

Technical whitepaper

HP PC Commercial BIOS (UEFI) Setup

Administration Guide

For Business Notebook and Desktop 2015 Models

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1 Abstract

HP redesigned the 2015 generation of BIOS to support the requirements of the latest CPU and operating systems. HP took this opportunity to create a new BIOS architecture based on the UEFI specification version 2.4 with a common set of core modules capable of supporting both notebook and desktop models. Now HP notebooks and HP desktops models using this generation of the BIOS will have a similar look and feel for the (F10) setup menu, more shared WMI strings, and more shared features.

2 Introduction

This white paper provides detailed information about features adjusted through the F10 BIOS setup menu. The section on computer notifications provides an explanation for the LED blink codes and screen messages that may occur.

For decades, HP has provided an industry leading level of built in customer value through an internally developed Read Only Memory Basic Input/Output System (ROM BIOS), a set of routines that enable a PC to load the operating system and communicate with various devices such as storage drives, keyboard, display, slots, and ports. The BIOS ensures that there is a high degree of integration between firmware and HP professional innovations such as HP ProtectTools, HP Power Assistant, and HP Client Management Solutions.

Currently a common BIOS experience for HP notebooks and desktops has been developed. Desktop models will move to a notebook user interface that supports mouse control. To help users understand the new features, the description of each feature includes a reference to the name and location of that feature from the previous year, if it is different from the current year.

2.1 Supported models

This document applies to HP commercial-grade notebooks and desktops. That is products designed to meet the demanding security and manageability requirements of national, regional, and local government agencies, schools, the military, international financial institutions and retail sales companies.

This document applies to 2015 models only. For reasons previously stated, the BIOS setup menu has significant changes from previous years. For reference, the table below shows the year associated with particular models. In the feature documentation below, references to 2014 models are applicable to 2014 and earlier.

Table 1 Notebook Generations

Platforms		2013	2014	2015
HP EliteBook Folio	9480m		x	
HP EliteBook Folio	1040		G2	G3
HP EliteBook Folio	1020		G1	
HP ZBook	17	x	G2	G3
HP ZBook	15	x	G2	G3
HP ZBook	14	x	G2	
HP ZBook	15u		G2	G3
HP EliteBook	850	G1	G2	G3
HP EliteBook	840	G1	G2	G3
HP EliteBook	820	G1	G2	G3
HP EliteBook	755		G2	G3
HP EliteBook	745		G2	G3
HP EliteBook	725		G2	G3
HP ProBook	470		G2	G3

Platforms		2013	2014	2015
HP ProBook	450		G2	G3
HP ProBook	440		G2	G3
HP ProBook	430		G2	G3
HP ProBook	445		G2	G3
HP EliteFolio	940	x		
HP EliteBook Folio				G3
HP EliteBook	Revolve 810			G3
HP ProBook				G2
HP ZBook Studio				G3
HP ProBook	455			G3

Table 2 Desktop Generations

Platforms		2014	2015
HP EliteDesk	800 TWR		G2
HP EliteDesk	880 TWR		G2
HP EliteDesk	800 SFF		G2
HP EliteDesk	800 DM (35W)	G1	G2
HP EliteDesk	800 DM (65W)		G2
HP EliteOne	800 AiO 23 T & NT (GPU down)		G2
HP EliteOne	800 AiO 23 T	G1	G2
HP EliteOne	800 AiO 23 NT		G2
HP EliteDesk	705 MT	G1	G2
HP EliteDesk	705 SFF	G1	G2
HP EliteDesk	705 DM	G1	G2
HP EliteOne	705 AiO 23 T (23 NT dropped)	G1	G2
HP ProDesk	600 MT	G1	G2
HP ProDesk	680 MT		G2
HP ProDesk	600 SFF		G2
HP ProDesk	600 DM	G1	G2
HP ProOne	600 AiO 21.5 T (EMEA only)		G2
HP ProOne	600 AiO 21.5 NT		G2
HP ProDesk	400 SFF (2x2)	G2	G2.5
HP ProDesk	400 MT	G2	G3

Platforms		2014	2015
HP ProDesk	400 SFF (2x2)		
HP ProDesk	480 MT	G2	G3
HP ProDesk	490 MT	G2	G3
HP ProDesk	498 MT	G2	G3
HP ProDesk	400 DM		G1
HP ProDesk	400 DM		G2
HP ProOne	400 AiO 20 T/NT		G2
HP ProOne	460/480 AiO 20 T		G2
HP Collaboration PC			G2

Table 3 Additional 2014 Models

Platforms		2014
HP EliteOne	800 AiO 21.5 NT	G1
HP EliteDesk	705 MT	G1
HP EliteDesk	700 SFF	G1
HP EliteDesk	700 MT	G1
HP ProDesk	405 MT	G1
HP ProDesk	485 MT	G2
HP ProDesk	405 MT	G2
HP ProDesk	485 MT	G2
HP ProDesk	405 MT	G2
HP ProDesk	485 MT	G2
HP ProDesk	400 MT	G2
HP ProDesk	400 SFF	G2
HP ProOne	400 AiO 19.5 NT	G2
HP ProOne	400 AiO 21.5 T	G2
HP ProOne	400 AiO 21.5 T	G2
HP 402 SFF		G1
HP 406 MT		G1
HP 18 AiO Business		

This document applies to products with the N family of BIOS, introduced in 2015 to 2016.

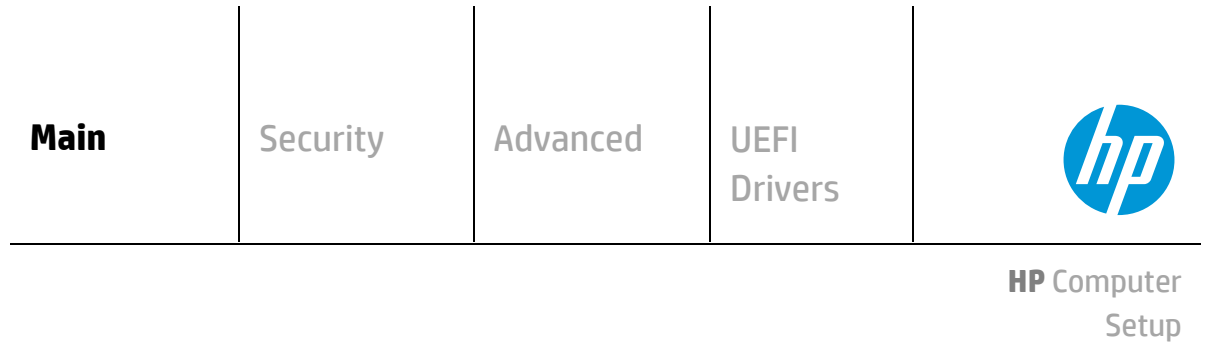
An **N** family BIOS is a version that begins with the letter **N**. For example “**N01 ver. 02.04 10/12/2015.**”

To be sure that this document applies to your product simply look at the header of the F10 setup menu. The new BIOS has four tabs:

- Main
- Security
- Advanced
- UEFI Drivers.

This is completely new for Desktops and Notebooks since the UEFI Drivers tab has been added recently.

3 F10 Main Menu



Organization of the F 10 section:

The hierarchy of the table of contents matches the sequence of the menus found in the F10 Setup menu, currently three levels deep.

The top level tabs are: Main, Security, Advanced and UEFI Drivers.

The next level are the menus found under these tabs.

At the beginning of each major section is a diagram of the sub-menu items for each tab.

A table provides a list of features for each menu.

At the top of the table is a breadcrumb trail that describes the menu relationship in the hierarchy.

Advanced ->Port Options Continued...				
Feature	Type	Description	Default	Notes

The table has columns for feature, type, description, default and notes. The following is a field description or definition.

Feature

This is the name of the feature as it appears in the Setup menu. A feature prefaced with box or underlined shows how it appears in the menu.

Type

Features can be settings, actions, another menu, or display only settings. Most of the features by far are settings. A setting is system value modifiable by the user, using a check box, a drop down menu or a text box.

Description

If the feature is a setting with a drop down box, then all possible values are displayed. If the feature is new or has changed its name or location from the 2014 notebooks or desktops, then the description references or includes its previous name and location. The notation to describe the location indicates the menus that the user must navigate through to access the feature. For example: Menu 1->Menu 2->Feature X indicates that to access Feature X, the user navigates through Menu 1 to Menu 2.

Default

For features that are settings, this column provides the factory default setting.

Notes

Some features are not available for all types of models. The notes will describe when a feature is Intel only, AMD only, notebook only or desktop only.

Some actions require a reboot or physical presence. Physical presence is a menu that requires a human response to validate that a person is physically present before the action is completed. Actions that require physical presence are security sensitive changes.



- ⇒ [System Information](#)
- ⇒ [System Diagnostics](#)
- ⇒ [Update System BIOS](#)

- ⇒ [System IDs](#)

- ⇒ [Replicated Setup](#)
- ⇒ [Save Custom Defaults](#)
- ⇒ [Apply Custom Defaults and Exit](#)
- ⇒ [Apply Factory Defaults and Exit](#)
- ⇒ [Ignore Changes and Exit](#)
- ⇒ [Save Changes and Exit](#)

3.1 Main Menu

The following table describes the features in the Main menu.

Table 4 Main Menu features

Feature	Type	Description	Default	Notes
System Information	Menu	System information, such as serial number, model number, CPU type, and memory configuration 2014 Desktop: File -> System Information		
System Diagnostics	Menu	Application to run diagnostic tests on your system, such as start-up test, run-in test, memory test, and hard disk test 2014 Desktop: New		

Feature	Type	Description	Default	Notes
Update System BIOS	Menu	Update system firmware from FAT 32 partition on the hard drive, a USB disk-on-key, or the network 2014 Desktop: New menu. The equivalent 2014 feature for File -> Flash system ROM is located under this menu		
System IDs	Menu	Identification strings that assigned by an enterprise to track the system. 2014 Notebook & Desktop: Security -> System IDs		
Replicated Setup	Action	Save your current BIOS settings, and later restore your setting from this file. 2014 Notebook: New		
Save Custom Defaults	Action	As an alternative to factory default settings, create custom default values for all but the security settings. It is not possible to create custom default values for security settings. 2014 Notebook: New 2014 Desktop: File -> Default Setup -> Save Current Settings as Default		Reboot required
Apply Custom Defaults and Exit	Action	Set all but the security settings to your custom default values Note: For 2014 Desktops, you could only restore to one set of defaults. This year it is possible to restore to custom defaults or the factory defaults. 2014 Notebook: New 2014 Desktop: File -> Default Setup -> Apply Defaults and Exit		
Apply Factory Defaults and Exit	Action	Set all, but the security settings to factory values. See the Security menu section to set security settings to factory values 2014 Notebook: Main -> Restore Defaults 2014 Desktop: Two-step process. <ul style="list-style-type: none"> File -> Default Setup -> Restore Factory Settings as Default File -> Apply Defaults and Exit 		
Ignore Changes and Exit	Action	Exits F10 Setup without saving any changes made during current session 2014 Desktop: File -> Ignore Changes and Exit		
Save Changes and Exit	Action	Exits F10 Setup and saves all changes made during current session 2014 Desktop: File -> Save Changes and Exit		

3.2 Update System BIOS Menu

This sub-menu under the Main menu provides information about the current system firmware, settings; these control updates, the ability to check for updates over the internet or on the local network, and the ability to update system firmware from a FAT 32 partition on the hard drive, or a USB disk-on-key.

For the BIOS flash to succeed, do not remove power or turn off the system during any phase of the process. Below is a description of the BIOS flash phases to help you avoid interrupting the process. The BIOS flash proceeds in four phases:

1. The system displays a progress bar. When progress is 100%, the system reboots. This is the initial BIOS flash.
2. The screen is black; the system blinks one LED and makes a steady beeping sound. This is the system flashing the boot block. Video cannot display during this phase; so, the LED and the beep are the only way to let you know that the system is flashing normally.
3. (Sure Start enabled systems only) A screen indicates that the system is copying the DXE to the HP Security Device
4. The screen is black for a short period, and then the OS starts. The BIOS flash is now complete.

Table 5 Update System BIOS Menu features

Feature	Type	Description	Default	Notes
Current System BIOS Version	Display Only			
Current BIOS Release Date	Display Only			
Installation Date of Current BIOS	Display Only			
Most Recent Update Check	Display Only			
Check the Network for BIOS Updates (or) Check HP.com for BIOS Updates	Action	Updates the system BIOS by using an image stored on hp.com or another source defined in the "BIOS Update Preferences" menu. When BIOS source is HP.com, then the feature appears as "Check HP.com for BIOS Updates" 2014 Desktop: File -> Flash System ROM -> Network		Reboot required
<input type="checkbox"/> Lock BIOS version	Setting	When checked, disallows BIOS updates. 2014 Desktop: New	Unchecked	
<input type="checkbox"/> Allow BIOS Update using a Network	Setting	When checked, automatic BIOS updates through the network in a scheduled basis. 2014 Desktop: Advanced -> Update BIOS via Network -> Automatic BIOS Update Setting	Checked	
BIOS Update Preferences	Menu	Menu with network BIOS update settings such as source, actions when and update is available and the frequency to check for updates. 2014 Notebook: Main -> Network Update Settings 2014 Desktop: Advanced -> Update BIOS via Network		

Network Configuration Settings	Menu	Configure the network connection to the server that is the host for your system firmware updates. 2014 Notebook & Desktop: New		
Update BIOS using Local Media	Action	Updates the system BIOS by using an image stored on local media such as the hard drive or a USB drive formatted as FAT32 or EFI system partition. 2014 Desktop: File -> Flash System ROM -> Hard Drive		Reboot required

3.3 BIOS Update Preferences Menu

The “Update System BIOS” sub-menu provides a method for initiating a check for an update to the current system firmware and settings that control where to check for system firmware updates, what to do when an update is available, and the frequency to check for system updates

Table 6 BIOS Update Preferences Menu features

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Check for Update on Next Reboot	Action	When checked, check if an updated BIOS is available during the next boot. This feature is only necessary from a WMI call. From the F10 Setup menu use the feature “Main -> Update System BIOS -> Check the Network for BIOS Updates” that will check for updates without a reboot. 2014 Notebook: Main -> Network Update Settings -> Check for Update on Next Reboot 2014 Desktop: Advanced -> Update BIOS via Network -> Force Check on Next Reboot	Unchecked	Reboot required
BIOS Source	Setting	Select the source URL for BIOS updates <ul style="list-style-type: none"> • HP.com • Custom URL 2014 Notebook: Main -> Network Update Settings -> BIOS Source 2014 Desktop: Advanced -> Update BIOS via Network -> Update Source	HP.com	
Edit Custom URL	Setting	When not using HP.com, define the custom URL here. 2014 Notebook: Main -> Network Update Settings -> BIOS Source -> Edit Custom URL 2014 Desktop: Advanced -> Update BIOS via Network -> Update Address		

Feature	Type	Description	Default	Notes
Automatic BIOS Update Setting	Setting	<p>Defines how automatic updates behave. The following settings are possible:</p> <ul style="list-style-type: none"> Do not update Check for BIOS updates automatically, but let me decide whether to install them Download and install normal BIOS update automatically Download and install important BIOS updates automatically <p>2014 Notebook: Main -> Network Update Settings -> Automatic BIOS Update Setting</p> <p>2014 Desktop: Advanced -> Update BIOS via Network -> Automatic BIOS Update Setting</p>	Do Not Update	
BIOS Update Frequency	Setting	<p>Sets the frequency of checks to the BIOS update server. If a newer version of BIOS has been made available on the network server, the system will prompt to update the BIOS</p> <ul style="list-style-type: none"> Daily Weekly Monthly <p>2014 Notebook: Main -> Network Update Settings -> BIOS Update Frequency</p> <p>2014 Desktop: Advanced -> Update BIOS via Network -> Automatic Update Frequency</p>	Monthly	

3.4 Network Configuration Settings Menu

The “Update System BIOS” sub-menu configures the network connection to the server that is the host for the system firmware updates

Table 7 Network Configuration Settings Menu features

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Proxy Server	Setting	<p>When checked, enables the use of a proxy server</p> <p>2014 Notebook: Main -> Network Update Settings -> Proxy server</p> <p>2014 Desktop: Advanced -> Connected BIOS -> Use Proxy</p>	Unchecked	
<u>Edit Proxy Server</u>	Setting	<p>Specify the Proxy Server Address and the Port Number through the common-used <server>:<port> notation</p> <p>2014 Notebook: Main -> Network Update Settings -> Edit Proxy Server</p> <p>2014 Desktop: Advanced -> Connected BIOS -> Use Proxy</p>		
<u>Test Network Connection</u>	Action	<p>Check the network connection using current BIOS update configuration</p> <p>2014 Notebook: Main -> Network Update Settings -> Test Network Connection</p> <p>2014 Desktop: New</p>		
IPv4 Configuration	Setting	<p>The following settings are possible:</p> <ul style="list-style-type: none"> Automatic Manual 	Automatic	

Feature	Type	Description	Default	Notes
		2014 Notebook & Desktop: New		
IPv4 Address	Setting	When IPv4 settings are manual, setup for static IPv4 address 2014 Notebook & Desktop: New		
IPv4 Subnet Mask	Setting	When IPv4 settings are manual, configure a valid IPv4 address for subnet mask 2014 Notebook & Desktop: New		
IPv4 Gateway	Setting	When IPv4 settings are manual, configure a valid IPv4 address for gateway. 2014 Notebook & Desktop: New		
DNS Configuration	Setting	Configure a list of DNS addresses. The following settings are possible: <ul style="list-style-type: none"> • Automatic • Manual 2014 Notebook & Desktop: New	Automatic	
DNS Addresses	Setting	When DNS configuration is manual, configure a comma separated list of DNS addresses 2014 Notebook & Desktop: New		
Data Transfer Timeout	Setting	Set data transfer timeout in seconds. It is recommended not to use values under 15 seconds 2014 Notebook & Desktop: New	30	
<input type="checkbox"/> Force HTTP No Cache	Setting	When checked, disables HTTP caching. This means that caching in upstream proxies is disabled as well, which guarantees that the BIOS goes all the way to the content source for any updated BIN files or catalog files but might slow down downloads slightly. 2014 Notebook & Desktop: New	Unchecked	

3.5 System IDs Menu

This sub-menu provides identification strings assigned by an enterprise to track the system.

Table 8 System IDs Menu features

Level	Feature	Type	Description	Default	Notes
2	Asset Tracking Number	Setting	Allows custom configuration of an asset tag (up to 18 characters) 2014 Notebook & Desktop: Security -> System IDs -> Asset Tracking Number	Serial Number	
2	Ownership Tag	Setting	Allows custom configuration of an ownership tag (up to 80 characters) 2014 Notebook: Security -> System IDs -> Ownership Tag (40 characters) Security -> System IDs -> Ownership Tag 2 (40 characters) 2014 Desktop: Security -> System IDs	Blank	

4 Security Menu

Main

Security

Advanced

UEFI Drivers



HP Computer Setup

Administrator Tools

- ⇒ [Create/Change BIOS Administration Password](#)
- ⇒ [Create/Change POST Power-On Password](#)
- Fingerprint Reset on Reboot** (Notebook with Fingerprint Reader Only)
- ⇒ [Password Policies](#)

Security Configuration

- ⇒ [TPM Embedded Security](#)
- ⇒ [BIOS SureStart](#)
- ⇒ [Smart Cover](#) (Desktop Only)
- Trusted Execution Technology (TXT)**
TXT cannot be enabled unless VTx, VTd and TPM are enabled first
Intel Software Guard Extensions (SGX)

Utilities

- ⇒ [Hard Drive Tools](#)
- Absolute® Persistence Module Current State**
Activation Status :
Absolute® Persistence Module Permanent Disable:
- System Management Command (SMC)**
- ⇒ [Restore Security Settings to Factory Defaults](#)

Table 9 Security Menu features

Feature	Type	Description	Default	Notes
Create BIOS Administrator Password Or Change BIOS Administrator Password	Setting	The Administrator password controls access to the setup menu (F10), 3 rd Party Option ROM Management (F3), Update System ROM, WMI commands that change system settings and the BIOS Configuration Utility (BCU). When no Administrator password is set, anyone can change the system settings, add 3 rd Party Option ROM or update the system ROM. When the power-on password is set, use the administrator password as an alternative to power-on the system. Recommendation: Set an administrator password when a power-on password is set. When a power-on password is forgotten, an administrator can reset the power-on password by using "Restore Security Settings to Factory Defaults" 2014 Notebook: Security -> Setup BIOS Administrator Password 2014 Desktop: Security -> Setup Password		
Create POST Power-On Password Or Change POST Power-On Password	Setting	Password required to power on the PC, independent of the OS password. When no password is set, anyone can power-on the PC. In addition to the administrator password, there is only one power-on password. Recommendation: Set an administrator password when a power-on password is set. When a power-on password is forgotten, an administrator can reset the power-on password by using "Restore Security Settings to Factory Defaults" 2014 Notebook: Security -> User Management -> Create New BIOS User Account (multiple power-on passwords, including HP Client Security Users were possible.) 2014 Desktop: Security -> Power-On Password		
<input type="checkbox"/> Fingerprint Reset on Reboot	Action	When checked, resets the fingerprint on the next reboot. After reboot, this will be unchecked again. 2014 Notebook: Security -> Fingerprint Reset on Reboot (If Present)	Unchecked	Notebook Only
Password Policies	Menu	Allows the administrator to set password requirements for BIOS administration and power-on regarding the use of symbols, numbers, case and spaces 2014 Desktop: New		
TPM Embedded Security	Menu	The Trusted Platform Module (TPM) is a dedicated microprocessor that provides security functions for secure communication and software and hardware integrity. The TPM hardware solution is more secure than a software only solution. 2014 Desktop: New menu. TPM features referenced the Embedded Security Device, instead of TPM. See the TPM Embedded Security menu section of this document for details on individual TPM features.		

Feature	Type	Description	Default	Notes
BIOS Sure Start	Menu	Settings that control the behavior of HP Sure Start. HP Sure Start is a built-in hardware security system that protects your BIOS from accidental or malicious corruption by (1) detecting BIOS corruption and then (2) automatically restoring the BIOS to its last installed HP certified version. 2014 Notebook: Security -> Sure Start 2014 Desktop: New.		
Smart Cover	Menu	Controls settings for Cover Lock and Cover Sensor on a desktop.		Desktop Only with a Cover Lock installed
<input type="checkbox"/> Trusted Execution Technology (TXT)	Setting	When checked, enables Trusted Execution Technology on select Intel-based systems NOTE: Enabling this feature disables OS management of Embedded Security Device, prevents a reset of the Embedded Security Device, and prevents the configuration of VTx, VTd, and Embedded Security Device 2014 Notebook and Desktop: New	Unchecked	Intel Only Reboot Required
Intel Software Guard Extensions (SGX)	Setting	Enables Intel Software Guard Extensions. The following settings are possible: <ul style="list-style-type: none"> • Enabled • Disabled NOTE: This feature is only available for systems with Intel vPro 2014 Notebook and Desktop: New	Disabled	Intel Only
Hard Drive Utilities	Menu	Utilities to protect private information on individual hard drives: Drive Lock and Secure Erase. 2014 Notebook: Security -> Hard Drive Tools 2014 Desktop: New		
Absolute® Persistence Module	Heading	A subscription service that provides PC theft recovery, tracking and data delete solutions 2014 Notebook: Security -> Anti-Theft Tools 2014 Desktop: New		
Activation Status	Display Only	The subscription status can be inactive, active, or permanently disabled 2014 Notebook: Security -> Anti-Theft Tools 2014 Desktop: New	Inactive	
Absolute® Persistence Module Permanent Disable	Display Only	2014 Notebook: New 2014 Desktop: New	No	

Feature	Type	Description	Default	Notes
<input type="checkbox"/> System Management Command	Setting	When checked, allows authorized HP service personnel in possession of the PC to reset security settings in case of a customer service event. For customers that require more BIOS security, uncheck this to prevent this type of HP service command. NOTE: In the event BIOS password is lost and this option is disabled, HP authorized personnel will not be able to remove a lost password. 2014 Desktop: New	Checked	Reboot Required
Restore Security Settings to Default	Action	Apply factory defaults to all security settings. 2014 Notebook: Security -> Restore Security Level Defaults 2014 Desktop: New		Reboot Required

4.1 Password Policies Menu

This sub-menu allows the administrator to set text requirements controlling the use of symbols, numbers, case and spaces for the BIOS administration password and the power-on password. To set these requirements an administration password must be already set.

Table 10 Password Policies Menu features

Feature	Type	Description	Default	Notes
Password Minimum Length	Setting	Allows the administrator to specify the minimum number of characters required for a password. <ul style="list-style-type: none"> • Minimum: 4 • Maximum: 32 2014 Desktop: New	8	
<input type="checkbox"/> At least one symbol required in Administrator and User passwords	Setting	When checked, passwords require at least one symbol, such as \$, %, ^, &, or # 2014 Notebook: At least one symbol required 2014 Desktop: New	Unchecked	
<input type="checkbox"/> At least one number required in Administrator and User passwords	Setting	When checked, passwords require at least one number 2014 Notebook: At least one number required 2014 Desktop: New	Unchecked	
<input type="checkbox"/> At least one upper-case character required in Administrator and User passwords	Setting	When checked, passwords require at least one upper case character 2014 Notebook: At least one upper case character required 2014 Desktop: New	Unchecked	
<input type="checkbox"/> At least one lower-case character required in Administrator and User passwords	Setting	When checked, passwords require at least one lowercase character 2014 Notebook: At least one lower case character required 2014 Desktop: New	Unchecked	
<input type="checkbox"/> Are spaces allowed in password?	Setting	When checked, passwords can have one or more spaces 2014 Desktop: New	Unchecked	

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Prompt for Administrator password on F9 (Boot Menu)	Setting	When checked, the administrator password is required to enter the boot menu	Checked	
<input type="checkbox"/> Prompt for Administrator password on F11 (System Recovery)	Setting	When checked, the administrator password is required to enter system recovery	Checked	
<input type="checkbox"/> Prompt for Administrator password on F12 (Network Boot)	Setting	When checked, the administrator password is required to enter the network boot	Checked	
Clear Password Jumper	Setting	On Desktops, a jumper is available that when removed, will clear the administrator and power on passwords. Set this to ignore, to prevent someone from clearing your passwords with the jumper. The following settings are possible: <ul style="list-style-type: none"> • Honor • Ignore 2014 Desktop: Security -> Password Options -> Stringent Password	Honor	Desktop Only

4.2 Trusted Platform Module (TPM) Embedded Security Menu

This sub-menu for the Trusted Platform Module (TPM.) is a dedicated microprocessor that provides security functions for secure communication and software and hardware integrity. The built in TPM hardware solution is more secure than a software only solution.

Table 11 TPM Embedded Security Menu features

Feature	Type	Description	Default	Notes
TPM Activation Policy	Setting	This setting allows an administrator to choose between convenience and extra security. The extra security is to ensure that the user of the system will at least see that the TPM device upgraded its firmware (F1 to Boot), or at most the user has the ability to reject the upgrade of the TPM device (Allow user to reject.) These user prompts limit the impact of remote attacks on the system by requiring a user to be physically present for the upgrade. When security of the system is of less concern, the third option (No prompts) removes any requirement for a user to acknowledge the upgrade. This last option is the most convenient for remotely upgrading many systems at once. The following settings are possible: <ul style="list-style-type: none"> • F1 to Boot • Allow user to reject • No prompts 	Allow user to reject	HP recommends an option that requires the physical presence of the user
TPM Specification Version	Display Only	The Trusted Computing Group (TCG) is an industry group that defines specifications for a TPM. As of this writing, possible TPM specification versions are 1.2 or 2.0. 2014 Notebook and Desktop: New		
TPM Device	Setting	Makes the TPM available. The following settings are possible: <ul style="list-style-type: none"> • Available • Hidden 2014 Desktop: Security -> Device Security -> Embedded Security Device	Available	Reboot, Physical Presence Required
<input type="checkbox"/> TPM State	Setting	When checked, enables the ability for the OS to take ownership of the TPM 2014 Notebook: Security -> TPM Embedded Security -> Embedded Security Device State 2014 Desktop: Security -> System Security -> Embedded Security Device	Checked	Reboot, Physical Presence Required
Clear TPM	Action	When selected, clears the TPM on the next boot. After clearing the TPM, this resets to No. The following settings are possible: <ul style="list-style-type: none"> • No • On next boot 2014 Notebook: Security -> TPM Embedded Security -> TPM Reset to Factory Defaults 2014 Desktop: Security -> System Security -> Embedded Security Device->Reset to Factory Settings	No	Reboot Required

4.3 BIOS Sure Start Menu

Settings menu for Enhanced hardware based assurance that only HP approved Embedded Controller firmware will run on the HP Embedded Controller and that only HP approved BIOS will run on the host CPU.

Table 12 BIOS Sure Start Menu features

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Verify Boot Block on Every Boot	Setting	<p>When not checked, HP Sure Start© will verify the integrity of HP firmware in the non-volatile (flash) memory before resume from Sleep, Hibernate, or Off.</p> <p>When checked, HP Sure Start© will verify the integrity of HP firmware in the non-volatile (flash) memory across operating system restart (warm reset) in addition to resume from Sleep, Hibernate Off. This setting provides higher security assurance, but could increase the time required to restart operating system</p> <p>2014 Desktop: New</p>	Unchecked	Reboot Required
BIOS Data Recovery Policy	Setting	<p>The following settings are possible for HP Sure Start – Recovery Policy:</p> <ul style="list-style-type: none"> • Automatic • Manual <p>Automatic: HP SureStart will automatically repair any HP firmware integrity issues in the non-volatile (flash) memory</p> <p>Manual: HP Sure Start will not repair any HP firmware integrity issues in the non-volatile (flash) memory until the Windows +Up Arrow+ Down Arrow keys are pressed.</p> <p>NOTE: Manual recovery is intended for use by the system administrator in the event forensic investigation is desired before HP Sure Start repairs the issue. It is not recommended for the typical user 2014 Desktop: New</p>	Automatic	Reboot Required
Network Controller Configuration Restore	Action	<p>HP Sure Start – Network Controller Configuration Restore</p> <p>This action will restore the network controller parameters to the factory state saved in the HP Sure Start Private non-volatile (flash) memory.</p> <p>NOTE: This process can take up to 30 seconds. You only need to restore this when the Network Controller Configuration mismatch warning is set</p> <p>2014 Notebook: Security -> Sure Start -> Restore Network Controller Configuration to factory defaults</p> <p>2014 Desktop: New</p>		Reboot Required
<input type="checkbox"/> Prompt on Network Controller Configuration Change	Setting	<p>When enabled, HP Sure Start will monitor the network controller configuration and prompt the local user if any changes are detected compared to the factory configuration. The local user has the option to ignore the prompt, or restore the network controller to the factory configuration when prompted.</p> <p>2014 Notebook and Desktop: New</p>	Checked	Intel Only Reboot Physical Presence Required

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Dynamic Runtime Scanning of Boot Block	Setting	When checked, allows HP Sure Start © will verify the integrity of the HP firmware in the non-volatile (flash) memory every 15 minutes while the system in the On state with the user operating system active 2014 Desktop: New	Checked	

4.4 Smart Cover Menu (Desktop Only)

This sub-menu controls settings for Cover Lock and Cover Sensor.

Table 13 Smart Cover Menu features

Feature	Type	Description	Default	Notes
Cover Lock	Setting	The Smart Cover Lock is a software-controllable cover lock. This lock prevents unauthorized access to the internal components. The following settings are possible: <ul style="list-style-type: none"> • Lock • Unlock 	Unlock	Desktop Only with Cover Lock Reboot Required
Cover Removal Sensor	Setting	The Cover Removal Sensor has the following settings: <ul style="list-style-type: none"> • Disabled • Notify the User: (Used by individuals managing their desktop) • Administrator Password: (Used to alert desktop administrators of a cover removal, by blocking use of the desktop without an administrator password. This setting is only visible when an administrator password set) 	Disabled	Desktop Only with Cover Sensor Reboot Required

4.5 Hard Drive Utilities Menu

This sub-menu provides features that protect the data on individual hard drives, such as: recovering the master boot record, preventing unauthorized access and erasing data.

Table 14 Hard Drive Utilities Menu features

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Save/Restore MBR of the system hard drive	Setting	When checked, saves a baseline MBR that can be restored if a change is detected NOTE: Not applicable for UEFI boot modes 2014 Notebook: Security -> Hard Drive Tools -> Save/Restore MBR of the system hard drive 2014 Desktop: Security -> Master Boot Record Security	Unchecked	Reboot Required
<u>DriveLock</u> Select a Drive...	Menu	DriveLock prevents unauthorized access to the contents of a selected hard drive. Enter a password to access the drive and the drive is accessible only when attached to a PC NOTE: DriveLock states cannot change after a warm reboot. Power off the system then boot directly to the setup menu, then to this menu 2014 Notebook: Security -> Hard Drive Tools -> DriveLock 2014 Desktop: Security -> DriveLock Security		
<u>Secure Erase</u> Select a Drive...	Action	Uses hardware based methods to erase safely all data and personal information from a selected Hard Drive. 2014 Notebook: Security -> Hard Drive Tools -> Secure Erase 2014 Desktop: New		Reboot Required

4.6 DriveLock Menu

DriveLock prevents unauthorized access to the contents of a selected hard drive. Enter a password to access the drive and the drive is accessible only when attached to a PC.

NOTE: DriveLock states cannot change after a warm reboot. Power off the system then boot directly to the setup menu, then to this menu.

Table 15 DriveLock Menu features

Feature	Type	Description	Default	Notes
Set DriveLock Master Password	Setting	Password to disable or access a hard drive with DriveLock protection. 2014 Notebook: Security -> Hard Drive Tools -> DriveLock -> Set DriveLock Password 2014 Desktop: Security -> DriveLock Security -> Configure Master Password		Reboot Required
Enable DriveLock	Setting	Enables DriveLock protection and creates a user password distinct from the master password that allows access to the hard drive 2014 Notebook: Security -> Hard Drive Tools -> DriveLock -> DriveLock password on restart 2014 Desktop: Security -> DriveLock Security -> Enable/Disable DriveLock	Disabled	Reboot Required

Feature	Type	Description	Default	Notes
Automatic DriveLock	Setting	<p>Requires the BIOS to authenticate the user before the drive is unlocked. The user can be a BIOS user (managed by F10 Setup) or a HP Client Security Software Suite user (managed by the OS)</p> <p>Following authentication, the BIOS automatically supplies the DriveLock password.</p> <p>A BIOS administrator password is required for this feature and is set as the DriveLock master password.</p> <p>2014 Notebook: Security -> Hard Drive Tools -> Automatic DriveLock</p> <p>2014 Desktop: New</p>	Disabled	Reboot Required

5 Advanced Menu

Main

Security

Advanced

UEFI Drivers



HP Computer Setup

- ⇒ [Display Language](#)
- ⇒ [Scheduled Power-On](#)
- ⇒ [Boot Options](#)
- ⇒ [Secure Boot Configuration](#)
- ⇒ [System Options](#)
- ⇒ [Built-In Device Options](#)
- ⇒ [Port Options](#)
- ⇒ [Option ROM Launch Policy](#)
- ⇒ [Power Management Options](#)
- ⇒ [Remote Management Options](#) (Intel Only)
- ⇒ [Electronic Labels](#) (Notebook Only)

5.1 Advanced Menu

For detailed information on the features in the advanced menu, see the following table:

Table 16 Advanced Menu features

Feature	Type	Description	Default	Notes
Display Language	Menu	Select the display language and the keyboard language. Choose between 14 languages. You can display the menu in English, French, German, Spanish, Italian, Dutch, Danish, Japanese, Norwegian, Portuguese, Swedish, Finnish, Chinese Traditional, or Chinese Simplified. NOTE: Affects the BIOS menus, not the OS nor the WMI commands 2014 Notebook and Desktop: New menu. Selecting a language is not new, but selecting the keyboard language is new. 2014 Desktop: New languages: Simplified Chinese and Traditional Chinese		
Scheduled Power On	Menu	Choose days of the week and a single time of day for the system to power-on. This feature wakes the system up from a powered off state. 2014 Notebook and Desktop: Advanced -> BIOS Power-On		
Boot Options	Menu	Settings that control the behavior of the system during boot up 2014 Notebook: Moved Secure Boot settings to a separate menu. See below. 2014 Desktop: New menu. Groups features from the following menus: Storage -> Boot Order, Security -> Network Boot, and Advanced -> Power-On Options.		
Secure Boot Configurations	Menu	Starting with Windows 8, Secure Boot is a UEFI feature that helps resist attacks and infection from malware. From the factory, your system came with a list of keys that identify trusted hardware, firmware, and operating system loader code. Your system also has a list of keys to identify known malware. 2014 Notebook: New 2014 Desktop: Security -> Secure Boot Configuration		
System Options	Menu	Settings that control the CPU, PCI, PCIe, the power button and function keys. 2014 Notebook: New 2014 Desktop: New Menu. Groups features from the following menus: Security -> Slot Security, Advanced -> Bus Options, and Advanced -> Device Options		
Built in Device Options	Menu	Settings of devices built-in to the PC 2014 Desktop: New menu. Groups selected features from the following menus: Advanced -> Power-On Options, Advanced -> Device Options, Advanced -> VGA configuration, Power -> Thermal and Security -> Network boot		
Port Options	Menu	Settings that enable or disable ports and interrupts on the system. 2014 Desktop: New menu. Groups selected features from the following menus: Advanced -> Onboard Devices, Advanced -> Device Options, Security -> Device Security, Security -> USB Security		
Option ROM Launch Policy	Menu	Configure the Device Option ROMs that load at boot time. 2014 Notebook: new		

Feature	Type	Description	Default	Notes
Power Management Options	Menu	Settings that control power saving features and the behavior of the system in low power modes 2014 Notebook: New 2014 Desktop: New Menu. Groups features from the following menus Power -> OS Power Management, Power -> Hardware Power Management		
Remote Management Options	Menu	Settings that controls Intel Active Management technology that provides out-of-band remote management of the system. 2014 Notebook: Advanced -> AMT Options 2014 Desktop: Advanced -> Management Operations		Intel Only
Electronic Labels	Display Only	Mandatory certification marks, for example: the Federal Communication Commission (FCC) Declaration of Conformity (Doc) and the CE marking for Europe 2014 Notebook: New		Notebook Only

5.2 Display Language Menu

This sub-menu allows for selection of the display language and the keyboard language. For each setting, choose from the following languages:

- English
- Italiano
- Português
- Nederlands
- 简体中文
- Deutsch
- Français
- Danske
- Norsk
- 繁體中文
- Español
- 日本語
- Svenska
- Suomi

NOTE: Affects the BIOS menus, not the OS nor the WMI commands.

Table 17 Display Language Menu features

Feature	Type	Description	Default	Notes
Select Language	Setting	Language used by BIOS setup menus 2014 Notebook: Advanced -> Language 2014 Desktop: F8 key	English	
Select Keyboard Layout	Setting	Language of the keyboard layout used by BIOS setup menus 2014 Notebook and Desktop: New	English	

5.3 Scheduled Power-On Menu

This sub-menu controls the days of the week and a single time of day for the system to power-on. This feature wakes the system up from a powered off state.

Table 18 Scheduled Power On Menu features

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Sunday <input type="checkbox"/> Monday <input type="checkbox"/> Tuesday <input type="checkbox"/> Wednesday <input type="checkbox"/> Thursday <input type="checkbox"/> Friday <input type="checkbox"/> Saturday	Setting	Days of the week selection 2014 Notebook and Desktop: Advanced -> BIOS Power-On		Reboot Required
Hour	Setting	Time selection 2014 Notebook and Desktop: Advanced -> BIOS Power-On -> Hour	0	Reboot Required
Minute	Setting	Hour: 0 – 23, Minute: 0 – 59 2014 Notebook and Desktop: Advanced -> BIOS Power-On -> Minute	0	Reboot Required

5.4 Boot Options Menu

Sub-menu controls the behavior of the system during boot up

Table 19 Boot Options Menu features

Feature	Type	Description	Default	Notes
Startup Menu Delay	Setting	Select the number of seconds (0 – 60) to pause the boot before starting the OS. Increasing the delay, gives more time to press a key that opens one of the BIOS menus. Set this to 0 if you have excellent twitch reflexes honed from a lifetime of video games. Increase the delay, if you need a little more time to respond during the boot up. 2014 Desktop: Advanced -> Power-On Options -> POST Delay	0	
<input type="checkbox"/> Fast Boot	Setting	When checked, reduces boot up time by bypassing boot to USB, CD-ROM, and PXE. NOTE: When a power on password, other security features, or default boot order have been modified, Fast Boot is ignored 2014 Desktop: Security -> Secure Boot Configuration -> Fast Boot	Unchecked	
<input type="checkbox"/> CD-ROM Boot	Setting	When checked, allows system to boot from CD-ROM 2014 Desktop: New. Storage -> Storage Options -> Removable Media Boot.	Checked	
<input type="checkbox"/> USB Storage Boot	Setting	When checked, allows system to boot from USB 2014 Notebook: Advanced -> Boot Options -> USB device boot 2014 Desktop: New. Storage -> Storage Options -> Removable Media Boot.	Checked	

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Network PXE Boot	Setting	When checked, allows system to boot from a network card 2014 Notebook: Advanced -> Boot Options -> PXE Internal NIC boot 2014 Desktop: Security -> Network Boot	Checked	
After Power Loss	Setting	Specifies the desktop state after power loss. The following settings are possible: <ul style="list-style-type: none"> • Power Off • Power On • Previous State 2014 Desktop: Advanced -> Power-On Options -> After Power Loss	Power Off	Desktop Only
<input type="checkbox"/> Power On When AC Detected	Setting	When checked, the notebook will power on when it is off, AC power has not been available and then becomes available. 2014 Notebook: Advanced -> Device Configurations -> Power on Unit when AC is detected	Unchecked	Notebook Only
<input type="checkbox"/> Power On When Lid is Open	Setting	When checked, the system will power on when the lid opens 2014 Notebook: Advanced -> Built-In Device Options -> Power on unit when lid is opened	Unchecked	Notebook Only
<input type="checkbox"/> Prompt on Battery Errors	Setting	When checked, the system will pause during system boot to warn about battery errors 2014 Notebook: New	Checked	Notebook Only
<input type="checkbox"/> Thunderbolt Boot	Setting	When checked, allows the system to boot from a device connected to a Thunderbolt interface. 2014 Notebook and Desktop: New	Unchecked	Systems with Thunderbolt Only
<input type="checkbox"/> Audio Alerts during boot	Setting	When checked, errors trigger audible beeps during POST 2014 Desktop: New	Checked	
<input type="checkbox"/> Prompt on Memory Size Change	Setting	When checked, notify the user during the boot process when a memory size change has been detected 2014 Notebook: New 2014 Desktop: New. The most similar feature is Advanced -> Power-On Options -> Bypass F1 Prompt on Configuration Changes. This disabled all prompts including prompts for memory size changes.	Checked	
<input type="checkbox"/> Prompt on Fixed Storage Change	Setting	When checked, notify the user during the boot process when a fixed storage change has been detected 2014 Notebook: New 2014 Desktop: New. The most similar feature is Advanced -> Power-On Options -> Bypass F1 Prompt on Configuration Changes. This disabled all prompts including prompts for storage changes.	Unchecked	
<input type="checkbox"/> Prompt on Memory Size Change	Setting	When checked, notify the user during the boot process when a memory size change has been detected 2014 Notebook: New 2014 Desktop: New. The most similar feature is Advanced -> Power-On Options -> Bypass F1 Prompt on Configuration Changes. This disabled all prompts including prompts for memory size changes.	Checked	

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Legacy Boot Order	Setting	<p>When checked, allows the system to boot from non-UEFI devices.</p> <p>2014 Notebook: New</p> <p>2014 Desktop: Storage -> Boot Order -> Legacy Boot Sources -> F5 key</p> <p>Requires "Legacy Boot Enable and Secure Boot Disable." See "Secure Boot Configuration" -> "Configure Legacy Support and Secure Boot"</p> <p>When Legacy Boot Disabled, the check boxes for UEFI Boot Order and Legacy Boot Order will grayed out and not functional, because only UEFI devices can boot in this mode.</p> <p>When enabling the UEFI Boot Order, the system attempts to boot from all UEFI devices before any non-UEFI devices.</p> <p>Arrange the boot order from the non-UEFI devices found. By default, the system will arrange the boot order by device type using the following precedence:</p> <ol style="list-style-type: none"> 1. USB 2. SATA DVD (Desktop Only) 3. SATA Hard Drives 4. M.2 devices <p>Network Boot</p>	Checked	

5.5 Secure Boot Configurations Menu

Submenu to configure Secure Boot. Starting with Windows 8, Secure Boot is a UEFI feature that helps resist attacks and infection from malware. From the factory, your system came with a list of keys that identify trusted hardware, firmware, and an operating system loader code. It also created a list of keys to identify known malware.

Table 20 Secure Boot Configurations Menu features

Feature	Type	Description	Default	Notes
Configure Legacy Support and Secure Boot	Setting	<p>Legacy Support is the ability to boot from a non-UEFI device. Only UEFI devices can support Secure Boot. The following settings are possible:</p> <ul style="list-style-type: none"> Legacy Support Enable and Secure Boot Disable Legacy Support Disable and Secure Boot Enable Legacy Support Disable and Secure Boot Disable <p>2014 Notebook: Advanced -> Boot Options -> Boot Mode</p> <ul style="list-style-type: none"> Legacy UEFI Hybrid (With CSM) UEFI Native (Without CSM) <p>2014 Desktop: Security -> Secure Boot Configuration</p> <p>-> Legacy support</p> <p>-> Secure Boot</p>	Legacy Support Enable and Secure Boot Disable	
<input type="checkbox"/> Clear Secure Boot Keys	One Time Action	<p>When checked, clears the Secure Boot keys one time on next save and exit. This setting will be unchecked again, when you return from exit. This action is not available with Legacy Support enabled or when no keys are present, possibly from a previous clear command.</p> <p>2014 Notebook: Advanced -> Boot Options -> Clear Secure Boot Keys</p> <p>2014 Desktop: Security -> Secure Boot Configuration</p> <p>-> Clear Secure Boot Keys</p> <p>-> Key Ownership: HP Keys</p>	Unchecked	
<input type="checkbox"/> Reset Secure Boot Keys to Factory Defaults	One Time Action	<p>When checked, restores secure boot keys to factory defaults one time on next save and exit. This setting will be unchecked again, when you return from exit.</p> <p>2014 Notebook: Advanced -> Boot Options -> User Mode -> HP Factory Keys</p>	Unchecked	
<input type="checkbox"/> Enable MS UEFI CA key	Setting	<p>When checked, the Microsoft (MS) UEFI Certificate Authority (CA) key is trusted by Secure Boot</p> <p>Note: Uncheck this to support Windows 10 Device Guard feature</p> <p>2014 Notebook and Desktop: New</p>	Checked	

5.6 System Options Menu

Table 21 System Options Menu features

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Configure Storage Controller for RAID	Setting	When checked, configures SATA Controller for RAID mode 2014 Desktop: Storage -> Storage Options -> SATA Emulation	Unchecked	Desktop Only
PCIe GEN Support Speed	Setting	Allows you to restrict the maximum speed of the PCI Express devices to previous generations. The following settings are possible: <ul style="list-style-type: none"> • Auto • Gen 1 • Gen 2 • Gen 3 2014 Notebook and Desktop: New	Auto	
<input type="checkbox"/> POST Prompt for RAID Configuration	Setting	When checked, prompts for RAID Configuration utility 2014 Desktop: Storage -> Storage Options -> Ctrl-I Suppression	Checked	Desktop Only
<input type="checkbox"/> Turbo Boost	Setting	When checked, enables Intel® Turbo Boost Technology to improve performance when operation conditions allow 2014 Notebook: New 2024 Desktop: Advanced -> Device Options -> Turbo Mode	Checked	Intel Only
<input type="checkbox"/> Hyper-threading (Intel® HT)	Setting	When checked, enables Hyper-threading capability on Intel processors Intel HT Technology (HT) is designed to improve performance of multi-threaded software products and requires a computer system with a processor supporting HT and an HT-enabled chipset, BIOS and OS. Please contact your software provider to determine compatibility. Not all customers or software applications will benefit from the use of HT. See http://www.intel.com/info/hyperthreading for more information. 2014 Notebook: Advanced -> Device Configurations -> Intel® HT Technology 2014 Desktop: Advanced -> Device Options -> Hyper-threading (Intel® HT)	Checked	Intel CPU with Hyper-threading Only (Core i7)
<input type="checkbox"/> Multi-processor	Setting	When checked, enables BIOS to report multiple processor cores to the OS 2014 Notebook: Advanced -> Device Configurations -> Multi Core CPU 2014 Desktop: Advanced -> Device Options -> Multi-Processor	Checked	

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Virtualization Technology (VTx)	Setting	When checked, enables VT on Intel-based systems 2014 Notebook: Advanced -> Device Configurations -> Virtualization Technology (VTx) 2014 Desktop: Security -> System Security -> Virtualization Technology (VTx)	Unchecked	Intel Only
<input type="checkbox"/> Virtualization Technology for Directed I/O (VTd)	Setting	When checked, grants virtual machines direct access to peripheral devices on select Intel-based systems 2014 Notebook: Advanced -> Device Configurations -> Virtualization Technology for Directed I/O (VTd) 2014 Desktop: Security -> System Security -> Virtualization Technology for Directed I/O (VTd)	Unchecked	Intel Only
<input type="checkbox"/> SVM CPU Virtualization	Setting	When checked, enables Virtualization on AMD-based systems 2014 Notebook: New 2014 Desktop: Security -> System Security -> SVM CPU Virtualization	Unchecked	AMD Only
<input type="checkbox"/> Swap Fn and Ctrl (Keys)	Setting	When checked, switches functionality between Fn and Ctrl keys 2014 Notebook: Advanced -> Device Configurations -> Fn+(F1-F12) Key switch	Unchecked	Notebook Only
<input type="checkbox"/> Enable Turbo Boost on DC	Setting	When checked, allows Intel® Turbo Boost Technology to activate when a power adapter is not connected 2014 Notebook: Advanced -> Device Configurations -> Enable Turbo Boost on DC	Unchecked	Intel Notebook Only
<input type="checkbox"/> PCI Express x16 Slot 1	Setting	When checked, PCI Express x16 slot is available 2014 Desktop: Security -> Slot Security	Checked	Desktop Only
<input type="checkbox"/> PCI Express x1 Slot 1	Setting	When checked, PCI Express x1 slot is available 2014 Desktop: Security -> Slot Security	Checked	Desktop Only
<input type="checkbox"/> PCI Express x1 Slot 2	Setting	When checked, PCI Express x1 slot is available 2014 Desktop: Security -> Slot Security	Checked	Desktop Only
<input type="checkbox"/> PCI Express x4 Slot 1	Setting	When checked, PCI Express x4 slot is available 2014 Desktop: Security -> Slot Security	Checked	Desktop Only
<input type="checkbox"/> Allow PCIe/PCI SERR# Interrupt	Setting	When checked, enables PCI device to generate SERR# (System Error), as defined by the PCI specification 2014 Desktop: Advanced -> Bus Options -> PCI SERR# Generation	Checked	Desktop Only

Feature	Type	Description	Default	Notes
Power Button Override	Setting	Sets the time required to hold the power button down for the desktop to turn off, overriding the power button behavior defined by the operating system. The following settings are possible: <ul style="list-style-type: none"> • Disable • 4 sec • 15 sec 2014 Desktop: New	4 sec	Desktop Only

5.7 Built-in Device Options Menu

This menu provides settings built-in devices on the system.

Table 22 Built-in Device Options Menu features

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Embedded LAN Controller	Setting	When checked, enables integrated network interface controller (NIC) device 2014 Desktop: Security -> Device Security -> Network Controller	Checked	
Wake on LAN	Setting	Allows the system to wake via Local Area Network (LAN). The following settings are possible: <ul style="list-style-type: none"> • Disabled • Boot to Network • Boot to Hard Drive 2014 Desktop: New	Boot to Network	
<input type="checkbox"/> Dust Filter	Setting	When checked, enables the dust filter reminder. This will prompt you after a period of days specified by the setting below. 2014 Desktop: New	Unchecked	Desktop Only
Dust Filter Reminder (Days)		Number of days for a reminder to replace the dust filter <ul style="list-style-type: none"> • 15 • 30 • 60 • 90 • 120 • 180 2014 Desktop: New	60	Desktop Only
<input type="checkbox"/> Integrated Video	Setting	When checked, enables the integrated video device. When not using the integrated video, disable the integrated video to save system memory. 2014 Desktop: New	Checked	Desktop with add-in graphics card Only

Feature	Type	Description	Default	Notes
VGA Boot Device		<p>The firmware can only support one graphic device when booting up; so, when a graphics card is added, this feature selects the graphics system to use as the primary VGA device during boot-up</p> <ul style="list-style-type: none"> The integrated graphics Add-in graphics card <p>2014 Desktop: New</p>	Add-in graphics is set as primary	Desktop with add-in graphics card Only
Video Memory Size	Setting	<p>System memory reserved for video memory. The following settings are possible:</p> <p>Intel:</p> <ul style="list-style-type: none"> 32 MB 64 MB 128 MB 256 MB 512 MB <p>AMD:</p> <ul style="list-style-type: none"> 128 MB 256 MB 512 MB Auto <p>2014 Notebook: Advanced -> Device Configurations -> Video Memory Size</p> <p>2014 Desktop: New</p>	Intel: 32 MB AMD: Auto	
Graphics	Setting	<p>Set the graphics adapter. The following settings are possible:</p> <ul style="list-style-type: none"> Hybrid Graphics UMA Graphic <p>2014 Notebook: New</p>	Hybrid Graphics	Multiple Graphic Card Notebook Only
<input type="checkbox"/> Audio Device	Setting	<p>This setting provides a single point of control for the integrated microphone, the internal speakers, and the headphone out.</p> <p>When checked, the operating system visibility of each audio device below is controlled independently</p> <p>When unchecked, hides all audio devices from the operating systems. The individual audio device settings below gray out and are not accessible.</p> <p>2014 Desktop: Security -> Device Security -> System Audio</p>	Checked	
<input type="checkbox"/> Integrated Microphone	Setting	<p>When checked, enables integrated microphone</p> <p>2014 Desktop: New. The most similar feature is Security -> Device Security -> System Audio</p>	Checked	Notebook Only

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Internal Speakers	Setting	When checked, enables the internal speaker 2014 Notebook: New. The most similar feature is Advanced → Built-In Options → Speakers and Headphones 2014 Desktop: New. The most similar feature is Security -> Device Security -> System Audio	Checked	
<input type="checkbox"/> Headphone Output	Setting	When checked, enables the headphone jack 2014 Notebook: New. The most similar feature is Advanced → Built-In Options → Speakers and Headphones 2014 Desktop: New. The most similar feature is Security -> Device Security -> System Audio	Checked	Notebook Only
<input type="checkbox"/> Embedded GPS device	Setting	When checked, enables integrated GPS device	Checked	Notebook Only
<input type="checkbox"/> Intel® Smart Sound	Setting	When checked enables Intel® Smart Sound 2014 Notebook: New	Checked	Intel Notebook Only
<input type="checkbox"/> Lock Wireless Button	Setting	When checked, the WLAN device cannot be toggled on and off using the wireless button 2014 Notebook: Advanced → Built-In Options → Wireless Button State	Unchecked	Notebook Only
Increase Idle Fan Speed (%)	Setting	Controls the minimum fan speed during periods that the fan would normally be off under the control of the desktop thermal sensor. Choose a percentage of the maximum fan speed: 0 –100%. 2014 Desktop: Power → Thermal → Fan Idle Mode	0	Desktop Only
<input type="checkbox"/> Wireless Network Device (WLAN)	Setting	When checked, enables integrated 802.11 device 2014 Notebook: Advanced → Built-In Device Options → Embedded WLAN Device	Checked	Notebook Only
<input type="checkbox"/> Mobile Network Device (WWAN)	Setting	When checked, enables integrated WWAN device 2014 Notebook: Advanced → Built-In Device Options → Embedded WWAN Device	Checked	Notebook Only
<input type="checkbox"/> Bluetooth	Setting	When checked, enables integrated Bluetooth device 2014 Notebook: Advanced → Built-In Device Options → Bluetooth Device	Checked	Notebook Only
<input type="checkbox"/> LAN/WLAN Auto Switching	Setting	When checked, enables automatic switching between embedded WLAN device and embedded LAN controller; disables WLAN when LAN connection is detected 2014 Notebook: Advanced → Built-In Device Options → LAN/WLAN Switching	Unchecked	Notebook Only
<input type="checkbox"/> Wake on LAN in Battery Mode	Setting	When checked and powered by battery, enables the notebook to wake via LAN	Unchecked	Notebook Only

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Fan Always on while on AC Power	Setting	When checked, leaves the fan on while running on AC power 2014 Notebook: Advanced -> Device Configuration -> Fan Always on while on AC Power	Unchecked	Notebook Only
<input type="checkbox"/> Boost Converter	Setting	When checked, the notebook draws power from the battery when the system is on AC in order to give the CPU a momentary performance gain by increasing the overall power available to the CPU	Checked	Notebook Only
Backlit Keyboard Timeout	Setting	Specifies the timeout period for the keyboard's backlit LEDs. The following settings are possible: <ul style="list-style-type: none"> • 5 secs • 15 secs • 30 secs • 1 min • 5 min • Never 2014 Notebook: New	15 seconds	Notebook Only
<input type="checkbox"/> Fingerprint Device	Setting	When checked, enables fingerprint reader	Checked	Notebook Only
<input type="checkbox"/> Integrated Camera	Setting	When checked, enables the integrated camera	Checked	Notebook Only

5.8 Port Options Menu

The following table describes various setting options for Ports.

Table 23 Port Options Menu features

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Thunderbolt Port	Setting	Thunderbolt technology is a new I/O technology that supports high-resolution displays and high-performance data devices through a single, compact port When checked, enables integrated Thunderbolt port 2014 Notebook: New	Checked	Notebook Only
Thunderbolt Security Level	Setting	The following settings are possible: <ul style="list-style-type: none"> • PCIe and DisplayPort – No Security • PCIe and DisplayPort – User Authorization • PCIe and DisplayPort – Secure Connect • DisplayPort only 2014 Notebook: New	PCIe and DisplayPort – No Security	Notebook Only
<input type="checkbox"/> USB Ports	Setting	When checked, enables integrated USB ports	Checked	Notebook Only

Feature	Type	Description	Default	Notes
<input type="checkbox"/> USB Charging Port	Setting	When checked, enables the USB charging port to charge devices during hibernation or shutdown. This setting is equivalent to the "USB Charging Port Function" setting on a desktop. 2014 Notebook: New	Unchecked	Notebook Only
<input type="checkbox"/> Media Card Reader	Setting	When checked, enables integrated media card reader. This setting is equivalent to the "Media Card Reader/SD_RDR USB" setting on a desktop 2014 Notebook: Advanced -> Port Options -> Flash media reader	Checked	Notebook Only
<input type="checkbox"/> Smart Card	Setting	When checked, enables integrated Smart Card slot	Checked	Notebook Only
<input type="checkbox"/> Smart Card Power Savings	Setting	When checked, enables the power-saving feature of the Smart Card reader, thus not maintaining a session when the card is removed 2014 Notebook: Advanced -> Device Configuration -> Smart Card Reader Power Setting	Checked	Notebook Only
<input type="checkbox"/> Serial Port A (B)	Setting	When checked, enables serial port A (B) 2014 Desktop: Security -> Device Security -> Serial Port A (B)	Checked	Desktop Only
I/O Address A (B)	Setting	The following settings are possible: <ul style="list-style-type: none"> • Auto • 3F8 • 2F8 • 3E8 • 2E8 2014 Desktop: Advanced -> On Board Devices -> Serial Port A (B)	Auto	Desktop Only
Interrupt A (B)	Setting	The following settings are possible: <ul style="list-style-type: none"> • Auto • IRQ 3 • IRQ 4 • IRQ 5 • IRQ 10 2014 Desktop: Advanced -> On Board Devices -> Serial Port A (B)	Auto	Desktop Only
SATA0 (1,2,3,4,5)	Setting	When checked, makes the specified SATA port visible to the OS 2014 Desktop: Security -> Device Security -> SATA0 (1,2,3,4,5)	Checked	Desktop Only
<input type="checkbox"/> Front USB Ports	Setting	When checked, enables front USB ports 2014 Desktop: Security -> USB Security -> Front USB Ports	Checked	Desktop Only
<input type="checkbox"/> Rear USB Ports	Setting	When checked, enables rear USB ports 2014 Desktop: Security -> USB Security -> Rear USB Ports	Checked	Desktop Only

Feature	Type	Description	Default	Notes
<input type="checkbox"/> USB Charging Port Function	Setting	When checked, enables the USB charging port to charge devices during hibernation or shutdown. This setting is equivalent to the "USB Charging Port" setting on a notebook. 2014 Desktop: Advanced -> Device Options -> USB Charging Port	Checked	Desktop Only
<input type="checkbox"/> Media Card Reader/SD_RDR USB	Setting	When checked, enables integrated media card reader. This setting is equivalent to the "Media Card Reader" setting on a notebook 2014 Desktop: New	Checked	Desktop Only
Restrict USB Devices	Setting	The following settings are possible: <ul style="list-style-type: none"> Allow all USB Devices Allow only keyboard and mouse Allow all but storage devices and hubs 2014 Desktop: New	Allow all USB Devices	Desktop Only

5.9 Option ROM Launch Policy Menu

This menu under the advanced menu configures the kind of device option ROM that can load at boot time.

Table 24 Option ROM Launch Policy Menu features

Feature	Type	Description	Default	Notes
Configure Option ROM Launch Policy	Setting	The following settings are possible: <ul style="list-style-type: none"> All Legacy All UEFI All UEFI Except Video 2014 Notebook: New 2014 Desktop: New. This feature consolidates separate settings under Advanced -> Option ROM Launch Policy. There are separate settings for PXE Option ROM, Storage Option ROM, and Video Option ROM. Possible settings are the following: <ul style="list-style-type: none"> Legacy Only+ UEFI Only Do Not Launch 	All Legacy	

5.10 Power Management Options Menu

The following table describes various setting options for Power Management Options.

Table 25 Power Management Options Menu features

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Runtime Power Management	Setting	When checked, enables Runtime Power Management 2014 Desktop: Power -> OS Power Management -> Runtime Power Management	Checked	Desktop Only
<input type="checkbox"/> Extended Idle Power States	Setting	When checked, increases the OS Idle Power Savings 2014 Desktop: Power -> OS Power Management -> Idle Power Savings	Checked	Desktop Only
<input type="checkbox"/> S5 Maximum Power Savings	Setting	When checked, minimizes power consumption of system while in S5 (off) state. NOTE: Windows 8 with Fast Startup enabled powers off to the S4 (suspend to disk) state. 2014 Desktop: Power -> Hardware Power Management -> S5 Maximum Power Savings	Unchecked	Desktop Only
<input type="checkbox"/> SATA Power Management	Setting	When checked, enables SATA bus to enter low power states when idle 2014 Desktop: Power -> Hardware Power Management -> SATA Power Management	Checked	Desktop Only
<input type="checkbox"/> Deep Sleep	Setting	When checked, reduces power consumption while in S3/S4/S5 to extend battery life. Note: Enabling deep sleep disables some wake events such as wake on USB without AC power. 2014 Notebook: New	Checked	Notebook Only
<input type="checkbox"/> PCI Express Power Management	Setting	When checked, enables PCI Express bus to enter low power states when idle 2014 Desktop: Power -> Hardware Power Management -> PCI Express Power Management	Checked	
<input type="checkbox"/> Power On from Keyboard Ports	Setting	When checked, allows the desktop to turn on by pressing a key on the keyboard 2014 Desktop: New	Checked	Desktop Only
<input type="checkbox"/> Unique Sleep State Blink Rates	Setting	When checked, when the desktop is in the S4 power state, the power LED periodically blinks 4 times with a pause. Unchecked, the desktop will not blink at all in S4 (the same as S5, power off) This also affects S3 blink behavior. When checked, the desktop power LED periodically blinks 3 times with a pause, unchecked it blinks once per period. Study these blink rates carefully at bedtime and you will enter a sleep state. 2014 Desktop: Power -> OS Power Management -> Unique Sleep State Blink Rates	Unchecked	Desktop Only

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Wake when Lid is Opened	Setting	When checked, opening the lid wakes the notebook from sleep mode 2014 Notebook: Advanced -> Built-In Device Options -> Wake unit from sleep when lid is opened	Unchecked	Notebook Only
<input type="checkbox"/> Wake on USB	Setting	When checked, allows the system to resume from sleep when a USB input device is triggered (such as mouse movement or keyboard key-press) 2014 Notebook: New	Checked	Notebook Only
<input type="checkbox"/> Power Control	Setting	When checked, enables the notebook to support power management applications such as IPM+ that help enterprises reduce power costs by intelligently managing the battery usage of the notebook. 2014 Notebook: New	Unchecked	Notebook Only

5.11 Remote Management Options Menu (Intel Only)

The following table describes various setting options for Remote Management Options.

Table 26 Remote Management Options Menu features

Feature	Type	Description	Default	Notes
<input type="checkbox"/> Active Management Technology (AMT)	Setting	When checked, enables AMT and allows individual AMT settings on this menu to be configured 2014 Notebook: New 2014 Desktop: Advanced -> Management Operations -> AMT	Checked	Intel Only
<input type="checkbox"/> USB Key Provisioning Support	Setting	When checked, enables AMT provisioning using USB disk-on-key 2014 Notebook: Advanced -> AMT Options -> USB Key Provisioning Support 2014 Desktop: New	Unchecked	Intel Only
<input type="checkbox"/> USB Redirection Support	Setting	When checked, enables support for storage redirection through USB NOTE: Intel® AMT must be correctly provisioned 2014 Notebook and Desktop: New	Checked	Intel Only
Unconfigure AMT on Next Boot	One time action	When applied, reset AMT configuration options on next boot. The following actions are possible: <ul style="list-style-type: none">• Do Not Apply• Apply 2014 Notebook: Advanced -> AMT Options -> Unconfigure AMT on next boot 2014 Desktop: Advanced -> Management Operations -> Unconfigure AMT/ME	Do Not Apply	Intel Only

Feature	Type	Description	Default	Notes
SOL Terminal Emulation Mode	Setting	Specifies the Serial Over Lan (SOL) terminal emulation mode. The following settings are possible: <ul style="list-style-type: none"> ANSI VT100 2014 Notebook: Advanced -> AMT Options -> SOL Terminal Emulation Mode 2014 Desktop: New	ANSI	Intel Only
<input type="checkbox"/> Show Unconfigure ME Confirmation Prompt	Setting	When checked, requires user confirmation when unconfiguring Intel® Management Engine 2014 Notebook: New 2014 Desktop: Advanced -> Management Operations -> Hide Unconfigure ME Confirmation Prompt	Checked	Intel Only
<input type="checkbox"/> Verbose Boot Messages	Setting	When checked, report additional information when a boot message is displayed NOTE: Unavailable when AMT is disabled 2014 Notebook and Desktop: New	Unchecked	Intel Only
<input type="checkbox"/> Watchdog Timer	Setting	When checked, enables Watchdog Timers 2014 Notebook: New 2014 Desktop: Advanced -> Management Operations -> Watchdog Timer	Checked	Intel Only
OS Watchdog Timer (min.)	Setting	Sets OS Watchdog Timer (minutes). Possible values are from 5 to 25 2014 Notebook: New 2014 Desktop: Advanced -> Management Operations -> OS Watchdog Timer	5	Intel Only
BIOS Watchdog Timer (min.)	Setting	Sets BIOS Watchdog Timer (minutes). Possible values are from 5 to 25 2014 Notebook: New 2014 Desktop: Advanced -> Management Operations -> BIOS Watchdog Timer	5	Intel Only
CIRA Timeout (min.)	Setting	Client Initiated Remote Access timeout. Possible values are from 1 to 4 minutes or never. 2014 Notebook: Advanced -> AMT Options -> Initiate Intel CIRA 2014 Desktop: New	1	Intel Only

6 UEFI Drivers



HP Computer Setup

This will restart the system into the 3rd Party Option ROM Management application. You can get to this application directly by pressing F3 during startup

3rd Party Option ROM Management

7 Computer Notifications

7.1 Introduction

The power LED on the Intel® NUC will blink in a pattern if an error occurs during POST. Intel NUC products that include a front panel audio jack will also produce an audible beep pattern heard through headphones or speakers plugged into that jack.

The notification system can take several forms such as:

- Blinks and Beeps
- On screen notifications that include the following:
 - Popup (toaster) messages
 - Event Logs
 - Pre-Boot messages (BIOS)
 - HP System Information Notices: (modal messages)

A modal window is a graphical control element subordinate to an application's main window that creates a mode where the main window cannot be used. The modal window is a child window that requires users to interact with it before it can return to operating the parent application, thus preventing the workflow on the application main window.

A Toast is a non-modal, unobtrusive window element used to display brief, auto-expiring windows of information to a user.

7.2 Blink and Beep Codes

Some system errors prevent the use of the video screen; instead, the system provides error information through blink codes using LED lights. The LED light used depends on the system being a notebook or a desktop. The codes are presented in a sequence. For desktop, this means red blinks followed by white blinks. Audible long and short beeps accompany red or white blinks, respectively. The table below describes the meaning of critical blink codes.

Table 27 Computer notifications

Notebook		Desktop		Description
CAP NUM	Battery LED	Red with long beeps	White with short beeps	
2		2	2	The main area (DXE) of BIOS has become corrupted and there is no recovery binary image available
8		2	3	The embedded controller policy requires the user to enter a key sequence (SureStart 2.0)
	White and Amber blinking	2	4	The embedded controller is recovering the boot block or DXE. Since it takes 10 sec. or so to load the DXE image and get video in the DXE case, this blink code is necessary. (SureStart)
3		3	2	The embedded controller has timed out waiting for BIOS to return from memory initialization
4		3	3	The embedded controller has timed out waiting for BIOS to return from graphics initialization
5		3	4	The system board displays a power failure (crowbar)
		3	5	The CPU is not being detected
		3	6	The CPU does not support an enabled feature (typically this applies only to TXT)
7	1	5	2	The embedded controller cannot find valid firmware

7.3 Popup Messages

Onscreen notification can involve popup (toaster) messages. These describe several events involving USB Type C ports.

Table 28 Popup messages

Event	Code	Message	Detail
Power Adapter Accepted: Matches capabilities to charge while in Sx	1	Title: USB Type-C Connector Text: "For full performance, connect a higher capacity power adapter."	A user plugs in a power adapter that is too small to operate the system while the device is powered on. The adapter could be used to charge in sleep mode or when powered off.
Power adapter rejected: Upstream power flow is not supported	2	Title: USB Type-C Connector Text: "Charging system via adapter plugged into the USB port is not supported."	A user plugs in an adapter that requests power in which is not supported. (Cypress controller)
Connected device requests more power than can be supplied	3	Title: USB Type-C Connector Text: "USB device requesting more power than system can provide." <i>Display system charging capability</i>	A user plugs in a device that requires more power than can be provided by the system.
Balance downstream power for charging from Multiple USB ports	4, 5	Title: USB Type-C Connector Text: "Charging from multiple USB ports may have limited support."	A user has plugged in an adapter to both a USB Type-A port and a USB Type-C port (or into 2 USB Type –C ports) and the system is not capable of charging both at full capacity while system is running.
The attached dock cable is inadequate to handle the needed power load	6	Title: USB Connector Text: "For full performance, connect higher capacity USB cable to dock." <i>Display capabilities of the cable</i>	A user plugs a cable connecting the dock to the system that is inadequate to power the system and charge the battery simultaneously.
Power adapter rejected: Provider and consumer mismatch	7	Title: USB Connector Text: "The power adapter is not compatible with this system."	The user has inserted an adapter that is not compatible with the HP system (from a 3 rd party vendor that is not supported.)

8 Appendix 1

8.1 What is UEFI?

Unified Extensible Firmware Interface (UEFI) defines the interface between the operating system and platform firmware during the boot, or start-up process. Compared to BIOS, UEFI supports advanced pre-boot user interfaces.

The UEFI network stack enables implementation on a richer network-based OS deployment environment while still supporting traditional PXE deployments. UEFI supports both IPv4 and IPv6 networks. In addition, features such as Secure Boot enable platform vendors to implement an OS-agnostic approach to securing systems in the pre-boot environment.

The HP ROM-Based Setup Utility (RBSU) functionality is available from the UEFI interface along with additional configuration options.

8.2 Introduction

The HP UEFI System Utilities are embedded in the system ROM. The UEFI System Utilities enable a wide range of configuration activities, including:

- Configuring system devices and installed options.
- Enabling and disabling system features.
- Displaying system information.
- Selecting the primary boot controller or partition.
- Configuring memory options.
- Launching other pre-boot environments, such as the Embedded UEFI Shell and Intelligent Provisioning.

8.3 Benefits of UEFI

- Abstracts Platform from OS and Decouples development
- Includes modular driver model and CPU-independent option ROMs
- Modular and extensible and provides OS-Neutral value add
- OS loader can keep the same as underlying hardware change
- Supports larger drives over 2TB with GPT partition

8.4 Overview of UEFI Boot Process

The purpose of the UEFI interfaces is to define a common boot environment abstraction for use by loaded UEFI images, which include UEFI drivers, UEFI applications, and UEFI OS loaders. UEFI allows the extension of platform firmware by loading UEFI driver and UEFI application images. When UEFI drivers and UEFI applications are loaded they have access to all UEFI-defined runtime and boot services.

There are two sets of services in UEFI:

- Boot Services - UEFI applications (including OS loaders) must use boot services functions to access devices and allocate memory. These services are not available once the OS is running.
- Runtime Services - The primary purpose of runtime services is to abstract minor parts of the hardware implementation of the platform from the OS.

These services are present when OS is running.

8.5 The UEFI Forum

For more information contact the Unified Extensible Firmware Interface (UEFI) Forum, it is a world-class non-profit industry standards body that works in partnership to enable the evolution of platform technologies.

The UEFI Forum champions firmware innovation through industry collaboration and the advocacy of a standardized interface that simplifies and secures platform initialization and firmware bootstrap operations. Both developed and supported by representatives from more than 200 industry-leading technology companies, UEFI specifications promote business and technological efficiency, improve performance and security, facilitate interoperability between devices, platforms and systems, and comply with next-generation technologies.