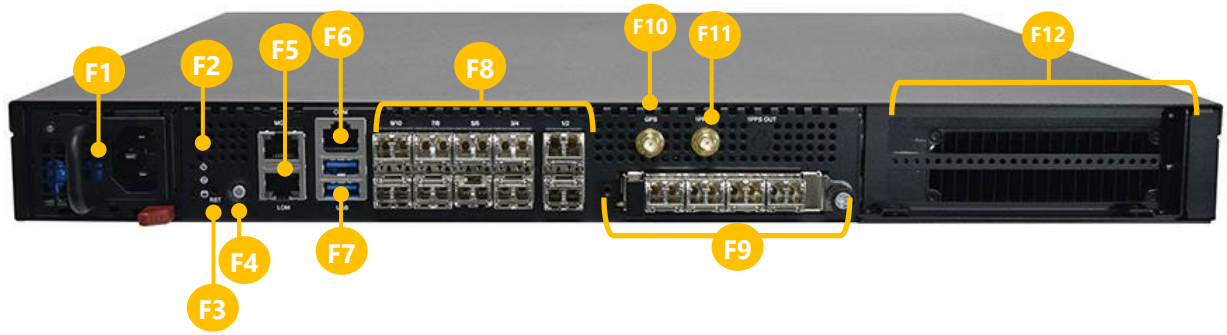
Model	Description
Riser Card Kit	Riser Card Kit for rear slot
Rackmount Slide Rail Kit	1U Rackmount Slide Rail Kit
AC Power Kit	AC Redundant Power Module
DC Power Kit	DC Redundant Power Module

Note The latest version of IEEE-1588 and SyncE Timing Module User Manual can be found on Lanner Download Center.

System Specifications

Form Factor		1U 19" Rackmount
Platform	Processor Options	Intel® Xeon® D2700/2800, 8~22 Cores
	CPU Socket	Onboard
	Chipset	SoC
	Security Acceleration	Intel® QuickAssist Technology
BIOS		AMI SPI Flash BIOS
System Memory	Technology	SKU A/D: DDR4 3200MHz REG RDIMM; SKU B/C/E: DDR4 2933MHz REG RDIMM
	Max. Capacity	Up to 256GB / 128GB
	Socket	SKU A/D: 4x 288pin DIMM SKU B/C/E: 2x 288pin DIMM
Networking	Ethernet Ports	2x GbE RJ45 (Intel® i210-AT) 4x 10G SFP+; 2x 25G SFP28; 4x 10G SFP+ (Intel® XL710)
	IEEE 1588	Yes
	GPS	Yes
LOM	I/O Interface	1x GbE RJ45 via NCSI
	OPMA slot	Yes, IPMI Module on board
I/O Interface	Reset Button	1x Reset Button (Default SW Reset)
	Power Button	1x ATX Power Switch (N/A for DC Power Input Design)
	LED Indicator	Power / Status / Storage, refer to **Appendix A**
	Console Port	1x RJ45 Console Port
	USB Port	2x USB 3.0 Port
	Power Input	AC Power Inlet on PSU; OR Single DC Power Inlet (By SKU)
Storage	HDD/SSD Support	2x 2.5" Internal Drive Bay (SKU A/D)
	Onboard Slots	1x M.2 2280 M-Key for NVMe; 1x M.2 2280 M-Key for SATA
Expansion	PCIe	1x PCIe*16 FH3/4L; 1x OCP 3.0 NIC Slot
Miscellaneous	Watchdog	Yes
	Internal RTC w/ Li Battery	Yes
	TPM	Yes, TPM 2.0 Module onboard
Cooling	Processor	Passive CPU Heatsink
	System	8x or 6x Smart Fans (By SKU)
Environmental Parameters	Temperature	SKU A/D: 0°C~40°C Operating SKU B/C/E: -40˚C ~65˚C Operating -40˚C ~70˚C Storage Temperature
	Humidity (RH)	5% ~ 90% RH Operating; 5% ~ 95% RH Storage
System Dimensions	(WxDxH)	438 x 380 x 44mm
	Weight	TBD
Package Dimensions	(WxDxH)	TBD
	Weight	TBD
Power	Type/Watts	600W or 800W
	Input	SKU A/B/C/D: AC 90~264V @47~63 Hz; SKU E: DC -57VDC~40VDC
Approvals and Compliance		RoHS Directive (EU), CE/FCC Class A, UL
OS Support		Linux

Front Panel



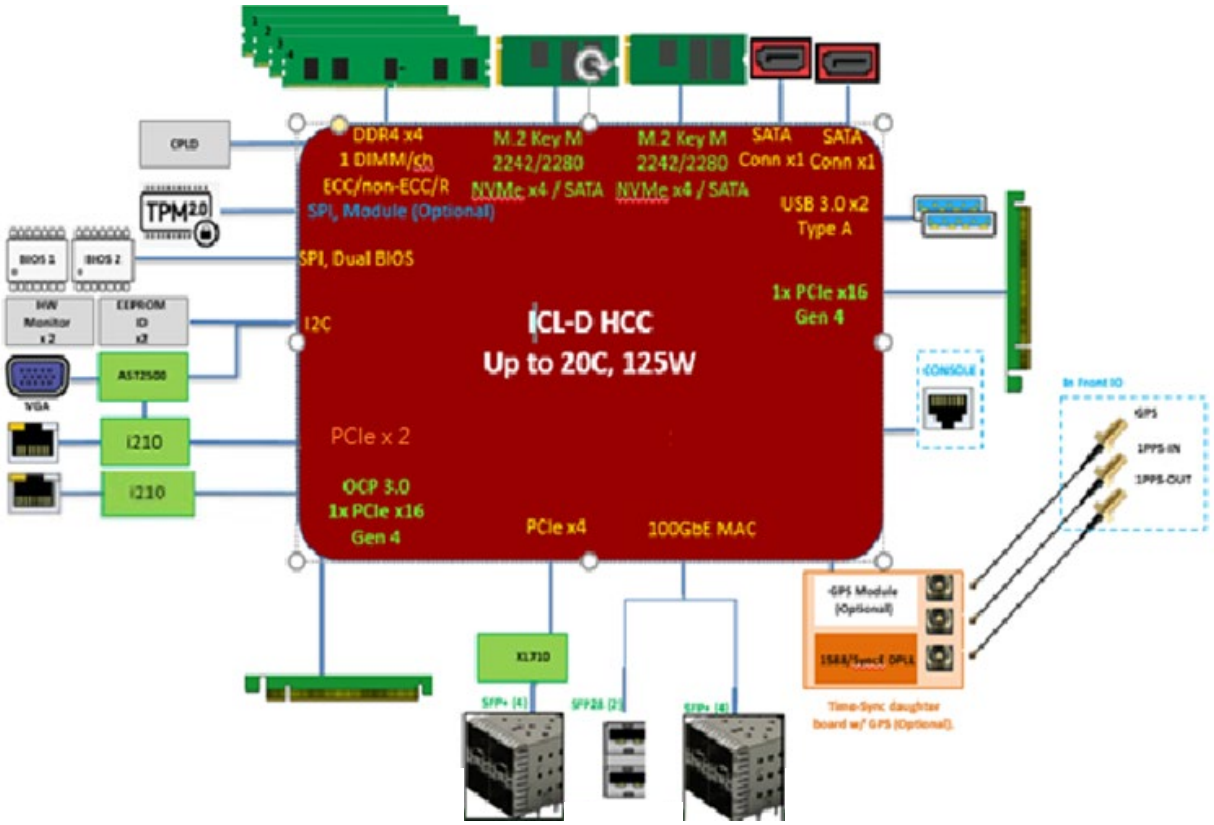
No.	Description	
F1	Power Supply	AC Power Supply
F2	LED Indicator	System Power / System Status / Storage Status LED Indicators
F3	Reset Button	For Software Reset (control by CPLD)
F4	Power Button	1x Power Button
F5	LOM Port	1x 1GbE RJ45 Management Port; 1x 1GbE RJ45 LOM Port
F6	Console Port	1x RJ45 Console Port
F7	USB Port	2x USB 3.0 Ports
F8	LAN Ports	8x 10G SFP+ Ports, 2x 25G SFP28 Ports
F9	OCP NIC	1x OCP 3.0 Slot
F10	Antenna	1x GPS Antenna Hole
F11	1PPS Connector	IEEE 1588v2 1PPS IN/OUT Connector
F12	PCIe Expansion	PCIe*16 FH3/4L Expansion Slot (Optional)

Rear Panel

No.	Description	
R1	Fan	6x Cooling Fans
R2	ESD Jack	1x ESD Screw Hole
R3	Grounding	1x Ground Screw Hole

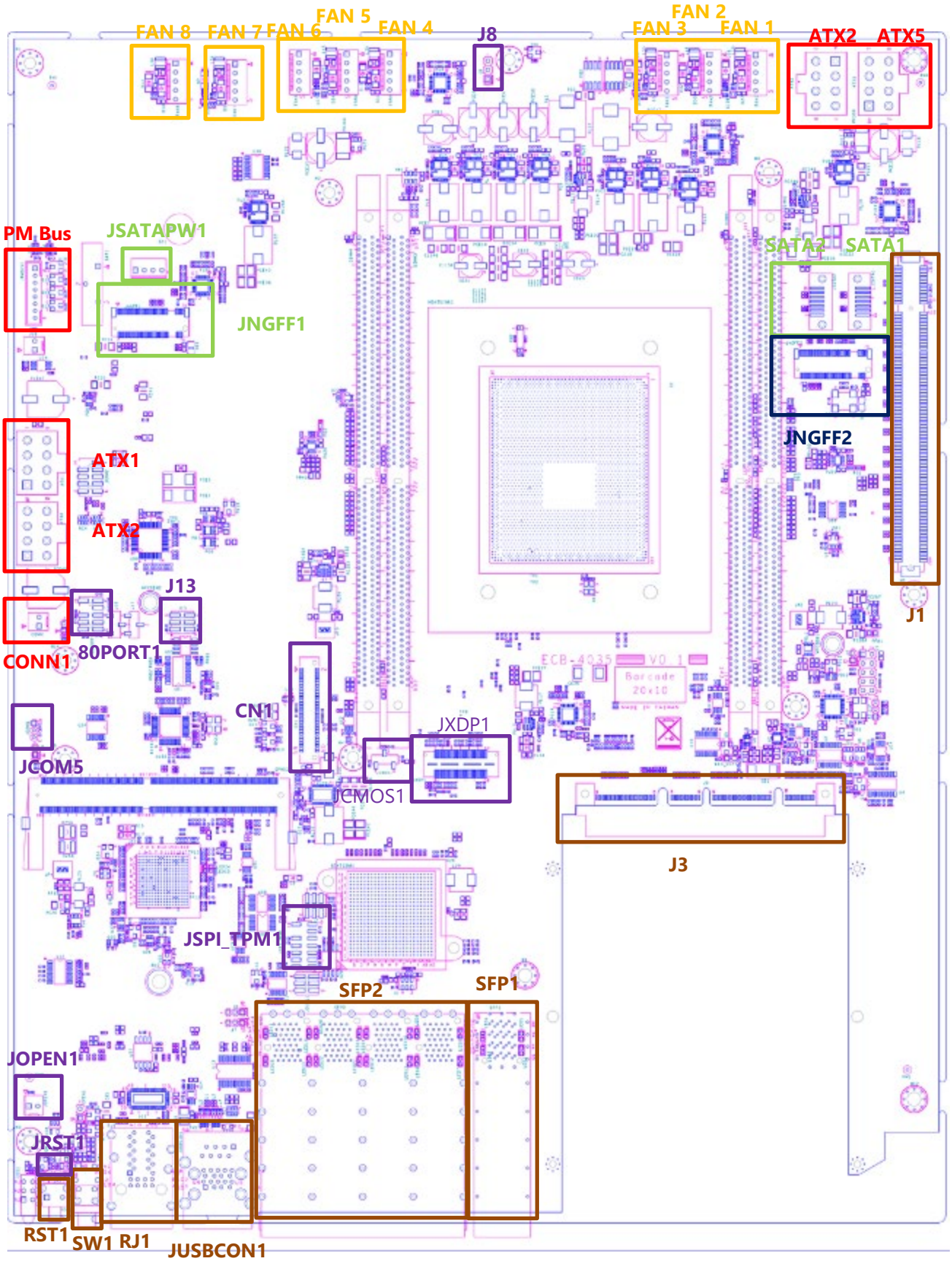
CHAPTER 2: MOTHERBOARD INFORMATION

Block Diagram



Motherboard Layout

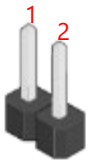
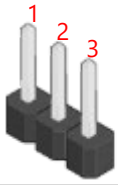
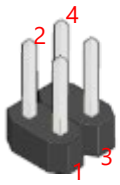
The motherboard layout shows the connectors and jumpers on the board. Refer to the following picture as a reference of the pin assignments and the internal connectors.



Internal Jumpers and Connectors

The pin headers on the motherboard are often associated with important functions. With the shunt (Jumper) pushed down on the designated pins (the pin numbers are printed on the circuit board, surrounding the pin header), certain feature can be enabled or disabled. While changing the jumpers, make sure your system is turned off.

To short the designated pins, push the jumper down on them so that they become **SHORT**. To make the pins setting **OPEN**, simply remove the jumper cap.

2-Pin Header		3-Pin Header		4-Pin Header	
					
Open	Short	Open	(1-2) Jumped	Open	(1-2) Jumped

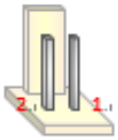
Connectors Pin Assignment

1. JFAN1~JFAN8: Fan Module Connection

Pin #	Description
1	PWM control
2	RPM sense
3	
4	+12V
5	GND

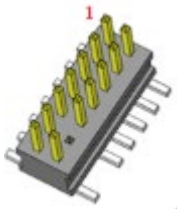
2. JOPEN1: Case Open Indication

Pin #	Description
1	FP_CHASSIS_INTRUSION
2	GND



3. JSPITPM: For Lanner TPM Module (IACTPM04) or SPI Fixture Debug Purpose

Pin #	Description	Pin #	Description
1	SPI_HOLD#	2	SPI_CS1#
3	SPI_CS0#	4	SPI_3V3
5	SPI_MISO	6	SPI_IO3
7	NC	8	SPI_CLK
9	GND	10	SPI_MOSI
11	TPM_PIRQ#	12	Key
13	TPM_CS0#	14	TPM_PLTRST#



4. JCOM5: For System or BMC Console Debug Purpose

Pin #	Description
1	RX
2	TX
3	GND

5. J8: For Lanner Power Debug Purpose
Clear CMOS Data

Pin #	Description
1	SMB_PMBUS_STBY_LVC3_R_SDA
2	GND
3	SMB_PMBUS_STBY_LVC3_R_SCL

6. JESPI80PORT: For Lanner eSPI Fixture Debug Purpose

Pin #	Description	Pin #	Description
1	ESPI_CLK	2	ESPI_IO1
3	ESPI_RST#	4	ESPI_IO0
5	ESPI_CS#	6	+P3V3
7	ESPI_IO3	8	Key
9	ESPI_IO2	10	GND
11	+P3V3_AUX	12	NC

7. J5: For Lanner CPLD Debug Purpose

Pin #	Description
1	GND
2	Intruder#

8. JCMOS1: For Clear CMOS

Pin #	Description
1-2	Normal (Default)
2-3	Clear CMOS

9. J13: For Boot Up BIOS Selection

Pin #	Description
1-3	First BIOS Boot (Default)
3-5	Second BIOS Boot
2-4	Dual BIOS Enable (Default)
4-6	Dual BIOS Disable

10. JDUAL1: Select CS for Flash Fixture

Pin #	Description
1-2, 3-4	Flash 1st BIOS (Default)
1-3, 2-4	Flash 2nd BIOS

11. JRST1: Select Front Panel Reset

Pin #	Description
1-2	Hardware Reset
1-3	Software (Default)

12. J16: Power PS-ON

Pin #	Description
1	PS-ON
2	GND

13. J17: DPLL COM2 Select

Pin #	Description
1-2	SIO COM2 TX (Default)
1-3	CPU COM2 TX

14. J18: DPLL COM2 Select

Pin #	Description
1-2	SIO COM2 RX (Default)
1-3	CPU COM2 RX

15. J6: COM1 Select

Pin #	Description
1-2	SIO COM1 TX (Default)
1-3	CPU COM1 TX

16. J7: COM1 Select

Pin #	Description
1-2	SIO COM1 RX (Default)
1-3	CPU COM1 RX

17. J9: BMC Debug COM PORT Select

Pin #	Description
1-2	Select SOC UART (Default)
No Stuff	Select BMC UART

18. J12: Flash Security

Pin #	Description
1-2	Flash Security Override
1-3	0 = Normal Operation (Default)

19. J3: OCP X16 Slot

Pin #	Description	Pin #	Description
OB1	NC	OA1	NC
OB2	NC	OA2	NC
OB3	NC	OA3	WAKE#
OB4	NC	OA4	NC
OB5	NC	OA5	NC
OB6	NC	OA6	NC
OB7	NC	OA7	NC
OB8	NC	OA8	NC
OB9	NC	OA9	NC
OB10	+P3V3_AUX	OA10	NC
OB11	NC	OA11	NC
OB12	+P3V3	OA12	NC
OB13	+P3V3	OA13	NC
OB14	NC	OA14	NC
B1	+P12V	A1	GND
B2	+P12V	A2	GND
B3	+P12V	A3	GND
B4	+P12V	A4	GND
B5	+P12V	A5	GND
B6	+P12V	A6	GND
B7	NC	A7	SMB_SCL
B8	NC	A8	SMB_CDA
B9	NC	A9	NC
B10	PERST	A10	PRSNTA_N
B11	+P3V3	A11	NC
B12	NC	A12	PRSNTB_N
B13	GND	A13	NC
B14	REFCLK+	A14	NC
B15	REFCLK-	A15	NC
B16	GND	A16	GND
B17	CPUPETN0	A17	CPUPERN0
B18	CPUPETP0	A18	CPUPERP0
B19	GND	A19	GND
B20	CPUPETN1	A20	CPUPERN1
B21	CPUPETP1	A21	CPUPERP1
B22	GND	A22	GND
B23	CPUPETN2	A23	CPUPERN2
B24	CPUPETP2	A24	CPUPERP2

B25	GND	A25	GND
B26	CPUPETN3	A26	CPUPERN3
B27	CPUPETP3	A27	CPUPERP3
B28	GND	A28	GND
B29	GND	A29	GND
B30	CPUPETN4	A30	CPUPERN4
B31	CPUPETP4	A31	CPUPERP4
B32	GND	A32	GND
B33	CPUPETN5	A33	CPUPERN5
B34	CPUPETP5	A34	CPUPERP5
B35	GND	A35	GND
B36	CPUPETN6	A36	CPUPERN6
B37	CPUPETP6	A37	CPUPERP6
B38	GND	A38	GND
B39	CPUPETN7	A39	CPUPERN7
B40	CPUPETP7	A40	CPUPERP7
B41	GND	A41	GND
B42	PRSNTB	A42	PRSNTB
B43	GND	A43	GND
B44	CPUPETN8	A44	CPUPERN8
B45	CPUPETP8	A45	CPUPERP8
B46	GND	A46	GND
B47	CPUPETN9	A47	CPUPERN9
B48	CPUPETP9	A48	CPUPERP9
B49	GND	A49	GND
B50	CPUPETN10	A50	CPUPERN10
B51	CPUPETP10	A51	CPUPERP10
B52	GND	A52	GND
B53	CPUPETN11	A53	CPUPERN11
B54	CPUPETP11	A54	CPUPERP11
B55	GND	A55	GND
B56	CPUPETN12	A56	CPUPERN12
B57	CPUPETP12	A57	CPUPERP12
B58	GND	A58	GND
B59	CPUPETN13	A59	CPUPERN13
B60	CPUPETP13	A60	CPUPERP13
B61	GND	A61	GND
B62	CPUPETN14	A62	CPUPERN14
B63	CPUPETP14	A63	CPUPERP14

B64	GND	A64	GND
B65	CPUPETN15	A65	CPUPERN15
B66	CPUPETP15	A66	CPUPERP15
B67	GND	A67	GND
B68	NC	A68	NC
B69	NC	A69	NC
B70	PRSNTB_N	A70	NC

20. JNGFF1: M.2 SATA

21. JNGFF2: M.2 PCIE NVME

CHAPTER 2: HARDWARE SETUP

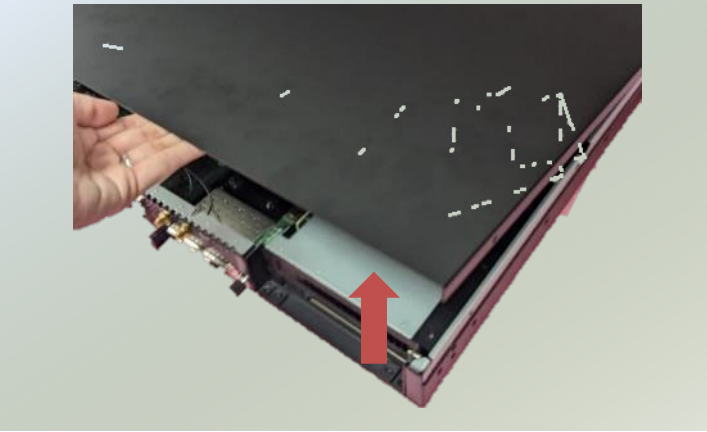
To reduce the risk of personal injury, electric shock, or damage to the system, please remove all power connections to shut down the device completely, and wear ESD protection gloves when conducting the steps in this chapter. Do not open the chassis cover when the system is in operation or after it has been powered on.

Opening the Chassis

1. Power off the system.
2. Unscrew the three (3) screws on the rear panel

3. Gently slide the chassis cover towards the rear a bit.

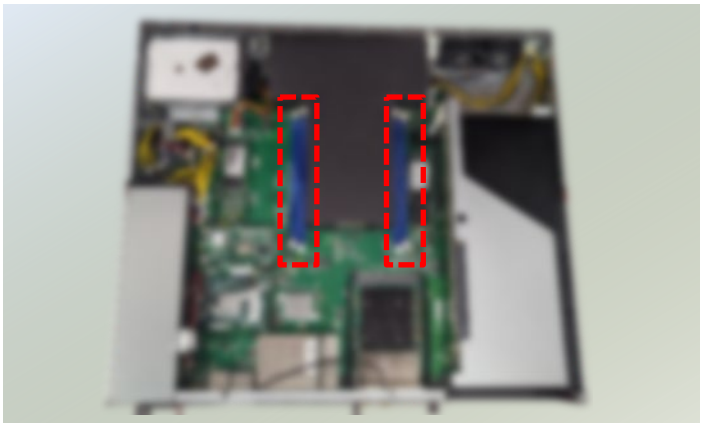
4. Lift the cover up to remove.



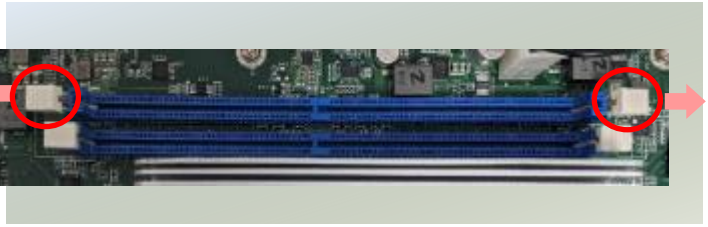
Installing the System Memory

ECA-4035A/D provides four DIMM DDR4 system memory, while ECA-4035B/C/E supports two DIMM DDR4 system memory. Please follow the instructions below to install the memory modules.

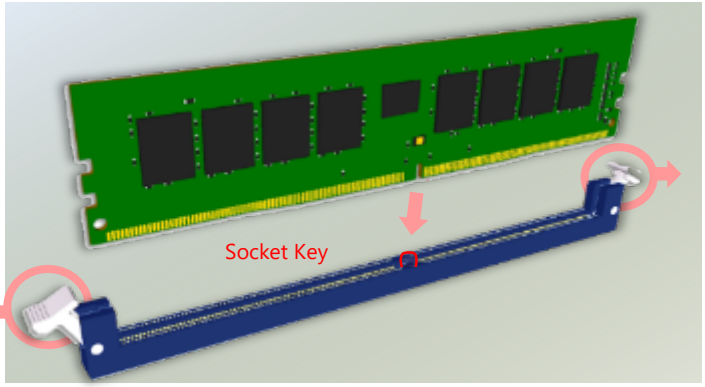
1. Power off the system and open the chassis.
2. Locate the DIMM memory modules slots on the motherboard.



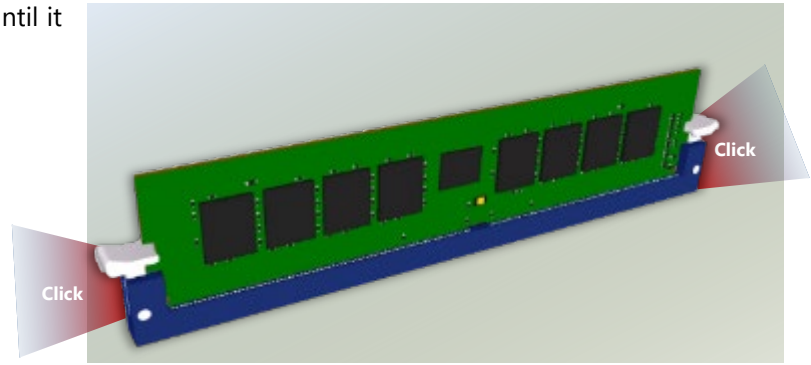
3. Pull open the white DIMM slot latches.



4. Align the notch of the memory module with the socket key in the slot.



5. Push the module down into the slot until it is firmly seated and clicks into place.

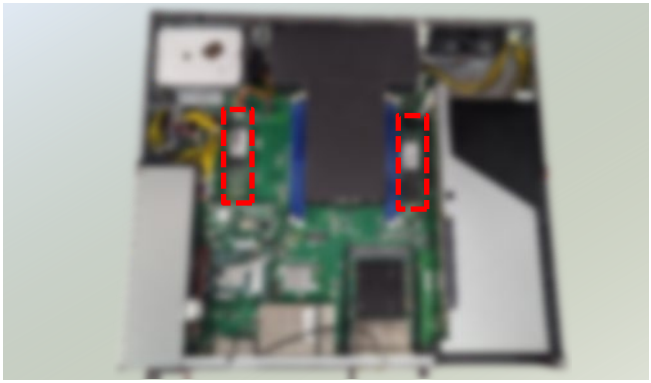


6. The memory modules have been installed.

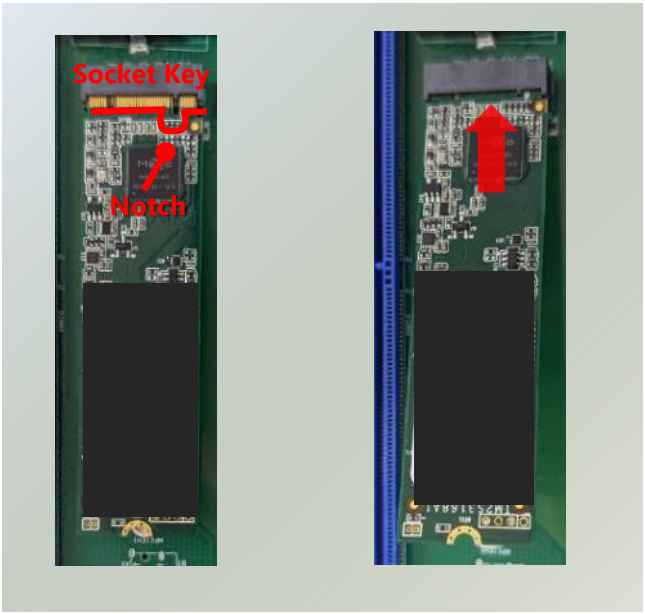
Installing M.2 Modules (Optional)

This system accommodates two M.2 2280 M-Key slots, supporting one NVMe and one SATA for memory expansion. Please follow the instructions for installation.

1. Power down the system and open the chassis.
2. Locate the M.2 module slots on the motherboard.



3. Align the notch of the module card with the socket key in the pin slot.
4. Insert the module card pins at 30 degrees into the socket until it is fully seated.

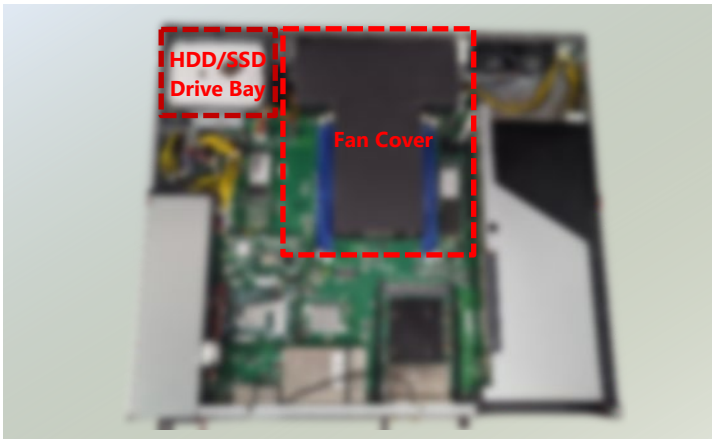


5. Push down on the module and secure it with a screw.

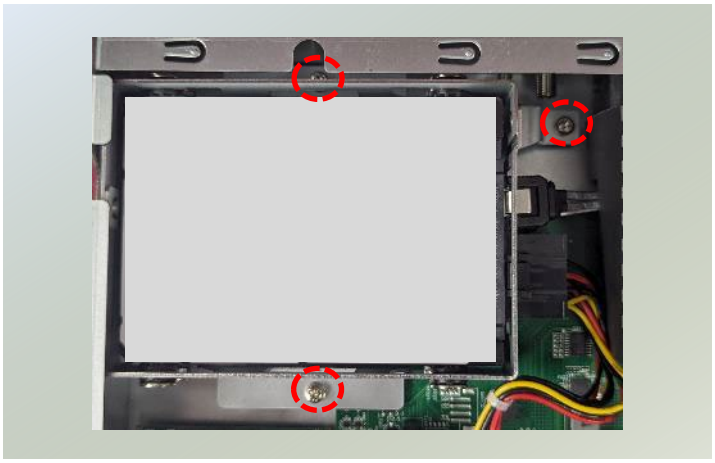
Installing the Disk Drives (Optional)

This system supports a disk drive bay, suitable for two 2.5" HDD/SSD drives. Please follow the instructions to install the disk drives.

1. Power off the system and open the chassis cover.
2. Locate the 2.5" drive bay and fan cover.

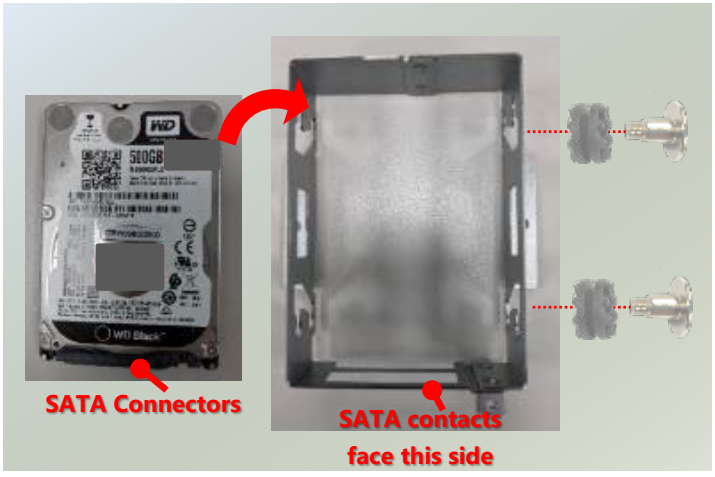


3. Loosen the three (3) screws that fixes the drive bay. Gently pull out the disk tray.

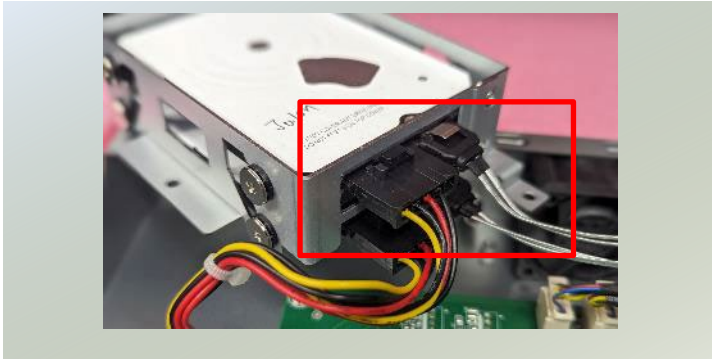


4. Mount the disk drive in the tray, make sure the SATA contacts are facing outwards. Apply two (2) disk screws with rubber washers on each side of the disk drive.

NOTE: If installing two disk drives, always start by installing the disk in the lower (bottom) slot.

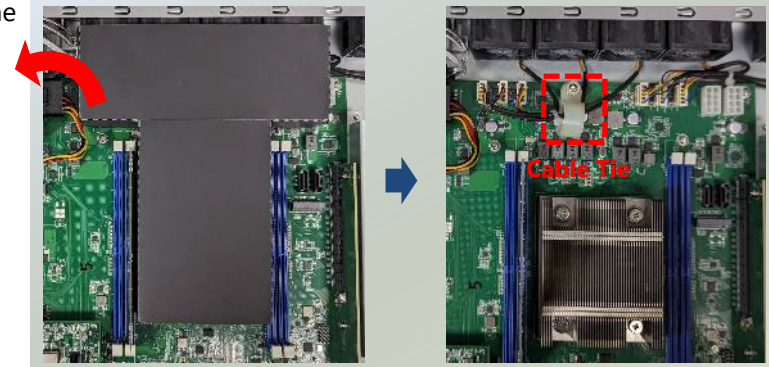


5. Attach the SATA data cable and power cable to the HDD/SSD drive.

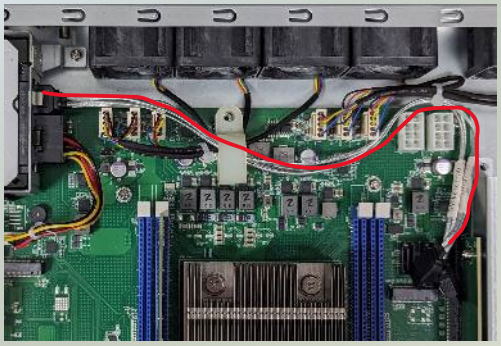


6. Place the tray (with the disk drives now installed) back to the its original place inside the system. Secure with the original three (3) screws.

7. Then, lift the fan cover, and unscrew the cable tie screw.

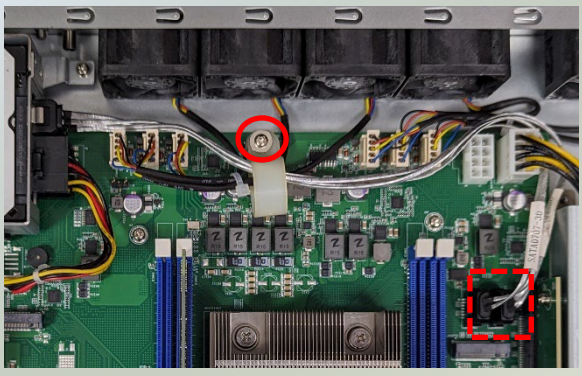


8. Wrap the SATA cables carefully into the cable tie and around, as shown.

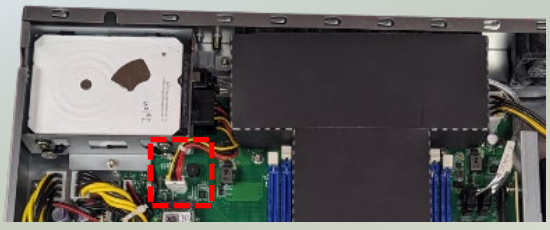


9. Screw in the cable tie, and insert the other end of the SATA data cables into the corresponding connector on the motherboard. Then place the fan cover over.

Note: Watch out for the side of the fan cover.



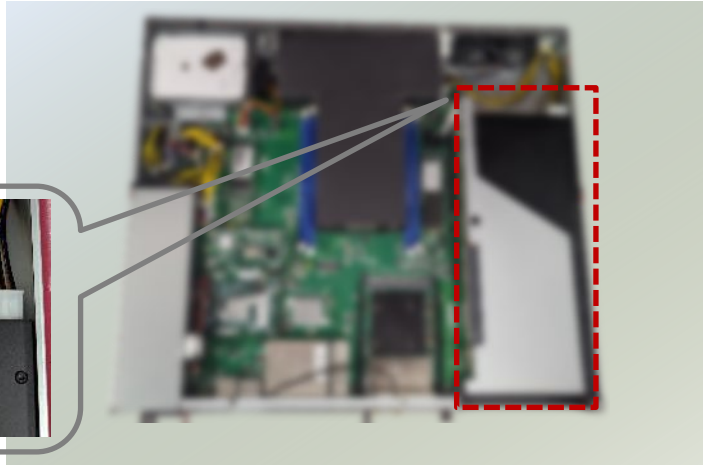
10. Then, insert the other end of the SATA power cables into the corresponding connector on the motherboard.



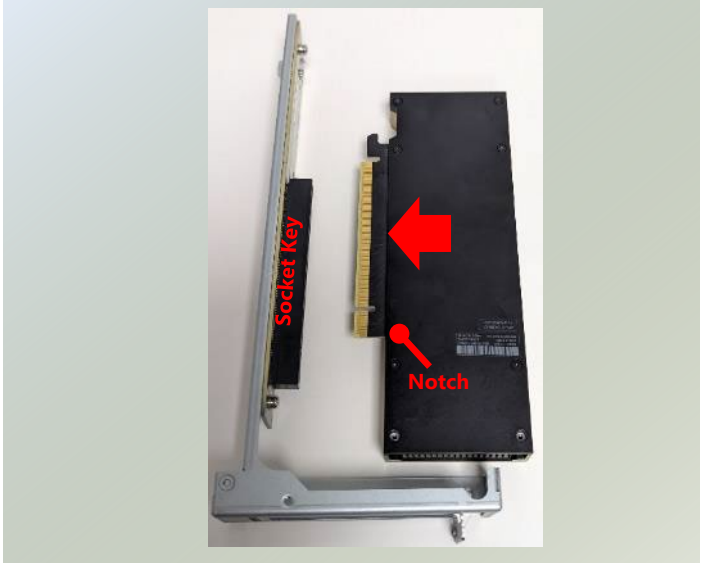
Installing Expansion Module (Optional)

ECA-4035 comes with an optional PCIe x16 FH3/4L slot for GPU graphics card or accelerator card expansion. Please follow the instructions for installation.

1. Power off the system and open the chassis cover.
2. Locate the PCIe slot. Unscrew the one (1) screw on the PCIe bracket.



3. Align the notch of the socket key in the pin slot, and slowly slide the module card into the bracket until fully seated.



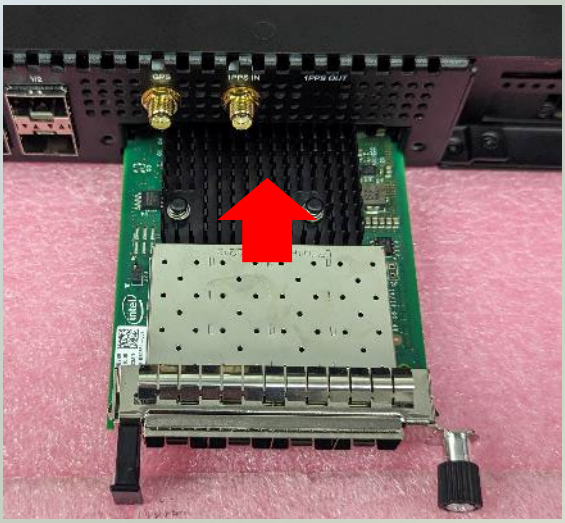
4. Install the bracket back onto the motherboard. Secure with the original screw.
5. Connect the cable to the module, and insert the other end of the cable into the corresponding connector on the motherboard.

Installing OCP NIC (Optional)

The system supports one OCP NIC 3.0 module. Please follow the steps for installation.

1. Power off the system and open the chassis cover.
2. On the front panel, locate the OCP NIC module slot. Rotate clockwise and loosen the lock-screw and remove the door.

3. Insert the OCP NIC. (Module shown in the image is for reference only)



4. Once the module is firmly seated, rotate counter-clockwise and tighten the lock-screw.

CHAPTER 3: REMOTE SERVER MANAGEMENT

Overview

This chapter will introduce the features of Lanner's BMC firmware and how to perform server remote management through it. The BMC firmware implements IPMI 2.0 based on ASPEED service processor. It performs all the BMC management tasks defined by IPMI 2.0. BMC firmware runs an embedded web-server for full configuration using Web UI.

BMC Main Features

Feature		Description
IPMI 2.0 Standard Features	System Interface Support	• KCS (System Interface Support) • LAN (RMCP+)
	IPMI 2.0 Based Management	• BMC stack with an IPMI 2.0 implementation
	System Management	• Sensor monitoring • System power management • Watchdog timer • Fan speed monitor and control
	Event Log	• System Event Log (SEL)
	User Management	• IPMI based user management • Multiple user permission level
	Text Console Redirection: SOL	• Support in IPMI stack for SOL to remotely access BIOS and text console before OS booting
Non-IPMI functions	Web User Interfaces	• BMC management via web user interface • Integrated KVM and Virtual Media
	User Authorization	• RADIUS support • LDAP support
	Security	• SSL and HTTPS support
	Maintenance	• Auto-sync time with NTP server • Remote firmware update by Web UI or Linux tool

BMC Firmware Functional Description

System health monitoring

The BMC implements system sensor monitoring feature. It could monitor voltage, temperature, and current of critical components.

System Power Management

The BMC implements chassis power and resets functions for system administrators to control and manage the system power behavior. These functions can be activated by sending the IPMI 2.0 compatible chassis commands to the BMC over messaging interfaces. The following list summaries the supported functions.

- Chassis power on
- Chassis power off
- Chassis power cycle
- Chassis power reset
- Chassis power soft
- Server's power status report

Watchdog Timer

The BMC provides an IPMI 2.0 compatible watchdog timer which can prevent the system from system hanging.

System Event Log (SEL)

A non-volatile storage space is allocated to store system events for system status tracking.

Serial over LAN (SOL)

IPMI 2.0 SOL is implemented to redirect the system serial controller traffic over an IPMI session. System administrators can establish a SOL connection with a standard IPMI client, like IPMITOOL, to remotely interact with serial text-based interfaces such as OS command-line and serial redirected BIOS interfaces.

User Management

The BMC supports 9 IDs for IPMI user accounts. The maximum length of the username and password are 16 and 20 respectively, and the possible privilege levels are Callback, User, Operator, and Administrator. Moreover, the account creator can enable/disable the user account at any time. If not specified, the default user accounts are listed follows:

User Name	Password	User Access	Characteristics
admin	admin	Enabled	Password can be changed

Keyboard, Video, Mouse (KVM) Redirection

- The BMC provides keyboard, video, and mouse (KVM) redirection over LAN. This application is available remotely from the embedded web server.
- Support video recording, recorded videos to be downloaded & playable.

Virtual Media Redirection

- The BMC provides remote virtual CD and HD redirection. CD image could be mounted directly in KVM window. HD could be mounted by NFS and SAMBA.
- Efficient USB 2.0 based CD/DVD redirection with a typical speed of 20XCD.
- Completely secured transmission.

IPMI Commands Support List

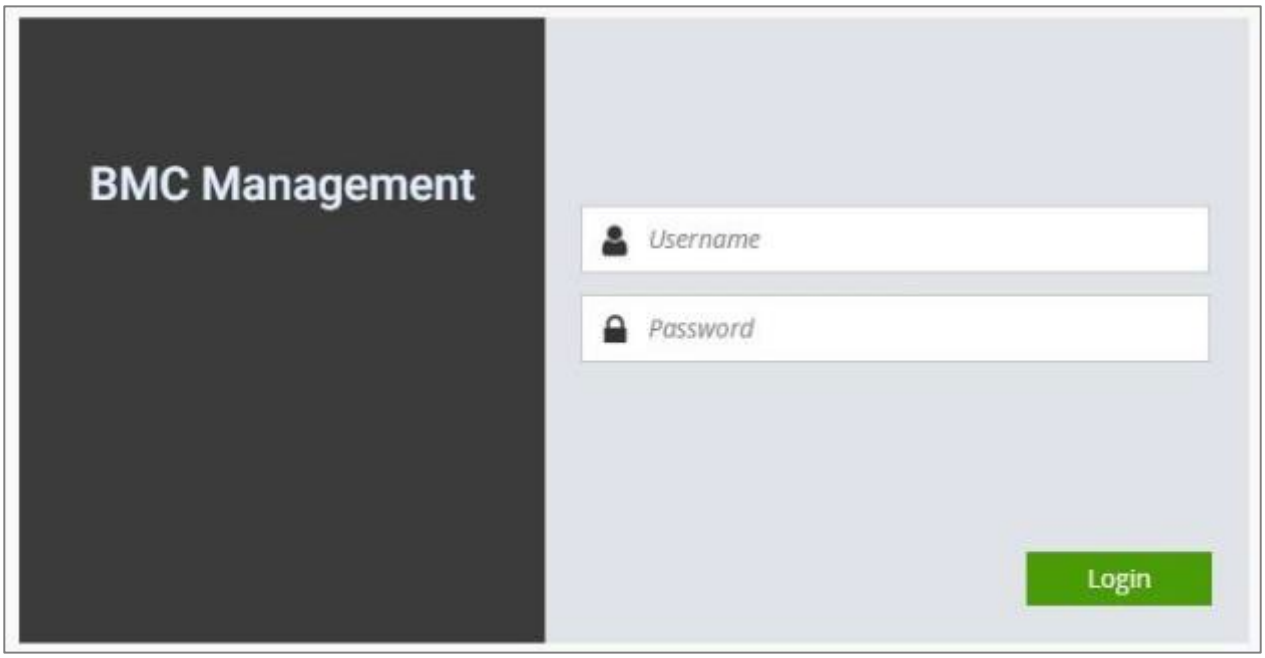
COMMANDS	NETFN	CMD
IPM Device "Global" Commands		
Get Device ID	APP (06h)	00h
Cold Reset	APP (06h)	02h
Warm Reset	APP (06h)	03h
Get Device GUID	APP (06h)	08h
BMC Watchdog Timer Commands		
Reset Watchdog Timer	APP (06h)	22h
Set Watchdog Timer	APP (06h)	24h
Get Watchdog Timer	APP (06h)	25h
BMC Device and Messaging Commands		
Get System GUID	APP (06h)	37h
Get Channel Info	APP (06h)	42h
Set User Access	APP (06h)	43h
Get User Access	APP (06h)	44h
Set User Name	APP (06h)	45h
Get User Name	APP (06h)	46h
Set User Password	APP (06h)	47h
Chassis Device Commands		
Get Chassis Capabilities	Chassis (00h)	00h
Get Chassis Status	Chassis (00h)	01h
Chassis Control	Chassis (00h)	02h
Chassis Reset	Chassis (00h)	03h
Sensor Device Commands		
Get Sensor Reading Factors	S/E (04h)	23h
Get Sensor Hysteresis	S/E (04h)	25h
Get Sensor Threshold	S/E (04h)	27h
Get Sensor Event Enable	S/E (04h)	29h
Get Sensor Event Status	S/E (04h)	2Bh
Get Sensor Reading	S/E (04h)	2Dh
Get Sensor Type	S/E (04h)	2Fh
FRU Device Commands		
Get FRU Inventory Area Info	Storage (0Ah)	10h
Read FRU Data	Storage (0Ah)	11h
Write FRU Data	Storage (0Ah)	12h
SDR Device Commands		
Get SDR Repository Info	Storage (0Ah)	20h
Get SDR Repository Allocation Info	Storage (0Ah)	21h
Get SDR	Storage (0Ah)	23h
Get SDR Repository Time	Storage (0Ah)	28h
SEL Device Commands		
Get SEL Info	Storage (0Ah)	40h
Get SEL Allocation Info	Storage (0Ah)	41h
Get SEL Entry	Storage (0Ah)	43h

Delete SEL Entry	Storage (0Ah)	46h
Clear SEL	Storage (0Ah)	47h
Get SEL Time	Storage (0Ah)	48h
Set SEL Time	Storage (0Ah)	49h
Get SEL Time UTC Offset	Storage (0Ah)	5Ch
Set SEL Time UTC Offset	Storage (0Ah)	5Dh
LAN Device Commands		
Set LAN Configuration Parameters	Transport (0Ch)	01h
Get LAN Configuration Parameters	Transport (0Ch)	02h
Serial/Modem Device Commands		
Set User Callback Options	Transport (0Ch)	1Ah
Get User Callback Options	Transport (0Ch)	1Bh
SOL Activating	Transport (0Ch)	20h
Set SOL Configuration Parameters	Transport (0Ch)	21h
Get SOL Configuration Parameters	Transport (0Ch)	22h

Using BMC Web UI

In the address bar of your Internet browser, input the IP address of the remote server to access the BMC interface of that server.

Initial access of BMC prompts you to enter username and password. A screenshot of the login screen is given below:



Login Page

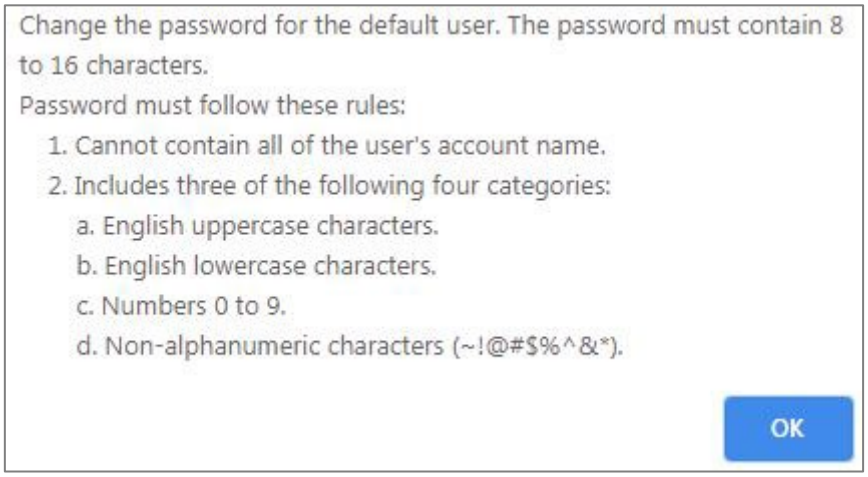
- **Username**: Enter your username in this field.
- **Password**: Enter your password in this field.
- **Login**: After entering the required credentials, click the **Login** to log in to Web UI.

Note: (1) If not specified, the default IP to access BMC is https://192.168.0.100.
(2) Please use **https** to access Web UI.

Default User Name and Password

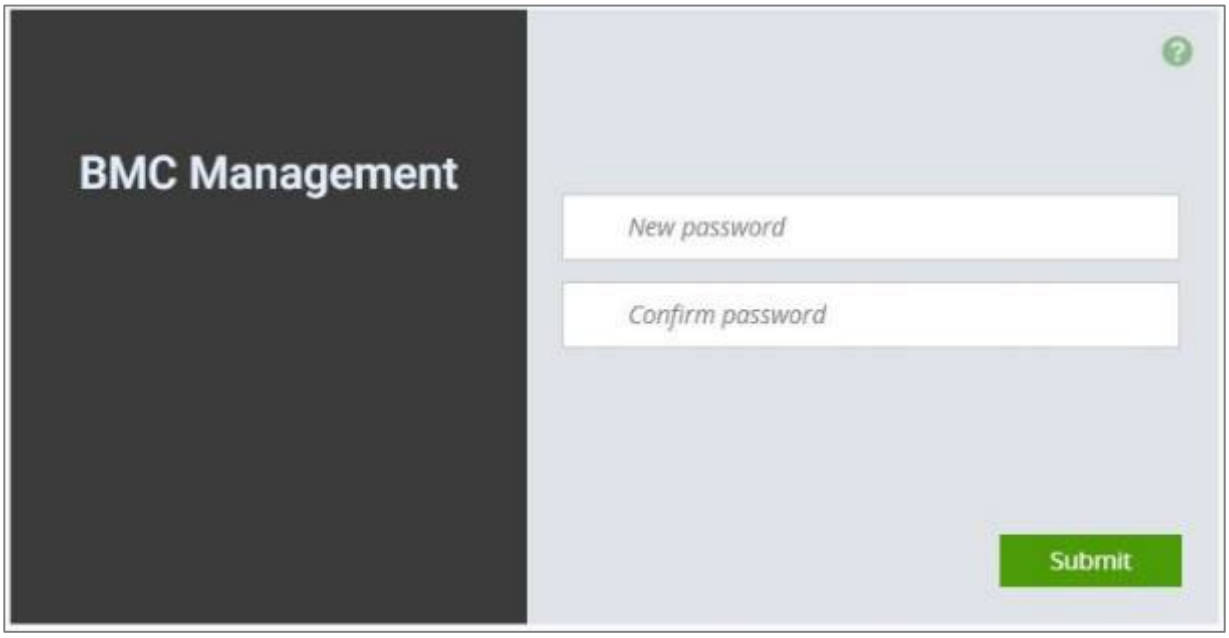
- **Username:** admin
- **Password**: admin

The default username and password are in lower-case characters. When you log in using the default username and password, you will get full administrative rights, and it will ask you to change the default password once you log in. The dialog is shown below:



Change the default password - Dialog

Clicking **OK** will take you to set a password.



Change the default password – Set password

Note: Duplicate usernames shouldn't exist across various authentication methods like LDAP, RADIUS or IPMI since the privilege of one Authentication method is overwritten by another authentication method during logging in, and hence the correct privilege cannot be returned properly.

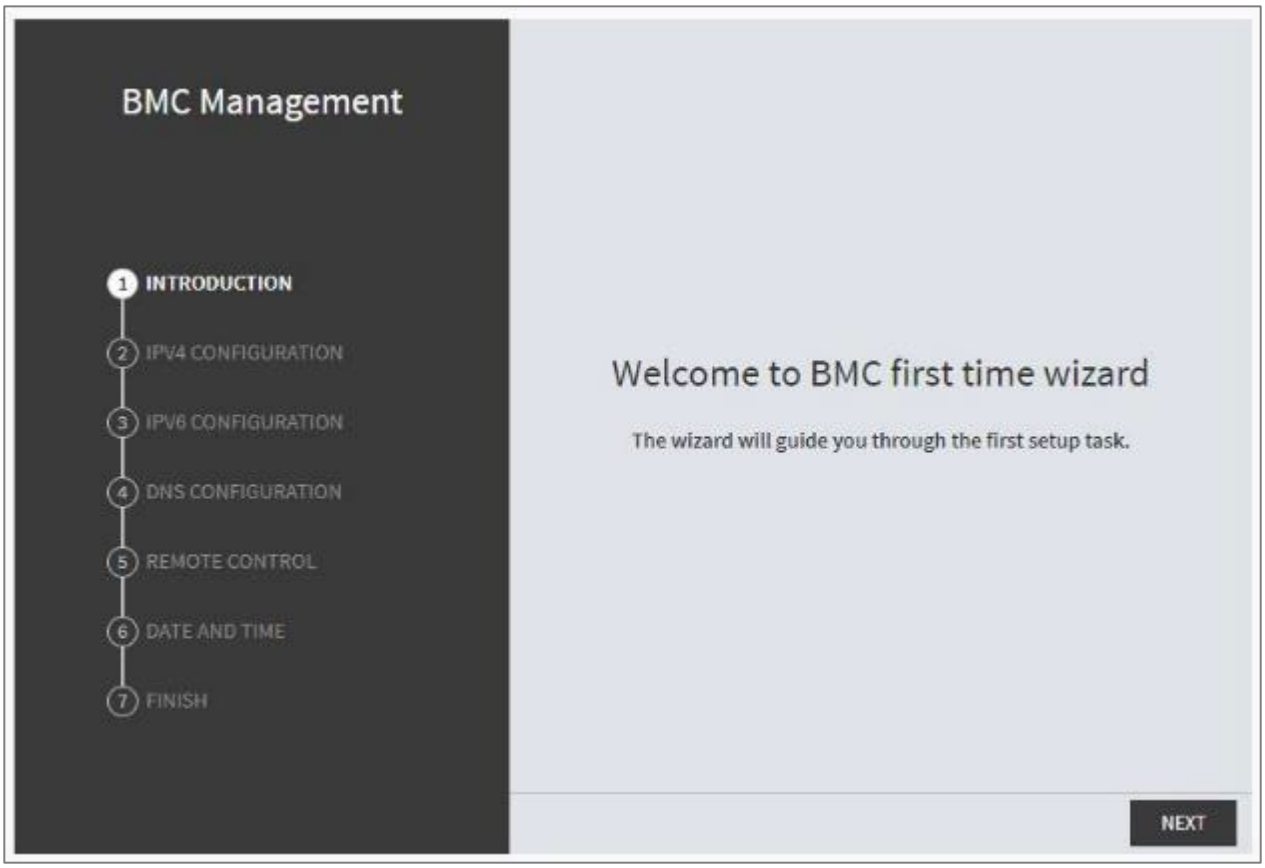
Wizard Welcome Page Introduction

After the first-time login, you will see first time wizard welcome page as the following picture. Please press the "Next" button and configure your BMC step by step.

On the "IPv4", "IPv6" and "DNS" pages, you could specify the hostname and network settings of BMC.

On the "Remote Control" page, you could specify allowed IP region which could access KVM and Remote media web pages.

On the "Date and Time" page, you could specify the NTP and time settings.



In the final page, please press "Finish" button to complete the first-time wizard. BMC will be rebooted and apply new settings. You could reconnect to the WebUI after a few minutes.

Web UI Layout Introduction

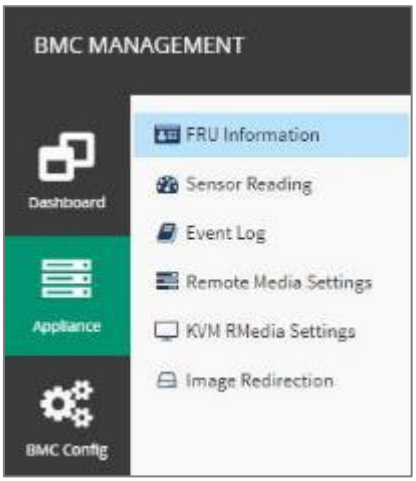
The BMC Web UI consists of various menu items:

Menu Bar

The menu bar displays the following:

- Dashboard
- Appliance – Sensor Reading
- Appliance – Event Log
- Appliance – Remote Media Settings
- Appliance – KVM RMedia Settings
- Appliance – Image Redirection
- BMC Config – Date and Time
- BMC Config – User Configuration – User List
- BMC Config – User Configuration – RADIUS Setup
- BMC Config – User Configuration – LDAP Setup
- BMC Config – User Configuration – LDAP Groups
- BMC Config – User Configuration – Login Block Settings
- BMC Config – Network Configuration – IP Settings
- BMC Config – Network Configuration – DNS Settings
- BMC Config – Network Configuration – Link Settings
- BMC Config – Network Configuration – SSL Certificate
- BMC Config – Network Configuration – Services
- BMC Config – Audit Log
- BMC Config – Maintenance – Firmware Update
- BMC Config – Maintenance – Restore Factory Defaults
- BMC Config – Maintenance – Preserve Configuration

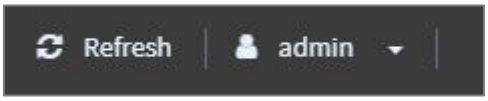
A screenshot of the menu bar is shown below:



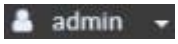
Menu Bar

Quick Button and Logged-in User

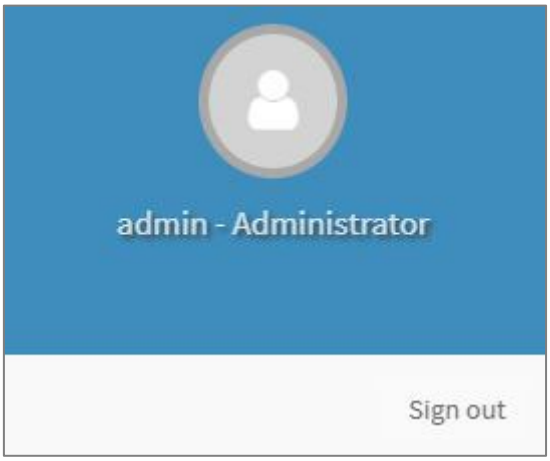
The user information and quick buttons are located at the top right of the Web UI.



User Information

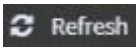
Logged-in user information: Click the icon  to view the logged-in user information.

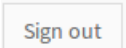
A screenshot of the logged-in user information is shown below:



Logged-in User Information

The logged-in user information shows the logged-in user's username, privilege, with the quick buttons allowing you to perform the following functions:

- **Refresh**: Click the icon  to reload the current page.

- **Sign out**: Click the icon  to log out of the Web UI.

Logged-in user and its privilege level

This option shows the logged-in username and privilege. There are four kinds of privileges:

- **User**: Only valid commands are allowed.
- **Operator**: All BMC commands are allowed except for the configuration commands that can change the behavior of the out-of-hand interfaces.
- **Administrator**: All BMC commands are allowed.
- **No Access:** Login access denied.

Help

Help: The **Help** icon is located at the top right of each page in Web UI. Click this help icon to view more detailed field descriptions.

Note: The latest detailed version of BMC LTS Specification can be found on Lanner Download Center.

CHAPTER 4: BIOS SETUP

BIOS is a firmware embedded on an exclusive chip on the system's motherboard. Lanner's BIOS firmware offering including market-proven technologies such as Secure Boot and Intel Boot Guard technology deliver solid commitments for the shield protection against malware, uncertified sequences and other named cyber threats.

BIOS Setup

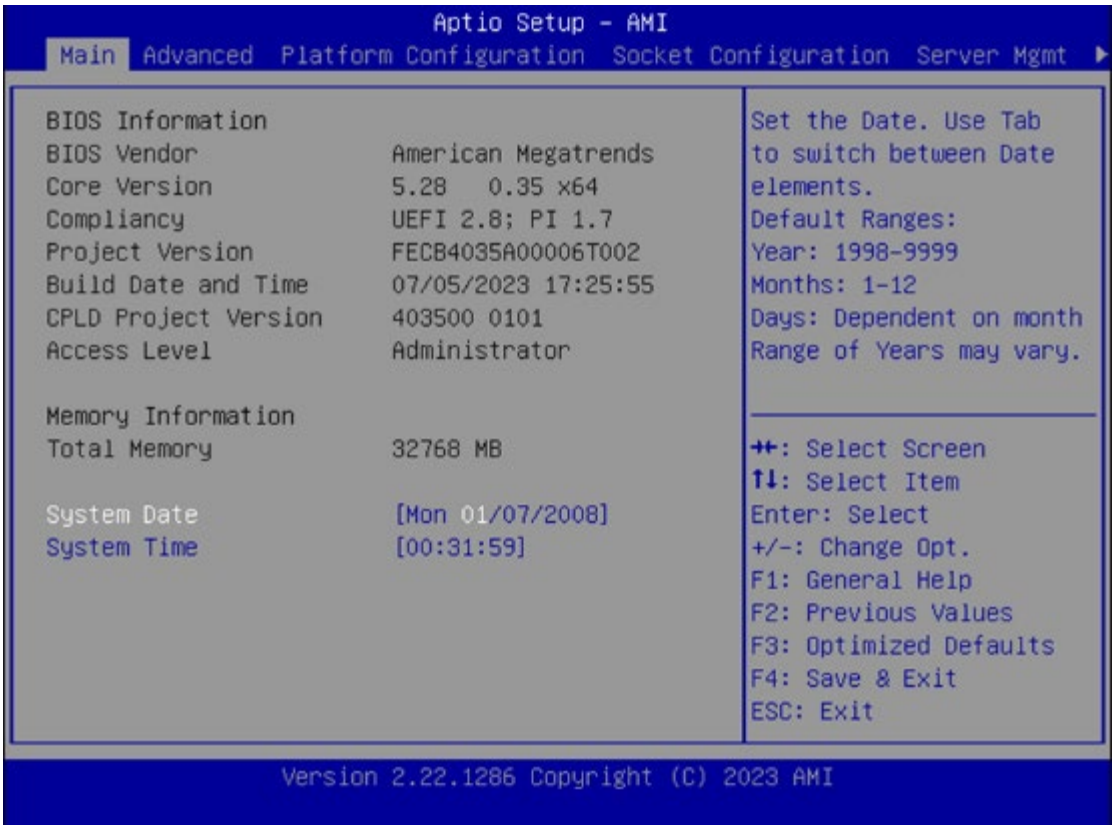
To enter the BIOS setup utility, simply follow the steps below:

1. Boot up the system.
2. Pressing the **<Tab>** or **<Del>** key immediately allows you to enter the Setup utility, and then you will be directed to the BIOS main screen. The instructions for BIOS navigations are as below:

Control Keys	Description
→←	select a setup screen
↑↓	select an item/option on a setup screen
<Enter>	select an item/option or enter a sub-menu
+/-	adjust values for the selected setup item/option
F1	display General Help screen
F2	retrieve previous values, such as the last configured parameters during the last time you entered BIOS
F3	load optimized default values
F4	save configurations and exit BIOS
<Esc>	exit the current screen

Main Page

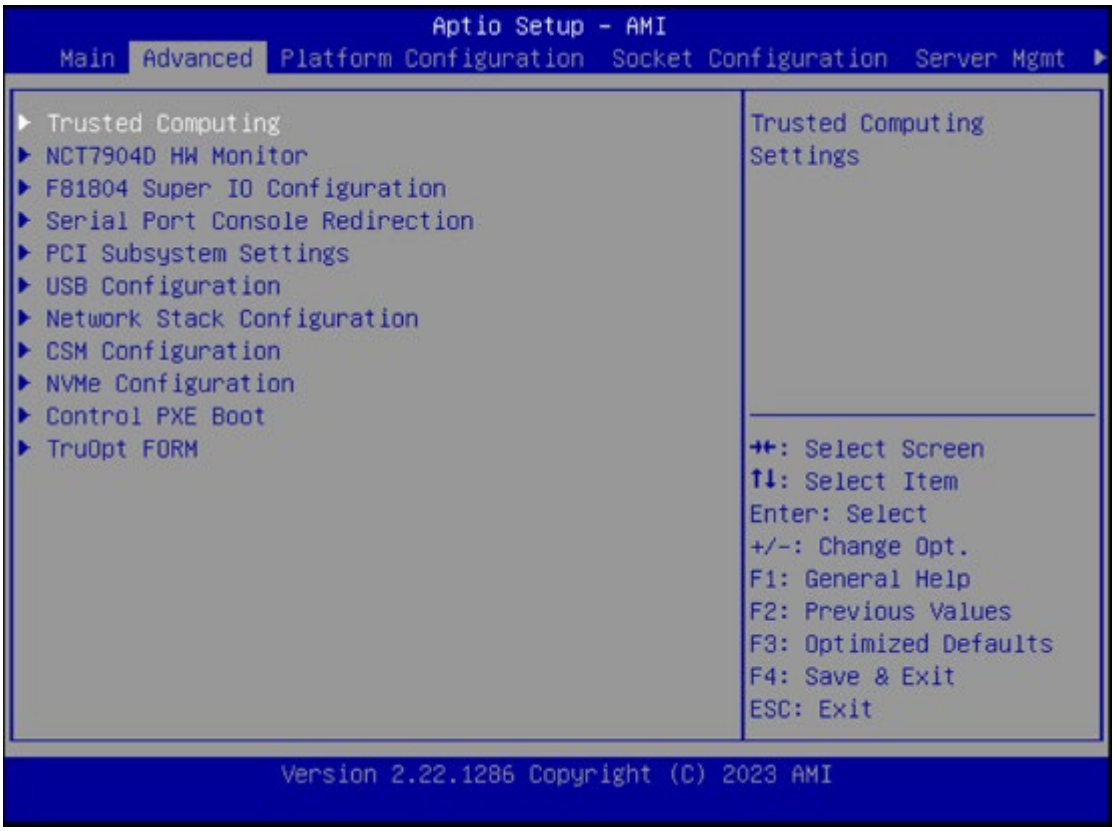
Setup main page contains BIOS information and project version information.



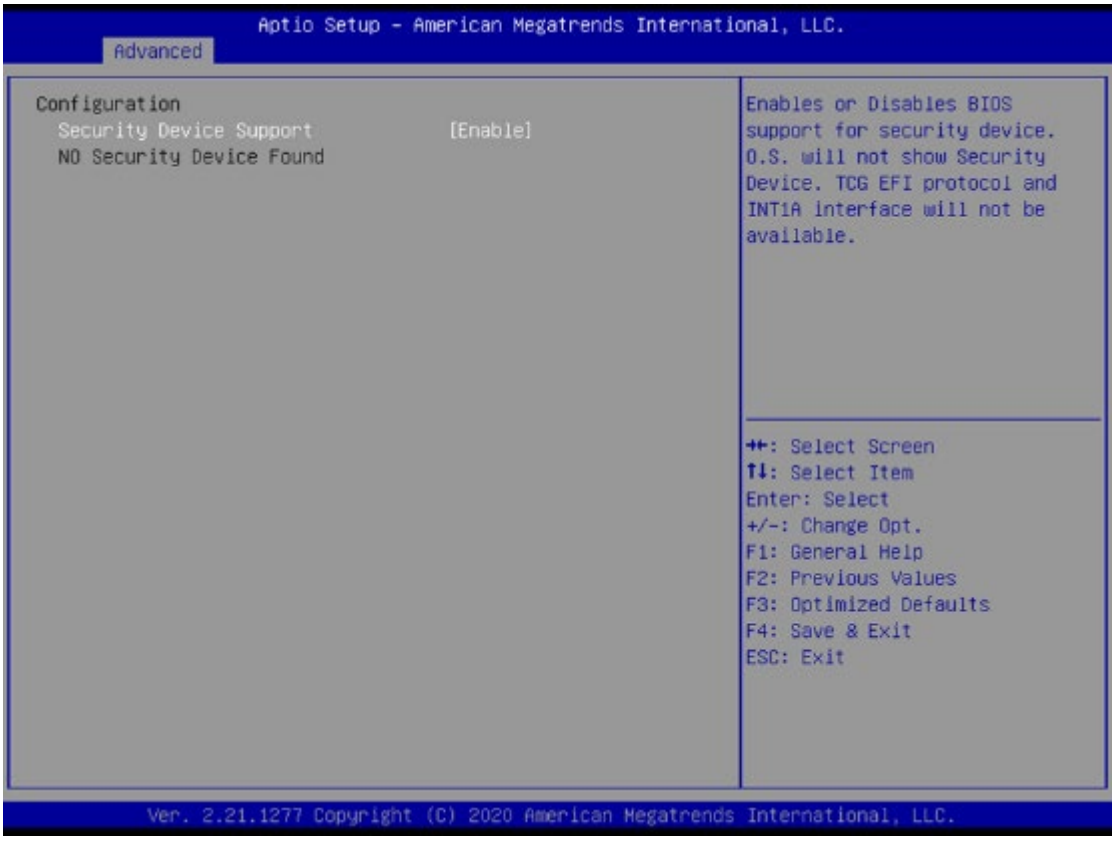
Feature	Description
BIOS Information	BIOS Vendor: American Megatrends Core Version: AMI Kernel version, CRB code base, X64 Compliancy: UEFI version, PI version BIOS Version: BIOS release version Build Date and Time: MM/DD/YYYY Access Level: Administrator / User
Memory Information	Total Memory: by case
System Date	To set the Date, use**<Tab>**to switch between Date elements. Default Range of Year: 2005-2099 Default Range of Month: 1-12 Days: dependent on Month.
System Time	To set the Date, use**<Tab>**to switch between Date elements.

Advanced Page

Select the **Advanced** menu item from the BIOS setup screen to enter the "Advanced" setup screen. Users can select any of the items in the left frame of the screen.

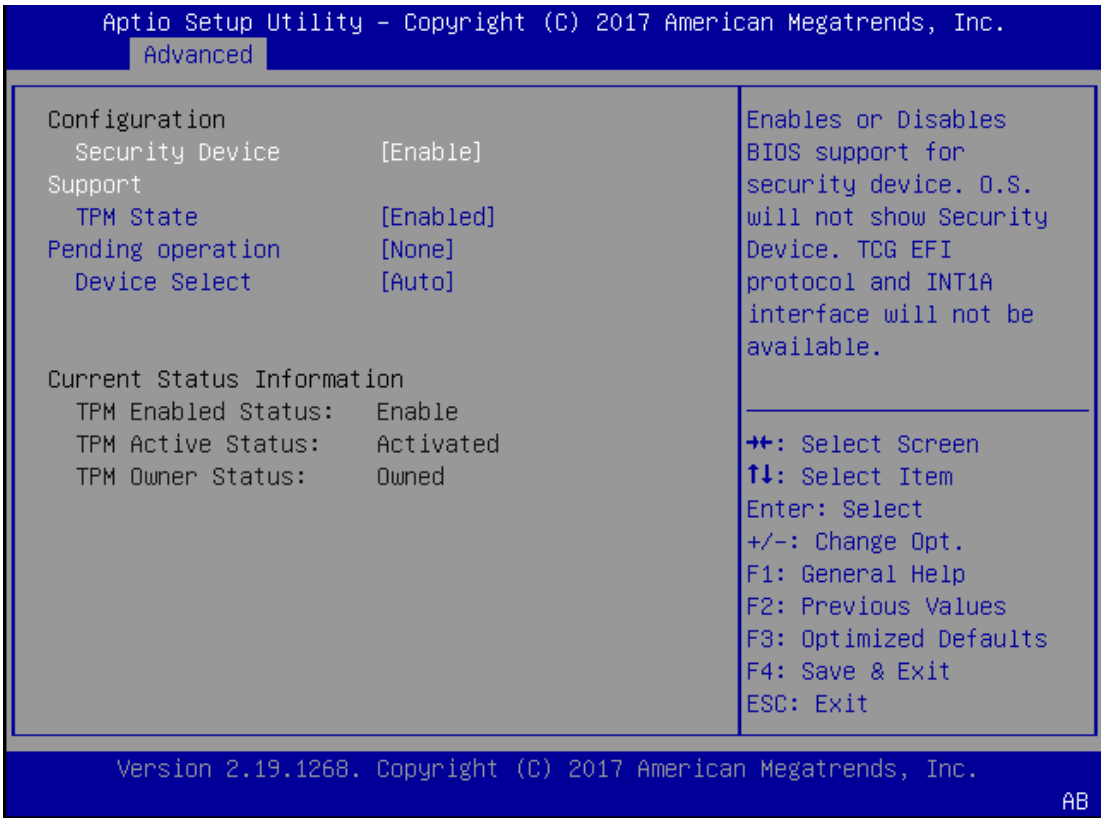


Trusted Computing



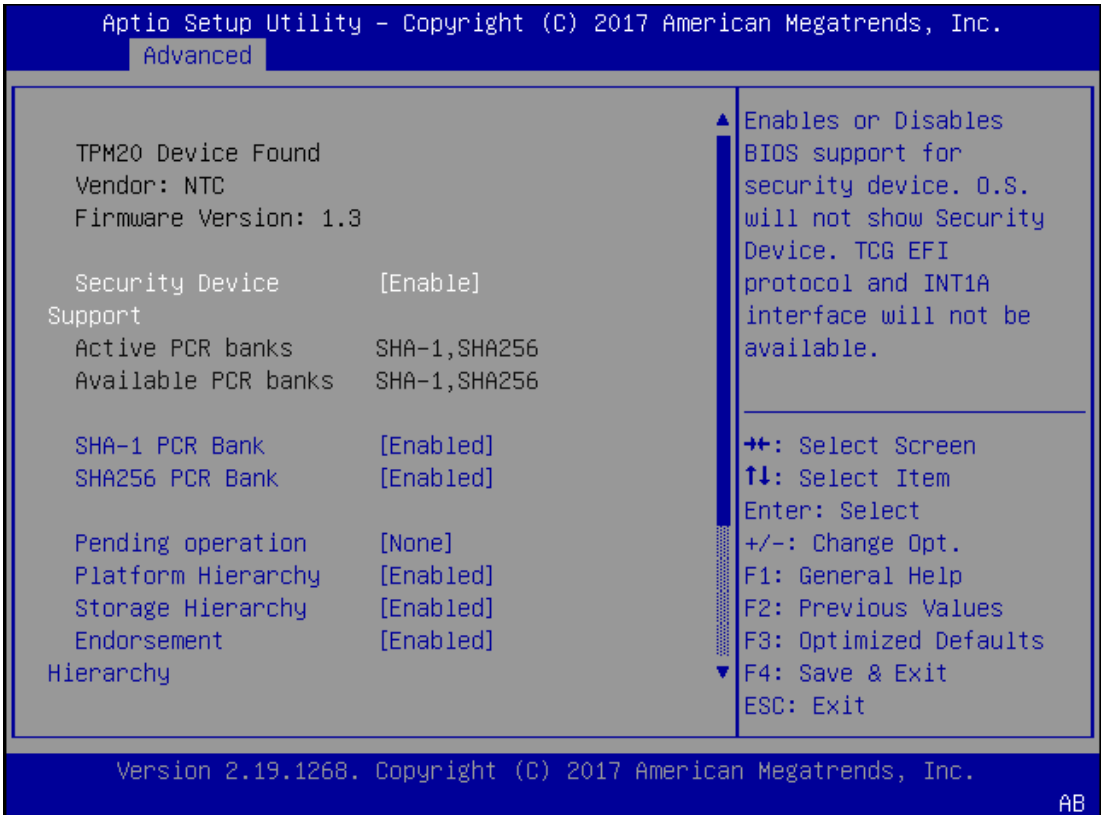
Feature	Options	Description
Security Device Support	Enabled Disabled	Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

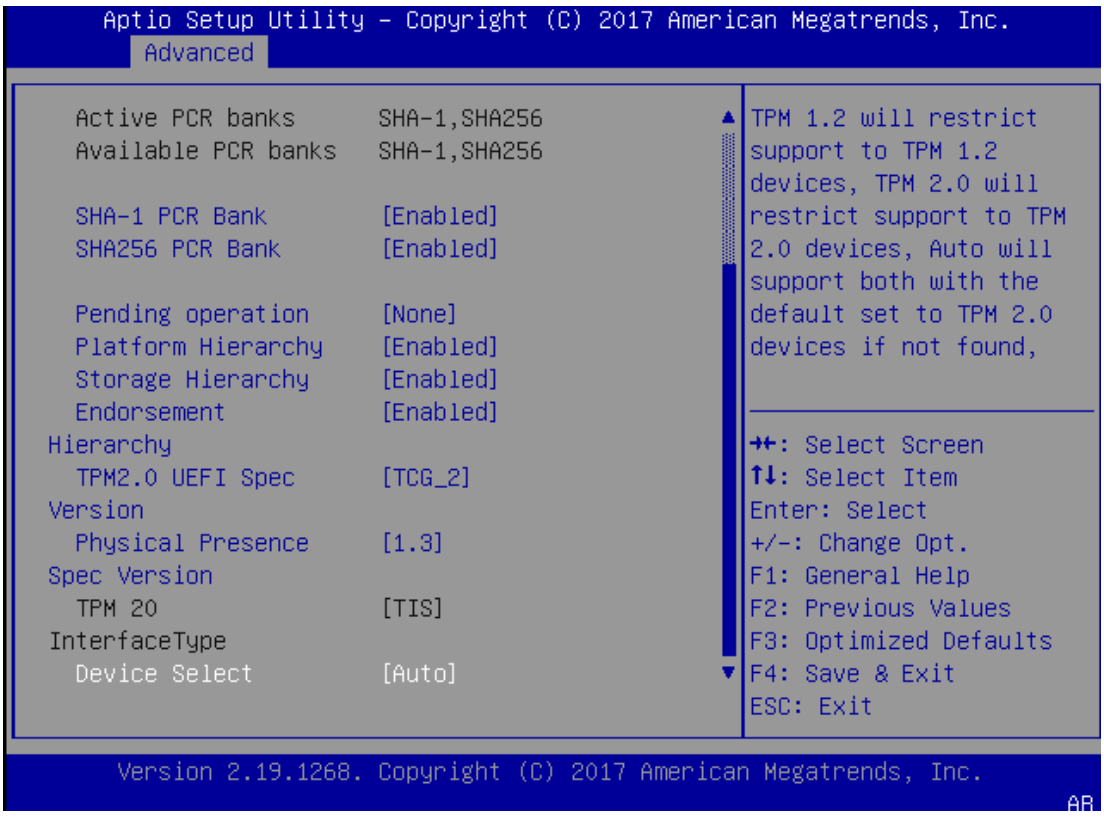
Trusted Computing (TPM1.2)



Feature	Options	Description
Security Device Support	Enabled Disabled	Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
TPM State	Enabled Disabled	Enables or disables Security Device. NOTE: Your computer will reboot during restart to change State of the Device.
Pending operation	None TPM Clear	Schedules an Operation for the Security Device. NOTE: Your computer will reboot during restart to change State of Security Device.
Device Select	TPM 1.2 TPM 2.0 Auto	**TPM 1.2** will restrict support to TPM 1.2 devices; while **TPM 2.0** will restrict support to TPM 2.0 devices; **Auto** will support both with the default set to TPM 2.0 devices. If not found, TPM 1.2 devices will be enumerated.

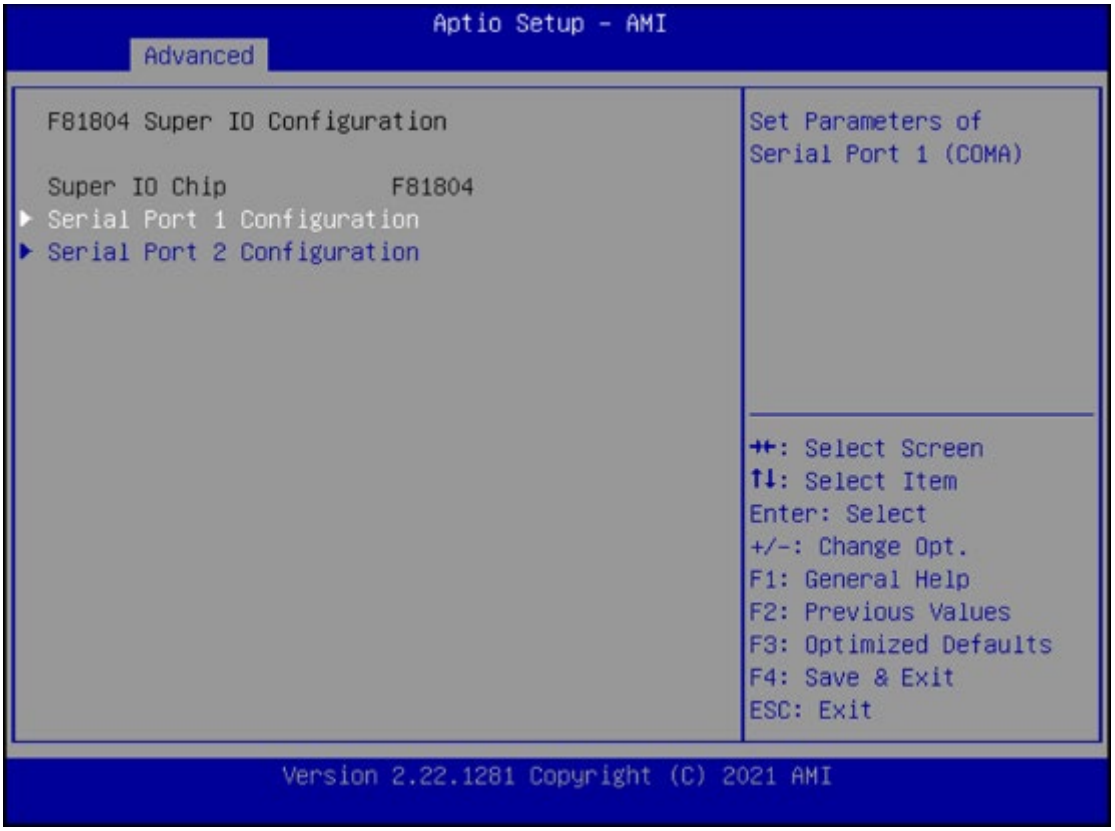
Trusted Computing (TPM2.0)



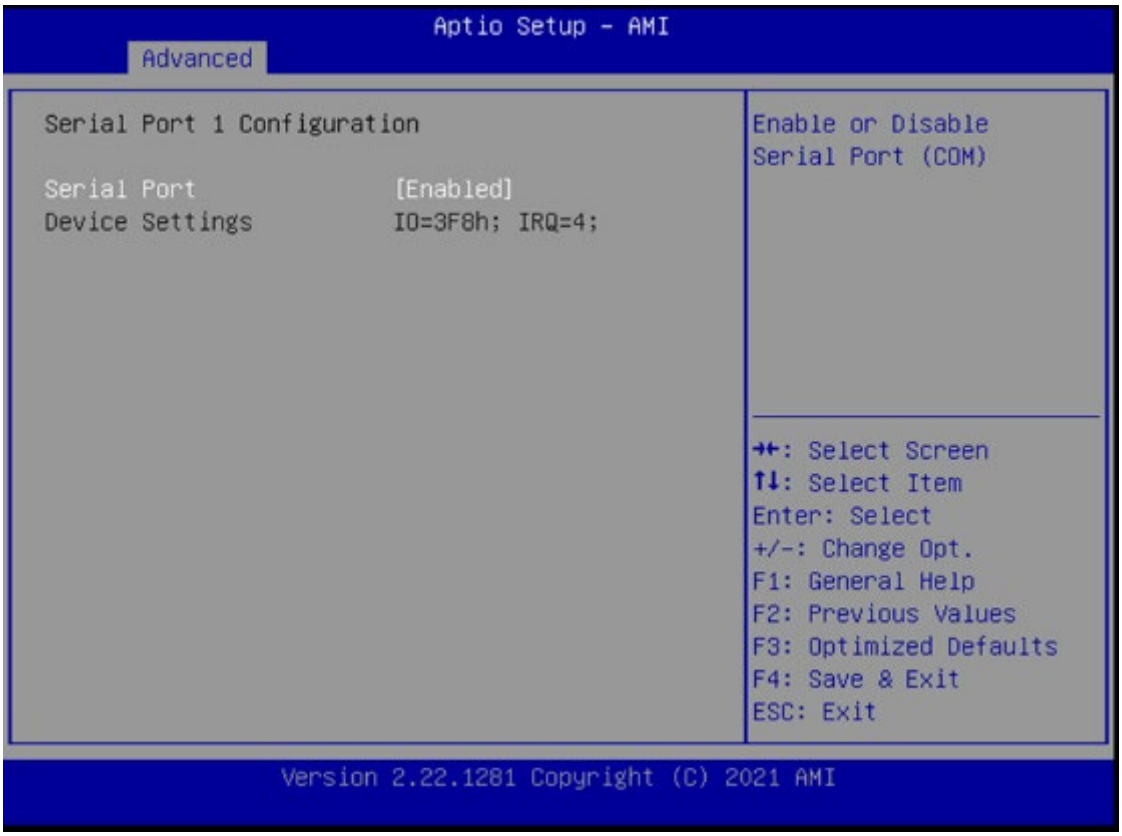


Feature	Options	Description
Security Device Support	Enabled Disabled	Enables or disables BIOS support for security device. By disabling this function, OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
SHA-1 PCR Bank	Enabled Disabled	Enables or disables SHA-1 PCR Bank.
SHA256 PCR Bank	Enabled Disabled	Enables or disables SHA256 PCR Bank.
Pending Operation	None TPM Clear	Schedules an Operation for the Security Device. NOTE: Your computer will reboot during restart to change State of Security Device.
Platform Hierarchy	Enabled Disabled	Enables or disables Platform Hierarchy.
Storage Hierarchy	Enabled Disabled	Enables or disables Storage Hierarchy.
Endorsement Hierarchy	Enabled Disabled	Enables or disables Endorsement Hierarchy.
TPM2.0 UEFI Spec Version	TCG_1_2 TCG_2	Select the TCG2 Spec Version, **TCG_1_2**: Supports the Compatible mode for Win8/Win10 **TCG_2**: Supports new TCG2 protocol and event format for Win10 or later.
Physical Presence Spec Version	1.2 1.3	Select to tell OS to support PPI Spec Version 1.2 or 1.3. NOTE: Some HCK tests might not support 1.3.
TPM 20 InterfaceType	TIS	Select **TPM 20 Device** for the Communication Interface.
Device Select	TPM 1.2 TPM 2.0 Auto	**TPM 1.2** will restrict support to TPM 1.2 devices; while **TPM 2.0** will restrict support to TPM 2.0 devices; **Auto** will support both with the default set to TPM 2.0 devices. If not found, TPM 1.2 devices will be enumerated.

Super IO Configuration

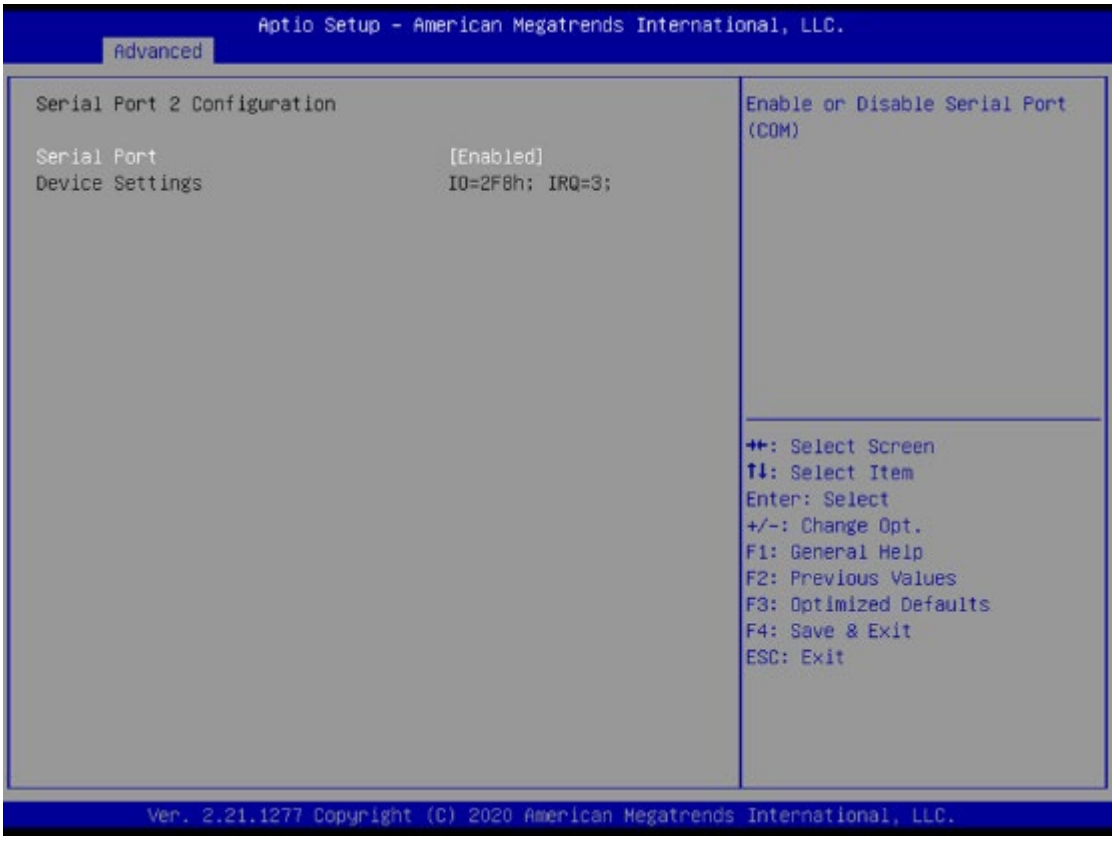


Serial Port 1 Configuration



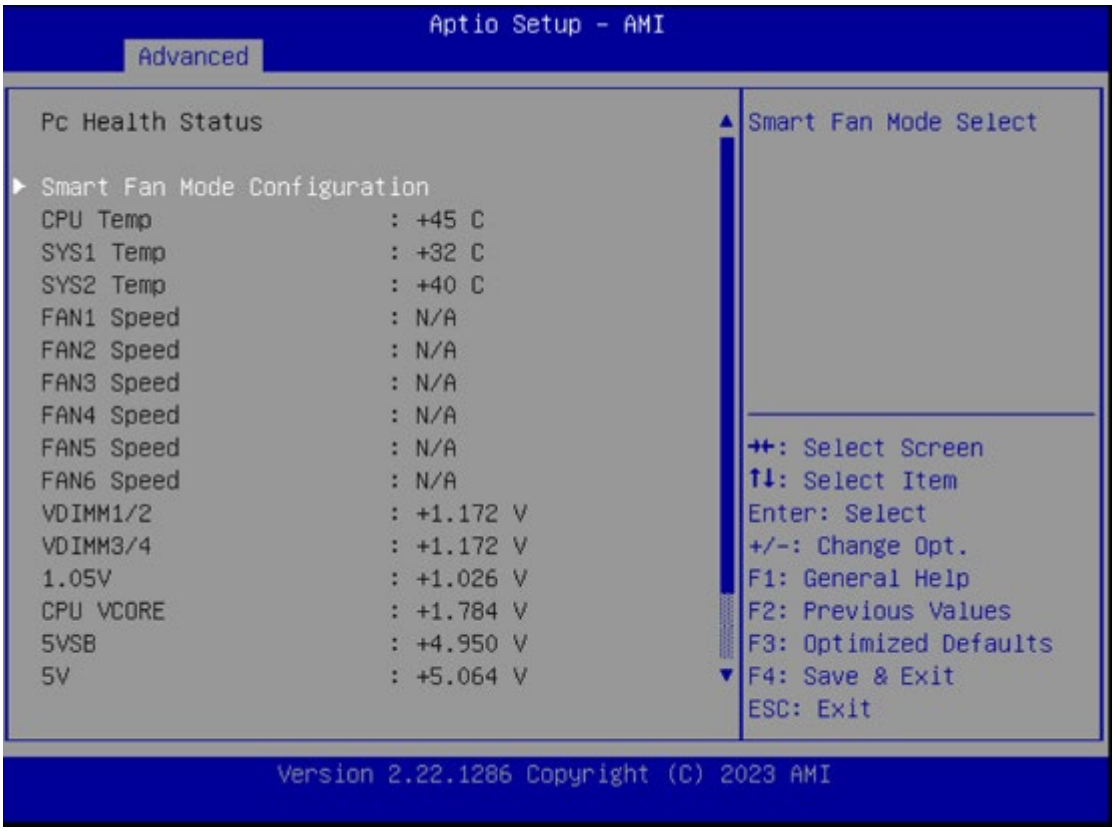
Feature	Options	Description
Serial Port	Enabled Disabled	Enables or disables Serial Port 1.
Device Settings	NA	IO=3F8h; IRQ = 4

Serial Port 2 Configuration



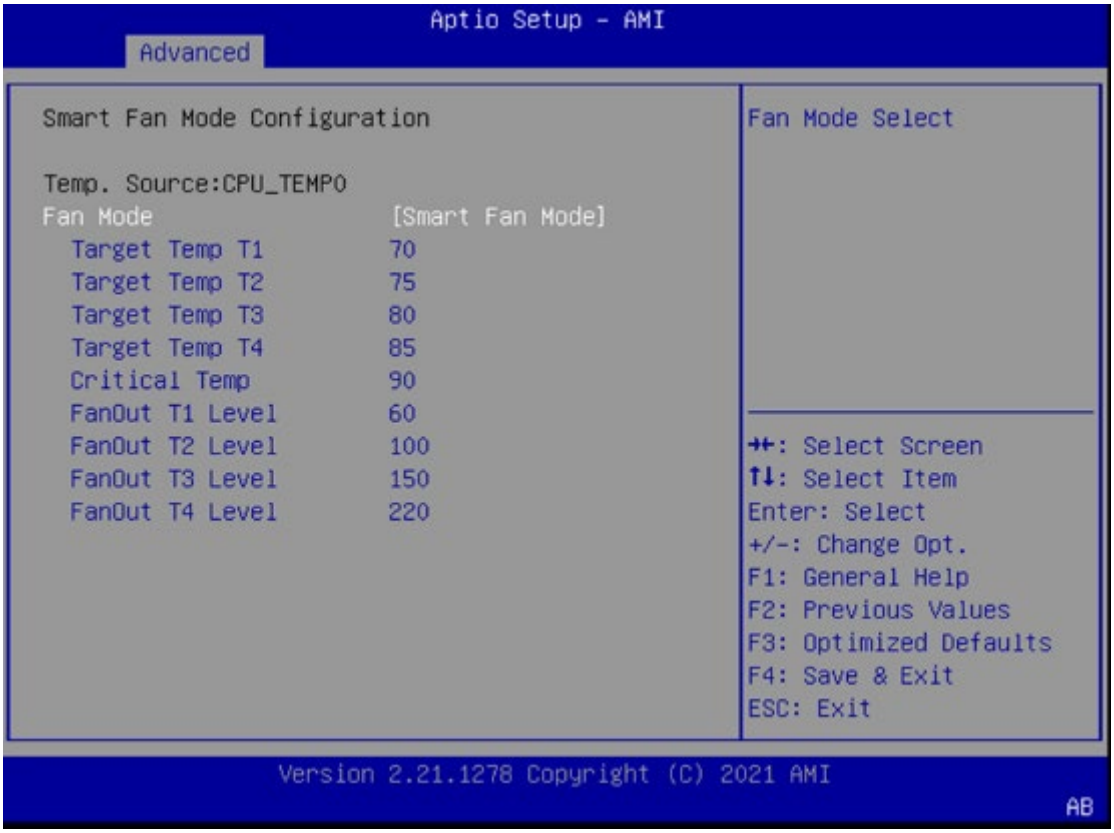
Feature	Options	Description
Serial Port	Enabled Disabled	Enables or disables Serial Port 2
Device Settings	NA	IO=2F8h; IRQ = 3

NCT7904D HW Monitor



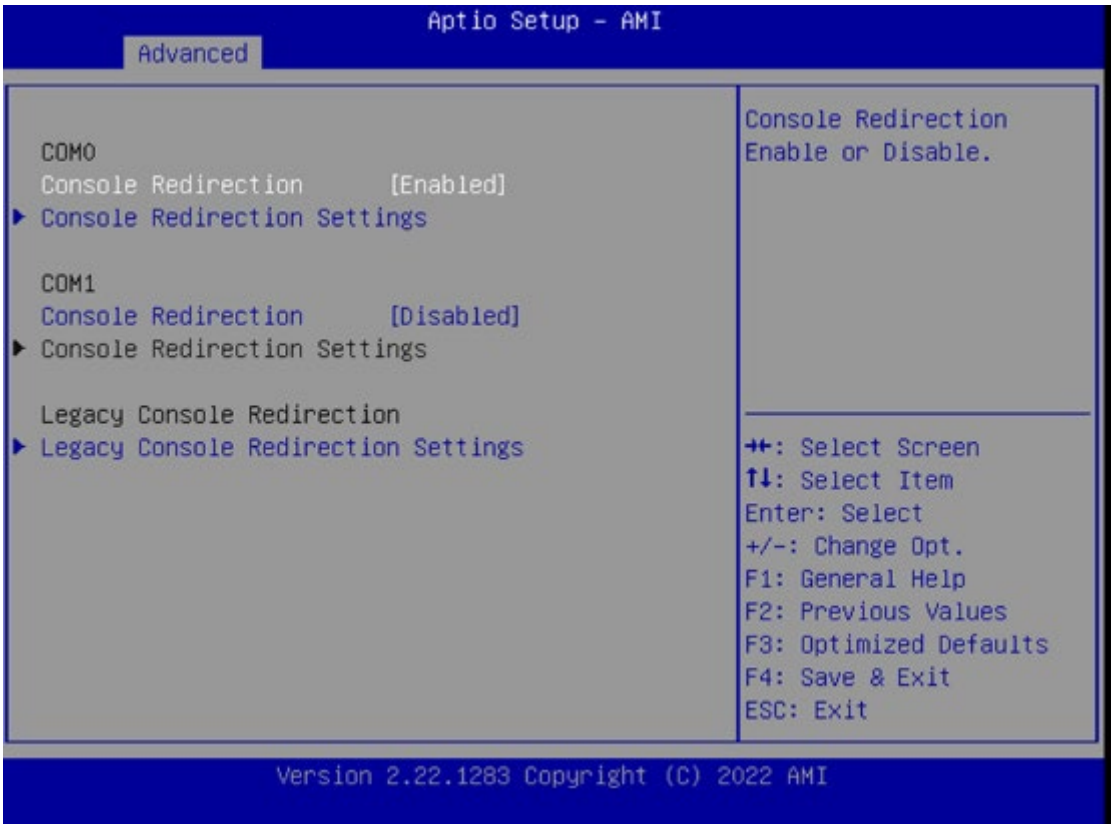
Feature	Options	Description
Smart Fan Mode Configuration	None	Smart Fan Parameters

Smart Fan Mode Configuration



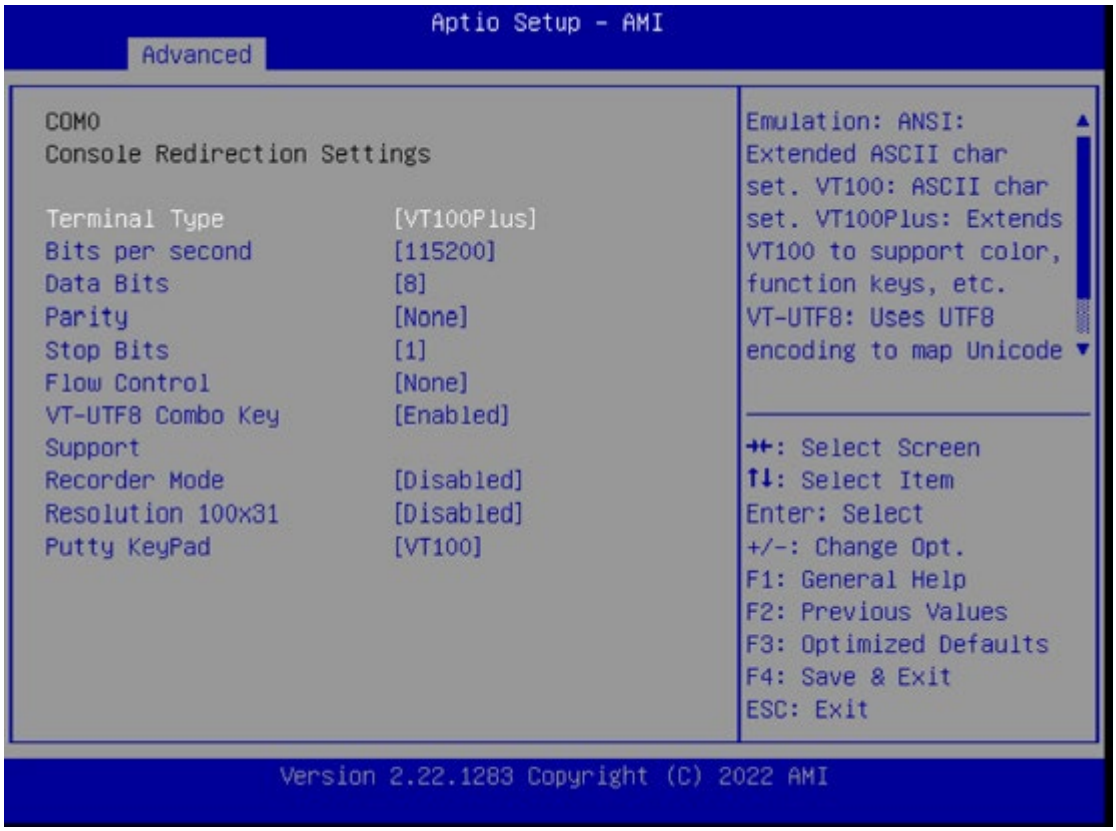
Feature	Options	Description
Smart Fan Mode	Manual Mode Smart Fan Mode	Smart Fan Mode select
Target Temperature T1	70	Input Target Temperature (Range:0 - 127)
Target Temperature T2	75	Input Target Temperature (Range:0 - 127)
Target Temperature T3	80	Input Target Temperature (Range:0 - 127)
Target Temperature T4	85	Input Target Temperature (Range:0 - 127)
Critical Temperature	90	Input Target Temperature (Range:0 - 127)
FanOut T1 Level	60	Input Target Fan Out
FanOut T2 Level	100	Input Target Fan Out
FanOut T3 Level	150	Input Target Fan Out
FanOut T4 Level	220	Input Target Fan Out

Serial Port Console Redirection



Feature	Options	Description
COM0 Console Redirection	Enabled Disabled	Enables or disables Console Redirection
Feature	Options	Description
COM1 Console Redirection	Enabled Disabled	Enables or disables Console Redirection

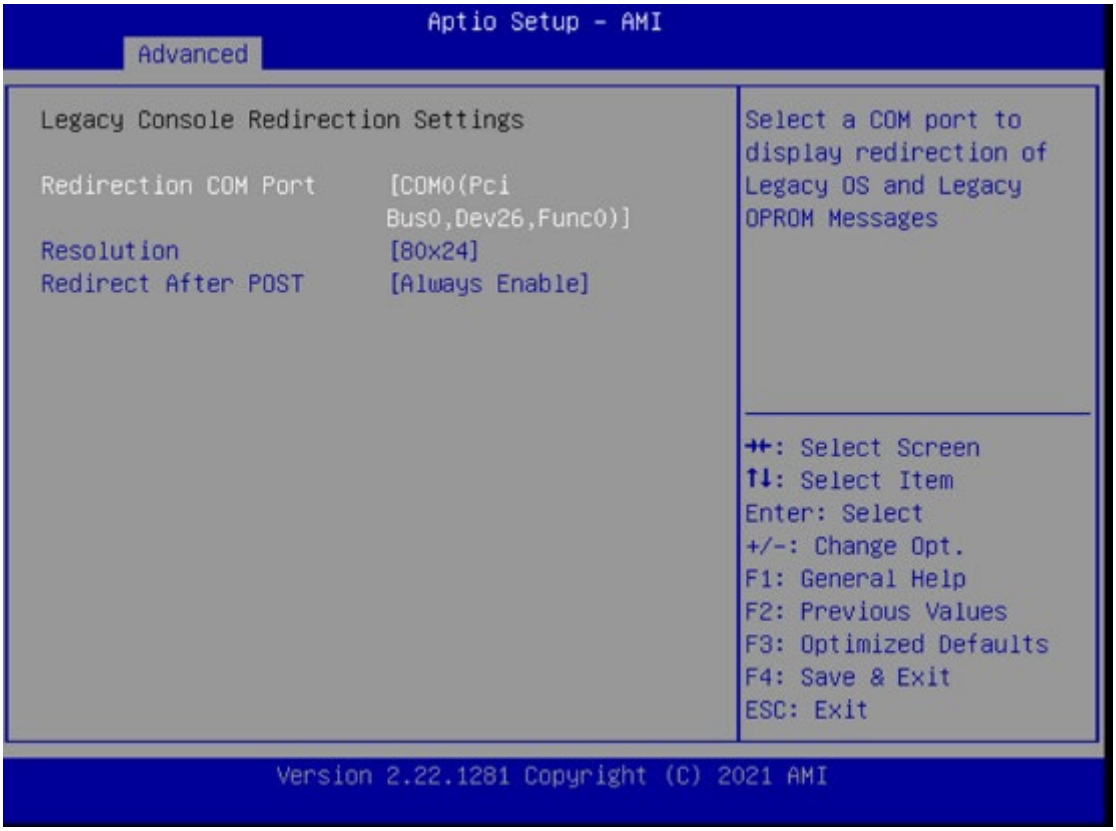
Console Redirection Settings



Feature	Options	Description
Terminal Type	VT100 VT100+ VT-UTF8 ANSI	**VT100**: ASCII char set **VT100+**:Extends VT100 to support color, function keys, etc. **VT-UTF8**:Uses UTF8 encoding to map Unicode chars onto 1 or more bytes **ANSI**: Extended ASCII char set
Bits per second	9600 19200 38400 57600 115200	Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Data Bits	7 8	Data Bits
Parity	None Even Odd Mark Space	A parity bit can be sent with the data bits to detect some transmission errors.
Stop Bits	1 2	Indicates the end of a serial data packet.
Flow Control	None Hardware RTS/CTS	Flow Control can prevent data loss from buffer overflow.

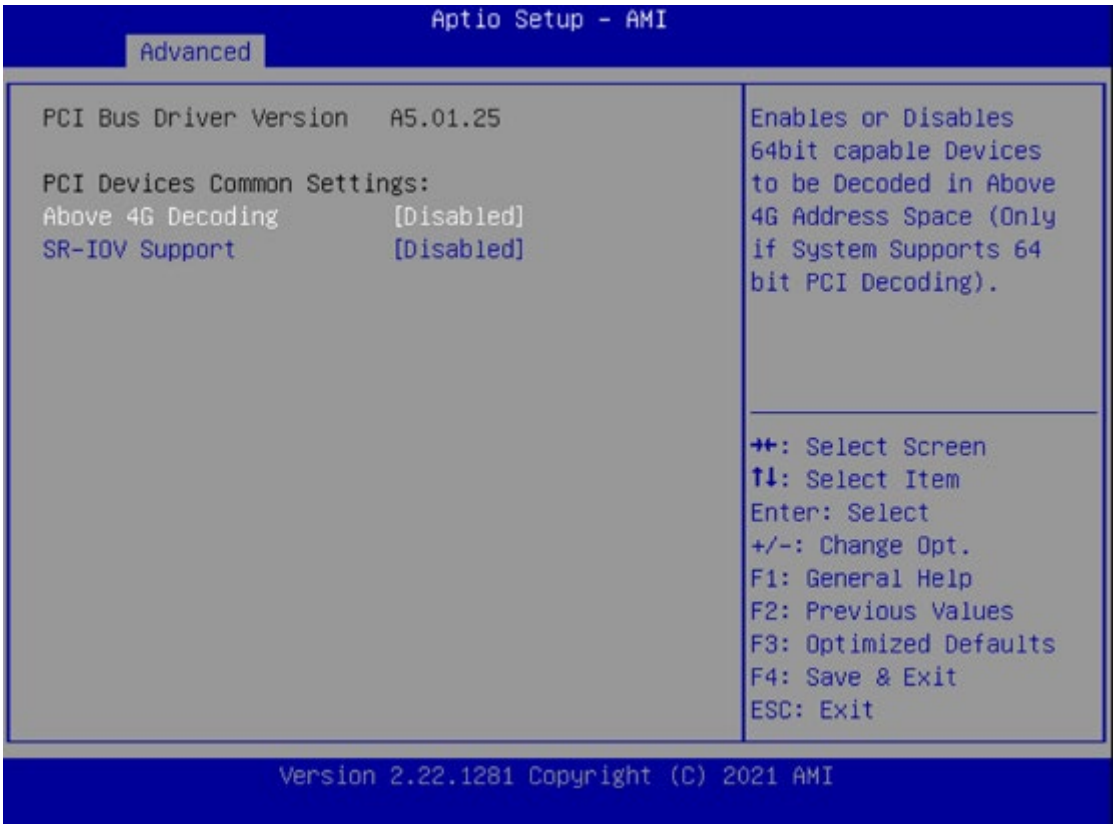
VT-UTF8 Combo Key Support	Disabled Enabled	Enables VT-UTF8 Combination Key Support for ANSI/VT100 terminals
Recorder Mode	Disabled Enabled	With this mode enabled, only text will be sent. This is to capture Terminal data.
Resolution 100x31	Disabled Enabled	Enables or disables extended terminal resolution
Putty KeyPad	VT100 LINUX XTERM86 SCO ESCN VT400	Selects FunctionKey and KeyPad on Putty.

Legacy Console Redirection Settings



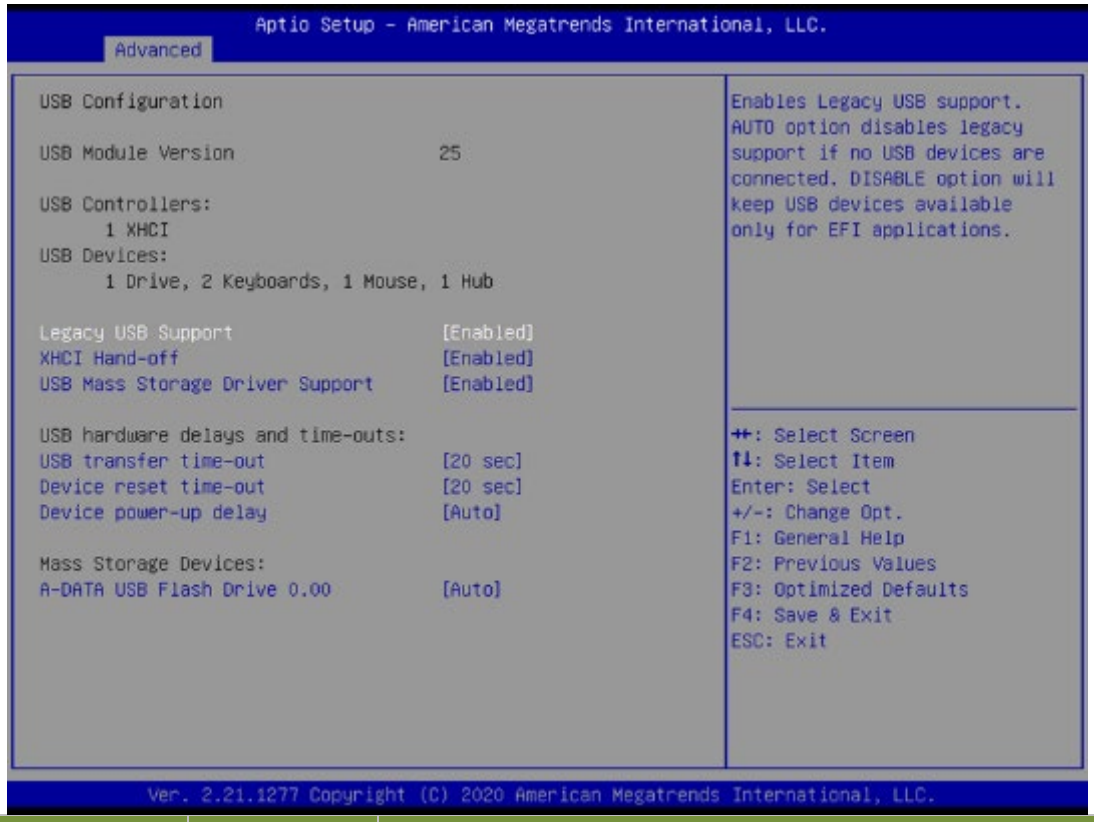
Feature	Options	Description
Legacy Serial Redirection Port	COM0	Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages
Legacy OS Redirection Resolution	80x24 80x25	On Legacy OS, the Number of Rows and Columns supported redirection.
Redirection After BIOS POST	Always Enable BootLoader	When **Bootloader** is selected, Legacy Console Redirection is disabled before booting to legacy OS. When **Always Enable** is selected, then Legacy Console Redirection is enabled for legacy OS. Default setting for this option is set to **Always Enable**.

PCI Subsystem Settings



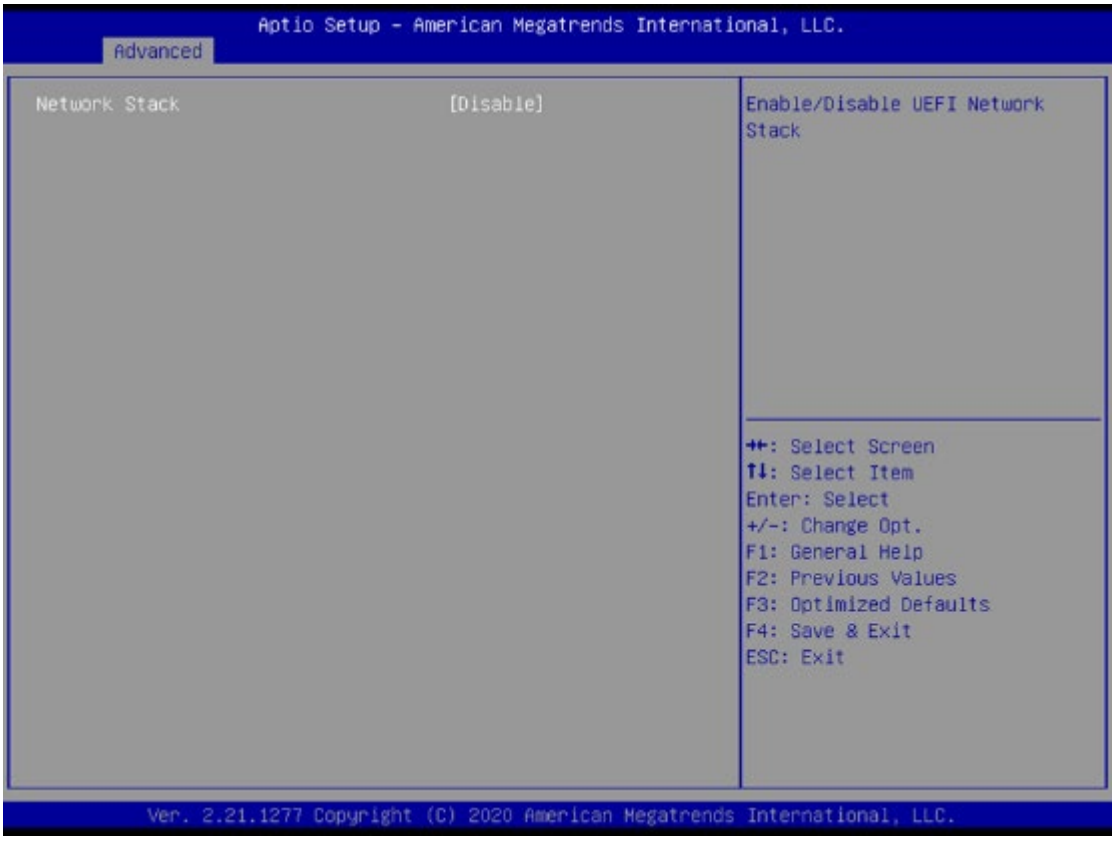
Feature	Options	Description
Above 4G Decoding	Disabled Enabled	Enables or disables 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System Supports 64-bit PCI Decoding)
SR-IOV Support	Disabled Enabled	If the system has SR-IOV capable PCIe Devices, this option enables or disables Single Root IO Virtualization Support.

USB Configuration



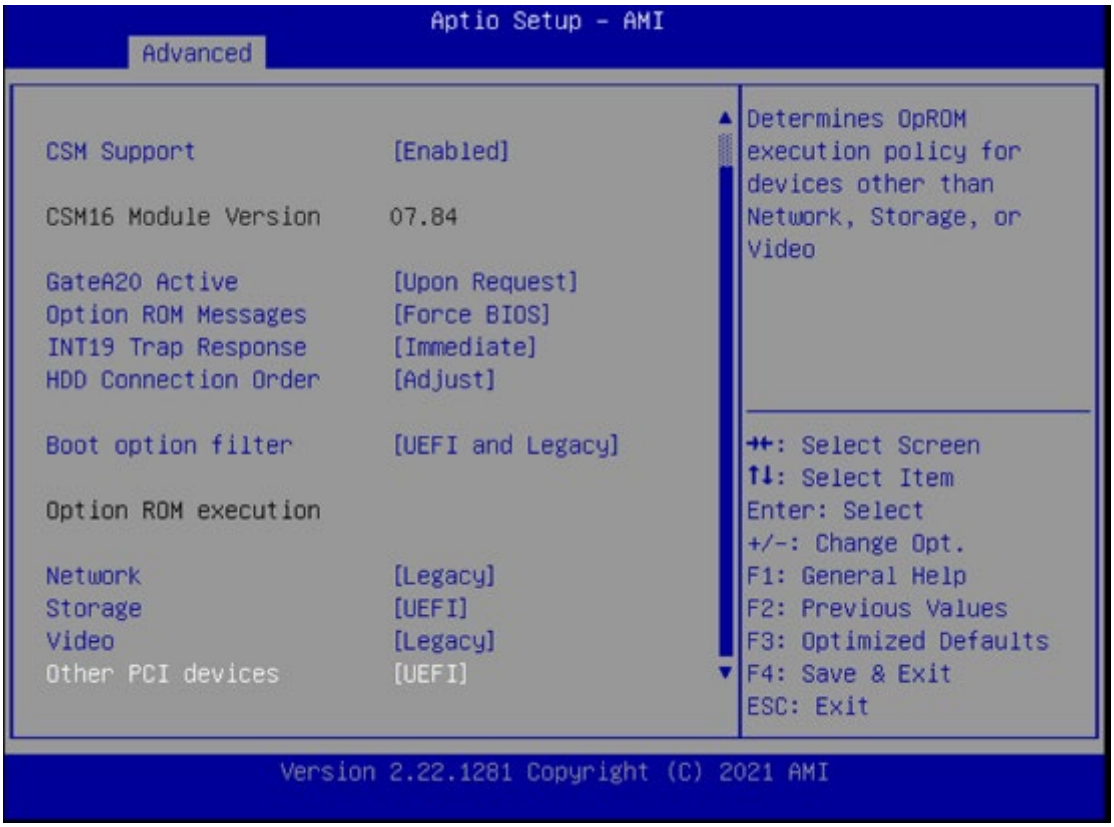
Feature	Options	Description
Legacy USB Support	Enabled Disabled Auto	Enables Legacy USB support. **Auto** option disables legacy support if no USB devices are connected; **Disabled**option will keep USB devices available only for EFI applications.
XHCI Hand-off	Enabled Disabled	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Enabled Disabled	Enables or disables USB Mass Storage Driver Support.
USB transfer time-out	1 sec 5 sec 10 sec 20 sec	The time-out value for Control, Bulk, and Interrupt transfers
Device reset time-out	1 sec 5 sec 10 sec 20 sec	USB mass storage device Start Unit command time-out
Device power-up delay	Auto Manual	Maximum time the device will take before it properly reports itself to the Host Controller. **Auto** uses default value: for a Root port, it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

Network Stack Configuration



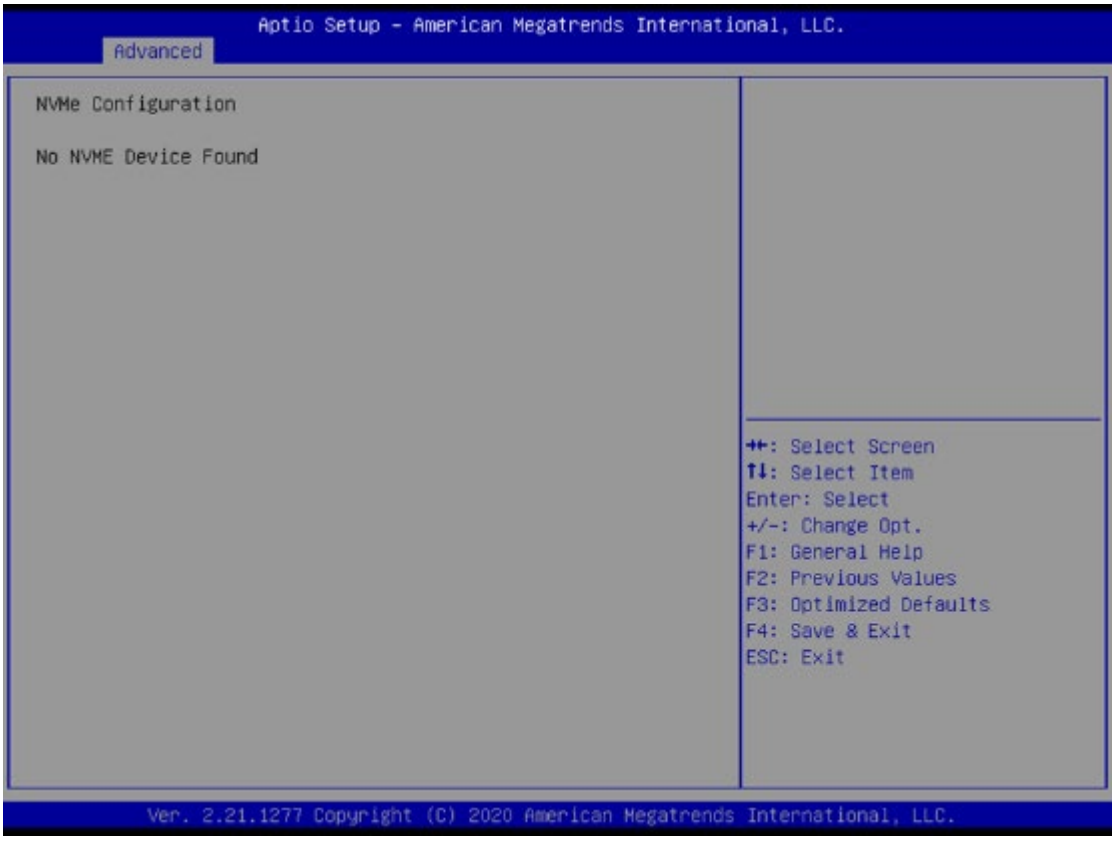
Feature	Options	Description
Network Stack	Disabled Enabled	Enables or disables UEFI Network Stack
Ipv4 PXE Support	Disabled Enabled	Enables Ipv4 PXE Boot Support. If IPV4 is disabled, PXE boot option will not be created.
Ipv4 HTTP Support	Disabled Enabled	Enables Ipv4 HTTP Boot Support. If IPV4 is disabled, HTTP boot option will not be created.
Ipv6 PXE Support	Disabled Enabled	Enables Ipv6 PXE Boot Support. If IPV6 is disabled, PXE boot option will not be created.
Ipv6 HTTP Support	Disabled Enabled	Enables Ipv6 HTTP Boot Support. If IPV6 is disabled, HTTP boot option will not be created.
PXE boot wait time	0	Wait time to press **<ESC>** key to abort the PXE boot
Media detect count	1	Number of times the presence of media will be checked

CSM Configuration

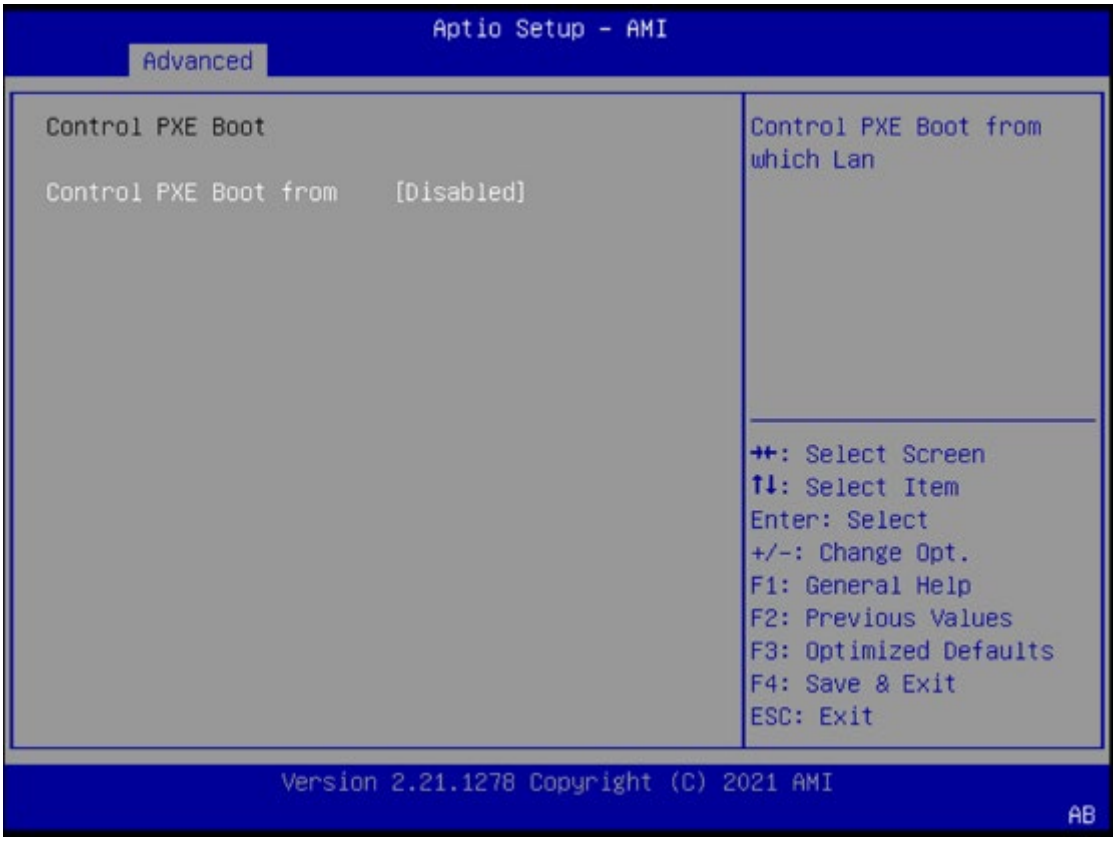


Feature	Options	Description
CSM Support	Disabled Enabled	Enables or disables CSM Support
Network	Do Not Launch UEFI Legacy	Controls the execution of UEFI and Legacy PXE OpROM
Storage	Do Not Launch UEFI Legacy	Controls the execution of UEFI and Legacy Storage OpROM
Video	Do Not Launch UEFI Legacy	Controls the execution of UEFI and Legacy Video OpROM
Other PCI device	Do Not Launch UEFI Legacy	Determines OpROM execution policy for devices other than Network, Storage, or Video

NVMe Configuration



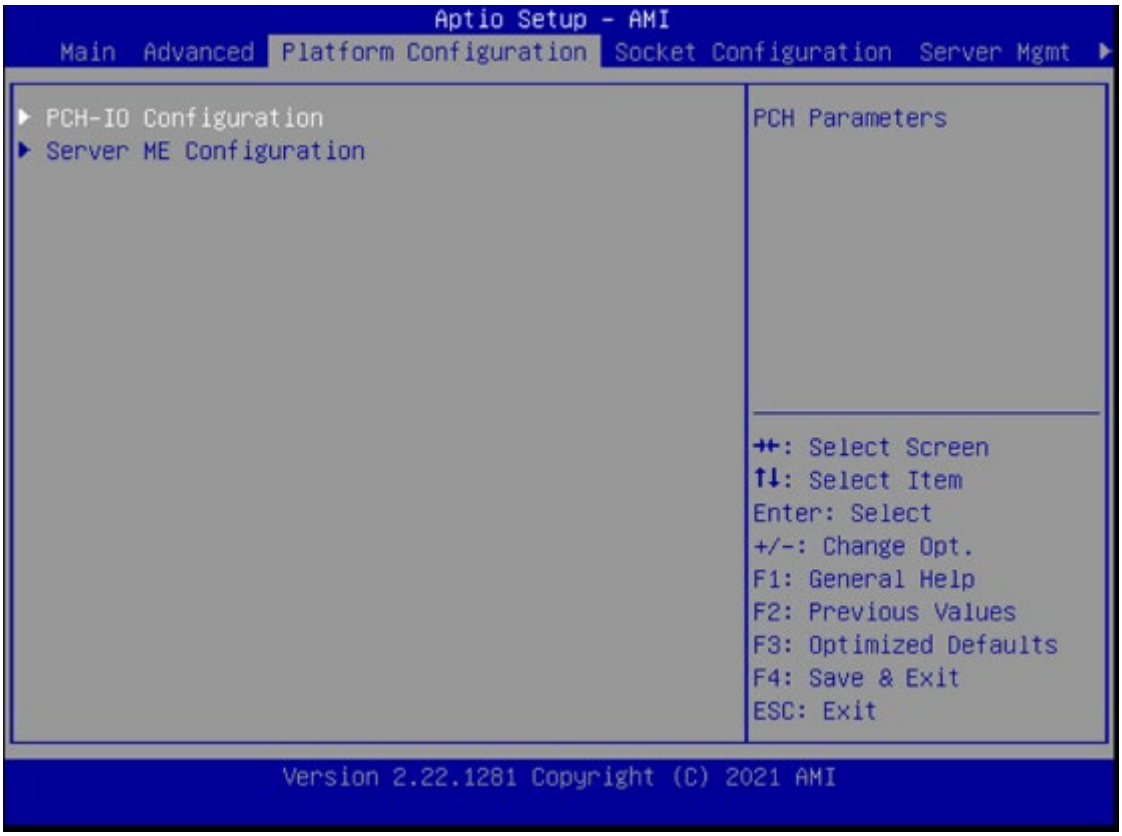
Control Legacy PXE Boot



Feature	Options	Description
Control Legacy PXE Boot from	Disabled LAN1 LAN2	Select On Board LAN# Boot

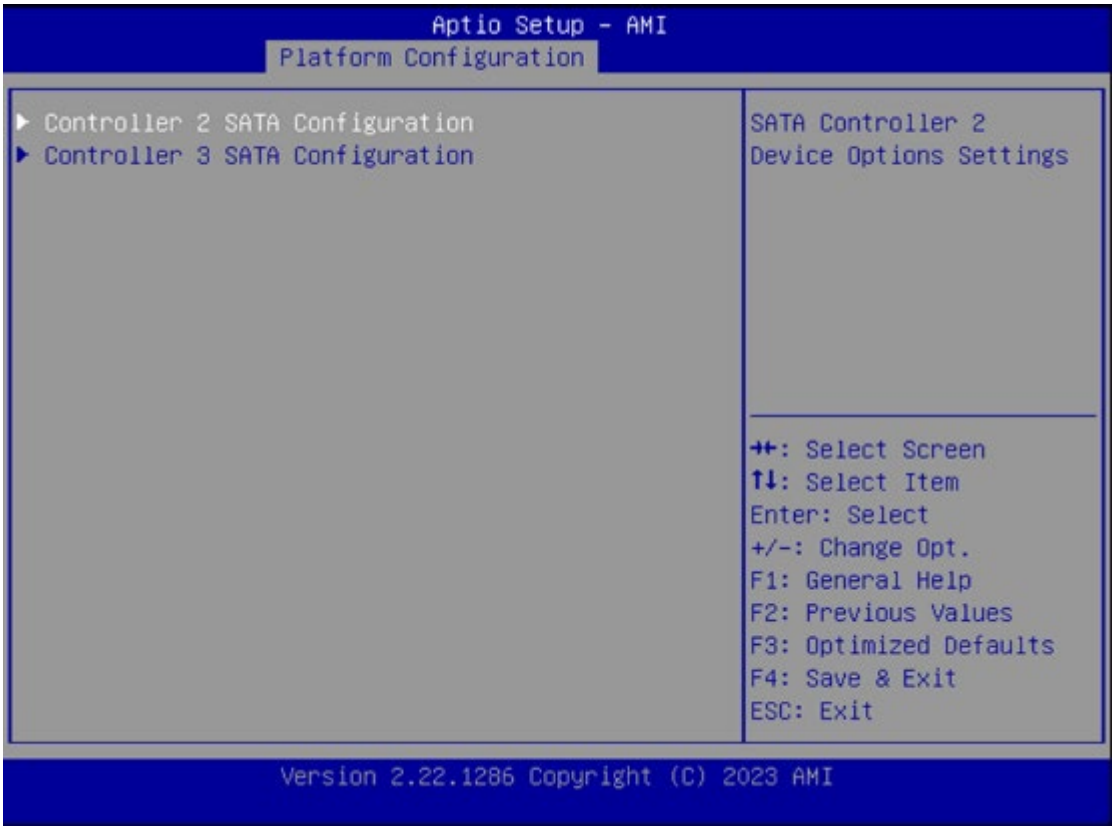
Platform Configuration

Select the Platform menu item from the BIOS setup screen to enter the Platform Setup screen. Users can select any of the items in the left frame of the screen.



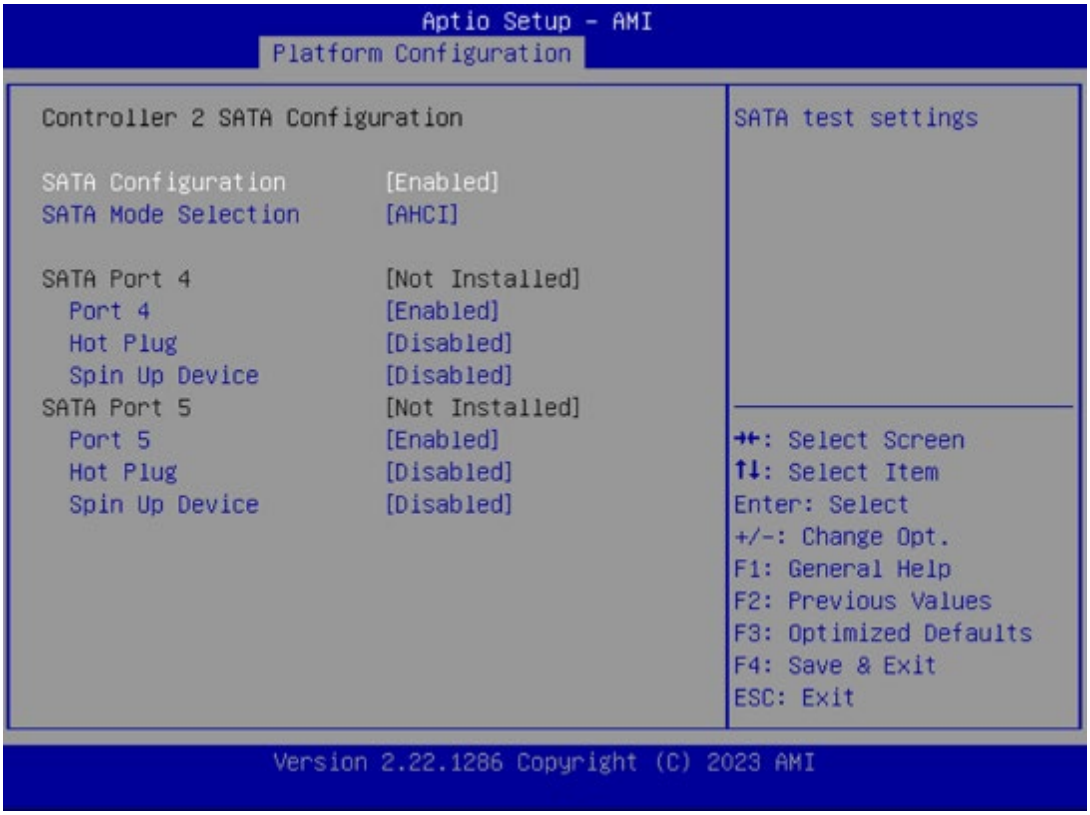
Feature	Options	Description
PCH-IO Configuration	None	Displays and provides option to change the PCH Settings
Server ME Configuration	None	Configure Server ME Technology Parameters

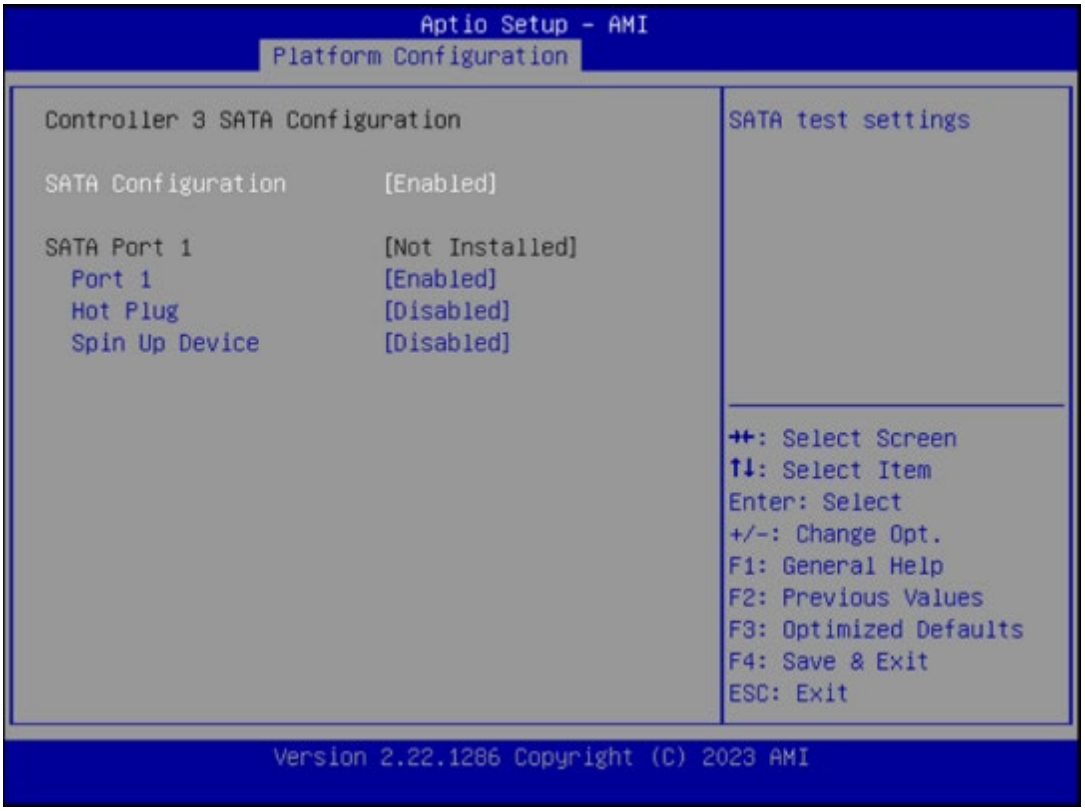
PCH Configuration



Feature	Options	Description
SATA Configuration	None	SATA devices and settings
Restore AC Power Loss	Power ON Power Off Last State	Select S0/S5 for ACPI state after a G3
Serial IRQ Mode	Quiet Continuous	Configure Serial IRQ Mode.

PCH SATA Configuration

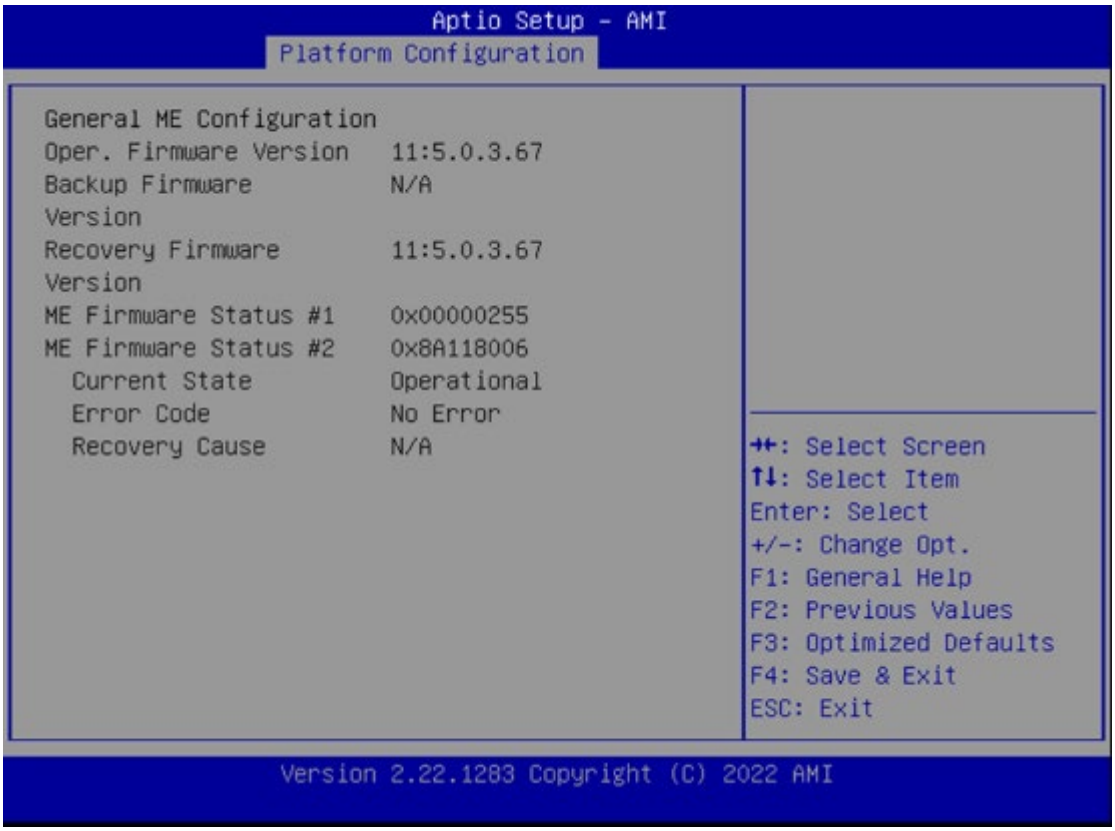




Feature	Options	Description
SATA Controller	Disabled Enabled	Enables or disables SATA Controller
Configure SATA as	AHCI RAID	This will configure SATA as **RAID** or **AHCI**.

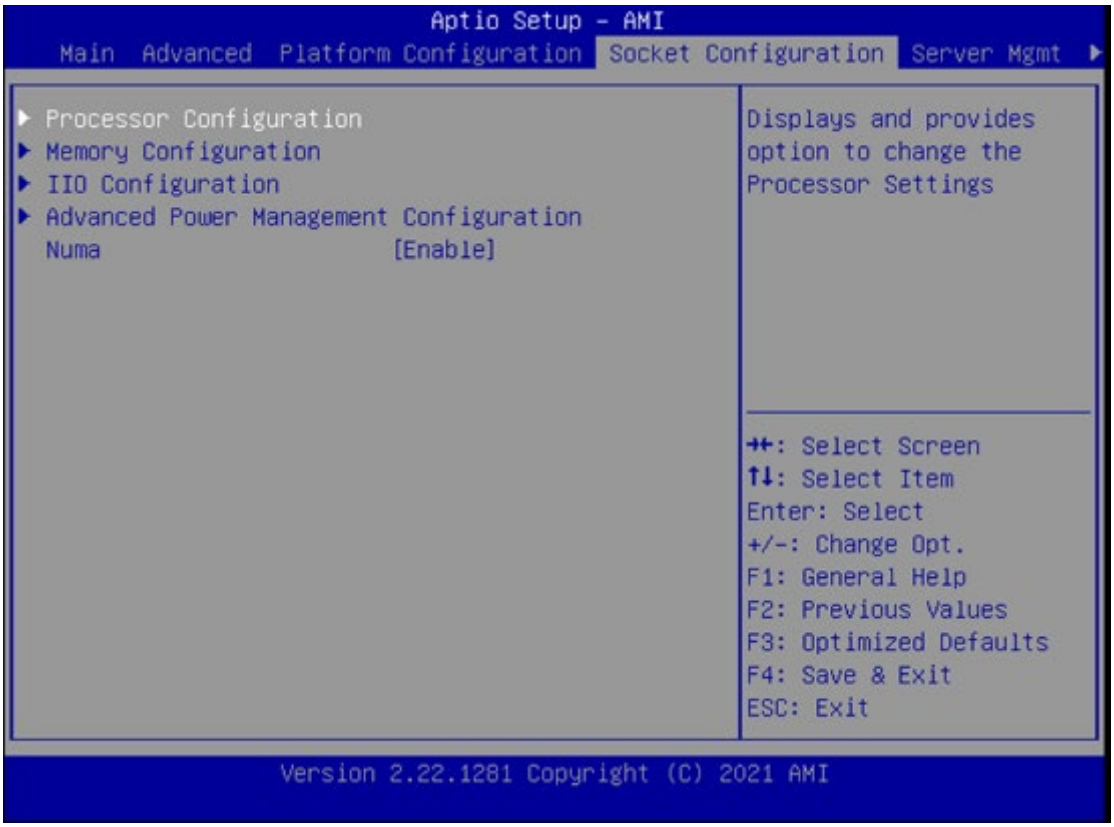
Port 1/4/5	Disabled Enabled	Enable or Disable SATA Port
Hot Plug	Disabled Enabled	Designates this port as Hot Pluggable.
Spin Up Device	Disabled Enabled	If enabled for any of ports Staggerred Spin Up will be performed and only the drive switch have this option enabled will spin up at boot. Otherwise all drives spin up at boot.

Server ME Configuration



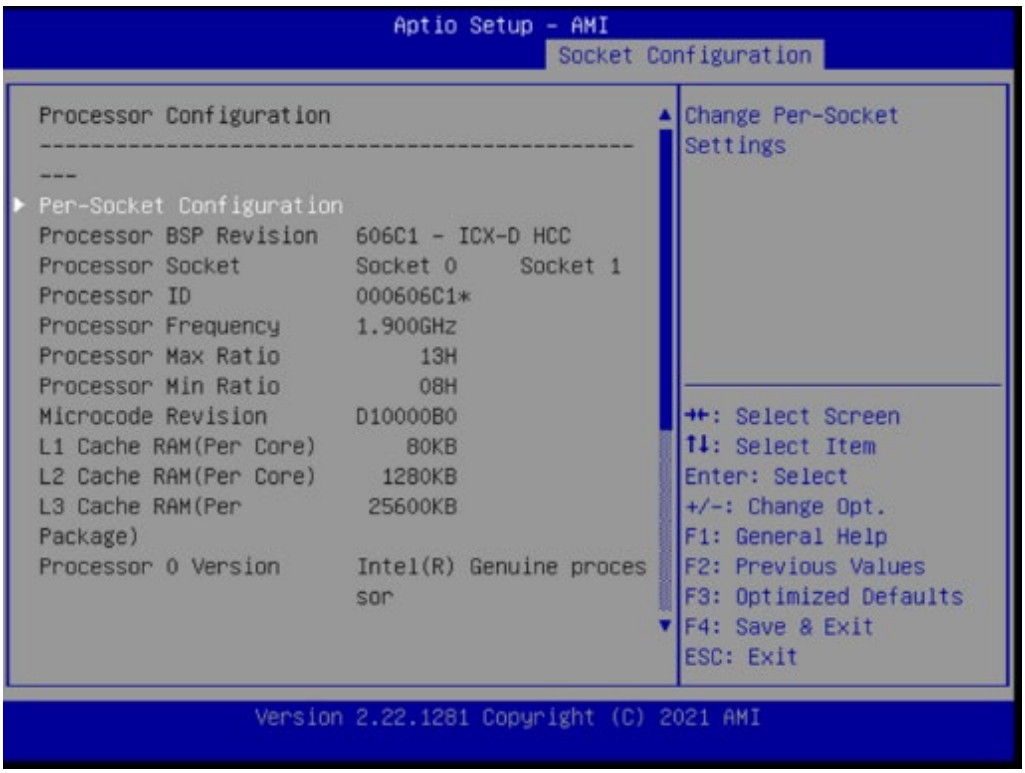
Socket Configuration

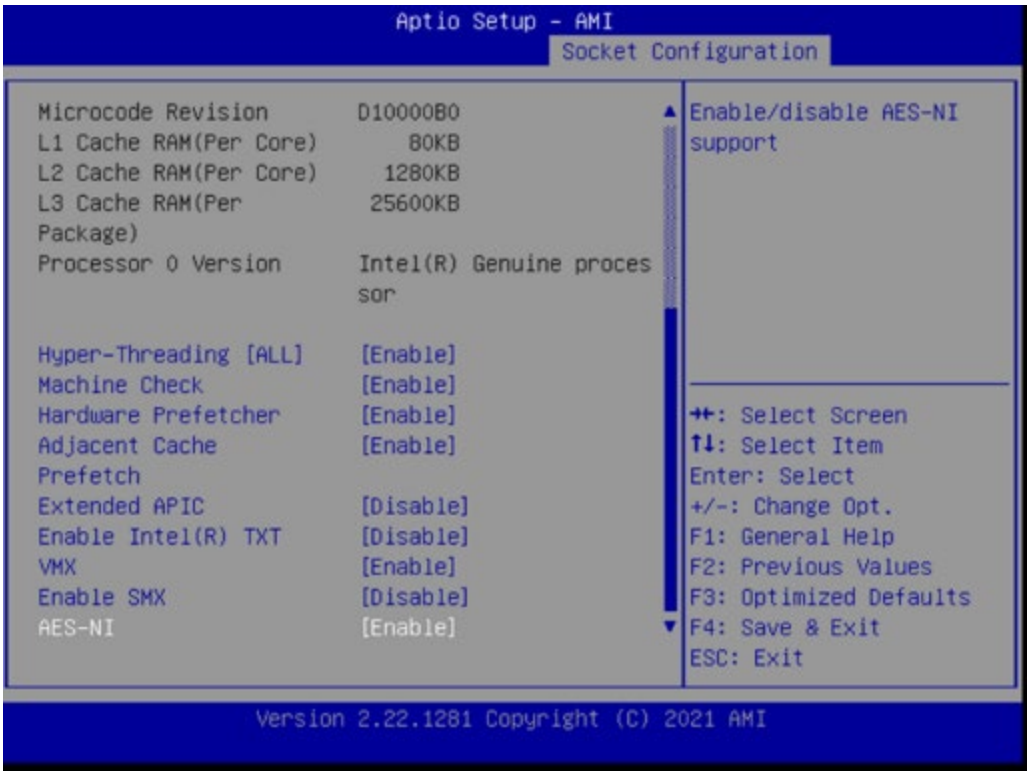
Select the Socket menu item from the BIOS setup screen to enter the Socket Setup screen. Users can select any of the items in the left frame of the screen.



Feature	Options	Description
Processor Configuration	None	Displays and provides option to change the Processor Settings
Memory Configuration	None	Displays and provides option to change the Memory Settings
IIO Configuration	None	Displays and provides option to change the IIO Settings
Advanced Power Management Configuration	None	Displays and provides option to change the Power Management Settings
Numa	Disabled Enabled	Displays and provides option to change the Power Management Settings

Processor Configuration

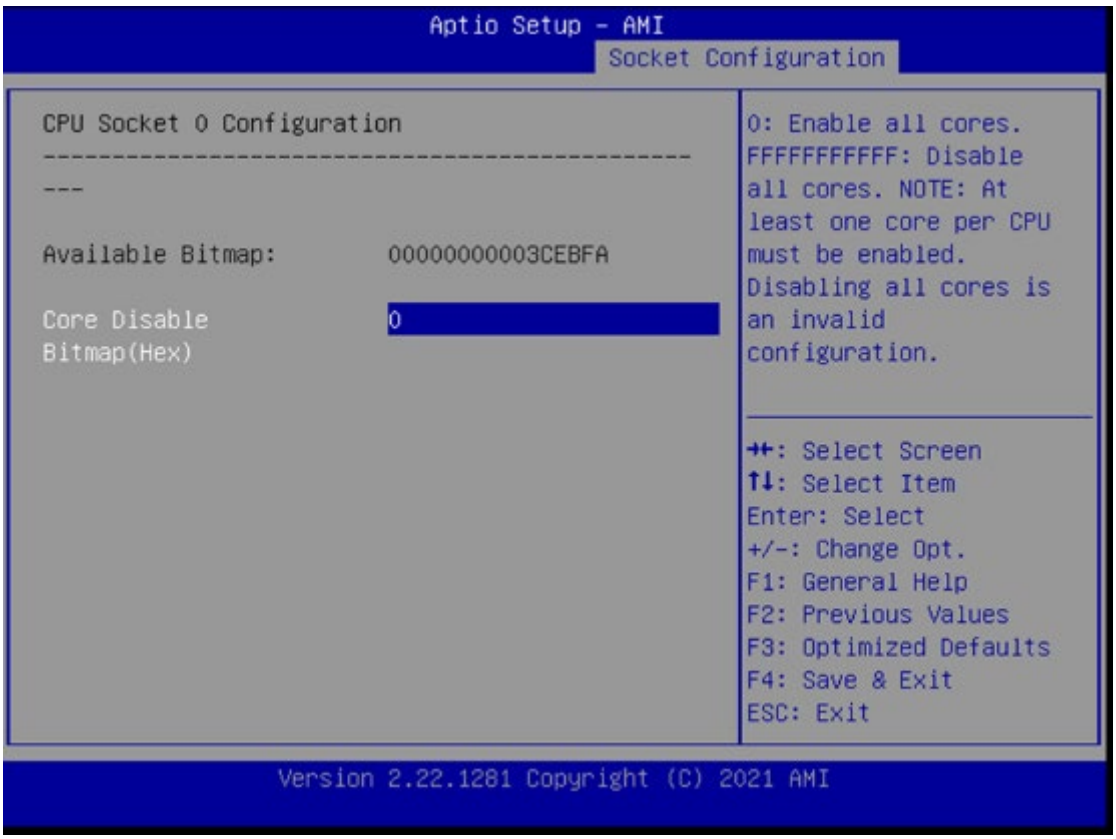




Feature	Options	Description
Hyper-Threading [ALL]	Disabled Enabled	Enables Hyper Threading (Software Method to Enable/Disable Logical Processor threads.
Machine Check	Disabled Enabled	Enable or Disable the Machine Check
Hardware Prefetcher	Disabled Enabled	= MLC Streamer Prefetcher (MSR 1A4h Bit[0])

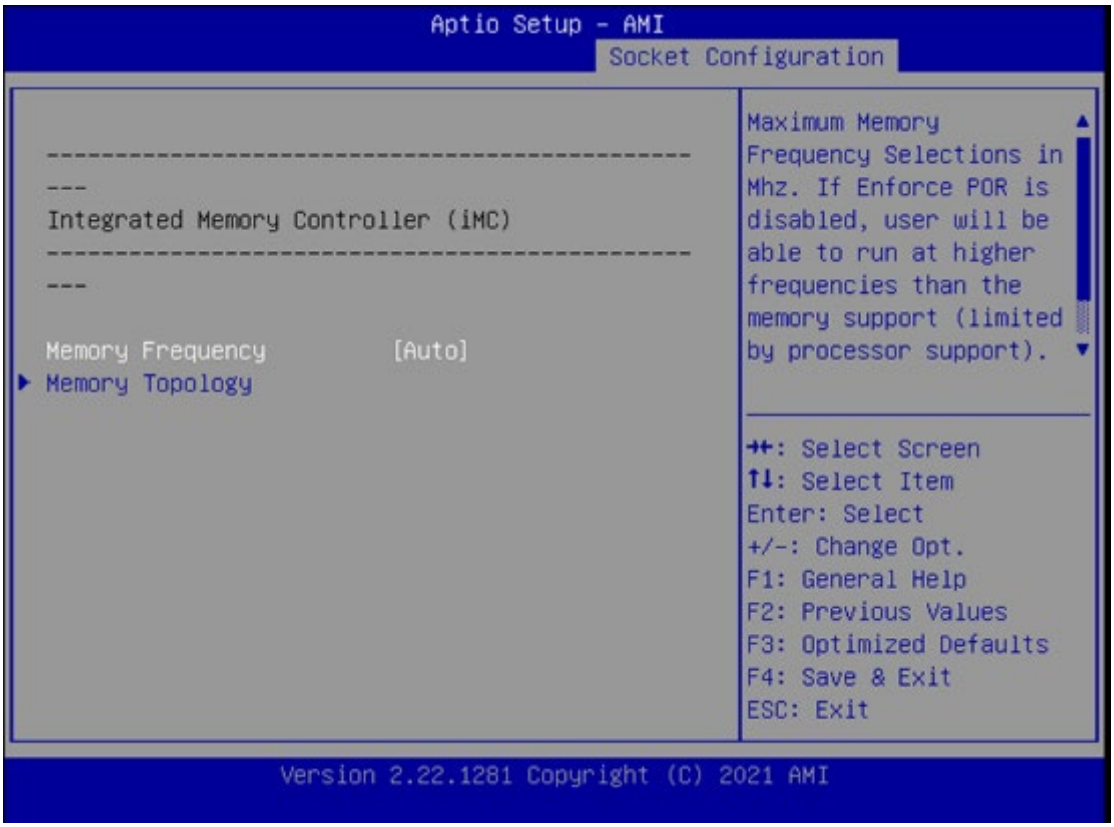
Adjacent Cache Prefetcher	Disabled Enabled	= MLC Spatial Prefetcher (MSR 1A4h Bit[1])
Extended APIC	Disabled Enabled	Enables or disables extended APIC support
Enable Intel® TXT	Disabled Enabled	Enables Intel(R) TXT
VMX	Disabled Enabled	Enables the Vanderpool Technology, which takes effect after reboot.
Enable SMX	Disabled Enabled	Enables Safer Mode Extensions
AES-NI	Disabled Enabled	Enables or disables AES-NI support

CPU Socket0 Configuration



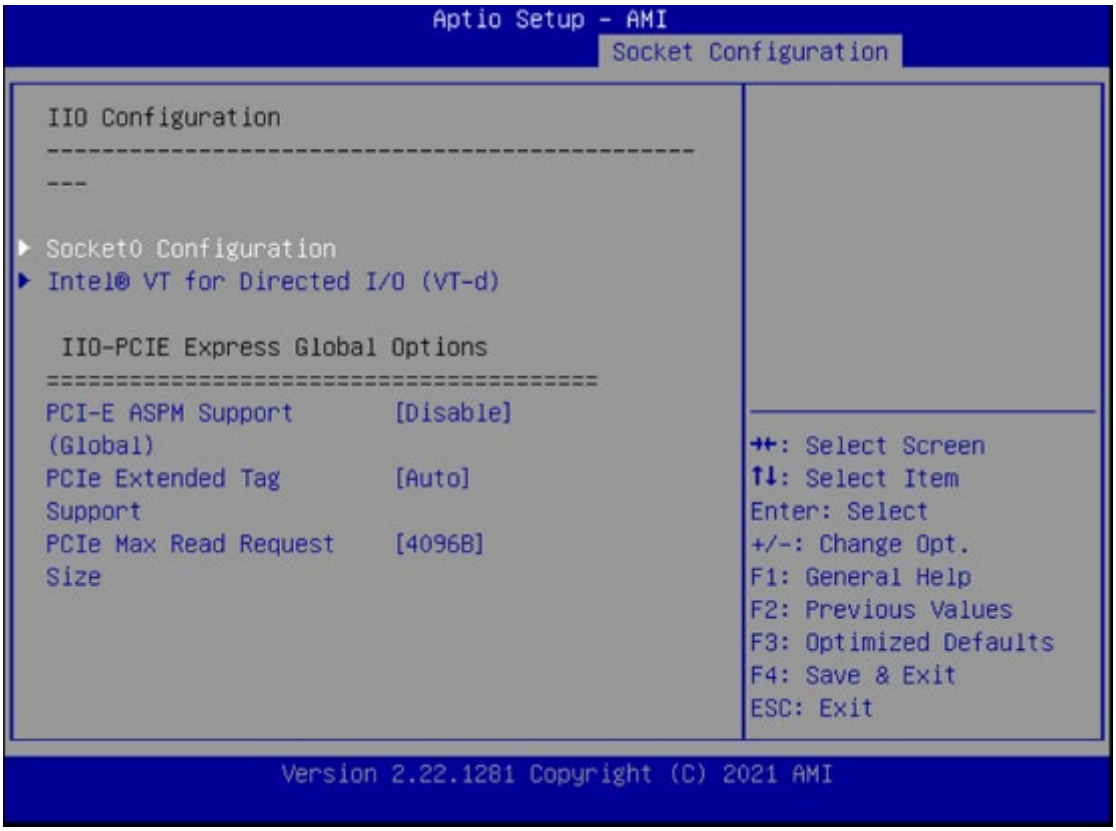
Feature	Options	Description
Core Disable Bitmap (Hex)	0	0: Enable all cores. FFFFFFFFFF: Disable all cores least one core per CPU must be enabled. Disabling all cores is an invalid configuration.

Memory Configuration



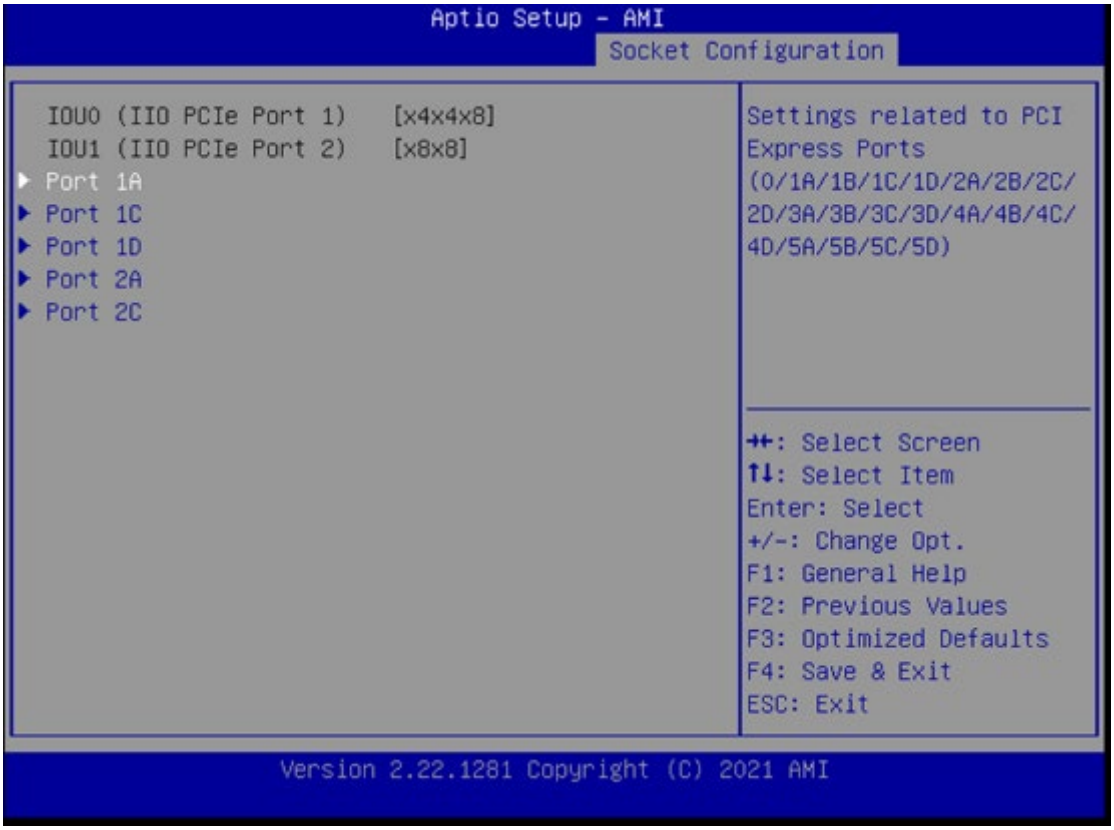
Feature	Options	Description
Memory Frequency	Auto 1200 1333 1400 1600 1800 1866 2000 2133 2200 2400 2600	Maximum Memory Frequency Selections in Mhz. Do not select Reserved
Memory Topology	None	Displays memory topology with DIMM population information

IIO Configuration



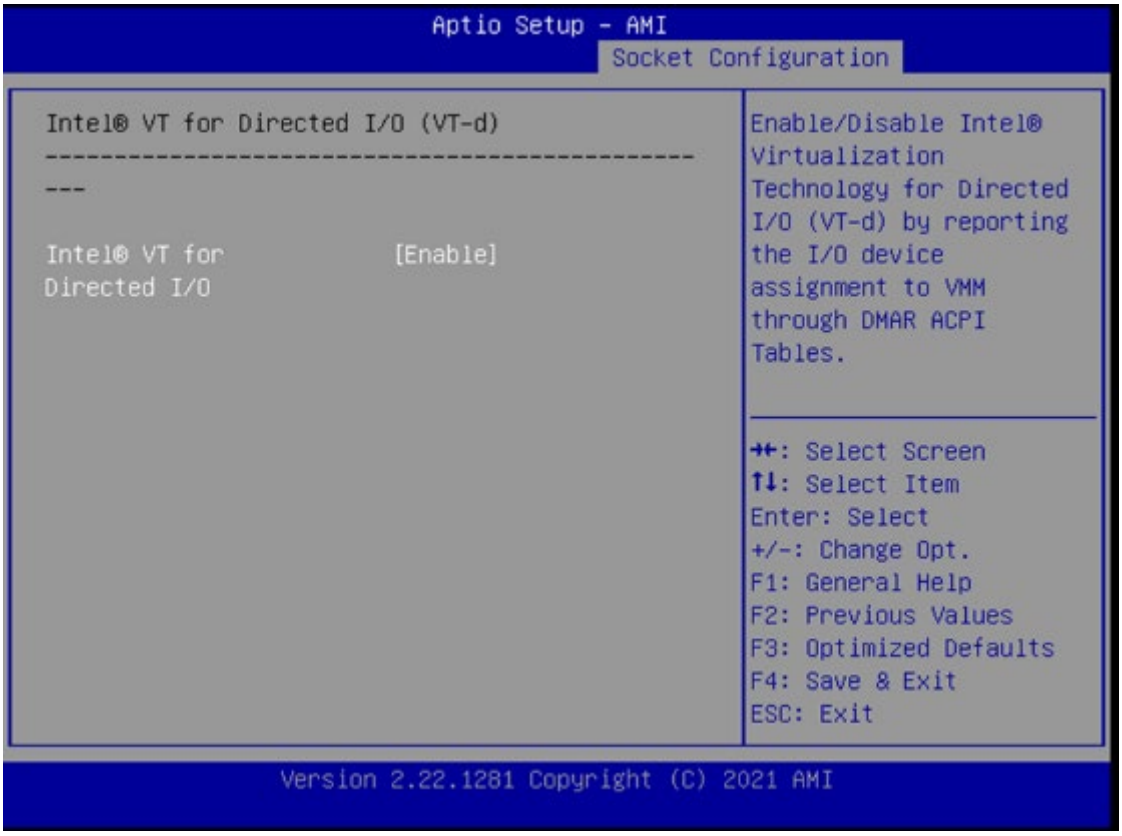
Feature	Options	Description
Socket0 Configuration	None	None
Intel® VT for Directed I/O (VT-d)	None	Press **<Enter>** to bring up the Intel? VT for Directed I/O (VT-d) Configuration menu.
PCI-E ASPM Support (Global)	No Per-Port L1 Only	This option enables / disables the ASPM support for all downstream devices.
PCIe Extended Tag Enable	Auto No Yes	Auto/Enable - BIOS sets 8-bit Tag Field for PCIe Root Port/EndPoint. Disable - BIOS sets 5-bit Tag Field for PCIe Root Port/EndPoint
PCIe Max Read Request Size	Auto 128B 256B 512B 1024B 2048B 4096B	Set Max Read Request Size in EndPoints

Socket0 Configuration



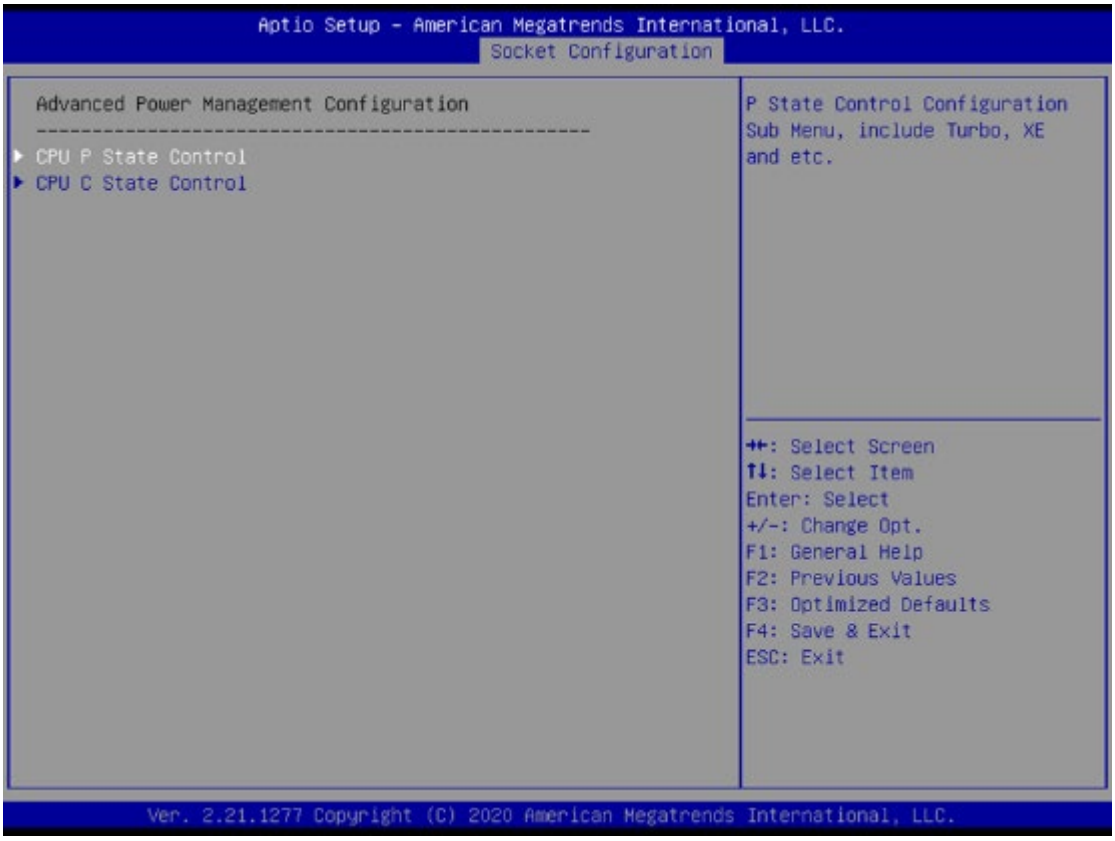
Feature	Options	Description
Socket 0 Port 1A	None	Settings related to PCI Express Port 1A
Socket 0 Port 1C	None	Settings related to PCI Express Port 2A
Socket 0 Port 1D	None	Settings related to PCI Express Port 2C
Socket 0 Port 2A	None	Settings related to PCI Express Port 4A
Socket 0 Port 2C	None	Settings related to PCI Express Port 4C

Intel® VT for Directed I/O (VT-d)



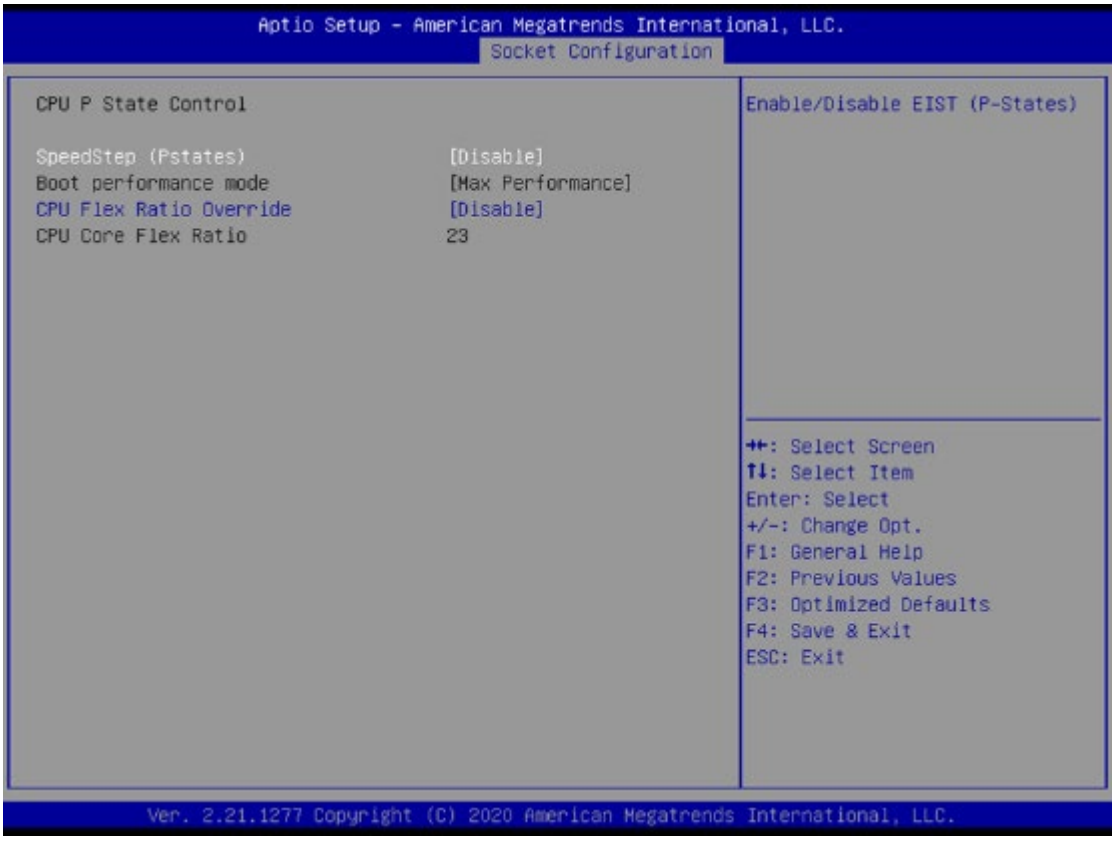
Feature	Options	Description
Intel® VT for Directed I/O (VT-d)	Enable Disable	Press **<Enter>** to bring up the Intel® VT for Directed I/O (VT-d) Configuration menu.

Advanced Power Management Configuration



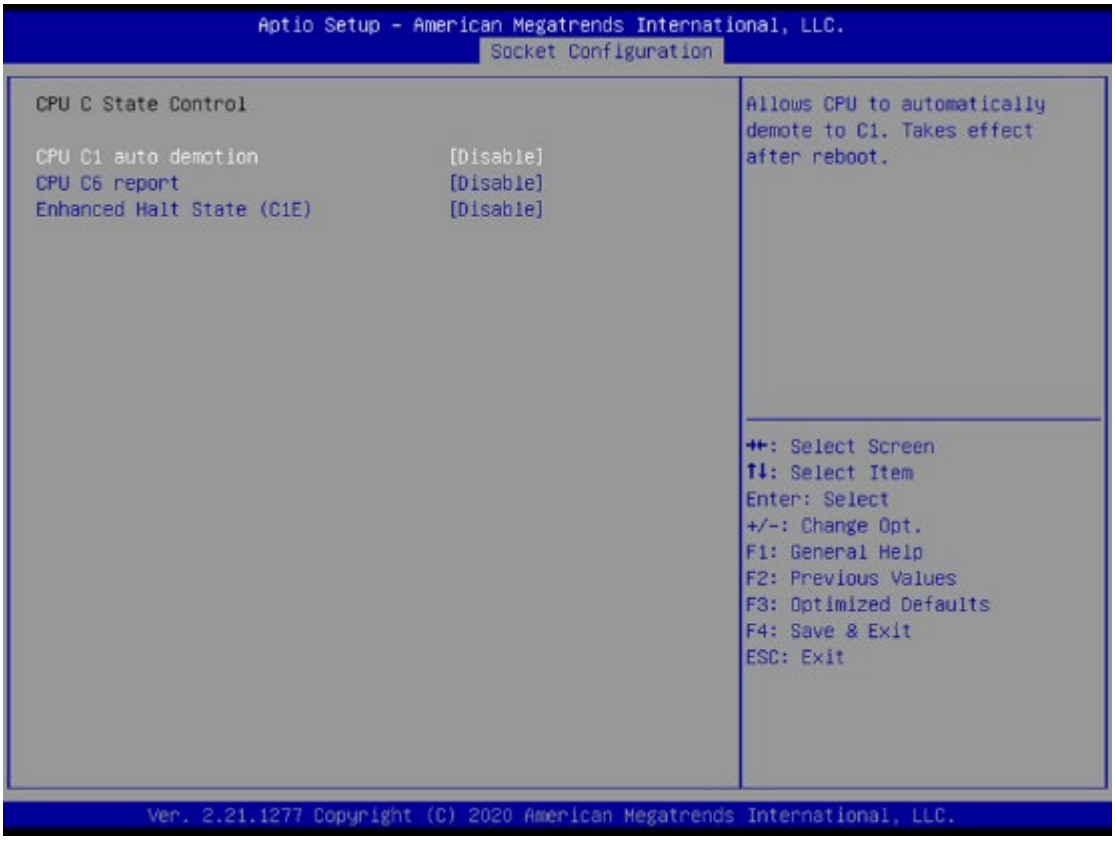
Feature	Options	Description
CPU P State Control	None	P State Control Configuration Sub Menu, include Turbo, XE etc.
CPU C State Control	None	CPU C State setting

CPU P State Control



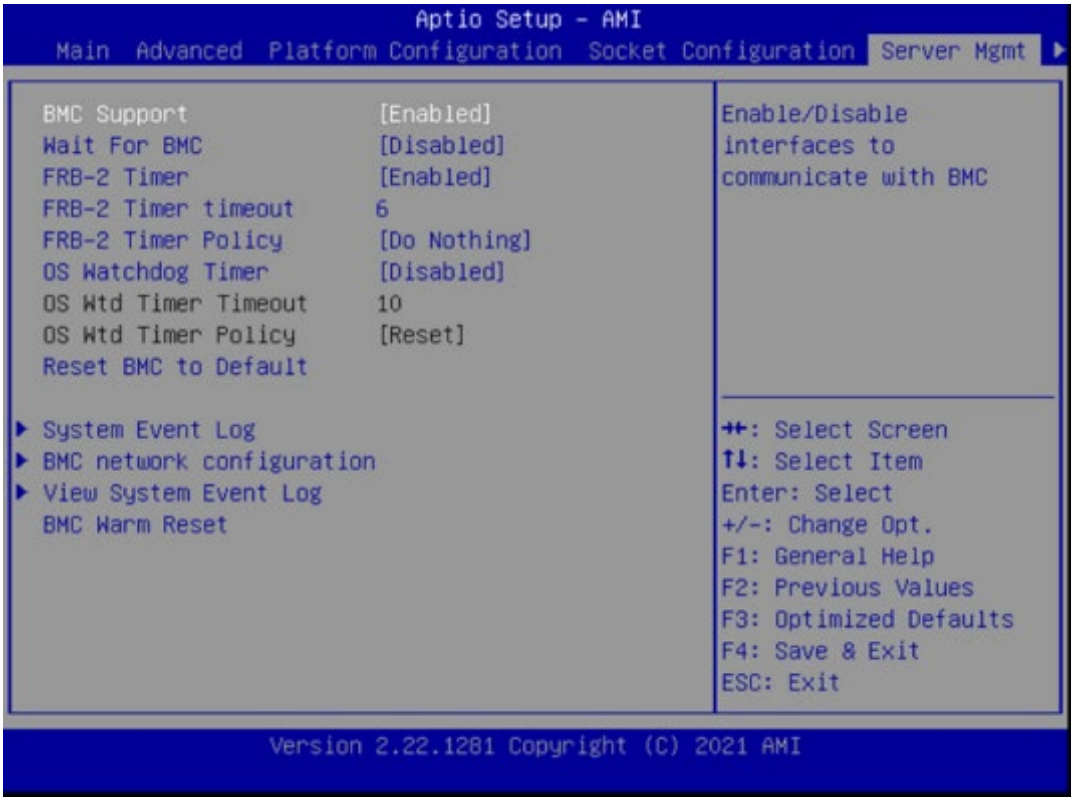
Feature	Options	Description
SpeedStep (Pstates)	Disabled Enabled	Enables or disables EIST (P-States)
Boot Performance Mode	Max Performance Max Efficient Set by Intel Node Manager	Select the performance state that the BIOS will set before OS hand off.
CPU Flex Ratio Override	Disabled Enabled	Enable/Disable CPU Flex Ratio Programming
CPU Core Flex Ratio	23	Non-Turbo Mode Processor Core Ratio Multiplier

CPU C State Control



Feature	Options	Description
CPU C1 Auto Demotion	Disabled Enabled	Autonomous Core C-State Control
CPU C6 Report	Disabled Enabled	Enables or disables CPU C6(ACPI C3) report to OS
Enhanced Halt State (C1E)	Disabled Enabled	Core C1E auto promotion Control. Takes effect after reboot.

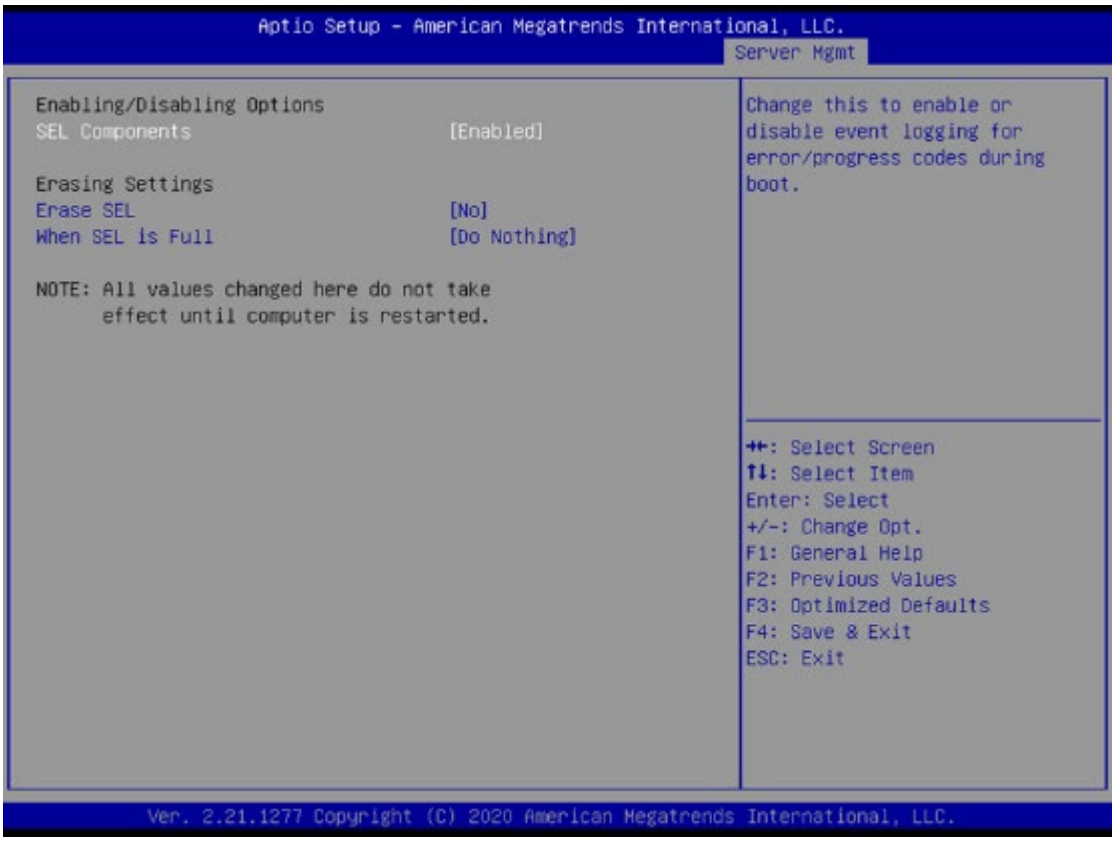
Server Mgmt



Feature	Options	Description
BMC Support	Enabled Disabled	Enable or disables interfaces to communicate with BMC.
Wait For BMC	Enabled Disabled	Wait For BMC response for specified time out. In PILOTII, BMC starts at the same time when BIOS starts during AC power ON. It takes around 30 seconds to initialize Host to BMC interfaces.
FRB-2 Timer	Enabled Disabled	Enables or disables 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.
FRB-2 Timer Policy	Do Nothing Reset Power Down Power Cycle	Configure how the system should respond if the FRB-2 Timer expires. Not available if FRB-2 Timer is disabled.
OS Watchdog Timer	Enabled Disabled	If enabled, it starts a BIOS timer which can only be shut off by Management Software after the OS loads. It also helps verify that the OS is successfully loaded or follows the OS Boot Watchdog Timer policy.

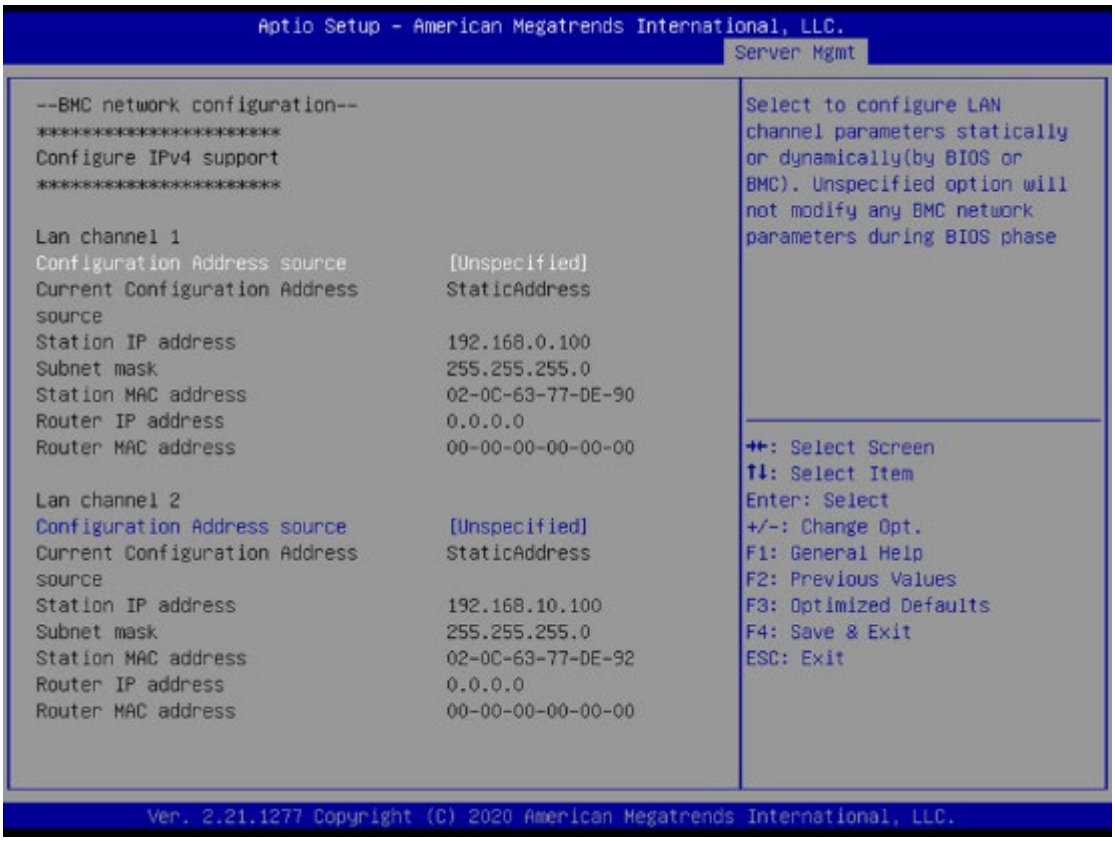
OS Wtd Timer Timeout	5 minutes 10 minutes 15 minutes 20 minutes	Configure the length of the OS Boot Watchdog Timer. Not available if OS Boot Watchdog Timer is disabled.
OS Wtd Timer Policy	Do Nothing Reset Power Down Power Cycle	Configure how the system should respond if the OS Boot Watchdog Timer expires. Not available if OS Boot Watchdog Timer is disabled.
System Event Log	NA	Press **<Enter>** to change the SEL event log configuration.
Reset BMC to Default	NA	Press <**Enter**> to do Reset BMC To Default
BMC Network Configuration	NA	Configure BMC network parameters.
View System Event Log	NA	Press **<Enter>** to view the System Event Log Records.
BMC Warm Reset	NA	Press **<Enter>** to do Warm Reset BMC.

System Event Log



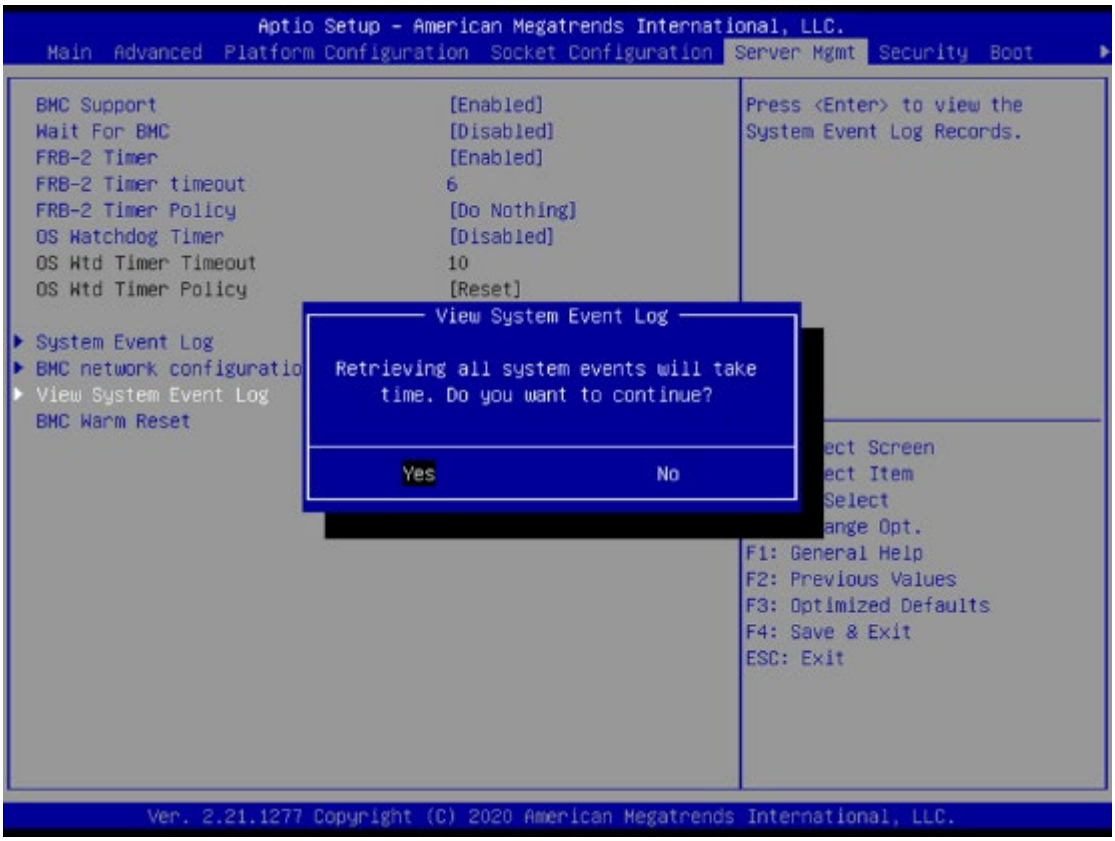
Feature	Options	Description
SEL Components	Disabled Enabled	Enables or disables all features of System Event Logging during boot.
Erase SEL	NO Yes, On next reset Yes, On every reset	Choose options for erasing SEL.
When SEL is Full	Do Nothing Erase Immediately Delete Oldest Record	Choose options for reactions to a full SEL.

BMC Network Configuration



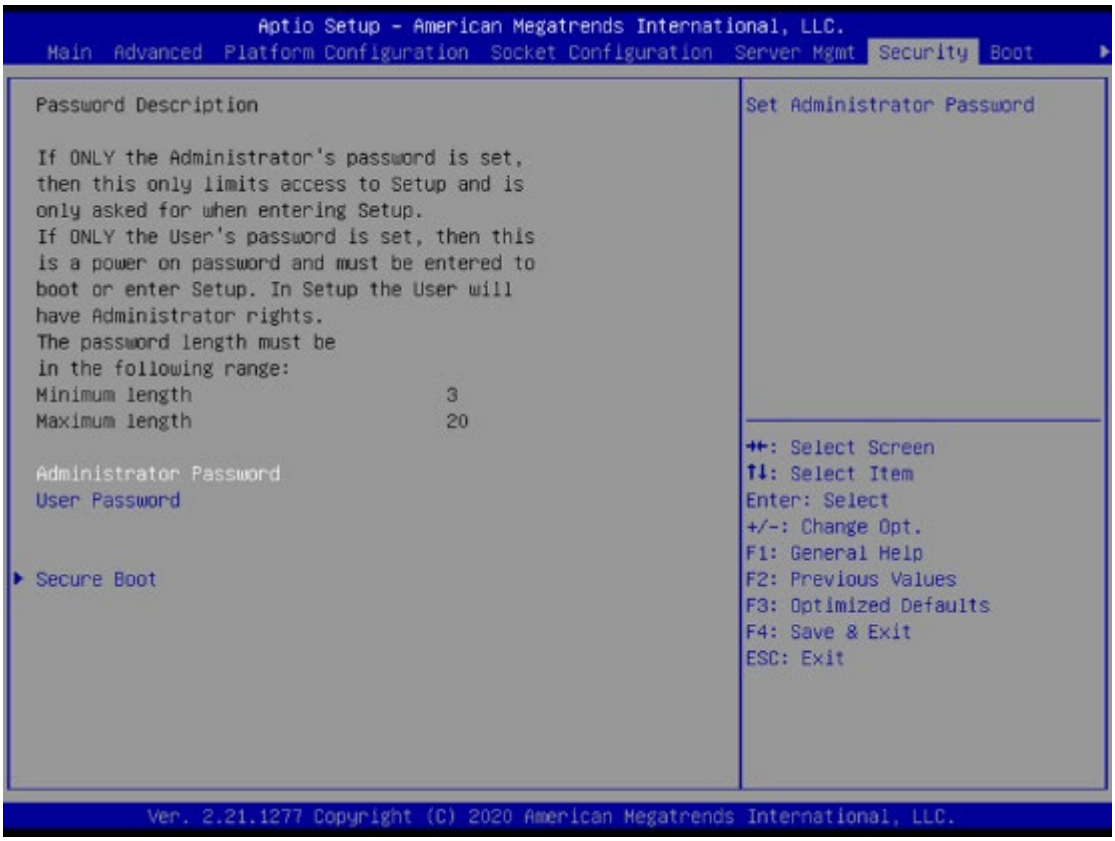
Feature	Options	Description
Configuration Address source	Unspecified Static DynamicBmcDhcp	Select to configure LAN channel parameters statically or dynamically (by BIOS or BMC). The **unspecified** option will not modify any BMC network parameters during BIOS phase.

View System Event Log



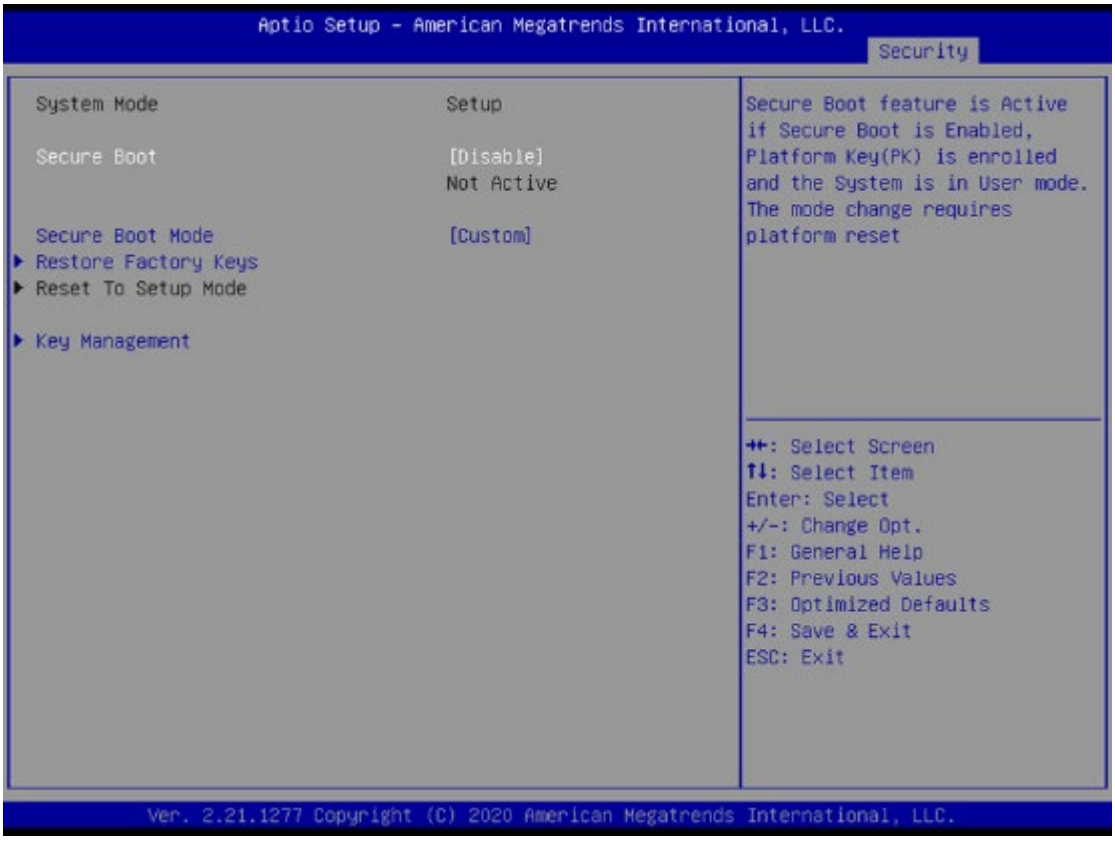
Security

Select the Security menu item from the BIOS setup screen to enter the Security Setup screen. Users can select any of the items in the left frame of the screen.



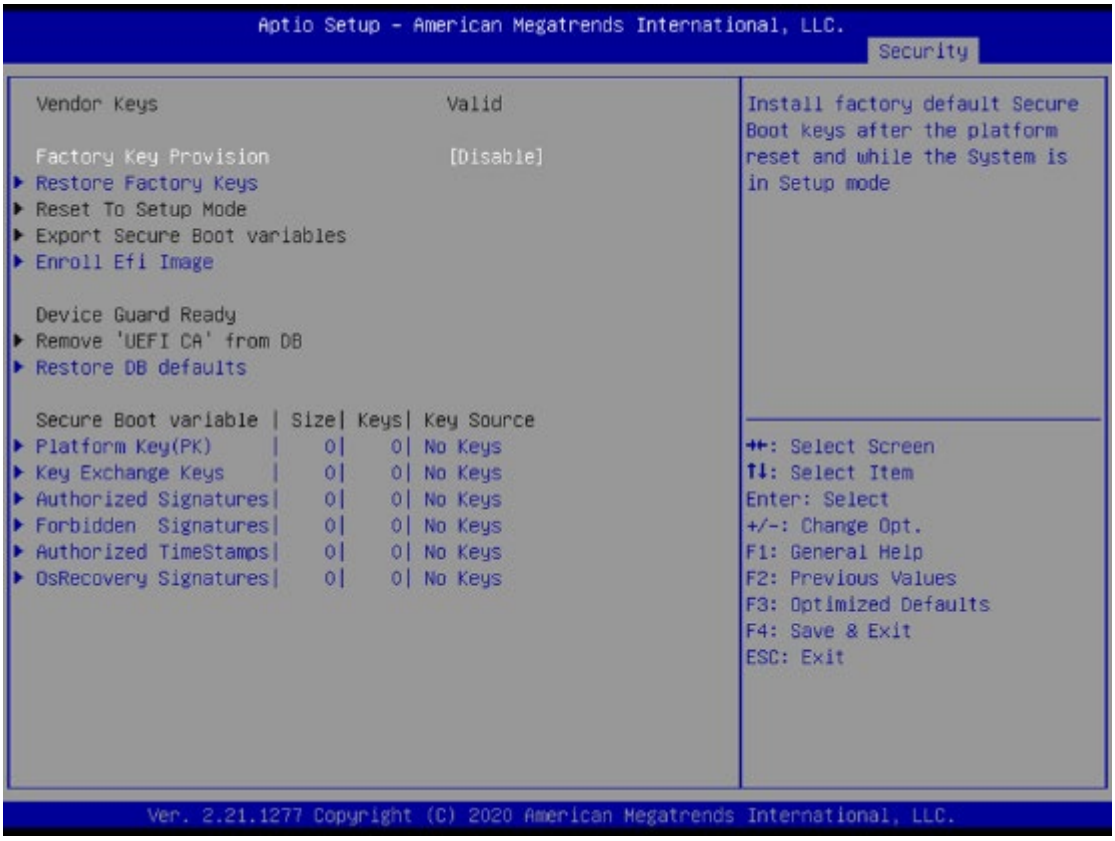
Feature	Description
Administrator Password	If ONLY the Administrator's password is set, it only limits access to Setup and is only asked for when entering Setup.
User Password	If ONLY the User's password is set, it serves as a power-on password and must be entered to boot or enter Setup. In Setup, the User will have Administrator rights.

Secure Boot



Feature	Options	Description
Secure Boot	Disabled Enabled	Secure Boot is activated when Platform Key (PK) is enrolled, System mode is User/Deployed, and CSM function is disabled.
Secure Boot Mode	Standard Custom	Secure Boot mode selector: In **Custom** mode, Secure Boot Variables can be configured without authentication

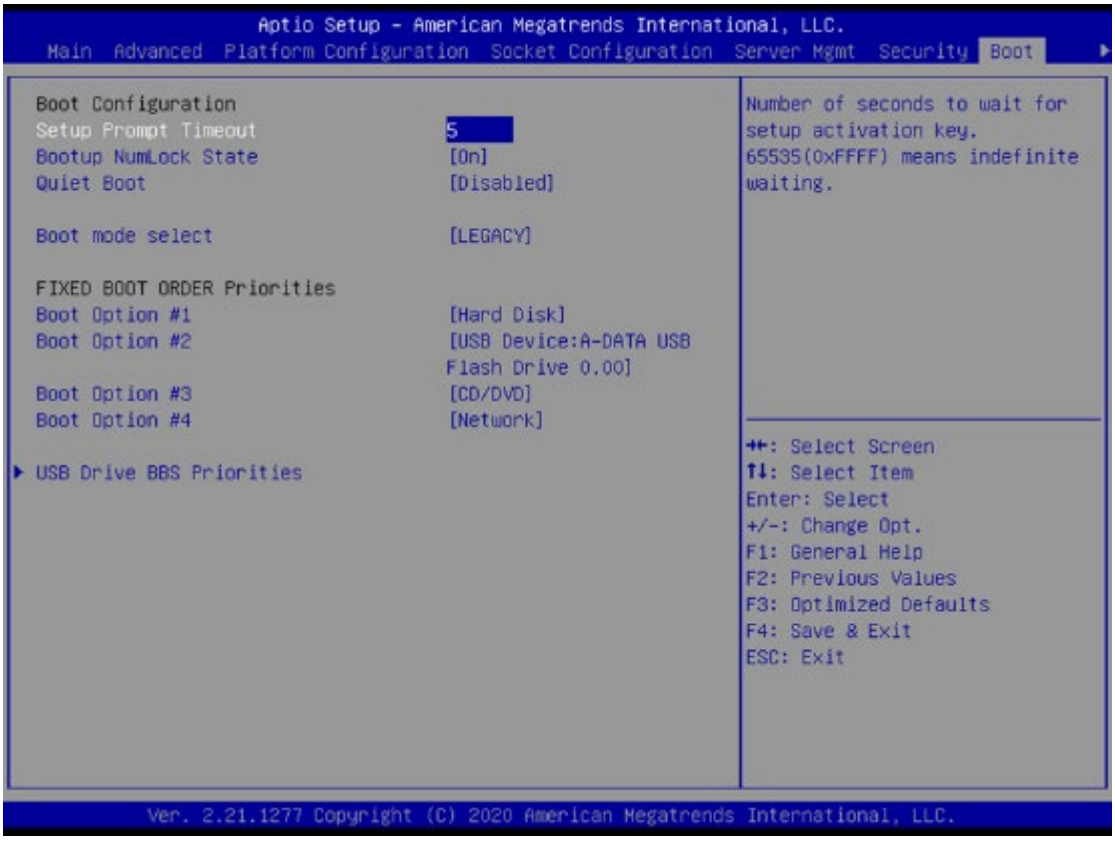
Key Management



Feature	Options	Description
Factory Key Provision	Disabled Enabled	Provision factory default keys on next re-boot only when System in Setup Mode.
Restore Factory keys	None	Force System to User Mode. Configure NVRAM to contain OEM-defined factory default Secure Boot keys.
Enroll Efi Image	None	Allows the image to run in Secure Boot mode. Enroll SHA256 hash of the binary into Authorized Signature Database (db)

Boot

Select the Boot menu item from the BIOS setup screen to enter the Boot Setup screen. Users can select any of the items in the left frame of the screen.

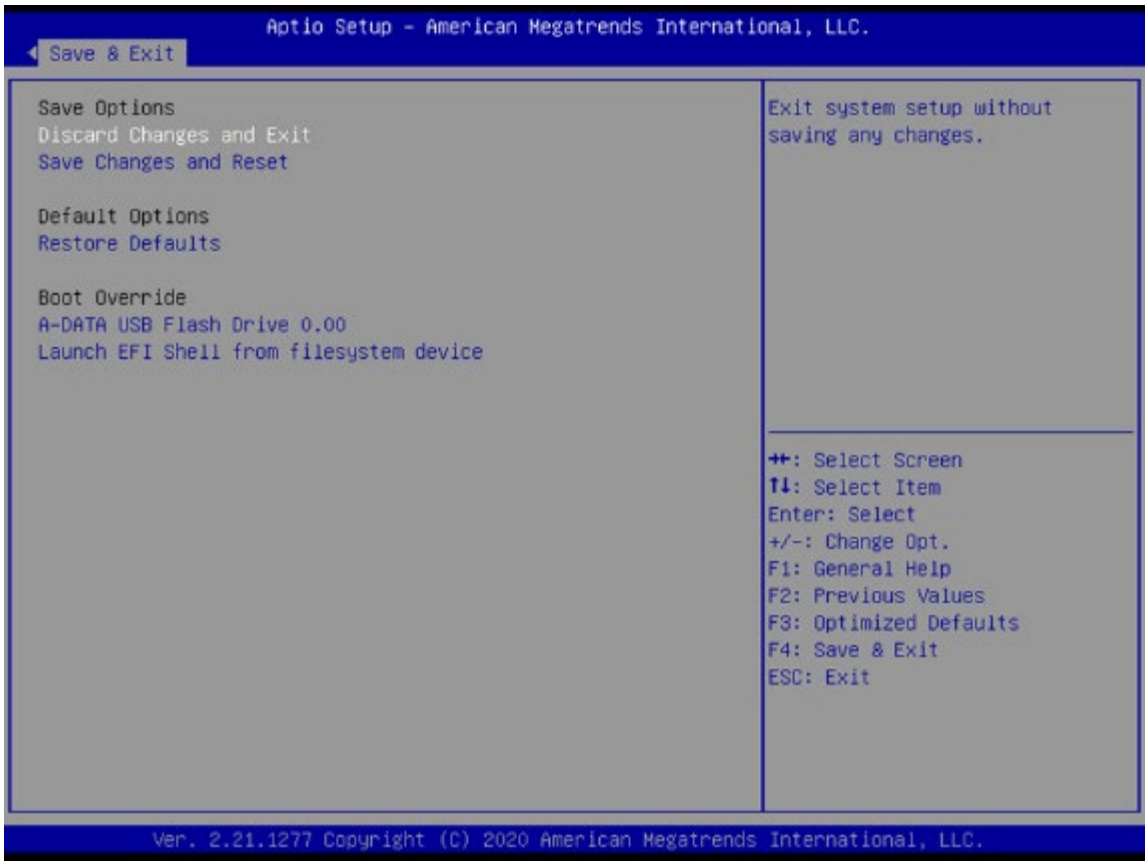


Feature	Options	Description
Setup Prompt Timeout	5	The Number of seconds to wait for setup activation key. 65535 means indefinite waiting.
Bootup NumLock State	On Off	Select the keyboard NumLock state.
Quiet Boot	Disabled Enabled	Enables or disables Quiet Boot option.
Boot Mode Select	LEGACY UEFI DUAL	Select boot mode for LEGACY or UEFI.

- Choose boot priority from boot option group.
- Choose specifies boot device priority sequence from available Group device.

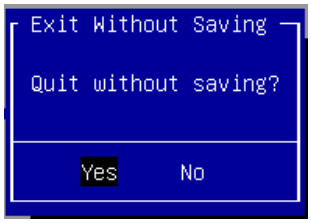
Save & Exit

Select the Save and Exit menu item from the BIOS setup screen to enter the Save and Exit Setup screen. Users can select any of the items in the left frame of the screen.



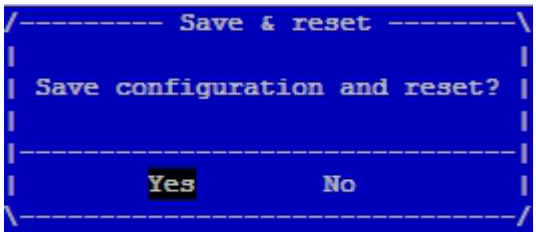
■ Discard Changes and Exit

Select this option to quit Setup without saving any modifications to the system configuration. The following window will appear after the "**Discard Changes and Exit**" option is selected. Select "**Yes"** to Discard changes and Exit Setup.



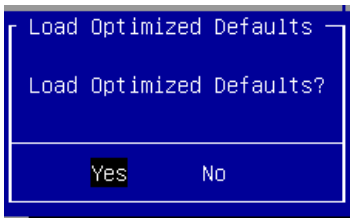
■ Save Changes and Reset

When Users have completed the system configuration changes, select this option to save the changes and exit from BIOS Setup in order for the new system configuration parameters to take effect. The following window will appear after selecting the "**Save Changes and Exit**" option is selected. Select "**Yes**" to Save Changes and Exit Setup.



■ Restore Defaults

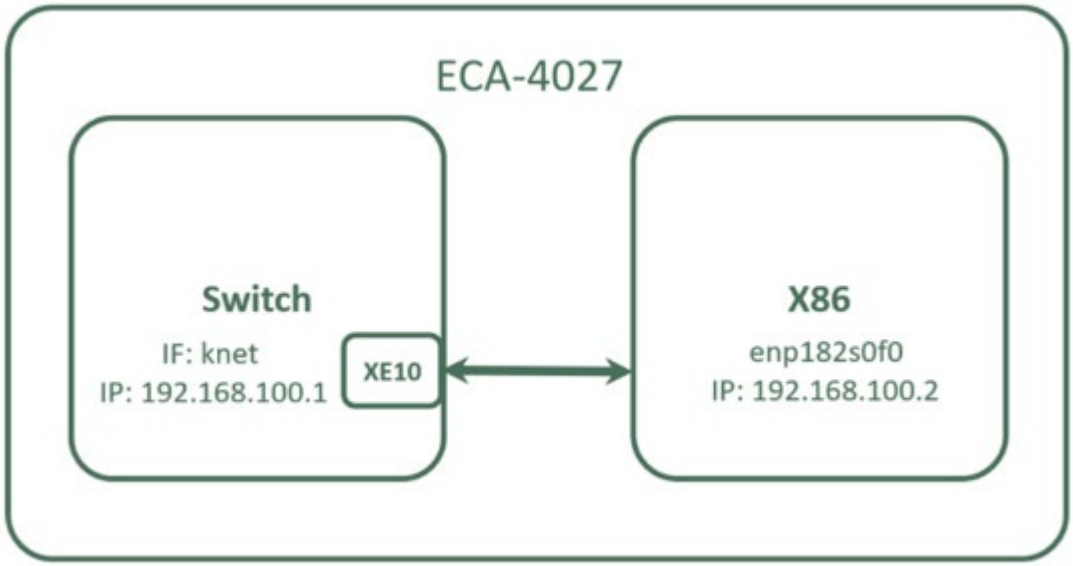
Restore default values for all setup options. Select "**Yes"** to load Optimized defaults.



Note
The items under Boot Override may not have the same exact image as above, as it would depend on the actual devices connected on system.

CHAPTER 5: BROADCOM CLI SETUP

This section describes how to setup Broadcom Command Line Interface (CLI) via network.



1. X86 ethernet enp182s0f0(pci bus b6:00.0) set IP 192.168.100.X.

   Example:

   sudo ip addr add 192.168.100.2/24 dev enp182s0f0

2. Broadcom CLI – 192.168.100.1 at port 12345

   telnet 192.168.100.1 12345

```
mint@mint:~$ telnet 192.168.100.1 12345
Trying 192.168.100.1...
Connected to 192.168.100.1.
Escape character is '^]'.

BCM.0> ps
                ena/    speed/ link auto    STP                 lrn  inter   max  loop
          port  link    duplex scan neg?   state   pause  discrd ops   face frame  back
       xe0( 16) down    10G  FD   SW   No   Forward  TX RX   None   FA    SFI 16356
       xe1( 17) down    10G  FD   SW   No   Forward  TX RX   None   FA    SFI 16356
       xe2( 18) down    10G  FD   SW   No   Forward  TX RX   None   FA    SFI 16356
       xe3( 19) down    10G  FD   SW   No   Forward  TX RX   None   FA    SFI 16356
       xe4( 20) down    10G  FD   SW   No   Forward  TX RX   None   FA    SFI 16356
       xe5( 21) down    10G  FD   SW   No   Forward  TX RX   None   FA    SFI 16356
       xe6( 22) down    10G  FD   SW   No   Forward  TX RX   None   FA    SFI 16356
       xe7( 23) down    10G  FD   SW   No   Forward  TX RX   None   FA    SFI 16356
       xe8( 24) down    40G  FD   SW   No   Forward  TX RX   None   FA    CR4 16356
       xe9( 25) down    40G  FD   SW   No   Forward  TX RX   None   FA    CR4 16356
      xe10( 26) up      10G  FD   SW   Yes  Forward           None   FA     KR 16356
      xe11( 27) up      10G  FD   SW   Yes  Forward           None   FA     KR 16356
      xe12( 28) up      10G  FD   SW   Yes  Forward           None   FA     KR 16356
      xe13( 29) up      10G  FD   SW   Yes  Forward           None   FA     KR 16356
       ge0( 30) down     1G  FD   SW   No   Forward  TX RX   None   FA   GMII 16356
       ge1( 31) !ena     1G  FD   SW   No   Forward  TX RX   None   FA   GMII 16356
       ge2( 32) !ena     1G  FD   SW   No   Forward  TX RX   None   FA   GMII 16356
       ge3( 33) !ena     1G  FD   SW   No   Forward  TX RX   None   FA   GMII 16356
```

CHAPTER 6: BROADCOM CLI SAMPLE GUIDE

The following section aims to guide developers in utilizing the Broadcom Command Line Interface (CLI) for configuring the Broadcom Switch and establishing the necessary environment.

Note: The examples below are for reference only, and may not be the same during actual usage.

5.1 Trunking (Link Aggregation)

5.1.1 PSC (Port Selection Criteria) Usage

The macros shown in Macros for Specifying Port Selection Criteria (PSC) are designated for specifying the Port Selection Criteria (PSC), that is, how to spread the traffic across the trunk's member ports:

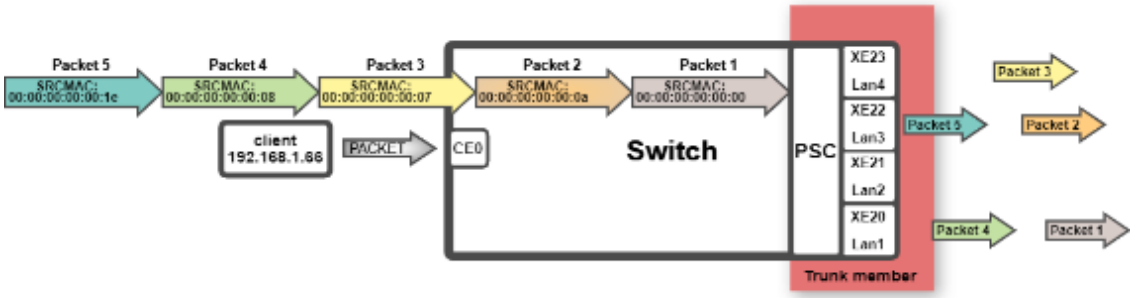
Table 2: Macros for Specifying Port Selection Criteria (PSC)

Macro	PSC Description
5.1.1.1 BCM_TRUNK_PSC_SRCMAC	Spread based on source MAC address
5.1.1.2 BCM_TRUNK_PSC_DSTMAC	Spread based on destination MAC address
5.1.1.3 BCM_TRUNK_PSC_SRCDSTMAC	Spread based on source and destination MAC address
5.1.1.4 BCM_TRUNK_PSC_SRCIP	Spread based on source IP address
5.1.1.5 BCM_TRUNK_PSC_DSTIP	Spread based on destination IP address
5.1.1.6 BCM_TRUNK_PSC_SRCDSTIP	Spread based on source and destination IP address
5.1.1.7 BCM_TRUNK_PSC_PORTFLOW	Enhanced hashing
5.1.1.8 BCM_TRUNK_PSC_ROUND_ROBIN	Round robin selection of members.

5.1.1.1 BCM_TRUNK_PSC_SRCMAC

Spread based on source MAC address.

Example: **Environmental architecture**



Load balancing based on source MAC address

The client uses the scapy command to send packets to the switch, and then it loads the distribution of traffic across trunk member ports in source MAC address. The example is for reference only.

CLI Settings:

trunk init

trunk add id=1 pbm=xe20-xe23 rtag=1

fp init

fp qset add srcip

fp group create 1 1

fp entry create 1 1

fp qual 1 srcip 192.168.1.66 255.255.255.255

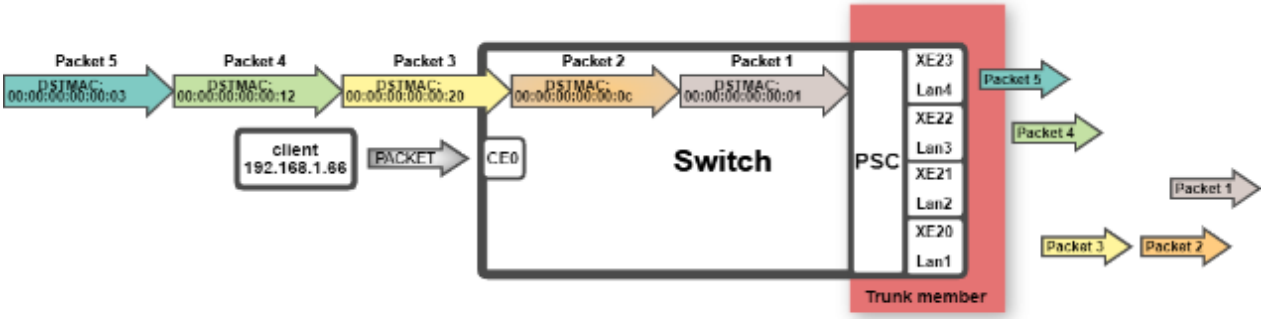
fp action add 1 redirecttrunk 1

fp entry install 1

5.1.1.2 BCM_TRUNK_PSC_DSTMAC

Spread based on destination MAC address.

Example: Environmental architecture



Load balancing based on destination MAC address

The client uses the scapy command to send packets to the switch, and then it loads the distribution of traffic across trunk member ports in destination MAC address. The example is for reference only.

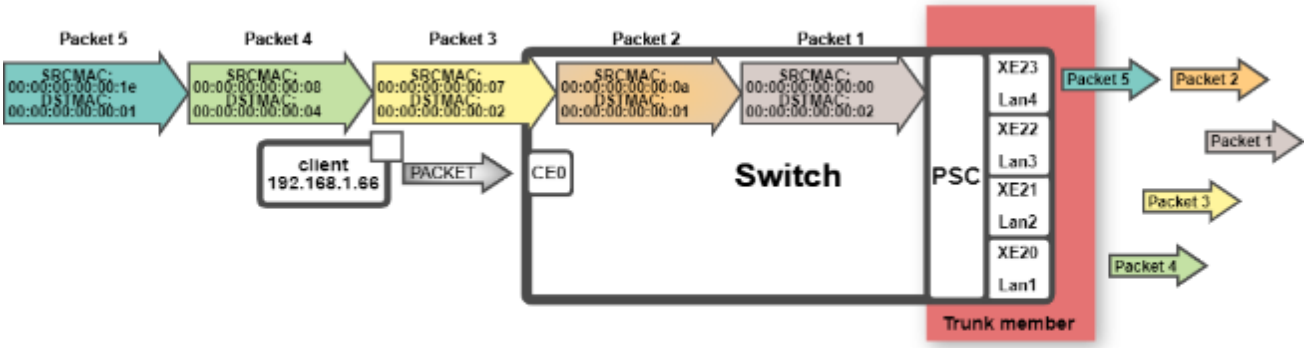
CLI Settings:

```
trunk init
trunk add id=1 pbm=xe20-xe23 rtag=2
fp init
fp qset add srcip
fp group create 1 1
fp entry create 1 1
fp qual 1 srcip 192.168.1.66 255.255.255.255
fp action add 1 redirecttrunk 1
fp entry install 1
```

5.1.1.3 BCM_TRUNK_PSC_SRCDSTMAC

Spread based on source and destination MAC address.

Example: Environmental architecture



Load balancing based on source and destination MAC address

The client uses the scapy command to send packets to the switch, and then it loads the distribution of traffic across trunk member ports in source and destination MAC address. The example is for reference only.

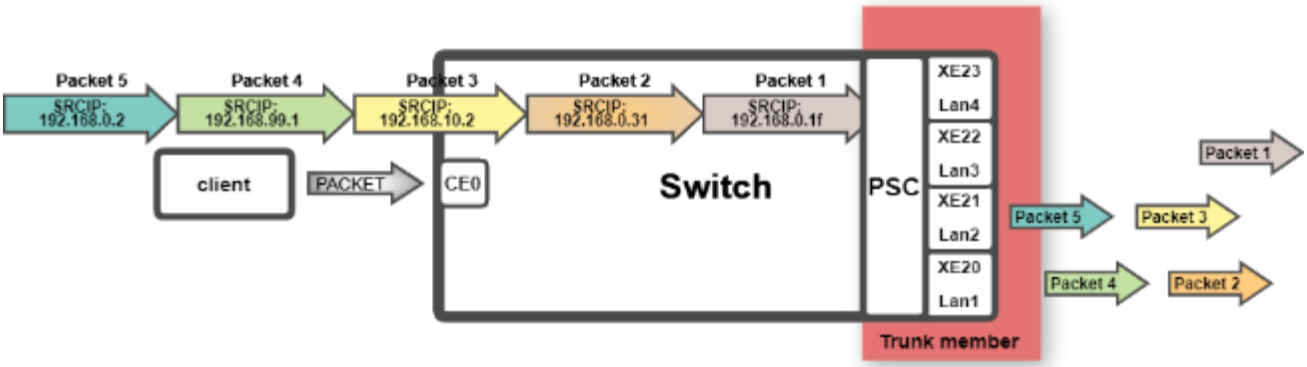
CLI Settings:

```
trunk init
trunk add id=1 pbm=xe20-xe23 rtag=3
fp init
fp qset add srcip
fp group create 1 1
fp entry create 1 1
fp qual 1 srcip 192.168.1.66 255.255.255.255
fp action add 1 redirecttrunk 1
fp entry install 1
```

5.1.1.4 BCM_TRUNK_PSC_SRCIP

Spread based on source IP address.

Example: Environmental architecture



Load balancing based on source IP address

The client uses the scapy command to send packets to the switch, and then it loads the distribution of traffic across trunk member ports in source IP address. The example is for reference only.

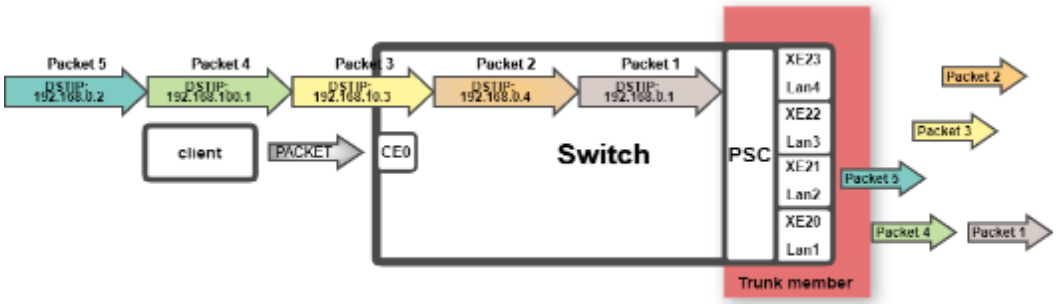
CLI Settings:

```
trunk init
trunk add id=1 pbm=xe20-xe23 rtag=4
fp init
fp qset add dstip
fp group create 1 1
fp entry create 1 1
fp qual 1 dstip 192.168.1.66 255.255.255.255
fp action add 1 redirecttrunk 1
fp entry install 1
```

5.1.1.5 BCM_TRUNK_PSC_DSTIP

Spread based on destination IP address.

Example: Environmental architecture



Load balancing based on destination IP address

The client uses the scapy command to send packets to the switch, and then it loads the distribution of traffic across trunk member ports in destination IP address. The example is for reference only.

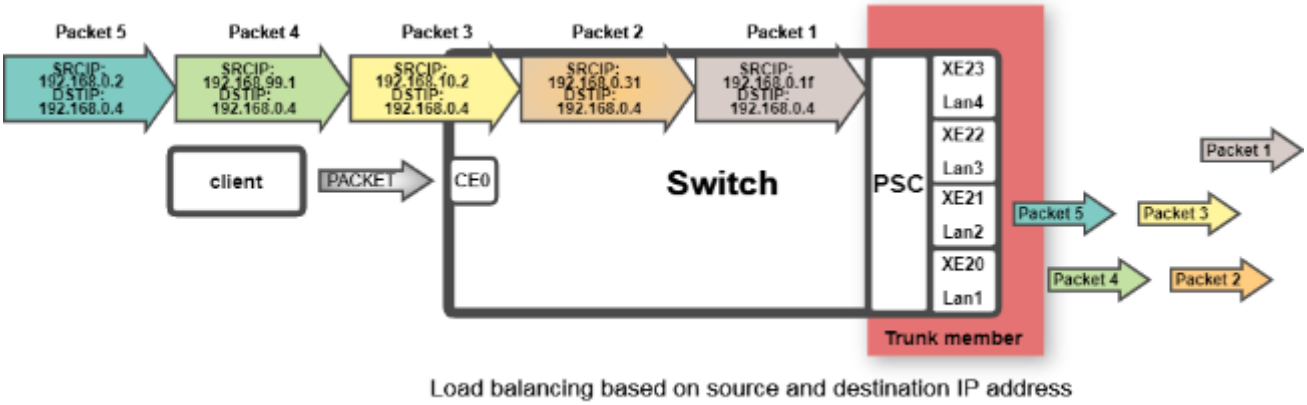
CLI Settings:

```
trunk init
trunk add id=1 pbm=xe20-xe23 rtag=5
fp init
fp qset add srcip
fp group create 1 1
fp entry create 1 1
fp qual 1 srcip 192.168.1.66 255.255.255.255
fp action add 1 redirecttrunk 1
fp entry install 1
```

5.1.1.6 BCM_TRUNK_PSC_SRCDSTIP

Spread based on source and destination IP address.

Example: Environmental architecture



Load balancing based on source and destination IP address

The client uses the scapy command to send packets to the switch, and then it loads the distribution of traffic across trunk member ports in source and destination IP address. The example is for reference only.

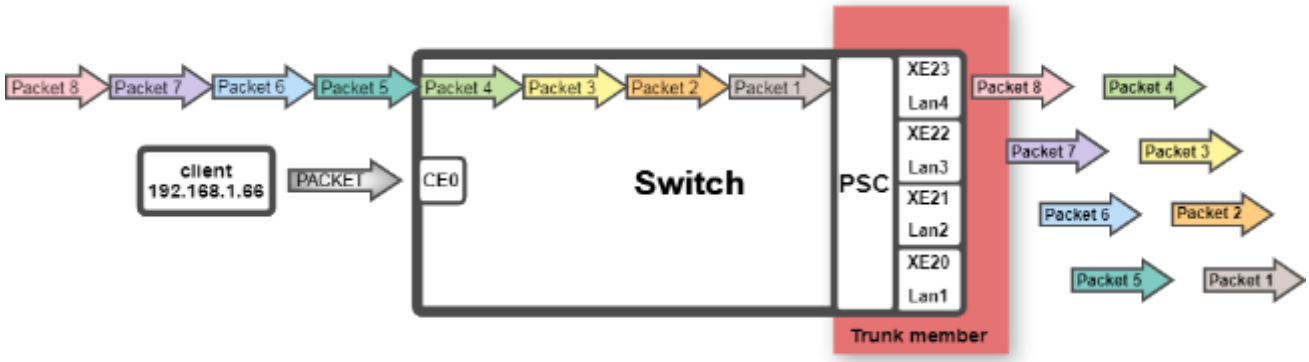
CLI Settings:

```
trunk init
trunk add id=1 pbm=xe20-xe23 rtag=6
fp init
fp qset add srcip
fp group create 1 1
fp entry create 1 1
fp qual 1 srcip 192.168.1.66 255.255.255.0
fp action add 1 redirecttrunk 1
fp entry install 1
```

5.1.1.7 BCM_TRUNK_PSC_ROUND_ROBIN

Provides Round Robin Load balancing distribution of traffic across trunk member ports.

Example: Environmental architecture



Round robin selection of members

The client uses the scapy command to send packets to the switch, and then it loads the distribution of traffic across trunk member ports in Round Robin. The example is for reference only.

CLI Settings:

```
trunk init
trunk add id=1 pbm=xe20-xe23 rtag=14
fp init
fp qset add srcip
fp group create 1 1
fp entry create 1 1
fp qual 1 srcip 192.168.1.66 255.255.255.255
fp action add 1 redirecttrunk 1
fp entry install 1
```

Test and Verify:

Use run.py in the flow_test folder, and check the returned log.

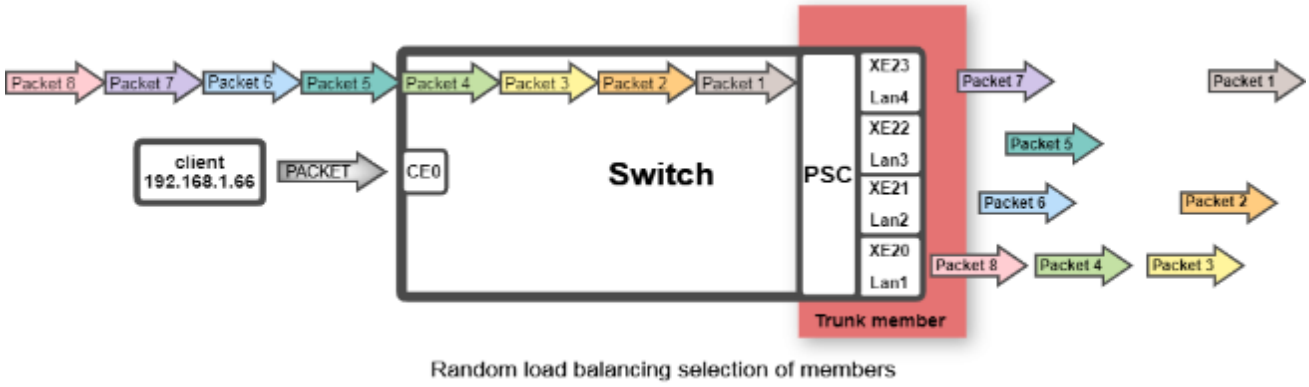
```
# ./run.py -srip 192.168.1.66 -v 2 -c 100 -rece 4
```

Number	Logic Port	Port Name	Host_IP	Target_Port	Transmit_by _SW	Received_by _sys	Received_by _TCPDump
0	69	xe20	127.0.0.1	enp11s0f0	25	25	Null
1	70	xe21	127.0.0.1	enp11s0f1	25	25	Null
2	71	xe22	127.0.0.1	enp11s0f2	25	25	Null
3	72	xe23	127.0.0.1	enp11s0f3	25	25	Null

5.1.1.8 BCM_TRUNK_PSC_ RANDOMIZED

Provides pseudo-random distribution of traffic across trunk member ports.

Example: Environmental architecture



Random load balancing selection of members

The client uses the scapy command to send packets to the switch, and then it loads the distribution of traffic across trunk member ports in random. The example is for reference only.

CLI Settings:

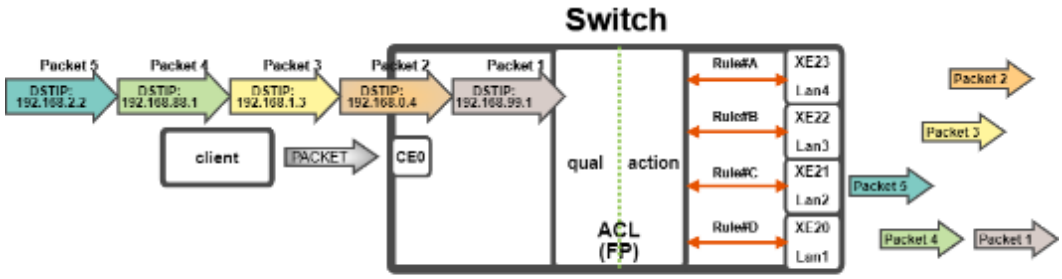
```
trunk init
trunk add id=1 pbm=xe20-xe23 rtag=16
fp init
fp qset add srcip
fp group create 1 1
fp entry create 1 1
fp qual 1 srcip 192.168.10.66 255.255.255.255
fp action add 1 redirecttrunk 1
fp entry install 1
```

5.2 ACL

5.2.1 ACL filters based on destination IP

Receiving CE0 packets, ACL based on destination IP, specify the route.

Example: Environmental architecture



Distribution routes based on destination IP address.

CLI Settings:

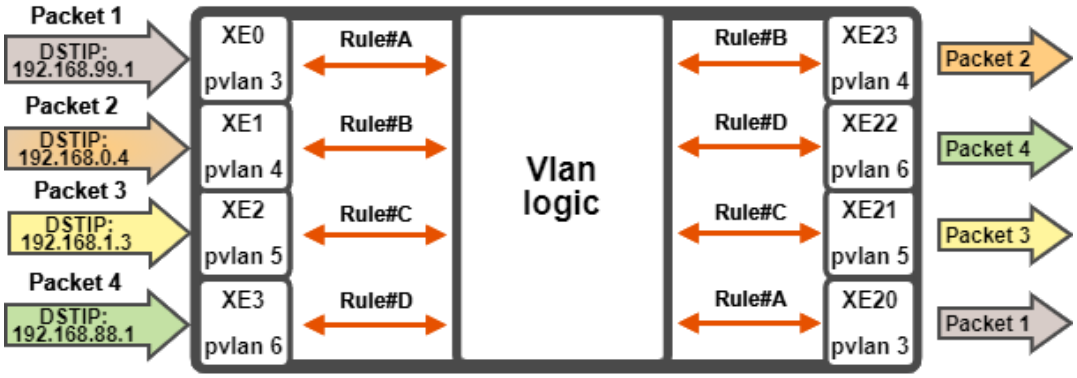
```
fp init
fp qset add dstip
fp group create 1 1
fp entry create 1 1
fp qual 1 dstip 192.168.99.1 255.255.0.255
fp action add 1 redirectport 0 69
fp entry install 1

fp group create 2 2
fp entry create 2 2
fp qual 2 dstip 192.168.0.4 255.255.0.255
fp action add 2 redirectport 0 72
fp entry install 2

fp group create 3 3
fp entry create 3 3
fp qual 3 dstip 192.168.1.3 255.255.0.255
fp action add 3 redirectport 0 71
fp entry install 3

fp group create 4 4
fp entry create 4 4
fp qual 4 dstip 192.168.2.2 255.255.0.255
fp action add 4 redirectport 0 70
fp entry install 4
```

5.3 VLAN

5.3.1 VLAN allocation is based on PVLAN

Assign vlan according to the specified ingress port If the received packet is untagged.

Example: Environmental architecture



Assign vlan id according to ingress port(pvlan).
Distribution routes based on vlan table.

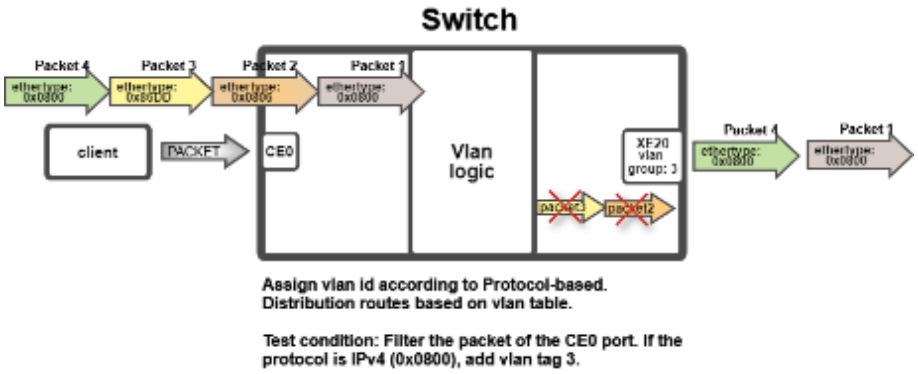
CLI Settings:

```
vlan create 3 pbm=xe0,xe20 ubm=xe0,xe20
vlan create 4 pbm=xe1,xe23 ubm=xe1,xe23
vlan create 5 pbm=xe2,xe21 ubm=xe2,xe21
vlan create 6 pbm=xe3,xe22 ubm=xe3,xe22
vlan remove 1 pbm=xe0-xe3,xe20-xe23 ubm=xe0-xe3,xe20-xe23
pvlan set xe0 3
pvlan set xe1 4
pvlan set xe2 5
pvlan set xe3 6
```

5.3.2 VLAN allocation is based on Protocol-based

If the received packet is untagged and the ether type and the frame type match a protocol-based VLAN then the VLAN assigned to the packet.

Example: Environmental architecture



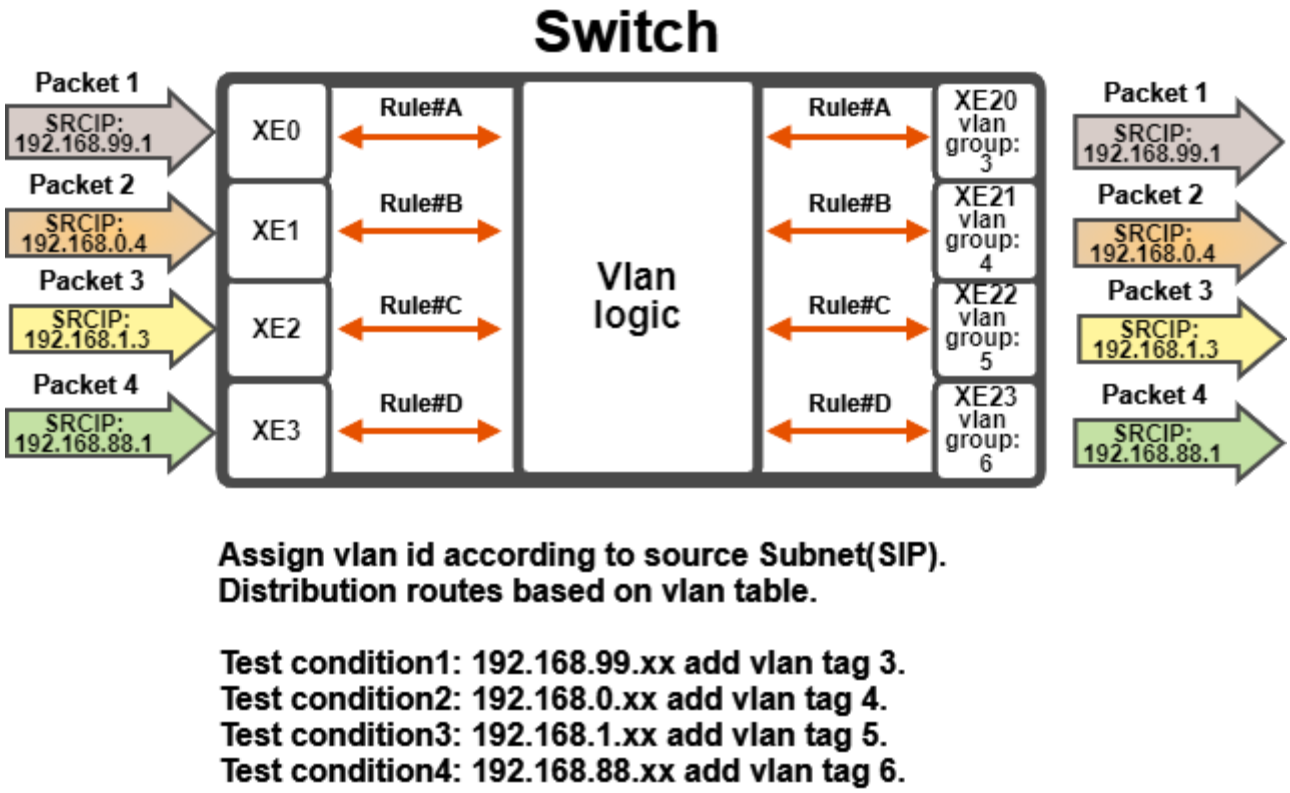
CLI Settings:

```
vlan create 3 pbm=xe20
vlan remove 1 pbm=xe20
vlan protocol add pbm=ce0 frame=0x1 ether=0x0800 vlan=3
```

5.3.3 VLAN allocation is based on source Subnet (SIP)

Add an association from source IP subnet to VLAN to use for assigning a VLAN tag to untagged packets.

Example: Environmental architecture



Assign vlan id according to source Subnet(SIP).
Distribution routes based on vlan table.

Test condition1: 192.168.99.xx add vlan tag 3.
Test condition2: 192.168.0.xx add vlan tag 4.
Test condition3: 192.168.1.xx add vlan tag 5.
Test condition4: 192.168.88.xx add vlan tag 6.

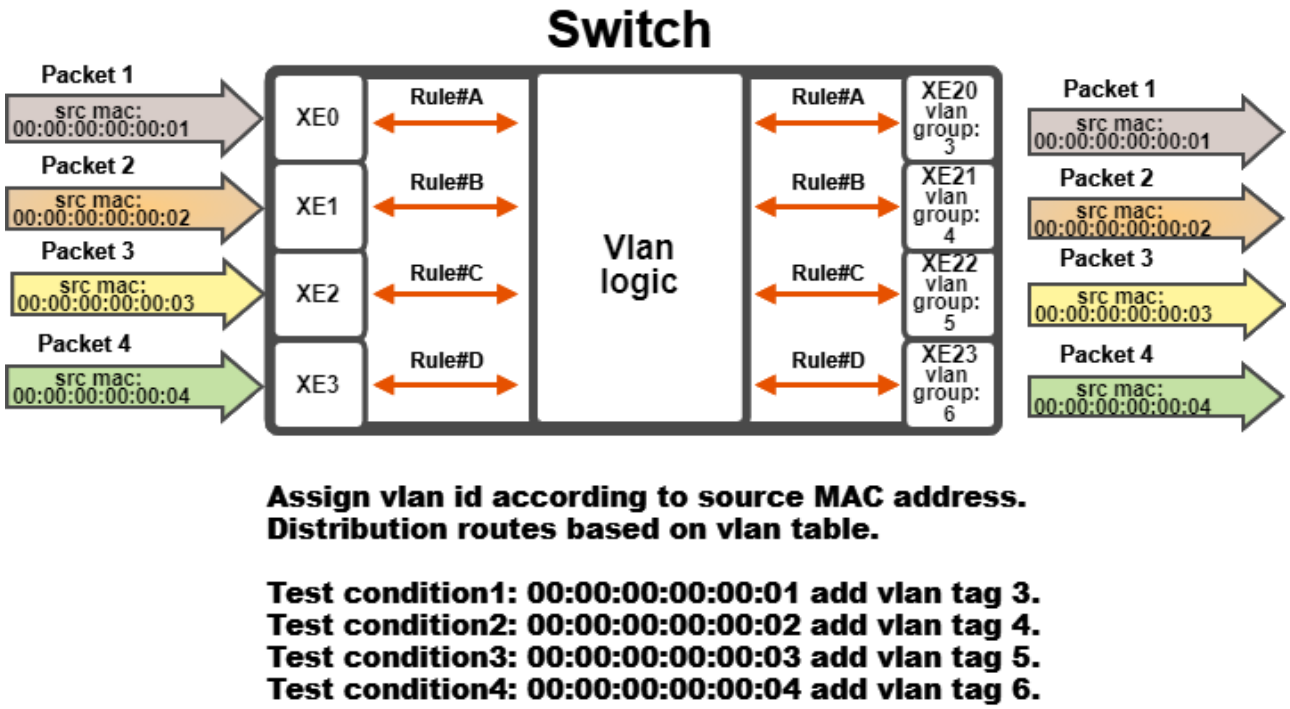
CLI Settings:

```
vlan create 3 pbm=xe20
vlan create 4 pbm=xe21
vlan create 5 pbm=xe22
vlan create 6 pbm=xe23
vlan remove 1 pbm=xe20-xe23
vlan control PreferIP4 1

vlan ip4 add ipaddr=192.168.99.1 netmask=255.255.255.0 vlan=3 prio=1
vlan ip4 add ipaddr=192.168.0.1 netmask=255.255.255.0 vlan=4 prio=1
vlan ip4 add ipaddr=192.168.1.1 netmask=255.255.255.0 vlan=5 prio=1
vlan ip4 add ipaddr=192.168.88.1 netmask=255.255.255.0 vlan=6 prio=1
```

5.3.4 VLAN allocation is based on source MAC address

Add an association from source Mac address to VLAN to use for assigning a VLAN tag to untagged packets.

Example: Environmental architecture



Assign vlan id according to source MAC address.
Distribution routes based on vlan table.

Test condition1: 00:00:00:00:00:01 add vlan tag 3.
Test condition2: 00:00:00:00:00:02 add vlan tag 4.
Test condition3: 00:00:00:00:00:03 add vlan tag 5.
Test condition4: 00:00:00:00:00:04 add vlan tag 6.

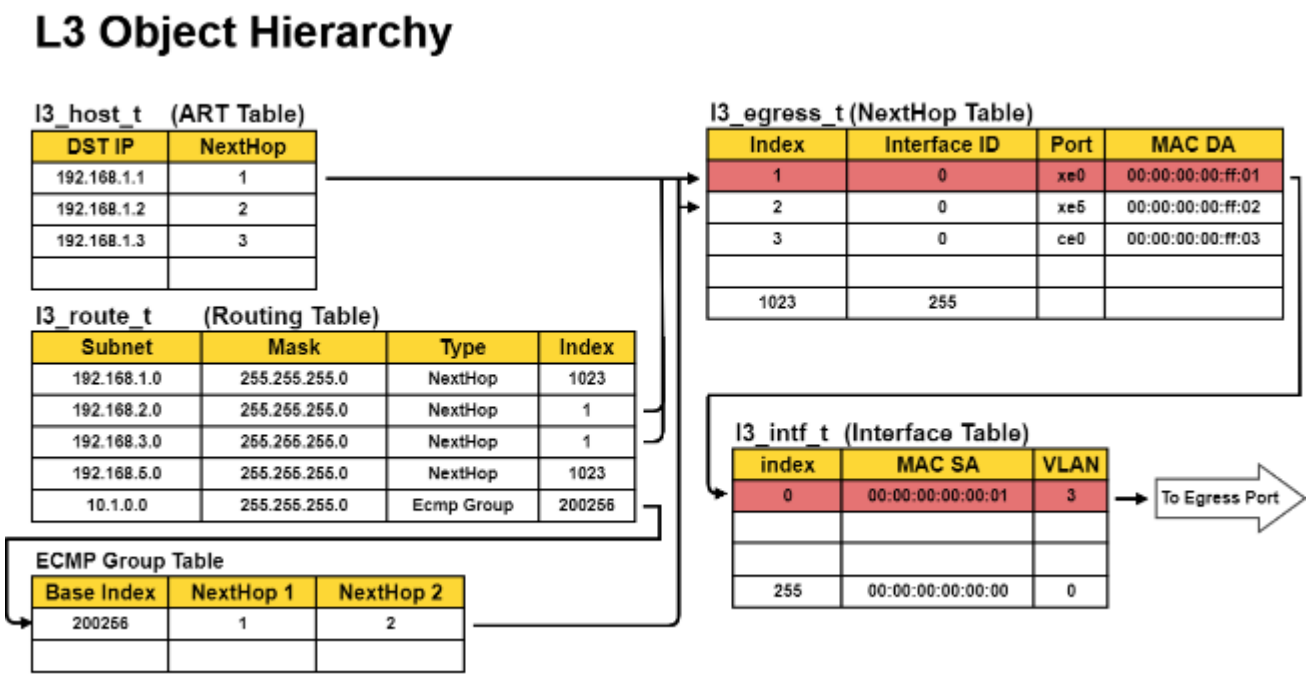
CLI Settings:

```
vlan create 3 pbm=xe20
vlan create 4 pbm=xe21
vlan create 5 pbm=xe22
vlan create 6 pbm=xe23
vlan remove 1 pbm=xe20-xe23
vlan control PreferMAC 1

vlan mac add mac=00:00:00:00:00:01 vlan=3 prio=1
vlan mac add mac=00:00:00:00:00:02 vlan=4 prio=1
vlan mac add mac=00:00:00:00:00:03 vlan=5 prio=1
vlan mac add mac=00:00:00:00:00:04 vlan=6 prio=1
```

5.4 LAYER 3

The Lanner Layer 3 APIs allow application developers to manage the Broadcom L3 switch features, including the L3 fast switching host table, L3 routing table, L3 interface table and L3 ecmp table.

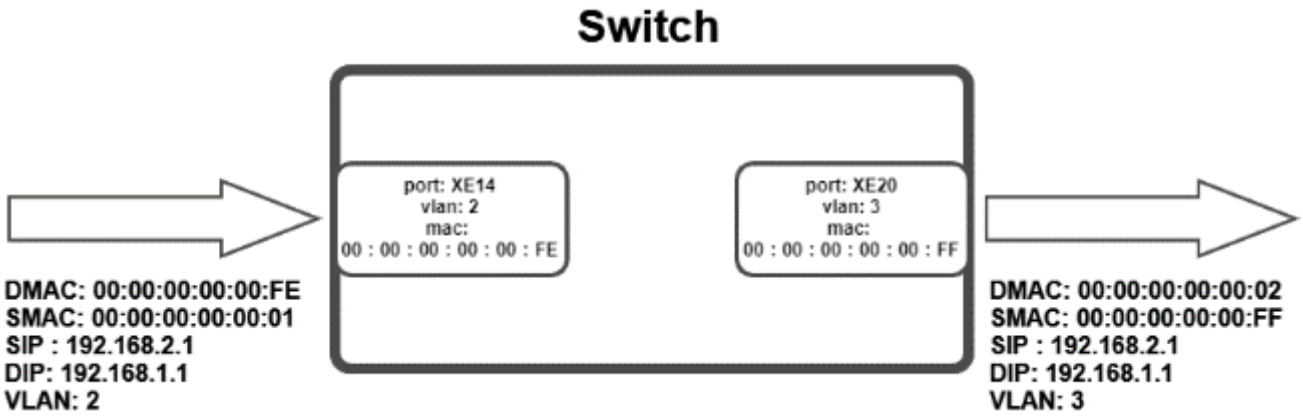
L3 packets are routed either based on subnet match, or fast-switched based on a full IP address match. These capabilities are managed in the route table and host table, respectively.



5.4.1 L3 Switching

Use L3 host table to implement L3 route.

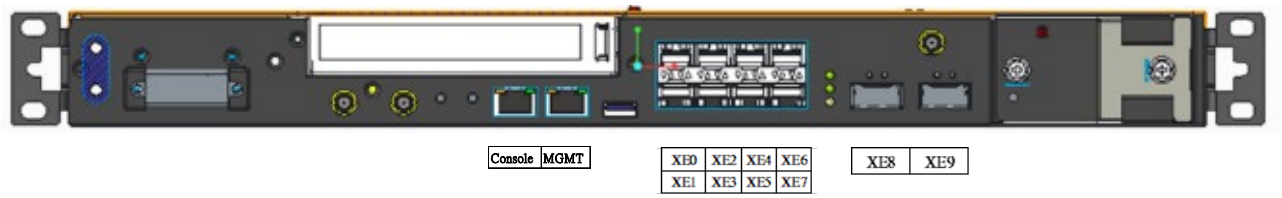
Example: Environmental architecture



CLI Settings:

```
l2 add port=cpu0 mac=00:00:00:00:00:fe vlan=2 l3=true ReplacePriority=false
l2 add port=cpu0 mac=00:00:00:00:00:ff vlan=3 l3=true ReplacePriority=false
vlan create 2 pbm=xe14
vlan create 3 pbm=xe20
vlan remove 1 pbm=xe14,xe20
l3 init
sc L3EgressMode=1
l3 intf add vlan=3 mac=00:00:00:00:00:ff intf=3
l3 egress add mac=00:00:00:00:00:02 intf=3 port=xe20
return:
New egress object index: 100002
Environment variable (egr_object_id) was set
l3 l3table add ip=192.168.1.1 intf=100002
```

PORT MAP



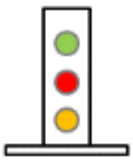
Pci bus	switch side	ethernet name
0000:b6:00.0	XE10	enp182s0f0
0000:b6:00.1	XE11	enp182s0f1
0000:b6:00.2	XE12	enp182s0f2
0000:b6:00.3	XE13	enp182s0f3

Pci bus	Front Port	ethernet name
0000:02:00.0	MGMT	enp2s0

Switch side	connected device
XE14	Timing Card (1588)

APPENDIX A: LED INDICATOR EXPLANATIONS

System Power / Status / HDD Activity



Green: System Power
Red/Green: System Status
Amber: HDD Activity

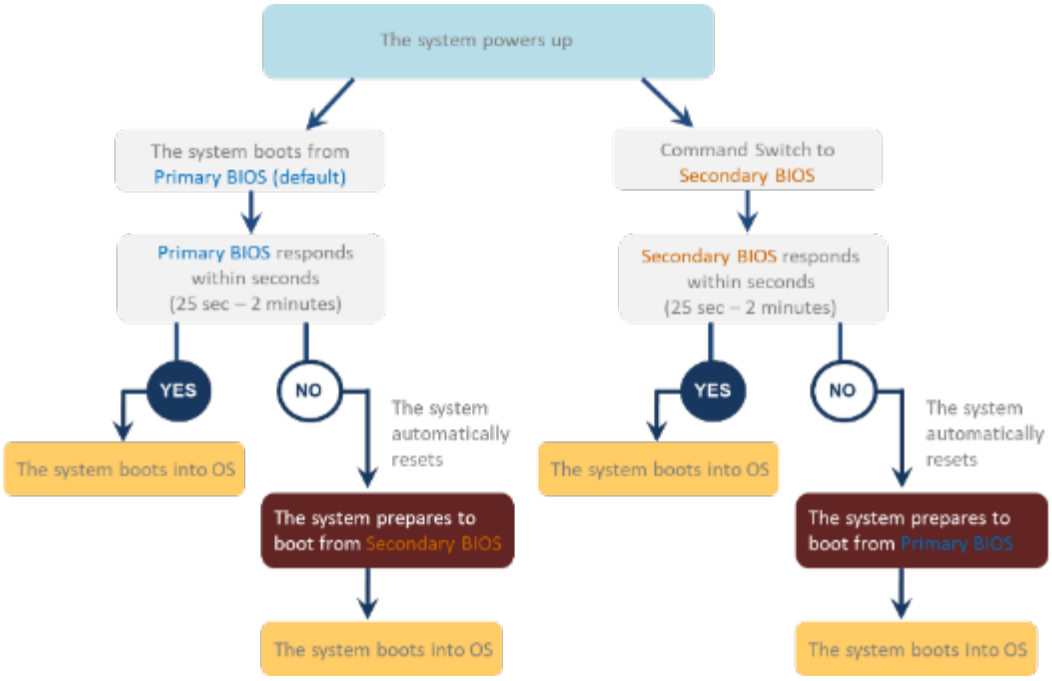
LED	COLOR ON LCM	COLOR ON BOARD	LED ACTION	DESCRIPTION
POWER	**Green**	**Green**	Steady	When system power on
	Off	Off	N/A	No power on
STATUS	**Green**	**Green**	Steady	control by GPIO
	Amber	**Red**	Steady	control by GPIO
	Off	Off	N/A	control by GPIO (Default) or No power on
HDD	**Amber**	**Amber**	Blinking	Blinking indicates HDD activity Include SATA / NVME
	Off	Off	N/A	No data access or No power on

APPENDIX B: DUAL BIOS INTRODUCTION

Failure when booting up BIOS is not uncommon and can occur most often during a power failure, a mishandled BIOS update, a malware attack resulting in data corruption. When it happens, recovering procedures consume considerable time and effort. Lanner understands this pain and have empowered our products with the Dual BIOS feature.

How Dual BIOS Works

Dual BIOS features two physical BIOS ROMs soldered onto the motherboard, carrying two separate BIOS images. If the Primary BIOS (default) is not functioning correctly and fails to respond within seconds (~25 seconds to 2 minutes, depend upon appliance), the system will invoke a bootup from the Secondary BIOS, automatically restarting the system and launch the operating system.



2nd Gen Dual BIOS

To provide increased flexibility and usage protection, Lanner has released the 2nd Gen Dual BIOS function on Lanner appliances. With 2nd Gen Dual BIOS, both the primary BIOS and secondary BIOS can be updated and flashed using the BIOS Tool to run different versions of BIOS ROMS independently for maximum compatibility. This additionally allow users to switch BIOS ROMS for booting up, toggling between primary BIOS and secondary BIOS.

- **Flexible recovery timer control**

Users can designate the amount of time before recovery BIOS launch. The amount of time is no longer fixed to 7 minutes.

- **Flexible Dual BIOS ROMs control.**

Users can flash both the Primary BIOS and Secondary BIOS, thus run different versions of BIOS ROMS independently for maximum compatibility.

- **Flexible Dual BIOS ROMs switch**

The 2nd Gen Dual BIOS allow users to choose one of the BIOS ROMS (Primary BIOS/Secondary BIOS) for booting up. Use software command prompt to toggle between Primary BIOS and Secondary BIOS.

	Gen1 Dual BIOS	Gen2 Dual BIOS
Function	Primary / Recovery 2ND BIOS for recovery purpose	Primary / Secondary (Peer to Peer) Both BIOS can let the system work
Detection Time	7 min	Seconds (By platform design)
2nd BIOS updated	Only using the SPI facility	By BIOS tool command or SPI facility
MAC/DMI	Only for BIOS1	For both BIOS
CPLD Interface	GPIO	LPC or eSPI (By Platform)

Figure 1. Gen 1 vs Gen 2 Dual BIOS comparison chart

Few things can shut down a computer as completely as a corrupted BIOS. With Dual BIOS feature, you will be guaranteed to enter a healthy OS to perform thorough troubleshooting before the situation is irreparable.

Get Ready for BIOS Update

Flashing a BIOS needs to be carefully completed, especially pertaining to a corrupted BIOS, which can lead to an unusable system if done incorrectly. To get ready for a BIOS update, acquire the following BIOS resources from Lanner technical support:

- Firmware and Flash Tool
- BIOS Engineering Spec

Before you start, make sure you select the correct firmware version, correct BIOS (Primary or Secondary) and go through the instructions for BIOS update in *BIOS Engineering Spec* thoroughly. If you cannot be certain if this version is correct for your system, please contact Lanner Technical Support.

Note:
1. Dual BIOS feature cannot work with BIOS Boot Guard function
2. To update BIOS, it is mandatory to have both BIOS updated first. This is to avoid both BIOS having ME code variations, which could lead to unexpected risk and errors.
3. When the system enters BIOS menu or Option ROM, the system will not reboot automatically.

Warning
DO NOT power off or reset the system during BIOS updating process.

Disclaimer
Under no circumstances will Lanner accept responsibility or liability for damages of any kind whatsoever resulting or arising directly or indirectly from a BIOS update.

APPENDIX C: TERMS AND CONDITIONS

Warranty Policy

1. All products are under warranty against defects in materials and workmanship for a period of one year from the date of purchase.
2. The buyer will bear the return freight charges for goods returned for repair within the warranty period; whereas the manufacturer will bear the after service freight charges for goods returned to the user.
3. The buyer will pay for the repair (for replaced components plus service time) and transportation charges (both ways) for items after the expiration of the warranty period.
4. If the RMA Service Request Form does not meet the stated requirement as listed on "RMA Service," RMA goods will be returned at customer's expense.
5. The following conditions are excluded from this warranty:
   - Improper or inadequate maintenance by the customer
   - Unauthorized modification, misuse, or reversed engineering of the product
   - Operation outside of the environmental specifications for the product.

RMA Service

Requesting an RMA#

1. To obtain an RMA number, simply fill out and fax the "RMA Request Form" to your supplier.
2. The customer is required to fill out the problem code as listed. If your problem is not among the codes listed, please write the symptom description in the remarks box.
3. Ship the defective unit(s) on freight prepaid terms. Use the original packing materials when possible.
4. Mark the RMA# clearly on the box.

Note: Customer is responsible for shipping damage(s) resulting from inadequate/loose packing of the defective unit(s). All RMA# are valid for 30 days only; RMA goods received after the effective RMA# period will be rejected.

RMA Service Request Form

When requesting RMA service, please fill out the following form. Without this form enclosed, your RMA cannot be processed.

RMA No:	Reasons to Return: ▫ Repair(Please include failure details) ▫ Testing Purpose
Company:	Contact Person:
Phone No.	Purchased Date:
Fax No.:	Applied Date:
Return Shipping Address: _____ Shipping by: ▫ Air Freight ▫ Sea ▫ Express_____ ▫ Others:_____	

Item	Model Name	Serial Number	Configuration

Item	Problem Code	Failure Status

*Problem Code:

01:D.O.A.	07: BIOS Problem	13: SCSI	19: DIO
02: Second Time R.M.A.	08: Keyboard Controller Fail	14: LPT Port	20: Buzzer
03: CMOS Data Lost	09: Cache RMA Problem	15: PS2	21: Shut Down
04: FDC Fail	10: Memory Socket Bad	16: LAN	22: Panel Fail
05: HDC Fail	11: Hang Up Software	17: COM Port	23: CRT Fail
06: Bad Slot	12: Out Look Damage	18: Watchdog Timer	24: Others (Pls specify)

Request Party

Authorized Signature / Date

Confirmed By Supplier

Authorized Signature / Date