Dell EMC

BIOS and UEFI Reference Guide

DELL EMC

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your product.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

Contents

1

Pre-operating system management applications

You can manage basic settings and features of a system without booting to the operating system by using the system firmware.

Options to manage the pre-operating system applications

You can use any one of the following options to manage the pre-operating system applications:

- System Setup
- Dell Lifecycle Controller
- Boot Manager
- Preboot Execution Environment (PXE)

Topics:

System Setup

Using the **System Setup** option, you can configure the BIOS settings, iDRAC settings, and device settings of the system.

You can access system setup by using any one of the following interfaces:

- Graphical User interface — To access go to iDRAC Dashboard, click **Configuration**, and click **BIOS Settings**.
- Text browser — The browser is enabled by using Console Redirection.

To view **System Setup**, power on the system, press F2, and click **System Setup Main Menu**.

NOTE: If the operating system begins to load before you press F2, wait for the system to finish booting, and then restart the system and try again.

The **System Setup Main Menu** screen details are described as follows:

Table 1. System Setup Main Menu

Option	Description
System BIOS	Enables you to configure the BIOS settings.
iDRAC Settings	Enables you to configure the iDRAC settings. The iDRAC settings utility is an interface to set up and configure the iDRAC parameters by using UEFI (Unified Extensible Firmware Interface). You can enable or disable various iDRAC parameters by using the iDRAC settings utility. For more information about this utility, see *Integrated Dell Remote Access Controller User's Guide* at www.dell.com/poweredgemanuals.
Device Settings	Enabled you to configure device settings for devices such as storage controllers or network cards.

System BIOS

To view the **System BIOS** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS**.

Table 2. System BIOS details

Option	Description
System Information	Provides information about the system such as the system model name, BIOS version, and Service Tag.
Memory Settings	Specifies information and options related to the installed memory.
Processor Settings	Specifies information and options related to the processor such as speed and cache size.
SATA Settings	Specifies options to enable or disable the integrated SATA controller and ports.
NVMe Settings	Specifies options to change the NVMe settings. If the system contains the NVMe drives that you want to configure in a RAID array, you must set both this field and the **Embedded SATA** field on the **SATA Settings** menu to **RAID** mode. You might also need to change the **Boot Mode** setting to **UEFI**. Otherwise, you should set this field to **Non-RAID** mode.
Boot Settings	Specifies options to specify the Boot mode (BIOS or UEFI). Enables you to modify UEFI and BIOS boot settings.
Network Settings	Specifies options to manage the UEFI network settings and boot protocols. Legacy network settings are managed from the **Device Settings** menu. **NOTE:** Network Settings are not supported in BIOS boot mode.
Integrated Devices	Specifies options to manage integrated device controllers and ports, specifies related features, and options.
Serial Communication	Specifies options to manage the serial ports, its related features, and options.
System Profile Settings	Specifies options to change the processor power management settings, memory frequency.
System Security	Specifies options to configure the system security settings, such as system password, setup password, Trusted Platform Module (TPM) security, and UEFI secure boot. It also manages the power button on the system
Redundant OS Control	Sets the redundant OS information for redundant OS control.
Miscellaneous Settings	Specifies options to change the system date and time.

System Information

To view the **System Information** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **System Information**.

Table 3. System Information details

Option	Description
System Model Name	Specifies the system model name.
System BIOS Version	Specifies the BIOS version installed on the system.
System Service Tag	Specifies the system Service Tag.
System Manufacturer	Specifies the name of the system manufacturer.
System Manufacturer Contact Information	Specifies the contact information of the system manufacturer.
System CPLD Version	Specifies the current version of the system complex programmable logic device (CPLD) firmware.

Table 3. System Information details (continued)

Option	Description
UEFI Compliance Version	Specifies the UEFI compliance level of the system firmware.
AGESA Version	Specifies the AGESA reference code version.
SMU Version	Specifies the SMU firmware version.
DXIO Version	Specifies the DXIO firmware version.

Memory Settings

To view the **Memory Settings** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Memory Settings**.

Table 4. Memory Settings details

Option	Description
System Memory Size	Specifies the memory size in the system.
System Memory Type	Specifies the type of memory installed in the system.
System Memory Speed	Specifies the system memory speed.
System Memory Voltage	Specifies the system memory voltage.
Video Memory	Specifies the amount of video memory.
System Memory Testing	Specifies whether the system memory tests are run during system boot. The two options available are **Enabled** and **Disabled**. This option is set to **Disabled** by default.
DRAM Refresh Delay	By enabling the **CPU memory controller** to delay running the **REFRESH** commands, you can improve the performance for some workloads. By minimizing the delay time, it is ensured that the memory controller runs the **REFRESH** command at regular intervals. For Intel-based servers, this setting only affects systems configured with DIMMs which use 8 Gb density DRAMs. This option is set to **Minimum** by default.
Memory Operating Mode	Specifies the memory operating mode. The option is available and is set to **Optimizer Mode**, by default.
Current State of Memory Operating Mode	Specifies the mode selected in the memory operating mode.
Memory Interleaving	Enables or disables the memory interleaving option. The two options available are **Auto** and **Disabled**. This option is set to **Auto** by default.
Opportunistic Self-Refresh	Enables or disables opportunistic self-refresh feature. This option is set to **Disabled** by default.
Correctable Error Logging	Enables or disables correctable error logging. This option is set to **Enabled** by default.

Processor Settings

To view the **Processor Settings** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Processor Settings**.

Table 5. Processor Settings details

Option	Description
Logical Processor	Each processor core supports up to two logical processors. If this option is set to **Enabled**, the BIOS displays all the logical processors. If this option is set to **Disabled**, the BIOS displays

Table 5. Processor Settings details (continued)

Option	Description
	only one logical processor per core. This option is set to **Enabled** by default.
Virtualization Technology	Enables or disables the virtualization technology for the processor. This option is set to **Enabled** by default.
IOMMU Support	Enable or Disable IOMMU support. It is required to create IVRS ACPI table. This option is set to **Enabled** by default.
L1 Stream HW Prefetcher	Enables or disables the L1 stream hardware prefetcher. This option is set to **Enabled** by default.
L2 Stream HW Prefetcher	Enables or disables the L2 stream hardware prefetcher. This option is set to **Enabled** by default.
MADT Core Enumeration	Specifies the MADT Core Enumeration. This option is set to **Linear** by default.
NUMA Nodes Per Socket	Specifies the number of NUMA nodes per socket. This option is set to **1** by default.
L3 cache as NUMA Domain	Enables or disables the L3 cache as NUMA Domain. This option is set to **Disabled** by default.
Minimum SEV non-ES ASID	Determines the number of Secure Encrypted Virtualization ES and non-ES available Address Space IDs. This option is set to **1** by default.
x2APIC Mode	Enable or disable x2APIC mode. This option is set to **Enabled** by default. **NOTE:** For two CPU 64 cores configuration, x2APIC mode is not switchable if 256 threads are enabled (BIOS settings: All CCD, cores and logical processors enabled).
Number of CCDs per Processor	Controls the number of enabled CCDs in each processor. This option is set to **All** by default.
Number of Cores per CCD	specifies the number of cores per CCD. This option is set to **All** by default.
Processor Core Speed	Specifies the maximum core frequency of the processor.
Processor Bus Speed	Specifies the bus speed of the processor. **NOTE:** The processor bus speed option displays only when both processors are installed.
Processor n	**NOTE:** Depending on the number of CPUs, there might be up to n processors listed. The following settings are displayed for each processor installed in the system:

Table 6. Processor n details

Option	Description
Family-Model-Stepping	Specifies the family, model, and stepping of the processor as defined by AMD.
Brand	Specifies the brand name.
Level 2 Cache	Specifies the total L2 cache.
Level 3 Cache	Specifies the total L3 cache.
Number of Cores	Specifies the number of cores per processor.

Table 6. Processor n details (continued)

Option	Description
Microcode	Specifies the processor microcode version.

SATA Settings

To view the **SATA Settings** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **SATA Settings**.

Table 7. SATA Settings details

Option	Description
Embedded SATA	Enables the embedded SATA option to be set to **Off**, **AHCI mode** , or **RAID modes**. This option is set to **AHCI Mode** by default. **NOTE:** 1. You might also need to change the Boot Mode setting to UEFI. Otherwise, you should set the field to Non-RAID mode. 2. No ESXi and Ubuntu OS support under RAID mode.
Security Freeze Lock	Sends **Security Freeze Lock** command to the embedded SATA drives during POST. This option is applicable only for AHCI Mode. This option is set to **Enabled** by default.
Write Cache	Enables or disables the command for the embedded SATA drives during POST. This option is set to **Disabled** by default.
Port n	Sets the drive type of the selected device. For **AHCI Mode** or **RAID Mode**, BIOS support is always enabled. **Table 8. Port n** **Options** / **Descriptions** **Model** — Specifies the drive model of the selected device. **Drive Type** — Specifies the type of drive attached to the SATA port. **Capacity** — Specifies the total capacity of the drive. This field is undefined for removable media devices such as optical drives.

NVMe Settings

This option sets the NVMe drive mode. If the system contains NVMe drives that you want to configure in a RAID array, you must set both this field and the Embedded SATA field on the SATA settings menu to RAID Mode. You may also need to change the Boot Mode setting to UEFI. The option is set to **Non-RAID** mode by default.

Boot Settings

You can use the **Boot Settings** screen to set the boot mode to either **BIOS** or **UEFI**. It also enables you to specify the boot order.

- **UEFI**: The Unified Extensible Firmware Interface (UEFI) is a new interface between operating systems and platform firmware. The interface consists of data tables with platform related information, boot and runtime service calls that are available to the operating system and its loader. The following benefits are available when the **Boot Mode** is set to **UEFI**:
  - Support for drive partitions larger than 2 TB.
  - Enhanced security (e.g., UEFI Secure Boot).

- Faster boot time.

NOTE: You must use only the UEFI boot mode in order to boot from NVMe drives.

- **BIOS**: The **BIOS Boot Mode** is the legacy boot mode. It is maintained for backward compatibility.

To view the **Boot Settings** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Boot Settings**.

Table 9. Boot Settings details

Option	Description
Boot Mode	Enables you to set the boot mode of the system. If the operating system supports UEFI, you can set this option to UEFI. Setting this field to BIOS allows compatibility with non-UEFI operating systems. This option is set to **UEFI** by default. CAUTION: **Switching the boot mode may prevent the system from booting if the operating system is not installed in the same boot mode.** NOTE: Setting this field to UEFI disables the **BIOS Boot Settings** menu.
Boot Sequence Retry	Enables or disables the **Boot Sequence Retry** feature. If this option is set to **Enabled** and the system fails to boot, the system re-attempts the boot sequence after 30 seconds. This option is set to **Enabled** by default.
Hard-disk Failover	Enables or disables the Hard-disk failover. This option is set to **Disabled** by default.
Generic USB Boot	Enables or disables the generic USB boot placeholder. This option is set to **Disabled** by default.
Hard-disk Drive Placeholder	Enables or disables the Hard-disk drive placeholder. This option is set to **Disabled** by default.
Clean all Sysprep order and variables	When set to **None**, BIOS will do nothing. When set to **Yes**, BIOS will delete variables of SysPrep #### and SysPrepOrder this option is a onetime option, will reset to none when deleting variables. This setting is only available in **UEFI Boot Mode**. This option is set to **None** by default.
UEFI Boot Settings	Specifies the UEFI boot sequence. Enables or disables UEFI Boot options. NOTE: This option controls the UEFI boot order. The first option in the list will be attempted first. **Table 10. UEFI Boot Settings** **Option** / **Description** **UEFI Boot Sequence** — Enables you to change the boot device order. **Boot Options Enable/Disable** — Enables you to select the enabled or disabled boot devices

Choosing system boot mode

System Setup enables you to specify one of the following boot modes for installing your operating system:

- UEFI boot mode (the default), is an enhanced 64-bit boot interface.

  If you have configured your system to boot to UEFI mode, it replaces the system BIOS.

1. From the **System Setup Main Menu**, click **Boot Settings**, and select **Boot Mode**.
2. Select the UEFI boot mode you want the system to boot into.

   CAUTION: **Switching the boot mode may prevent the system from booting if the operating system is not installed in the same boot mode.**
3. After the system boots in the specified boot mode, proceed to install your operating system from that mode.

NOTE: Operating systems must be UEFI-compatible to be installed from the UEFI boot mode. DOS and 32-bit operating systems do not support UEFI and can only be installed from the BIOS boot mode.

NOTE: For the latest information about supported operating systems, go to www.dell.com/ossupport.

Changing boot order

About this task

You may have to change the boot order if you want to boot from a USB key or an optical drive. The following instructions may vary if you have selected **BIOS** for **Boot Mode**.

NOTE: Changing the drive boot sequence is only supported in BIOS boot mode.

Steps

1. On the **System Setup Main Menu** screen, click **System BIOS** > **Boot Settings** > **UEFI Boot Settings** > **UEFI Boot Sequence**.
2. Use the arrow keys to select a boot device, and use the plus (+) and minus (-) sign keys to move the device down or up in the order.
3. Click **Exit**, and then click **Yes** to save the settings on exit.

   NOTE: You can also enable or disable boot order devices as needed.

Network Settings

To view the **Network Settings** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Network Settings**.

NOTE: For information about Linux network performance settings, see the *Linux Network Tuning Guide for AMD EPYC Processor Based Servers* at AMD.com.

NOTE: Network Settings are not supported in BIOS boot mode.

Table 11. Network Settings details

Option	Description
UEFI PXE Settings	Enables you to control the configuration of the UEFI PXE device.
PXE Device n (n = 1 to 4)	Enables or disables the device. When enabled, a UEFI PXE boot option is created for the device.
PXE Device n Settings(n = 1 to 4)	Enables you to control the configuration of the PXE device.
UEFI HTTP Settings	Enables you to control the configuration of the UEFI HTTP device.
HTTP Device n (n = 1 to 4)	Enables or disables the device. When enabled, a UEFI HTTP boot option is created for the device.
HTTP Device n Settings (n = 1 to 4)	Enables you to control the configuration of the HTTP device.
UEFI iSCSI Settings	Enables you to control the configuration of the iSCSI device.

Table 12. PXE Device n Settings details

Option	Description
Interface	Specifies NIC interface used for the PXE device.
Protocol	Specifies Protocol used for PXE device. This option is set to **IPv4** or **IPv6**. This option is set to **IPv4** by default.
Vlan	Enables Vlan for PXE device. This option is set to **Enable** or **Disable**. This option is set to **Disable** by default.

Table 12. PXE Device n Settings details (continued)

Option	Description
Vlan ID	Shows the Vlan ID for the PXE device
Vlan Priority	Shows the Vlan Priority for the PXE device.

Table 13. HTTP Device n Settings details

Option	Description
Interface	Specifies NIC interface used for the HTTP device.
Protocol	Specifies Protocol used for HTTP device. This option is set to **IPv4** or **IPv6**. This option is set to **IPv4** by default.
Vlan	Enables Vlan for HTTP device. This option is set to **Enable** or **Disable**. This option is set to **Disable** by default.
Vlan ID	Shows the Vlan ID for the HTTP device
Vlan Priority	Shows the Vlan Priority for the HTTP device.
DHCP	Enables or disables DHCP for this HTTP device. This option is set to **Enable** by default.
IP Address	Specifies IP address for the HTTP device.
Subnet Mask	Specifies subnet mask for the HTTP device.
Gateway	Specifies gateway for the HTTP device.
DNS info via DHCP	Enables or disables DNS Information from DHCP. This option is set to **Enable** by default.
Primary DNS	Specifies the primary DNS server IP address for the HTTP Device.
Secondary DNS	Specifies the secondary DNS server IP address for the HTTP Device.
URI	Obtain URI from the DHCP server if not specified.
TLS Authentication Configuration	Specifies the option for TLS authentication configuration.

Table 14. UEFI iSCSI Settings screen details

Option	Description
iSCSI Initiator Name	Specifies the name of the iSCSI initiator in IQN format.
iSCSI Device1	Enables or disables the iSCSI device. When disabled, a UEFI boot option is created for the iSCSI device automatically. This is set to **Disabled** by default.
iSCSI Device1 Settings	Enables you to control the configuration of the iSCSI device.

Table 15. ISCSI Device1 Settings screen details

Option	Description
Connection 1	Enables or disables the iSCSI connection. This option is set to **Disable** by default.
Connection 2	Enables or disables the iSCSI connection. This option is set to **Disable** by default.
Connection 1 Settings	Enables you to control the configuration for the iSCSI connection.
Connection 2 Settings	Enables you to control the configuration for the iSCSI connection.
Connection Order	Enables you to control the order for which the iSCSI connections will be attempted.

Integrated Devices

To view the **Integrated Devices** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Integrated Devices**.

Table 16. Integrated Devices details

Option	Description
User Accessible USB Ports	Configures the user accessible USB ports. Selecting **All Ports Off** disables all front and back USB ports. This option is set to **All Ports On** by default. The USB keyboard and mouse still function in certain USB ports during the boot process, depending on the selection. After the boot process is complete, the USB ports will be enabled or disabled as per the setting.
Internal SD card Port	Enables or disables the **Internal SD card Port**. This option is set to **On** or **Off**. This option is set to **On** by default.
iDRAC Direct USB Port	The iDRAC Direct USB port is managed by iDRAC exclusively with no host visibility. This option is set to **ON** or **OFF**. When set to **OFF**, iDRAC does not detect any USB devices installed in this managed port. This option is set to **On** by default.
Embedded NIC1	Enables or disables the **Embedded NIC1** options. If set to **Disabled (OS)**, the NIC may still be available for shared network access by the embedded management controller. Configure the **Embedded NIC1** option by using the NIC management utilities of the system.
Embedded Video Controller	Enables or disables the use of Embedded Video Controller as the primary display. When set to **Enabled**, the Embedded Video Controller will be the primary display even if add-in graphic cards are installed. When set to **Disabled**, an add-in graphics card will be used as the primary display. BIOS will output displays to both the primary add-in video and the embedded video during POST and pre-boot environment. The embedded video will then be disabled right before the operating system boots. This option is set to **Enabled** by default. **NOTE:** When there are multiple add-in graphic cards installed in the system, the first card discovered during PCI enumeration is selected as the primary video. You might have to re-arrange the cards in the slots in order to control which card is the primary video.
Current State of Embedded Video Controller	Displays the current state of the embedded video controller. The **Current State of Embedded Video Controller** option is a read-only field. If the Embedded Video Controller is the only display capability in the system (that is, no add-in graphics card is installed), then the Embedded Video Controller is automatically used as the primary display even if the **Embedded Video Controller** setting is set to **Disabled**.
PCIe Preferred IO Bus	When set to **Enabled**, you can provide the Bus address (in decimal) to choose end device for preferred IO Bus. This option is set to **Disabled** by default.
Enhanced Preferred IO	When set to **Enabled**, the LCLK speed for the root complex where Preferred IO is enabled will automatically be set to 600 MHz (effective 593 MHz).
SR-IOV Global Enable	Enables or disables the BIOS configuration of Single Root I/O Virtualization (SR-IOV) devices. This option is set to **Disabled** by default.
OS Watchdog Timer	If your system stops responding, this watchdog timer aids in the recovery of your operating system. When this option is set to **Enabled**, the operating system initializes the timer. When this option is set to **Disabled** (the default), the timer does not have any effect on the system.
Memory Mapped I/O Limit	Controls where MMIO is mapped. The **1 TB** option is designed for specific OS which cannot support MMIO over 1 TB. This option is set to **8 TB** by default. The default option is the maximum address that the system supports and recommended in most cases.

Table 16. Integrated Devices details (continued)

Option	Description
Slot Disablement	Enables or disables the available PCIe slots on your system. The slot disablement feature controls the configuration of the PCIe cards installed in the specified slot. Slots must be disabled only when the installed peripheral card prevents booting into the operating system or causes delays in system startup. If the slot is disabled, both the Option ROM and UEFI drivers are disabled. Only slots that are present on the system will be available for control. **Slot n**: Enables or disables or only the boot driver is disabled for the PCIe slot n. This option is set to **Enabled** by default.
Slot Bifurcation	**Slot Discovery Bifurcation Settings** allows **Platform Default Bifurcation** and **Manual bifurcation Control**. The default is set to **Platform Default Bifurcation**. The slot bifurcation field is accessible when set to **Manual bifurcation Control** and is grayed out when set to **Platform Default Bifurcation**.

Serial Communication

To view the **Serial Communication** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Serial Communication**.

Table 17. Serial Communication details

Option	Description
Serial Port Address	Enables you to set the port address for serial devices. . This field sets the serial port address to either COM1 or COM2 (COM1=0x3F8, COM2=0x2F8). **NOTE:** You can use only Serial Device 2 for the Serial Over LAN (SOL) feature. To use console redirection by SOL, configure the same port address for console redirection and the serial device. **NOTE:** Every time the system boots, the BIOS syncs the serial MUX setting that is saved in iDRAC. The serial MUX setting can independently be changed in iDRAC. Loading the BIOS default settings from within the BIOS setup utility may not always revert the serial MUX setting to the default setting of Serial Device 1.
Failsafe Baud Rate	Specifies the failsafe baud rate for console redirection. The BIOS attempts to determine the baud rate automatically. This failsafe baud rate is used only if the attempt fails, and the value must not be changed. This option is set to **115200** by default.
Remote Terminal Type	Sets the remote console terminal type. This option is set to **VT100/VT220** by default.
Redirection After Boot	Enables or disables the BIOS console redirection when the operating system is loaded. This option is set to **Enabled** by default.

System Profile Settings

To view the **System Profile Settings** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **System Profile Settings**.

Table 18. System Profile Settings details

Option	Description
System Profile	Sets the system profile. If you set the System Profile option to a mode other than **Custom**, the BIOS automatically sets the rest of the options. You can only change the rest of the

Table 18. System Profile Settings details (continued)

Option	Description
	options if the mode is set to **Custom**. This option is set to **Performance Per Watt (OS)** by default. Other options include **Performance** and **Custom**. **NOTE:** All the parameters on the system profile setting screen are available only when the **System Profile** option is set to **Custom**.
CPU Power Management	Sets the CPU power management. This option is set to **OS DBPM** by default. Other option includes **Maximum Performance**.
Memory Frequency	Sets the speed of the system memory. You can select **Maximum Performance** or a specific speed. This option is set to **Maximum Performance** by default.
Turbo Boost	Enables or disables the processor to operate in the turbo boost mode. This option is set to **Enabled** by default.
C States	Enables or disables the processor to operate in all available power states. C States allow the processor to enter lower power states when idle. When set to **Enabled** (OS controlled) or when set to **Autonomous** (if hardware controlled is supported), the processor can operate in all available Power States to save power, but may increase memory latency and frequency jitter. This option is set to **Enabled** by default.
Write Data CRC	When set to **Enabled**, DDR4 data bus issues are detected and corrected during 'write' operations. Two extra cycles are required for CRC bit generation which impacts the performance. Read-only unless System Profile is set to **Custom**. This option is set to **Disabled** by default.
Memory Patrol Scrub	Sets the memory patrol scrub mode. This option is set to **Standard** by default.
Memory Refresh Rate	Sets the memory refresh rate to either 1x or 2x. This option is set to **1x** by default.
PCI ASPM L1 Link Power Management	Enables or disables the PCI ASPM L1 Link Power Management. This option is set to **Enabled** by default.
Determinism Slider	Set the system determinism by **Power Determinism** or **Performance Determinism**. This option is set to **Power Determinism** by default.
Efficiency Optimized Mode	Efficiency Optimized Mode maximizes Performance-per-Watt by opportunistically reducing frequency/power. Enables or disables the Efficiency Optimized Mode.
Algorithm Performance Boost Disable (ApbDis)	Enables or disables the Algorithm Performance Boost Disable (ApbDis). This option is set to **Disabled** by default.
Dynamic Link Width Management (DLWM)	Reduces the xGMI link width between sockets from x16 to x8 (default), when no traffic is detected on the link. This option is set to **Unforced** by default.

System Security

To view the **System Security** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **System Security**.

Table 19. System Security details

Option	Description
CPU AES-NI	Improves the speed of applications by performing encryption and decryption by using the Advanced Encryption Standard Instruction Set (AES-NI). This option is set to **Enabled** by default.
System Password	Sets the system password. This option is set to **Enabled** by default and is read-only if the password jumper is not installed in the system.
Setup Password	Sets the setup password. This option is read-only if the password jumper is not installed in the system.
Password Status	Locks the system password. This option is set to **Unlocked** by default.

Table 20. TPM 1.2 security information

Option	Description
TPM Security	**NOTE:** The TPM menu is available only when the TPM module is installed. Enables you to control the reporting mode of the TPM. The **TPM Security** option is set to **Off** by default. You can only modify the TPM Status, and TPM Activation if the **TPM Status** field is set to either **On with Pre-boot Measurements** or **On without Pre-boot Measurements**. When TPM 1.2 is installed, the **TPM Security** option is set to **Off**, **On with Pre-boot Measurements**, or **On without Pre-boot Measurements**. When TPM 2.0 is installed, the **TPM Security** option is set to **On** or **Off**. This option is set to **Off** by default.
TPM Information	Changes the operational state of the TPM. This option is set to **No Change** by default.
TPM Firmware	Indicates the firmware version of the TPM.
TPM Status	Specifies the TPM status.
TPM Command	Controls the Trusted Platform Module (TPM). When set to **None**, no command is sent to the TPM. When set to **Activate**, the TPM is enabled and activated. When set to **Deactivate**, the TPM is disabled and deactivated. When set to **Clear**, all the contents of the TPM are cleared. This option is set to **None** by default.

Table 21. TPM 2.0 security information

Option	Description
TPM Information	Changes the operational state of the TPM. This option is set to **No Change** by default.
TPM Firmware	Indicates the firmware version of the TPM.
TPM Hierarchy	Enables, disables, or clears the storage and endorsement hierarchies. When set to **Enabled**, the storage and endorsement hierarchies can be used. When set to **Disabled**, the storage and endorsement hierarchies cannot be used. When set to **Clear**, the storage and endorsement hierarchies are cleared of any values, and then reset to **Enabled**.
TPM Advanced Settings	Specifies TPM Advanced Settings details.

Table 22. System Security details

Option	Description
Power Button	Enables or disables the power button on the front of the system. This option is set to **Enabled** by default.
AC Power Recovery	Sets how the system behaves after AC power is restored to the system. This option is set to **Last** by default.
UEFI Variable Access	Provides varying degrees of securing UEFI variables. When set to **Standard** (the default), UEFI variables are accessible in the operating system per the UEFI specification. When set to **Controlled**, selected UEFI variables are protected in the environment and new UEFI boot entries are forced to be at the end of the current boot order.
Secure Boot	Enables Secure Boot, where the BIOS authenticates each pre-boot image by using the certificates in the Secure Boot Policy. Secure Boot is set to **Disabled** by default.
Secure Boot Policy	When Secure Boot policy is set to **Standard**, the BIOS uses the system manufacturer's key and certificates to authenticate pre-boot images. When Secure Boot policy is set to **Custom**, the BIOS uses the user-defined key and certificates. Secure Boot policy is set to **Standard** by default.
Secure Boot Mode	Configures how the BIOS uses the Secure Boot Policy Objects (PK, KEK, db, dbx).

Table 22. System Security details (continued)

<table>
<tr><th>Option</th><th>Description</th></tr>
<tr><td></td><td>If the current mode is set to Deployed Mode, the available options are User Mode and Deployed Mode. If the current mode is set to User Mode, the available options are User Mode, Audit Mode, and Deployed Mode.

Table 23. Secure Boot Mode
<table><tr><th>Options</th><th>Descriptions</th></tr><tr><td>User Mode</td><td>In User Mode, PK must be installed, and BIOS performs signature verification on programmatic attempts to update policy objects.

The BIOS allows unauthenticated programmatic transitions between modes.</td></tr><tr><td>Deployed Mode</td><td>Deployed Mode is the most secure mode. In Deployed Mode, PK must be installed and the BIOS performs signature verification on programmatic attempts to update policy objects.

Deployed Mode restricts the programmatic mode transitions.</td></tr><tr><td>Audit Mode</td><td>In Audit mode, PK is not present. The BIOS does not authenticate programmatic updates to the policy objects, and transitions between modes. The BIOS performs a signature verification on pre-boot images and logs the results in the image Execution Information Table, but executes the images whether they pass or fail verification.

Audit Mode is useful for programmatic determination of a working set of policy objects.</td></tr></table></td></tr>
<tr><td>Authorize Device Firmware</td><td>Specifies the status of the device firmware.</td></tr>
<tr><td>Secure Boot Policy Summary</td><td>Specifies the list of certificates and hashes that secure boot uses to authenticate images.

Table 24. Secure Boot Custom Policy Settings screen
<table><tr><th>Options</th><th>Descriptions</th></tr><tr><td>Platform Key</td><td>Imports, exports, deletes, or restores the platform key (PK).</td></tr><tr><td>Key Exchange Key Database</td><td>Enables you to import, export, delete, or restore entries in the Key Exchange Key (KEK) Database.</td></tr><tr><td>Authorized Signature Database</td><td>Imports, exports, deletes, or restores entries in the Authorized Signature Database (db).</td></tr><tr><td>Forbidden Signature Database</td><td>Imports, exports, deletes, or restores entries in the Forbidden Signature Database (dbx).</td></tr></table></td></tr>
</table>

Creating a system and setup password

Prerequisites

Ensure that the password jumper is enabled. The password jumper enables or disables the system password and setup password features. For more information, see the System board jumper settings section.

NOTE: If the password jumper setting is disabled, the existing system password and setup password are deleted and you need not provide the system password to boot the system.

Steps

1. To enter System Setup, press F2 immediately after turning on or rebooting your system.
2. On the **System Setup Main Menu** screen, click **System BIOS** > **System Security**.
3. On the **System Security** screen, verify that **Password Status** is set to **Unlocked**.
4. In the **System Password** field, type your system password, and press Enter or Tab.
   Use the following guidelines to assign the system password:
   - A password can have up to 32 characters.

   A message prompts you to reenter the system password.
5. Reenter the system password, and click **OK**.
6. In the **Setup Password** field, type your setup password and press Enter or Tab.
   A message prompts you to reenter the setup password.
7. Reenter the setup password, and click **OK**.
8. Press Esc to return to the System BIOS screen. Press Esc again.
   A message prompts you to save the changes.
   NOTE: Password protection does not take effect until the system reboots.

Using your system password to secure your system

About this task

If you have assigned a setup password, the system accepts your setup password as an alternate system password.

Steps

1. Turn on or reboot your system.
2. Type the system password and press Enter.

Next steps

When **Password Status** is set to **Locked**, type the system password and press Enter when prompted at reboot.

NOTE: If an incorrect system password is typed, the system displays a message and prompts you to reenter your password. You have three attempts to type the correct password. After the third unsuccessful attempt, the system displays an error message that the system has stopped functioning and must be turned off. Even after you turn off and restart the system, the error message is displayed until the correct password is entered.

Deleting or changing system and setup password

Prerequisites

NOTE: You cannot delete or change an existing system or setup password if the **Password Status** is set to **Locked**.

Steps

1. To enter System Setup, press F2 immediately after turning on or restarting your system.
2. On the **System Setup Main Menu** screen, click **System BIOS** > **System Security**.
3. On the **System Security** screen, ensure that **Password Status** is set to **Unlocked**.
4. In the **System Password** field, alter or delete the existing system password, and then press Enter or Tab.
5. In the **Setup Password** field, alter or delete the existing setup password, and then press Enter or Tab.
   If you change the system and setup password, a message prompts you to reenter the new password. If you delete the system and setup password, a message prompts you to confirm the deletion.
6. Press Esc to return to the **System BIOS** screen. Press Esc again, and a message prompts you to save the changes.
7. Select **Setup Password**, change, or delete the existing setup password and press Enter or Tab.

NOTE: If you change the system password or setup password, a message prompts you to reenter the new password. If you delete the system password or setup password, a message prompts you to confirm the deletion.

Operating with setup password enabled

If **Setup Password** is set to **Enabled**, type the correct setup password before modifying the system setup options.

If you do not type the correct password in three attempts, the system displays the following message:

```
Invalid Password! Number of unsuccessful password attempts: <x> System Halted! Must
power down.
```

```
Password Invalid. Number of unsuccessful password attempts: <x> Maximum number of
password attempts exceeded.System halted.
```

Even after you turn off and restart the system, the error message is displayed until the correct password is typed. The following options are exceptions:

- If **System Password** is not set to **Enabled** and is not locked through the **Password Status** option, you can assign a system password. For more information, see the System Security Settings screen section.
- You cannot disable or change an existing system password.

NOTE: You can use the password status option with the setup password option to protect the system password from unauthorized changes.

Redundant OS Control

To view the **Redundant OS Control** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Redundant OS Control**.

Table 25. Redundant OS Control details

Option	Description
Redundant OS Location	Enables you to select a backup disk from the following devices: • **None** • **SATA Ports in AHCI mode** • **BOSS PCIe Cards (Internal M.2 Drives)** • Internal SD card
Redundant OS State	**NOTE:** This option is disabled if **Redundant OS Location** is set to **None**. When set to **Visible**, the backup disk is visible to the boot list and OS. When set to **Hidden**, the backup disk is disabled and is not visible to the boot list and OS. This option is set to **Visible** by default. **NOTE:** BIOS disables the device in hardware, so it is not accessed by the OS.
Redundant OS Boot	**NOTE:** This option is disabled if **Redundant OS Location** is set to **None** or if **Redundant OS State** is set to **Hidden**. When set to **Enabled**, BIOS boots to the device specified in **Redundant OS Location**. When set to **Disabled**, BIOS preserves the current boot list settings. This option is set to **Enabled** by default.

Miscellaneous Settings

To view the **Miscellaneous Settings** screen, power on the system, press F2, and click **System Setup Main Menu** > **System BIOS** > **Miscellaneous Settings**.

Table 26. Miscellaneous Settings details

Option	Description
System Time	Enables you to set the time on the system.
System Date	Enables you to set the date on the system.
Asset Tag	Specifies the asset tag and enables you to modify it for security and tracking purposes.
Keyboard NumLock	Enables you to set whether the system boots with the NumLock enabled or disabled. This option is set to **On** by default. **NOTE:** This option does not apply to 84-key keyboards.
F1/F2 Prompt on Error	Enables or disables the F1/F2 prompt on error. This option is set to **Enabled** by default. The F1/F2 prompt also includes keyboard errors.
Load Legacy Video Option ROM	Enables or disables the Load Legacy Video Option ROM option. This option is set to **Disabled** by default.
Dell Wyse P25/P45 BIOS Access	Enables or disables the Dell Wyse P25/P45 BIOS Access. This option is set to **Enabled** by default.
Power Cycle Request	Enables or disables the Power Cycle Request. This option is set to **None** by default.

iDRAC Settings utility

The iDRAC settings utility is an interface to set up and configure the iDRAC parameters by using UEFI. You can enable or disable various iDRAC parameters by using the iDRAC settings utility.

NOTE: Accessing some of the features on the iDRAC settings utility needs the iDRAC Enterprise License upgrade.

For more information about using iDRAC, see *Dell Integrated Dell Remote Access Controller User's Guide* at https://www.dell.com/idracmanuals.

Device Settings

Device Settings enables you to configure device parameters such as storage controllers or network cards.

Dell Lifecycle Controller

Dell Lifecycle Controller (LC) provides advanced embedded systems management capabilities including system deployment, configuration, update, maintenance, and diagnosis. LC is delivered as part of the iDRAC out-of-band solution and Dell system embedded Unified Extensible Firmware Interface (UEFI) applications.

Embedded system management

The Dell Lifecycle Controller provides advanced embedded system management throughout the lifecycle of the system. The Dell Lifecycle Controller is started during the boot sequence and functions independently of the operating system.

NOTE: Certain platform configurations may not support the full set of features provided by the Dell Lifecycle Controller.

For more information about setting up the Dell Lifecycle Controller, configuring hardware and firmware, and deploying the operating system, see the Dell Lifecycle Controller documentation at https://www.dell.com/idracmanuals.

Boot Manager

The **Boot Manager** option enables you to select boot options and diagnostic utilities.

To enter **Boot Manager**, power on the system and press F11.

Table 27. Boot Manager details

Option	Description
Continue Normal Boot	The system attempts to boot to devices starting with the first item in the boot order. If the boot attempt fails, the system continues with the next item in the boot order until the boot is successful or no more boot options are found.
One-shot Boot Menu	Enables you to access boot menu, where you can select a one-time boot device to boot from.
Launch System Setup	Enables you to access System Setup.
Launch Lifecycle Controller	Exits the Boot Manager and invokes the Dell Lifecycle Controller program.
System Utilities	Enables you to launch System Utilities menu such as Launch Diagnostics, BIOS update File Explorer, Reboot System.

PXE boot

You can use the Preboot Execution Environment (PXE) option to boot and configure the networked systems remotely.

To access the **PXE boot** option, boot the system and then press F12 during POST instead of using standard Boot Sequence from BIOS Setup. It does not pull any menu or allows managing of network devices.