



Tachyum

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Tachyum Prodigy

UEFI Manual

Revision History

Version	Date	Revision
V0.9	4/16/2024	Pre-release. Requires feedback for next revision.
V0.91	4/24/2024	<ol style="list-style-type: none"> 1. Added reference to UEFI release the Prodigy UEFI is based on (v2.10) in introduction. 2. Revised following menu screens: <ol style="list-style-type: none"> a. Thermal Monitor: Removed air flow monitor. b. Memory Configuration: Changed SCC to SDDC. c. PCIe Configuration: Revised spread spectrum to add SRNS, SSC, and SSC-SRIS options and remove from per port override. d. Advanced Settings: Changed tab name to "Advanced" and removed unused menus. 3. Revised text to add values for auto-boot timeout options. 4. Added final page with Tachyum web/contact information.
V0.92	5/03/2024	Updated the final boot menu with RAID1 support and removed the RAID1 configuration menu.

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Abstract

This user manual provides details of how to access and use the Unified Extensible Firmware Interface (UEFI) that is embedded in the system flash of all Prodigy platforms. It explains in detail each of the UEFI menus, how to configure UEFI parameters, and how to save new configurations. This document is intended for users who install, maintain, troubleshoot, and administer Prodigy platforms.

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1. Introduction

The Unified Extensible Firmware Interface, or UEFI, specifies the architecture of the platform firmware used for booting the computer hardware and its interface to the operating system. UEFI is used during startup to initialize the hardware and load the operating system. In addition, it determines the device boot priority and allows users to customize hardware and software settings.

Released in 2002, UEFI was created to overcome the limitations of BIOS (Basic Input/Output System) and shorten system boot time. Key UEFI enhancements over BIOS include support for 32/64-bit operating mode, increased partition support from 4 to 128 physical partitions, increased partition size from 2 terabytes to 18 exabytes, higher performance with faster boot time, and secure boot support. The Prodigy UEFI is based on UEFI 2.10, which is the most recent release.

2. Entering the UEFI Main Menu

The steps for entering the UEFI Main menu are outlined below. Table 1 summarizes the keys for controlling the UEFI screens.

1. Connect the power supply, keyboard, mouse, and monitor, or enter the remote console of BMC Web to control the server.
2. Power on the server.
3. When the system is starting, press .
4. Press to SETUP or <F11> to Boot Menu or <F12> to PXE Boot. Then, you will enter the BIOS Setup screen.

Key	Function
<Esc>	Exit or return to the main menu from a submenu
<←> or <→>	Select a menu
<↑> or <↓>	Move the cursor up or down
<Home> or <End>	Move the cursor to the top or bottom of the screen
<+> or <->	Next or previous value of the current item
<F1>	Help on shortcut keys
<F2>	Restore the last set value
<F9>	Restore the default setting
<F10>	Save and exit
<Enter>	Run the command or select the submenu
<K> or <M>	Scroll up/down in Help

Table 1: Keys for Controlling the UEFI Setup Screen

3. Main Menu

The Main screen is the first screen displayed within our UEFI. It displays basic platform information and allows the user to set the language, date, and time.

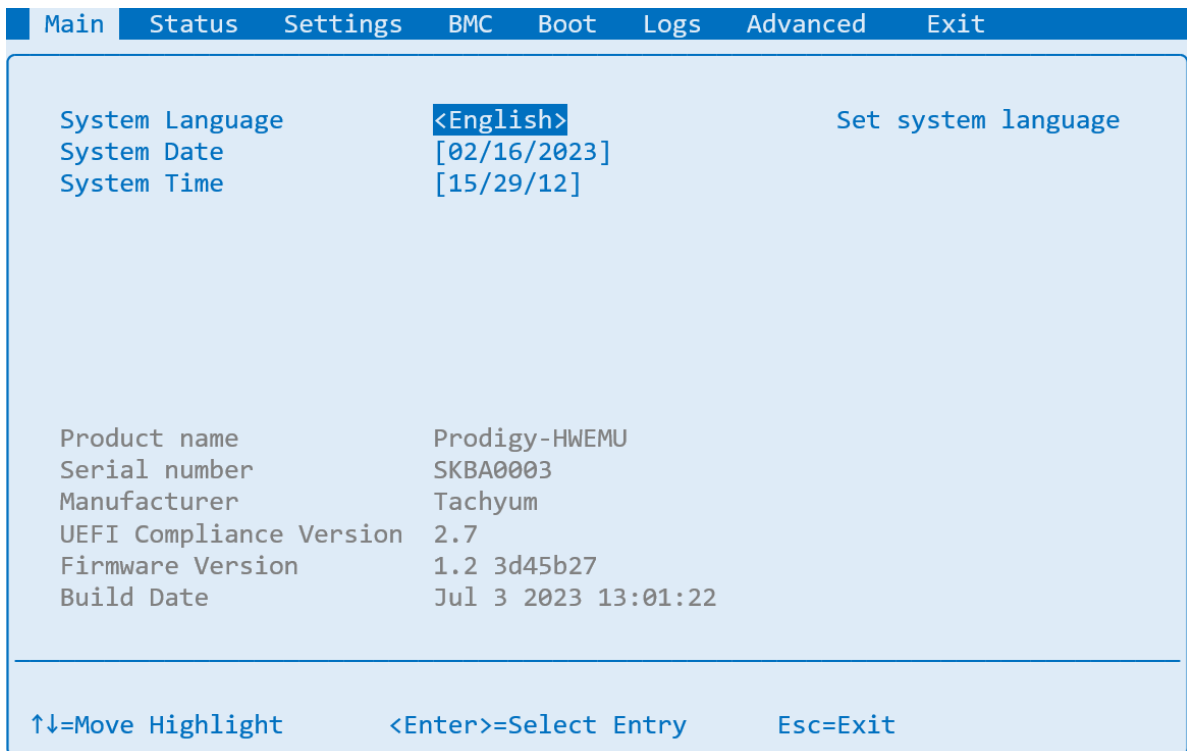


Figure 1: Main Screen

Programmable Fields:

- **System Language**

Allows the user to set the language. Available options: English, French. The default language is English. To choose another option click on the language field and choose the desired language from the pull-down menu.

- **System Date**

Allows the user to set the date in the format month/day/year. To set the date enter in the desired date.

- **System Time**

Allows the user to set the time in either 24-hour format (Hours: Minutes: Seconds), or 12-hour format (Hours: Minutes: Seconds: XM). To set the time choose the desired format and enter in the desired time.

Information Only Fields:

- **Product name**
Displays the processor product name.
- **Serial Number**
Displays the processor serial number.
- **Manufacturer**
Displays the processor manufacturer.
- **UEFI Compliance Version**
Displays the UEFI Compliance Version.
- **Firmware Version**
Displays the UEFI Firmware Version.
- **Build Date**
Displays the Firmware Build Date.

4. Status

The Status screen enables users to view the status of multiple sub-screens, each showing the status of a particular device subsystem by viewing the sub-screens. The sub-screens include System Information, Memory Information, PCIe Information for both external and internal devices, and monitors for thermal, cooling, and power. To view a sub-screen, click the mouse on the text bar for the desired screen in the main status screen. The sub-screens are illustrated and summarized below.

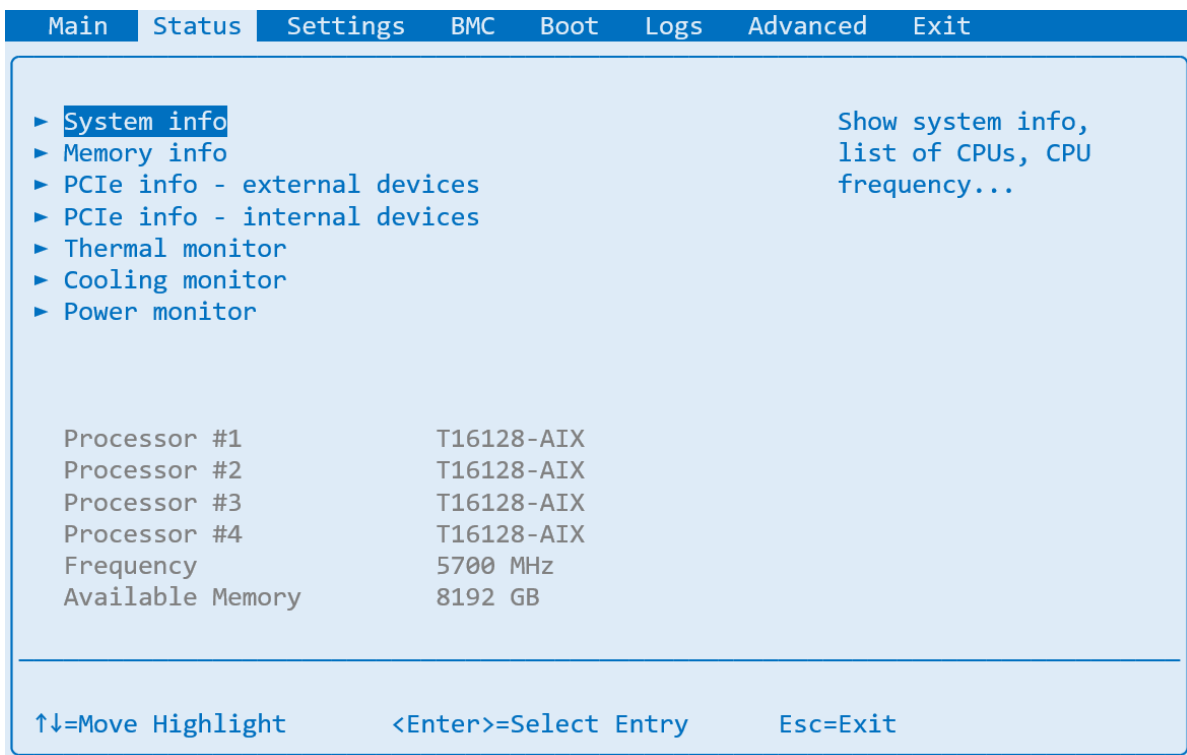


Figure 2: Status Screen

4.1. System Information

The System Information screen lists all installed processors on the platform and key processor parameters:

- **Installed CPUs** - Lists all populated processors in the platform.
- **Total processor cores** - Sum of all available cores within the platform.
- **Frequency** - Processor frequency.
- **CPU Interconnect Speed** - Processor interconnect speed for multi-socket systems.
- **Chassis Serial Number** - Shows Chassis Serial Number.
- **SKU number** - Displays processor SKU number.

Main Status Settings BMC Boot Logs Advanced Exit					
Status - System info					
Installed CPUs					
ID	SKU	Serial number	Cores	L1/L2 Cache size per core	
CPU1	T16128-AIX	#00003612	128	64 KB / 1 MB	
CPU2	T16128-AIX	#00003718	128	64 KB / 1 MB	
CPU3	T16128-AIX	#00000217	128	64 KB / 1 MB	
CPU4	T16128-AIX	#00000644	128	64 KB / 1 MB	
Total processor cores		512			
Frequency		5700 MHz			
CPU Interconnect Speed		112 GBps			
Chassis Serial Number		CHASSIS-00001			
SKU number		SKU-00001			
↑↓=Move Scroll			Esc=Exit		

Figure 3: System Information Screen

4.2. Memory Information

The Memory Information screen displays information related to the platform memory. The screen fields are summarized below:

- **System Memory Size** - Shows the total installed platform memory size as reported by the processor memory controllers.
- **System Memory Type** - Shows the system memory type: DD4, DDR5, or DDR5 with ECC.
- **System Memory Speed** - Memory speed in mega transfers (MT) and MHz. If slow memory is installed, all memories will be throttled to the slowest speed.
- **System Memory Voltage** - Displays the system memory voltage.
- **Available memory slots:** - The list of memory slots that have been loaded with RDIMMs, along with details of the installed modules and any reported errors.

```

Main  Status  Settings  BMC  Boot  Logs  Advanced  Exit
-----
Status - Memory Info

Memory controller info
System Memory Size      8192 GB
System Memory Type      DDR5 with ECC
System Memory Speed     4800 MT (2400 MHz)
System Memory Voltage   1.100 V

Refer to user manual how to install memory devices in case they are
not recognized

Available memory slots:
C1Ch1: 128 GB DDR5-4800 Samsung M321RAGA0B20-CWK
      4 x 32-bit, 2400 MHz, 1.100V, CL 42-40-40
      ECC State: Healthy
C1Ch2: 128 GB DDR5-4800 Samsung M321RAGA0B20-CWK
      4 x 32-bit, 2400 MHz, 1.100V, CL 42-40-40
      ECC State: SCC Active, see logs for details
C1Ch3: 128 GB DDR5-4800 Samsung M321RAGA0B20-CWK

↑↓=Move Scroll                               Esc=Exit

```

Figure 4: Memory Information Screen

4.3. PCIe Information - External Devices

The PCIe Information screen for external devices reports relevant platform information for all external PCIe devices and identifies all unpopulated slots. The fields are defined below:

- **CxPy** - "C" designates the CPU number and "P" designates the PCIe port number.
- **LnkCap** - Link Capability
- **LnkCtl** - Link Control
- **LnkSta** - Link Status

```

Main  Status  Settings  BMC  Boot  Logs  Advanced  Exit
-----
Status - PCIe info - External devices

C1P1:  Ethernet controller: Broadcom Inc. and subsidiaries BCM57508
       NetXtreme-E 10Gb/25Gb/40Gb/50Gb/100Gb/200Gb Ethernet (rev 11)
LnkCap: Port #0, Speed 16GT/s, Width x16, ASPM not supported
       ClockPM+ Surprise- LLActRep- BwNot- ASPMOptComp+
LnkCtl: ASPM Disabled; RCB 64 bytes, Disabled- CommClk+
       ExtSynch- ClockPM- AutWidDis- BWInt- AutBWInt-
LnkSta: Speed 16GT/s (ok), Width x8 (downgraded)
       TrErr- Train- SlotClk+ DLActive- BWMgmt- ABWMgmt-

Slots C1P2-C1P7 unpopulated

C1P8:  Ethernet controller: Broadcom Inc. and subsidiaries BCM57508
       NetXtreme-E 10Gb/25Gb/40Gb/50Gb/100Gb/200Gb Ethernet (rev 11)
LnkCap: Port #0, Speed 16GT/s, Width x16, ASPM not supported
       ClockPM+ Surprise- LLActRep- BwNot- ASPMOptComp+
LnkCtl: ASPM Disabled; RCB 64 bytes, Disabled- CommClk+
       ExtSynch- ClockPM- AutWidDis- BWInt- AutBWInt-

↑↓=Move Scroll                               Esc=Exit

```

Figure 5: Memory Information Screen

4.4. PCIe Information - Internal Devices

The PCIe Information screen for internal devices reports relevant platform information for all internal PCIe devices and identifies all unpopulated slots. The fields are defined below:

- **LnkCap** - Link Capability
- **LnkCtl** - Link Control
- **LnkSta** - Link Status

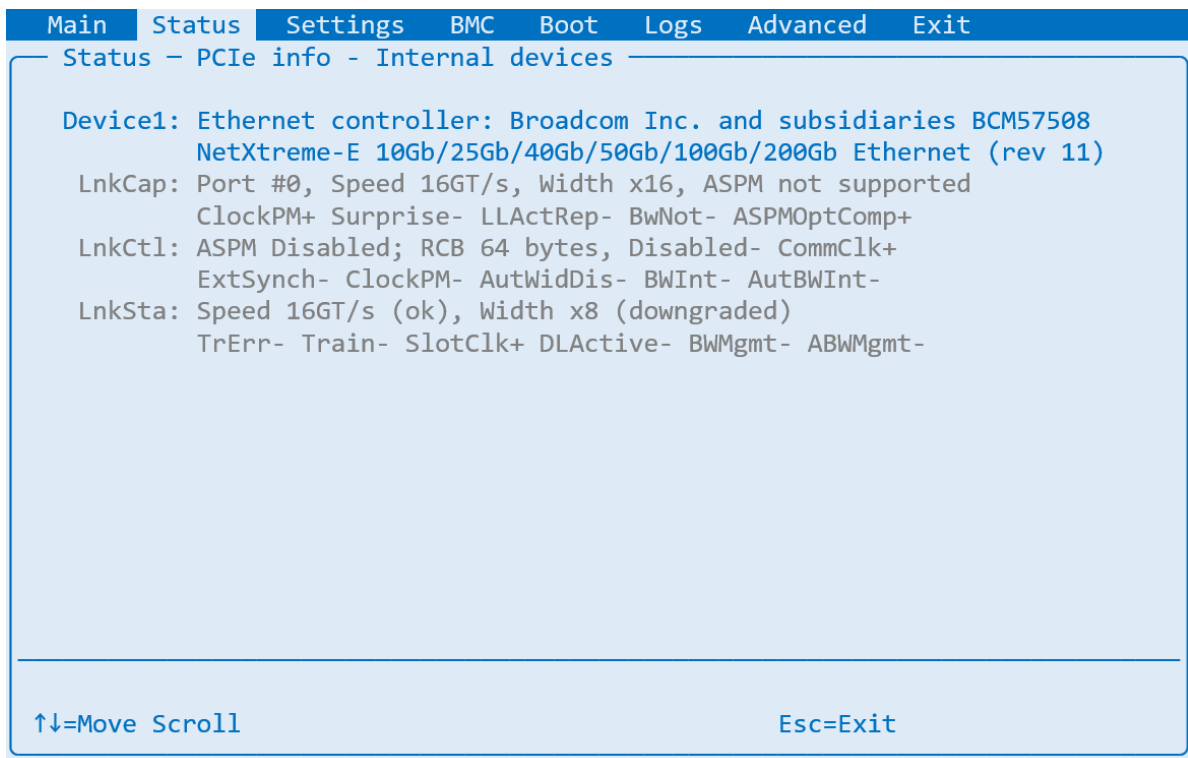
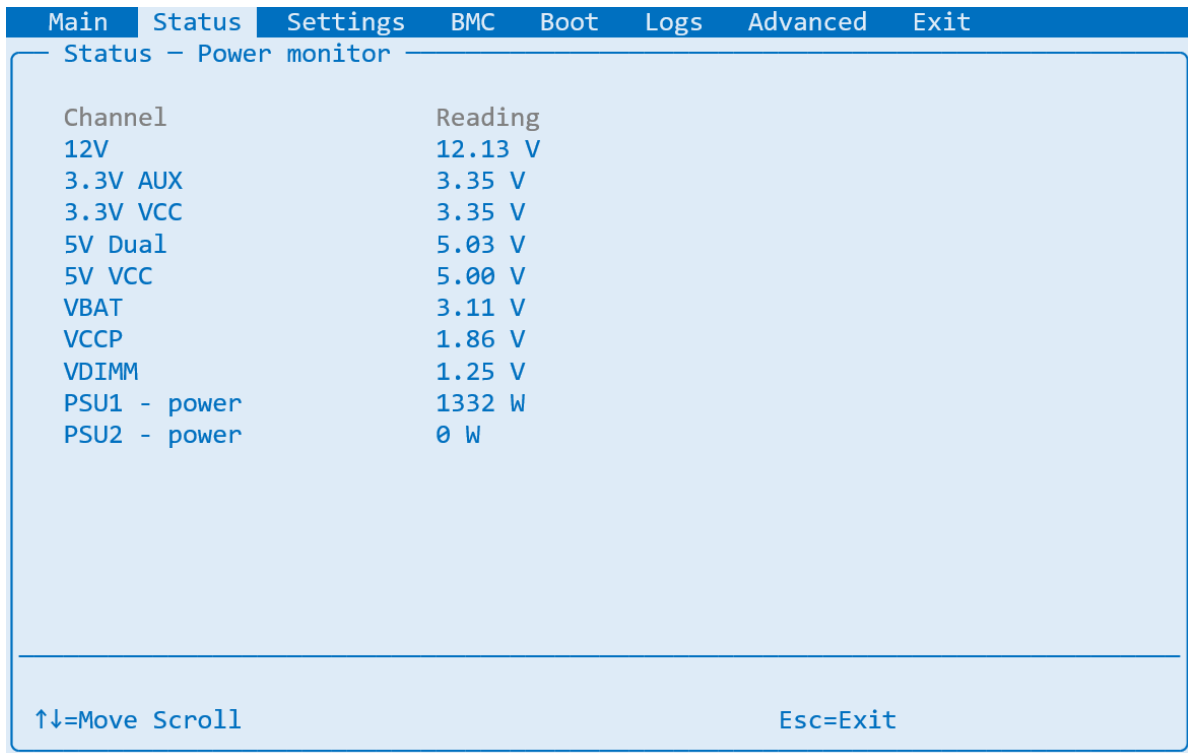


Figure 6: PCIe Information – Internal Devices Screen

4.6. Power Monitor

The Power Monitor screen shows voltage readings from the platform's switched mode power supplies (SMPS) and the power readings from the power supply units.



Channel	Reading
12V	12.13 V
3.3V AUX	3.35 V
3.3V VCC	3.35 V
5V Dual	5.03 V
5V VCC	5.00 V
VBAT	3.11 V
VCCP	1.86 V
VDIMM	1.25 V
PSU1 - power	1332 W
PSU2 - power	0 W

Figure 8: Power Monitor Screen

5. Settings

The Settings screen enables users to configure advanced settings for multiple device subsystems using multiple sub-screens, with each sub-screen allowing the configuration of a particular device subsystem. The sub-screens include Processor Settings, Memory Settings, PCIe Settings, Security Settings, Performance/Power Settings, Serial Communication Settings, and RAM Disk Configuration. To view a sub-screen, click the mouse on the text bar for the desired screen in the main Settings screen. The sub-screens are illustrated and summarized below.

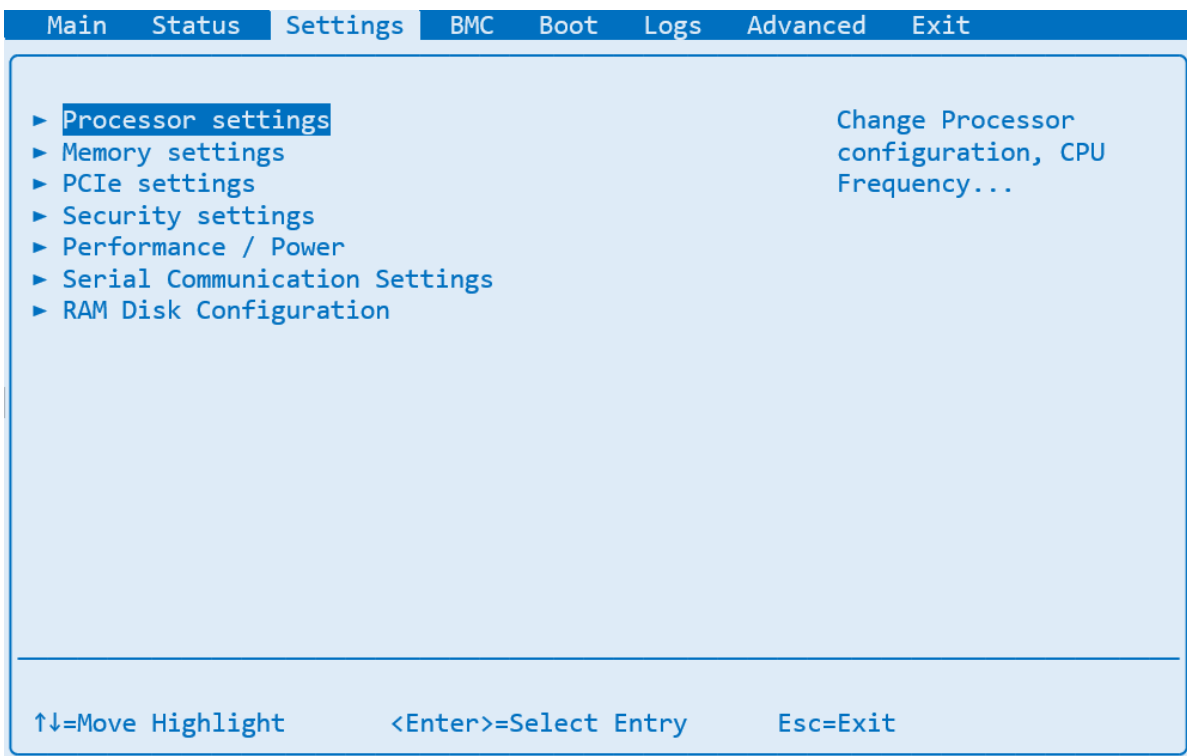


Figure 10: Processor Settings Screen

5.1. Processor Settings

The Processor Settings screen allows users to set the processor frequency, limit the number of processor cores that are enabled per socket, and, and enable or disable processor virtualization. Since the L2 cache of idle cores can be used as an L3 cache for the active cores, limiting the number of enabled cores effectively increases the L3 cache size for active cores. The valid settings for each field are summarized below:

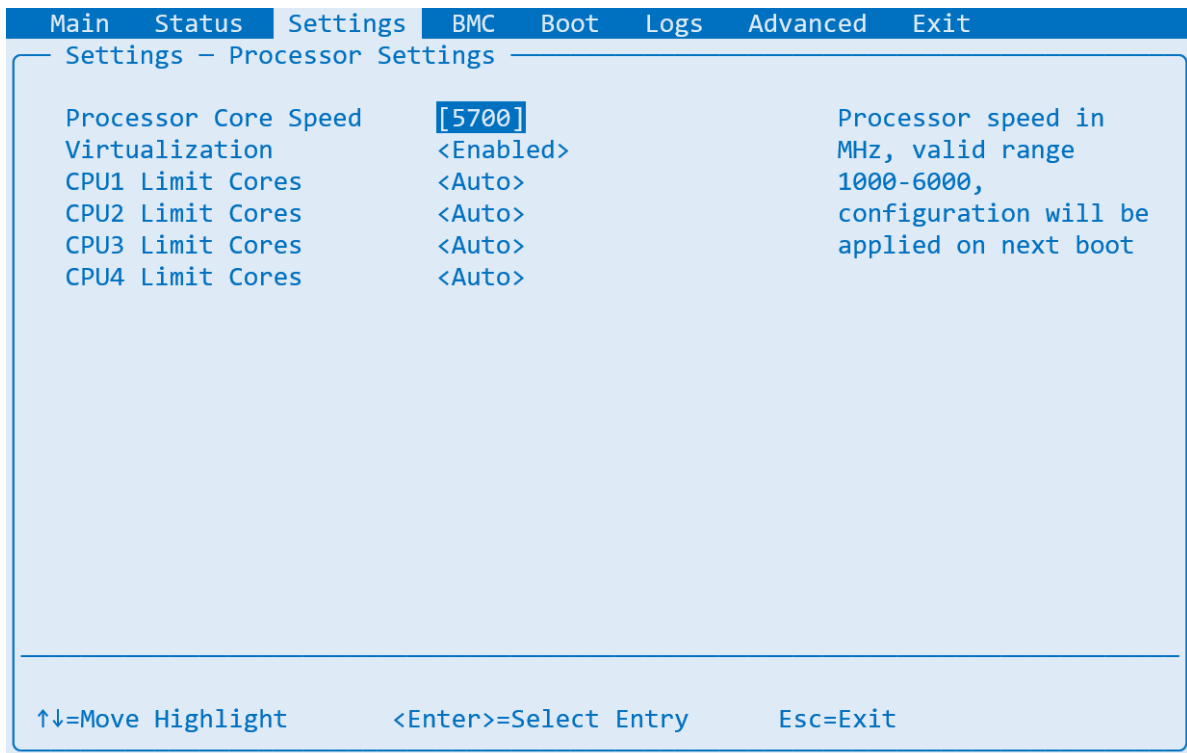


Figure 11: Processor Settings Screen

- **Processor Core Speed** – Sets processor speed in MHz. The valid range is 1000-6000, with the new configuration being applied on the next boot.
- **Virtualization** – Enable/disable virtualization. Disabling virtualization provides added security.
- **CPU1 Limit Cores** - Reduce active CPU1 core count to increase L3 cache size. Valid values are 1-64, which configures the reduced number of active cores, or <Auto> to disable, which means that all cores are active.
- **CPU2 Limit Cores** - Reduce active CPU2 core count to increase L3 cache size. Valid values are 1-64, which configures the reduced number of active cores, or <Auto> to disable, which means that all cores are active.
- **CPU3 Limit Cores** - Reduce active CPU3 core count to increase L3 cache size. Valid values are 1-64, which configures the reduced number of active cores, or <Auto> to disable, which means that all cores are active.
- **CPU4 Limit Cores** - Reduce active CPU4 core count to increase L3 cache size. Valid values are 1-64, which configures the reduced number of active cores, or <Auto> to disable, which means that all cores are active.

5.2. Memory Configuration

The Memory Configuration screen allows users to set a wide range of parameters to configure performance, runtime testing, and RAS for the memory subsystem. The configuration parameters are summarized below:

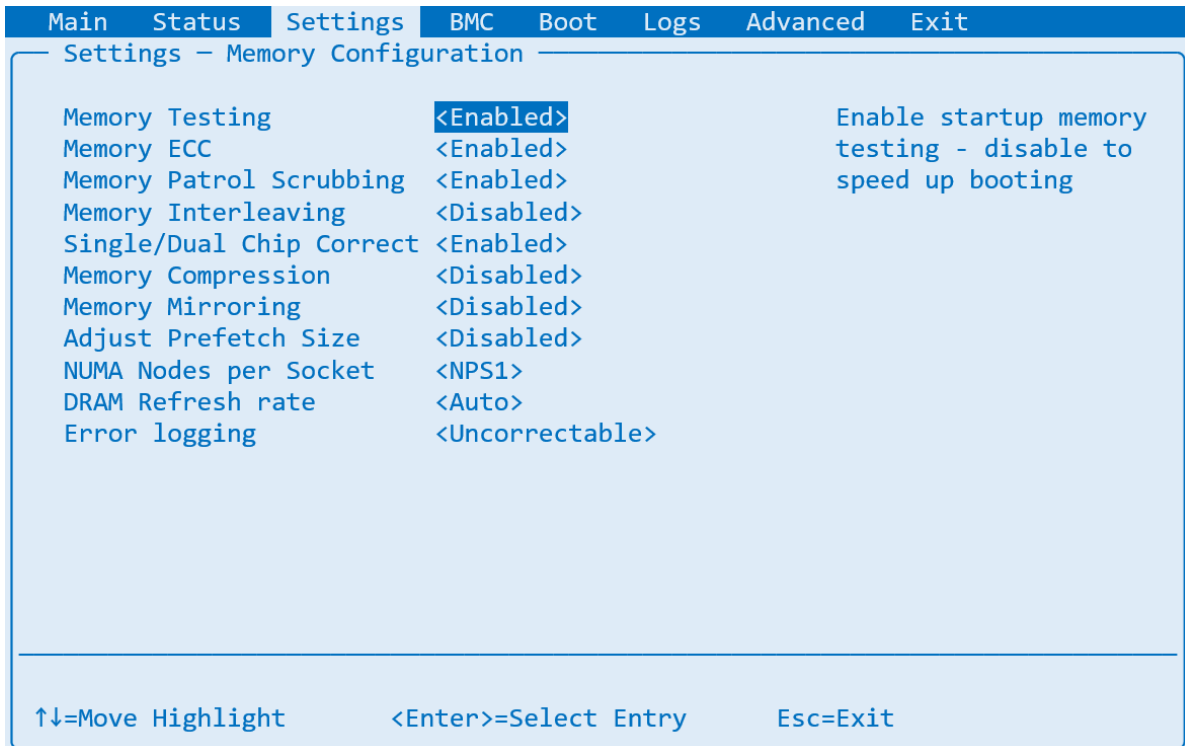


Figure 12: Memory Configuration Screen

- **Memory Testing**

Enable/disable startup memory testing. Disabling will speed up booting.

- **Memory ECC**

Enable/disable Error correction code algorithm for ECC enabled memory devices.

- **Memory Patrol Scrubbing**

Enable/disable memory patrol scrubbing. Enabling increases resilience to soft errors at a cost of slightly lower performance.

- **Memory Interleaving**

Enable/disable memory interleaving. Enabling increases memory access speed.

- **Single/Dual Chip Correct**

Enable/disable single device data correction (SDDC) and dual device data correction (DDDC), allowing Prodigy to withstand 4-bit memory chip failures and safely continue operating.

- **Memory Compression**

Enable/disable memory compression. Memory compression can yield up to 2x increase in memory bandwidth.

- **Memory Mirroring**

Enable/disable memory mirroring.

- **Adjust Prefetch Size**

Enabling allows user to adjust prefetch size to improve performance.

- **NUMA Nodes per Socket**

Configures the number of NUMA Nodes per socket. Available options:

NPS0: One NUMA node per system. Memory is interleaved across all memory controllers on a platform.

NPS1: One NUMA node per socket. Each processor is a NUMA domain, with all the cores and memory controllers on one socket belonging to that NUMA domain. The memory is interleaved across the memory controllers on a single socket.

NPS2: This partitions the processor into 2 NUMA domains, with half the cores and memory in each domain. Memory is interleaved across half of the memory channels in each NUMA domain.

NPS4: This setting partitions the processor into four NUMA domains, with one quarter of the cores and memory controllers in each domain, defined as a quadrant. Each quadrant is a NUMA domain, and memory is interleaved across each quadrant.

- **DRAM Refresh rate**

Set DRAM Refresh rate. Available options: Auto, Manual.

- **Error logging**

Configure whether to log nonfatal correctable errors during memory accesses.

Available options: Disabled, Correctable, Uncorrectable.

5.3. PCIe Configuration

The PCIe Configuration screen allows users to set a wide range of parameters to configure performance, flexibility, and radiated emissions for the PCIe subsystem. The configuration parameters are summarized below:

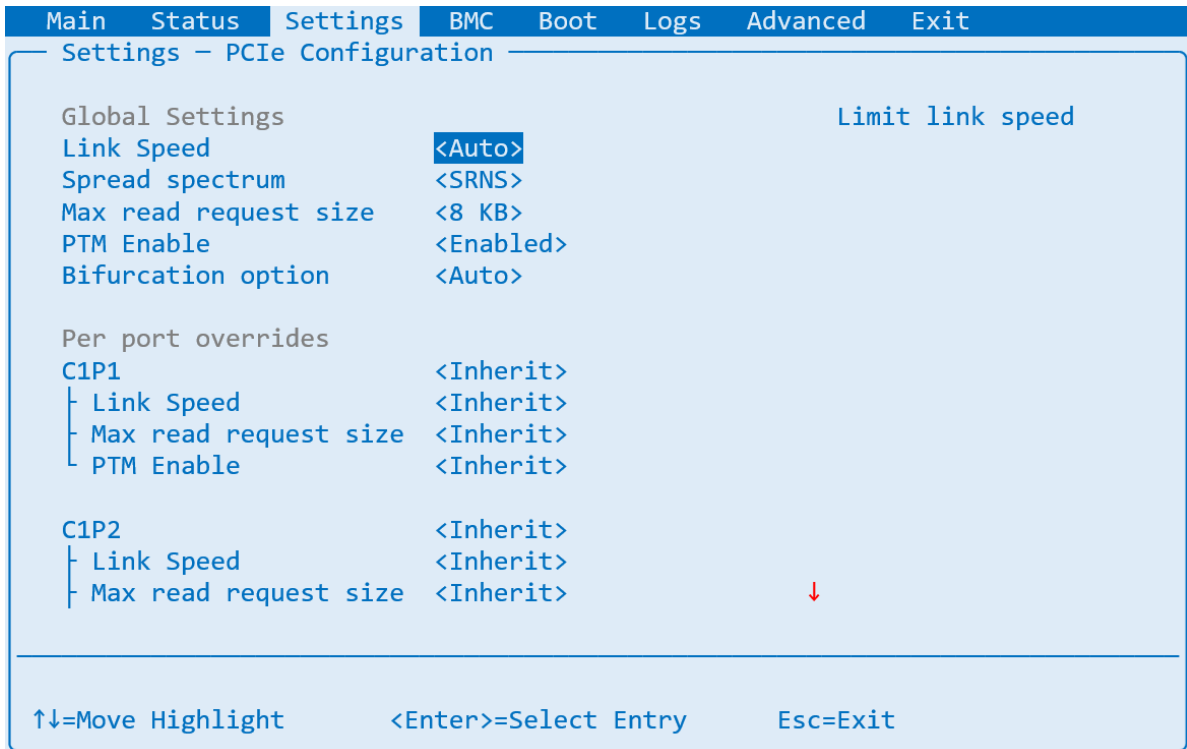


Figure 13: PCIe Configuration Screen

- **Link Speed**

Configures PCIe link speed, allowing it to be throttled if required. Available options:

Auto

Gen 5 (32 GT/s)

Gen 4 (16 GT/s)

Gen 3 (8 GT/s)

Gen 2 (5 GT/s)

Gen 1 (2.5 GT/s)

- **Spread Spectrum**

Allows shaping the MCLK clock signal by varying the clock frequency to reduce radiated emissions. UI, shown in the below configuration options, is defined as the clock period. Available options:

SRNS: Disable Spread Spectrum Clocking.

SSC: Enable Spread Spectrum Clocking, Deviation = 0.5UI.

SSC-SRIS: Enable Separate Reference Clock with Independent SSC, Deviation = 0.3UI.

- **Max Read Request Size**

Allows limiting the maximum request/packet size. Available options:

8 KB, 4 KB, 2 KB, 1 KB, 512 B.

- **PTM Enable**

Enable or disable precision time management protocol (PTM).

- **Bifurcation option**

Enable/disable PCIe bifurcation. Available options:

Auto, Manual - x16, x8x8, x4x4x4x4, x2x2x2x2x2x2x2x2.

- **Per port overrides - C1P1, C1P2, C1P3, C1P4, C1P5, C1P6**

Allows the global PCIe settings to be overridden on a per port basis. Below is an example for PCIe slot C1P1 (CPU1, Port1).

- **C1P1** – Available options:

Inherit: Keep the global settings.

Custom: Customize the port settings as shown below for this slot only:

- **Link Speed** - Available options:

Inherit (use global settings for this option),

Gen 5 (32 GT/s), Gen 4 (16 GT/s), Gen 3 (8 GT/s), Gen 2 (5 GT/s), Gen 1 (2.5 GT/s)

- **Max read request size** - Available options:

Inherit (use global settings for this option),

4 KB, 2 KB, 1 KB, 512 B, 256 B, 128 B

- **PTM Enable** - Settings will be applied only to slot C1P1, available options:

Inherit (use global settings for this option), Disabled, Enabled

5.4. Security Settings

The Security Settings screen allows users to configure security parameters, as summarized below:

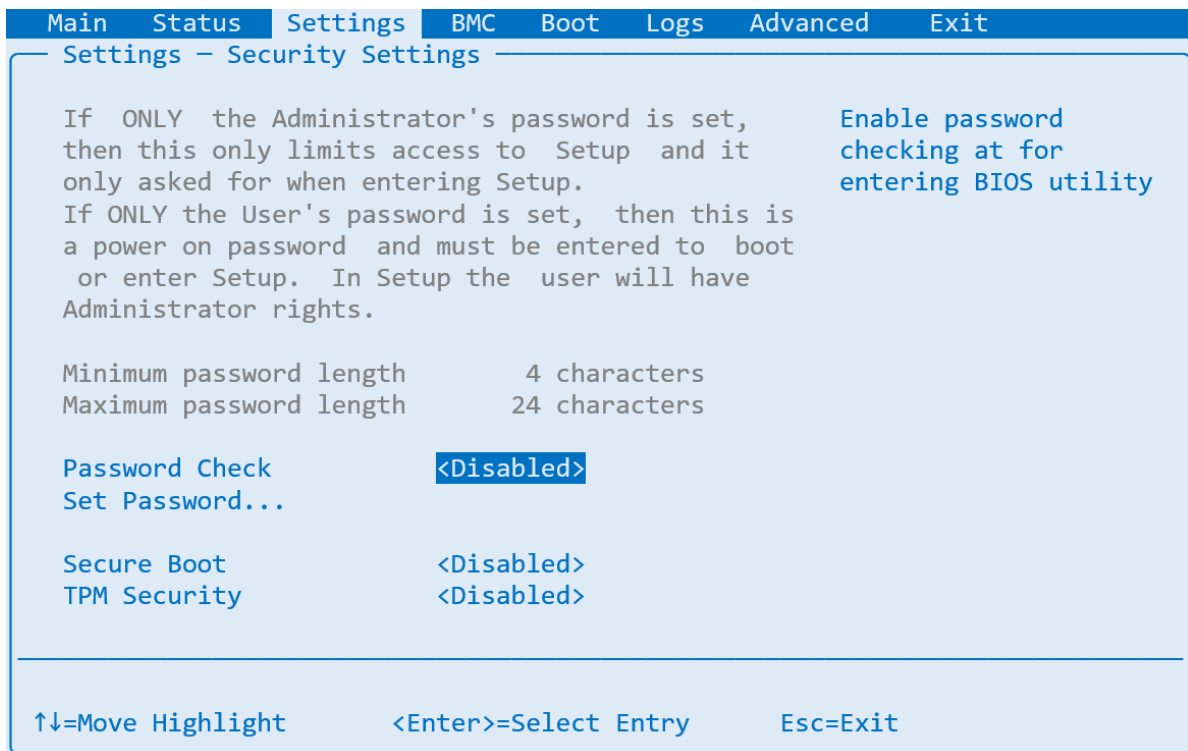


Figure 14: Security Settings Screen

- **Password Check**
Enable/Disable password checking at for entering BIOS utility.
- **Set Password**
Opens new password dialog. Password requires 4-24 characters.
- **Secure Boot**
Enable/Disable Secure boot.
- **TPM Security**
Enable/Disable Trusted Platform Module security services.

5.5. Performance/Power Settings

The Performance/Power Settings screen allows users to set a wide range of parameters to configure platform performance, application timing, and power. The configuration parameters are summarized below:

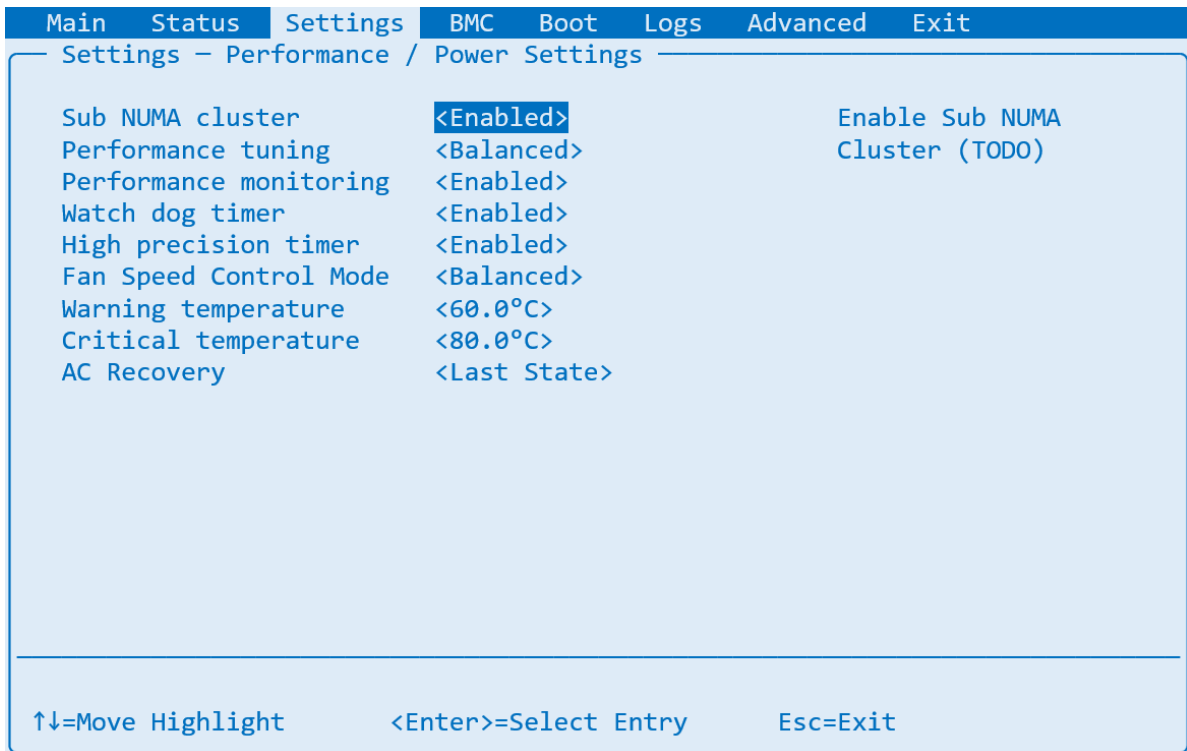


Figure 15: Performance/Power Settings Screen

- **Sub-NUMA Cluster**

Enable/Disable Sub NUMA Cluster

- **Performance Tuning**

Allows setting of performance profile. Available options:

Balanced - Automatically switch to power saver when CPU utilization is below 50%.

Performance - Maximum performance all the time.

Power Saver - Reduce power by issuing dummy instructions into vector pipeline.

- **Performance Monitoring**

Enable/Disable performance counters to profile system and application performance.

- **Watchdog Timer**

Enable/Disable watchdog timer which restarts the machine if it becomes unresponsive.

- **High-Precision Timer**

Enable/Disable High precision timer for scientific applications which require precise timing.

- **Fan Speed Control Mode**

Configures fan speed regulator. Available options:

Balanced

Performance

Low Noise

Fixed (100%, 75%, 50%, 25%, or 0%)

- **Warning Temperature**

Configure warning temperature threshold. Temperatures exceeding this point will be logged. Available options: 50.0°C, 55.0°C, 60.0°C, 65.0°C, 70.0°C, 75.0°C, 80.0°C.

- **Critical temperature**

Configure critical temperature threshold. Temperatures exceeding this point will cause the machine to power off. Available options: 50.0°C, 55.0°C, 60.0°C, 65.0°C, 70.0°C, 75.0°C, 80.0°C

- **AC Recovery**

Configure if the machine should automatically power on in case of sudden power outage. Available options:

Last State – Power on from the last known state before power outage.

Power On – Power-on normally following power loss.

Power Off – Stay off following power loss.



Fan Speed Control Mode to 0% will disable the fans completely, make sure you have independent means of cooling in operation

5.6. Serial Communication

The Serial Communication screen allows users to set the parameters to configure the serial ports. The configuration parameters are summarized below. The UEFI shell can be used for any desired non-standard configurations.

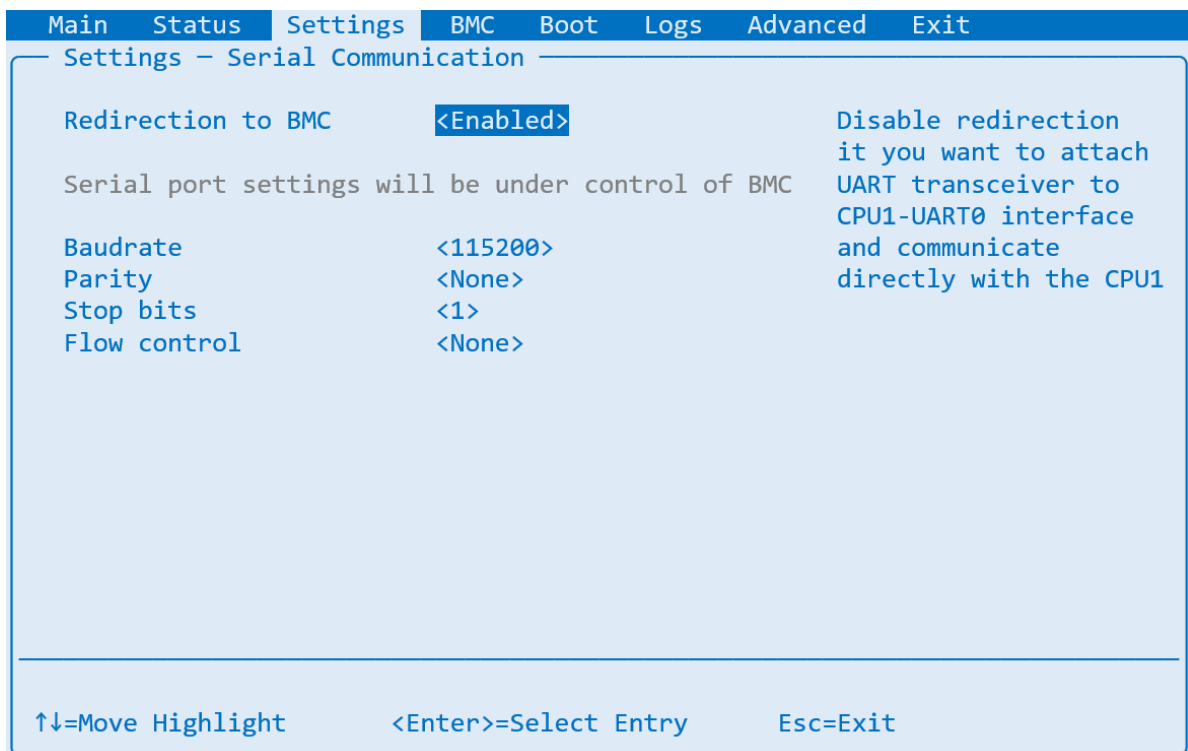


Figure 16: Serial Communication Screen

- **Redirection to BMC**

Disable redirection it you want to attach UART transceiver to CPU1-UART0 interface and communicate directly with the CPU1.

- **Baudrate**

Configures UART transmission speed. Available options:

4800, 9600, 19200, 38400, 57600, 115200.

- **Parity**

Configures UART parity. Available options: None, Odd, Even.

- **Stop Bits**

Configures the number of UART stop bits. Available options: 1, 1.5, 2.

- **Flow control**

Configures UART flow control. Available options: None, XOn/XOff.



With redirection disabled you won't be able to use Serial Over Lan (SOL) Console in BMC web interface

6. Board Management Controller (BMC)

The BMC screen along with the BMC Network Configuration Screen allow users to set the parameters to configure the BMC. The configuration parameters are summarized below.

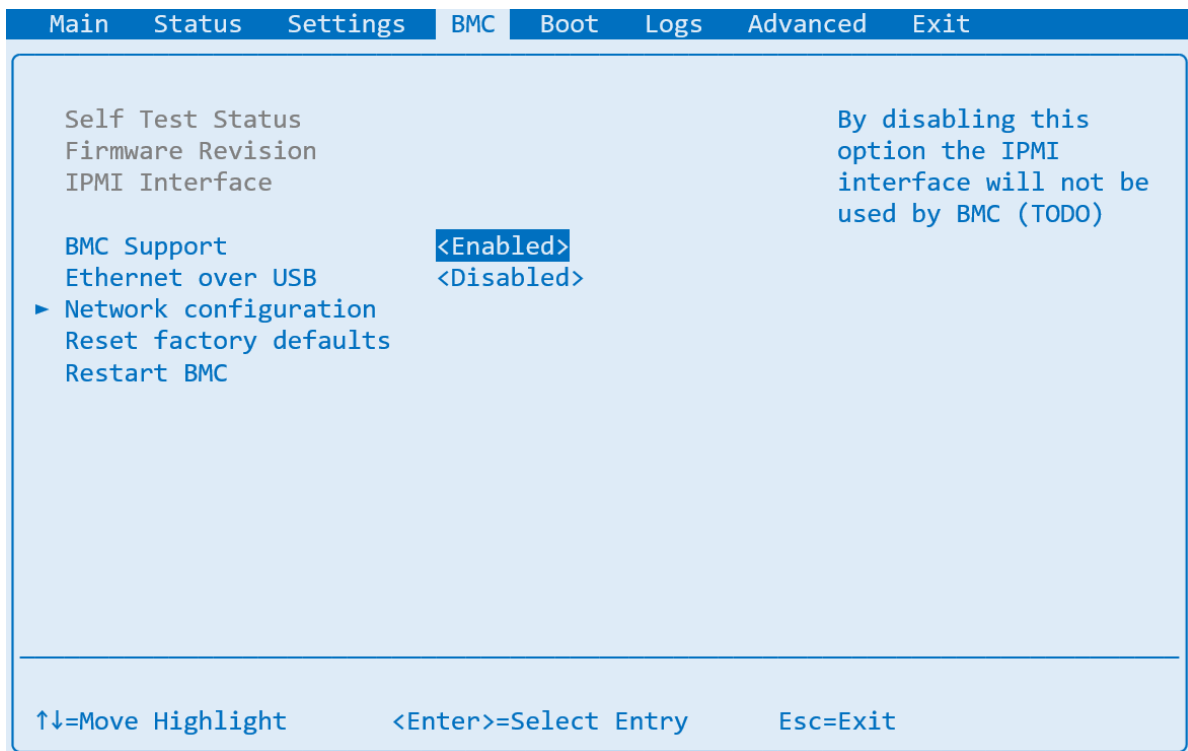


Figure 17: BMC Screen

- **BMC Support**
By disabling this option, the IPMI interface will not be used by BMC.
- **Ethernet over USB**
Enables/Disables Ethernet tunnelling over the USB link between CPU1 and the BMC.
- **Network configuration**
Configures the BMC network interface using network configuration screen below.
- **Reset Factory Defaults**
Resets BMC configuration to factory defaults.
- **Restart BMC**
Restarts the BMC.

6.1. BMC Network Configuration

The BMC Network Configuration screen configures all networking parameters for the BMC Network interface, which are summarized below:

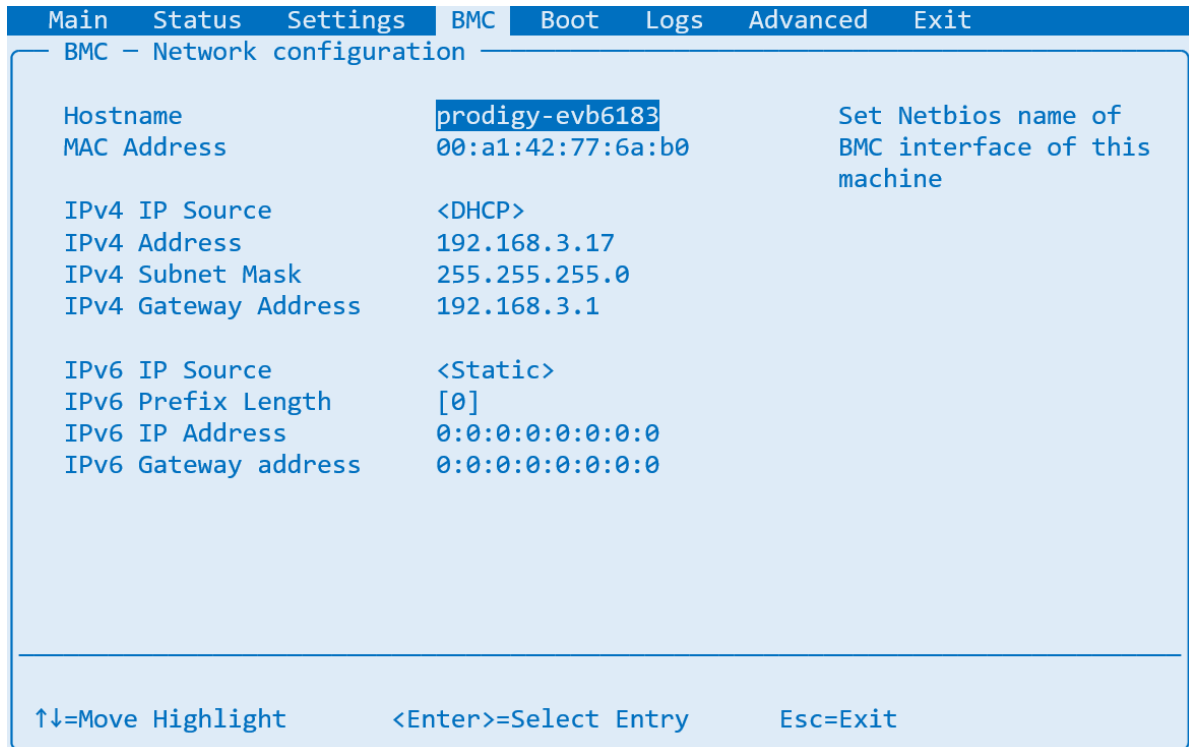


Figure 18: BMC Network Configuration Screen

- **Hostname**
Sets Netbios name of BMC interface for this machine.
- **MAC Address**
Sets MAC Address of Ethernet interface for BMC.
- **IPv4 IP Source**
Available options: DHCP, Static, Disabled.
Use this option to configure the IP address over DHCP service or provide the addresses manually.
- **IPv4 Address**
Sets static IPv4 address.
- **IPv4 Subnet Mask**
Sets static IPv4 subnet mask.

- **IPv4 Gateway Address**
Sets static IPv4 gateway address.
- **IPv6 IP Source**
Enables/Disables IPv6 interface.
- **IPv6 Prefix Length**
Sets IPv6 prefix length.
- **IPv6 IP Address**
Sets IPv6 IP address.
- **IPv6 Gateway address**
Sets IPv6 Gateway address.

7. Boot Manager

The Boot screen with all boot parameters. Tachyum added SW RAID 1 support to the boot menu for better boot storage selection, if disk mirroring is used.

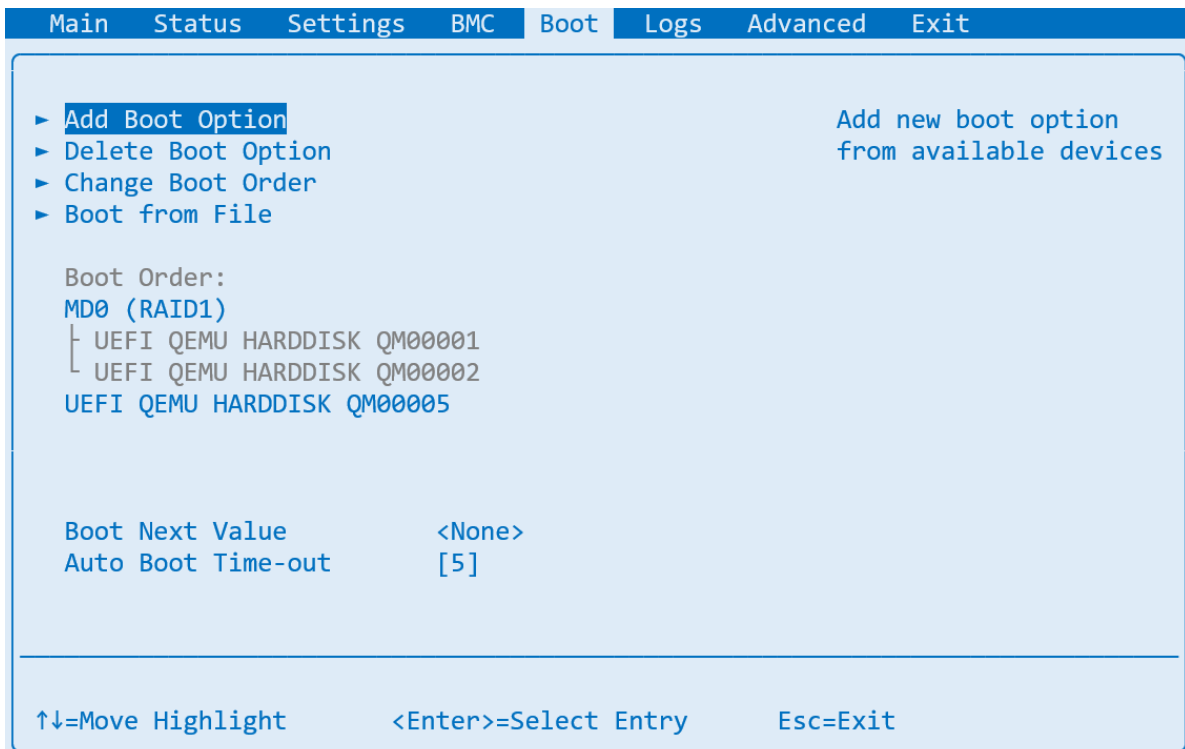


Figure 19: Boot Screen

- **Add Boot Option**
Add new boot option from available devices.
- **Delete Boot Option**
Remove existing boot option.
- **Change Boot Order**
Change the order of boot devices.
- **Boot From File**
Boot system from a selected file or device.
- **Boot Next Value**
Enables a single-shot boot override.
- **Auto Boot Time-out**
Timeout to boot default option. Units in seconds with maximum = 32,000. Recommended range is 3 – 5 seconds. -1 will wait for user to confirm boot selection.

8. System Logs

The Logs screen configures how system log information is collected and displayed.

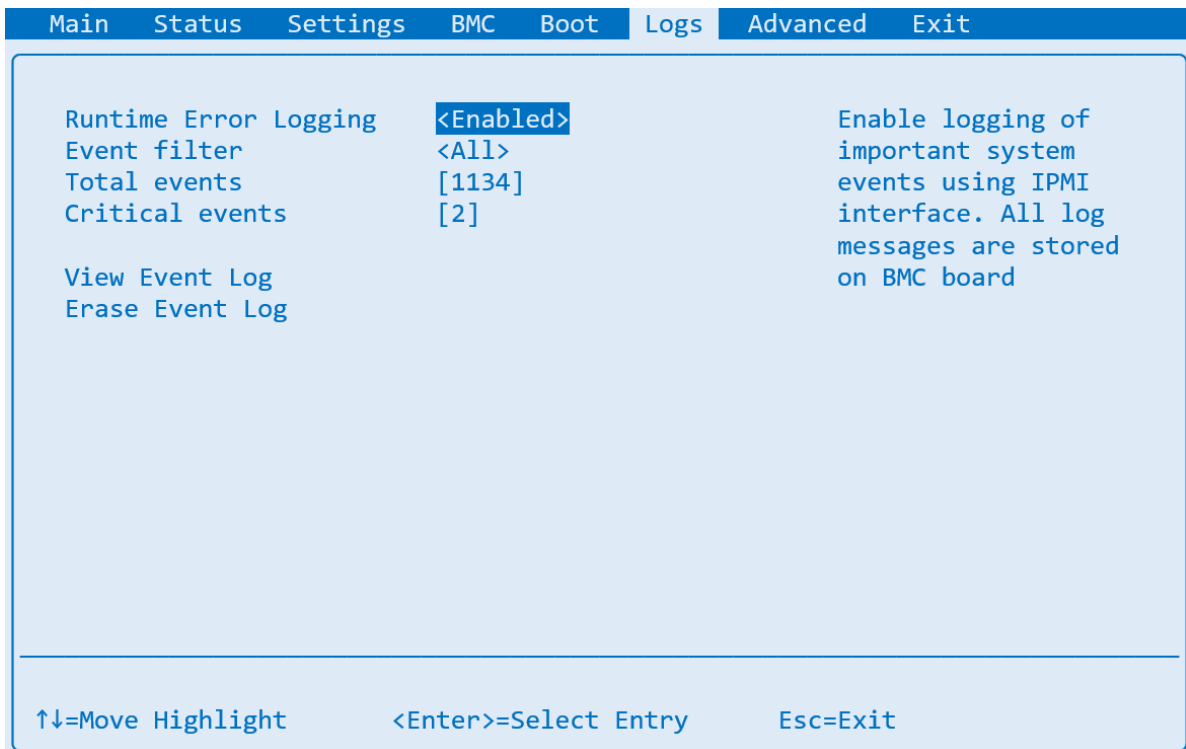


Figure 20: System Logs Screen

- Runtime Error Logging**
 Enables logging of important system events using the IPMI interface. All log messages are stored on the BMC board.
- Event filter**
 Filters which events are displayed in the event log viewer. Available options:
 - All:** All events are displayed.
 - Only Warnings:** Only warnings are displayed.
 - Only Error Messages:** Only warnings are displayed.
- Total events**
 Total events recorded.
- Critical events**
 Critical events recorded.
- View Event Log**
 View system event log.
- Erase Event Log**
 Clear system event log.

9. Advanced Settings

The Advanced screen provides advanced UEFI features for device testing and displaying system information.

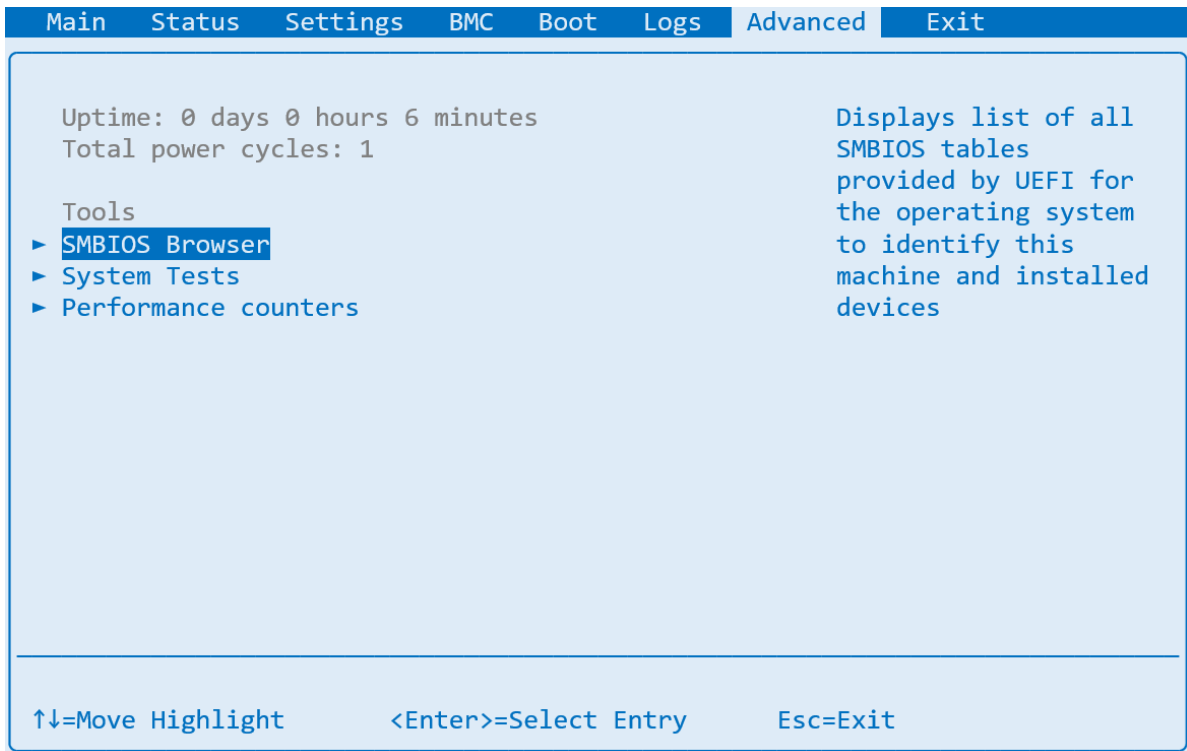


Figure 21: Advanced Settings Screen

- **SMBIOS Browser**

Displays list of all SMBIOS tables provided by UEFI for the operating system to identify this machine and installed devices.

- **System Tests**

Performs quick tests to validate functionality of ALU, FPU, Vector unit and IO quarter.

- **Performance counters**

Displays brief report on performance counters and system timer.

- **Open service menu**

Internal use only.

10. Save and Exit

The Exit screen provides several options for saving and exiting the UEFI utility.

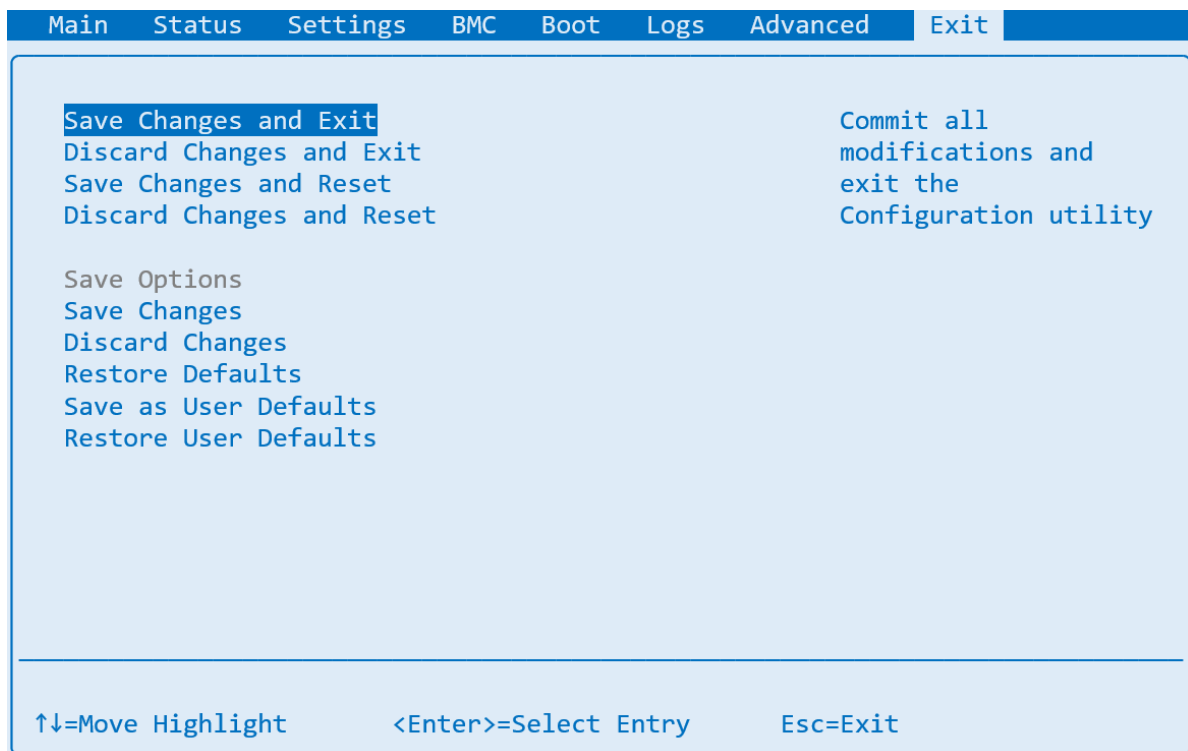


Figure 22: Save and Exit Screen

- **Save Changes and Exit**
Commit all modifications and exit the Configuration utility.
- **Discard Changes and Exit**
Exit the Configuration utility discarding all changes.
- **Save Changes and Reset**
Commit all modifications and reset the machine.
- **Discard Changes and Reset**
Discard all modifications and reset the machine.
- **Save Changes**
Save all modifications and continue browsing Configuration utility.

- **Discard Changes**

Discard all modifications.

- **Restore Defaults**

Reset all settings to factory settings.

- **Save as User Defaults**

Save current configuration as User Defaults.

- **Restore User Defaults**

Restore User Defaults configuration.

Thank You

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For questions, please email us: contactus@tachyum.com