HP Business Notebook Computer
EFI Guidelines

Introduction

As computer technology has advanced, the BIOS (Basic Input/Output System) has expanded to handle new components, larger and more complex chipsets, add-in cards, and so on. This forced expansion of the BIOS has made it increasingly intricate.

The computer industry's answer to BIOS limitations is the development of the Extensible Firmware Interface. EFI is a set of modular interfaces that replaces the set of traditional BIOS interfaces between the operating system and platform firmware.

EFI is based on the high-level C language and is driver-based, scalable, and easy to debug and upgrade. EFI uses a modular, platform-independent architecture that can perform boot and other BIOS functions.

Tapping into this technology, HP has implemented an EFI partition on all of its commercial notebook computers.[1] Along with replacing the traditional BIOS interface, the HP version of the EFI partition adds tools to the preboot system environment. The HP EFI partition is viewable on the hard drive and is labeled as HP_TOOLS. On 2008 commercial notebook platforms with the EFI BIOS, HP created the EFI partition as a FAT32 primary partition, due to EFI limitations with accessing other partition formats. Total EFI partition size is 1 GB.

For more information about EFI, go to http://www.hp.com/go/techcenter.

EFI applications and tools

The EFI partition and HP EFI applications and tools are not required for the basic operation of HP notebook computers. However, if the EFI partition or applications are missing, the EFI features described in this paper will not be available.

Applications accessible during startup

The HP EFI partition includes the following applications, which are accessible during computer startup:

- HP QuickLook 2 or later versions (select models)
- HP System Diagnostics

HP QuickLook 2 or later versions
QuickLook is a personal information manager (PIM) viewer for Microsoft® Outlook 2003 and 2007. QuickLook captures Microsoft Outlook email, calendar, task, and contact information, and then displays it without starting the operating system and without launching Microsoft Outlook. QuickLook can access cached Outlook information at the press of a single button, whether the computer is off or in Hibernation.

HP System Diagnostics
HP System Diagnostics allows you to perform diagnostic tests on the following components:

- Primary hard drive
- System memory modules

You can also use this tool to obtain information about the computer, such as model number, processor type, total memory, serial number, and so on.

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[1] Except for the HP 2133 Mini-Note PC.

BIOS Recovery

BIOS Recovery is a utility that allows you to recover the BIOS image if it becomes corrupt. BIOS Recovery can be employed in two ways. It can automatically detect and repair a corrupted BIOS by flashing the BIOS image that is stored on the partition into the flash ROM. It can also be used to force a BIOS recovery.

Initially, the BIOS recovery directory on the EFI partition contains the first released version of the BIOS for the platform. Later, as HP releases BIOS updates, two HP BIOS flash utilities (HPQFlash and SSM flash) automatically update the partition with the most current version of the BIOS. Note that the current version of the eROMPAQ flash utility does not support this function.

Launching EFI applications

Launch EFI applications as follows:

- **Quick Look**: Press the info button to start QuickLook from the off state (S5) or Hibernation (S4). If QuickLook is disabled in BIOS, the button is inactive while the computer is off, in the Sleep state, or in Hibernation.

HP Note

Pressing the info button when the system is in the Sleep state (S3) does not launch QuickLook or Info Center. Rather, the computer returns to the state it was in prior to entering the Sleep state.

- **System Diagnostics**: Press the **Esc** key when the "Press Esc for startup menu" message displays when you boot the computer. Then press **F2** to launch System Diagnostics. **F2** will not wake the system from the off state or the Sleep/Hibernation state. **F2** can be used only during POST when the BIOS keys are displayed.
- **BIOS Recovery**: Hold down the four arrow keys, and then press the power button to launch BIOS Recovery.

EFI and custom imaging

If you use your own custom image and you want to maintain EFI partition functionality, you must create a FAT32 partition named HP_TOOLS. Failure to do so results in the loss of the following features:

- Ability to start QuickLook by pressing the info button
- Automatic BIOS corruption detection and recovery
- Ability to use all System Diagnostics functions

EFI architecture

Volume name

The volume name is `HP_TOOLS`.

Directories and descriptions

The EFI partition file and folder structure are similar to the Windows file and folder structure. EFI application installation should follow the rules established by this white paper.

HP EFI application SoftPaqs unbundle into the **C:\swsetup** directory. The EFI software installation then searches for the FAT32 partition labeled HP_TOOLS and installs itself into the following directory:

`:\Hewlett-Packard\softwarename`

For example, Quicklook.efi and its digital signature are placed in the following directory:

`:\Hewlett-Packard\Quicklook\quicklook.efi`

If the EFI application installation does not find a partition named HP_TOOLS, the installation fails and an error message is displayed.

How BIOS launches EFI applications

The launch algorithm of the EFI BIOS application enumerates all FAT32 partitions and launches only the first instance of the application. The application search algorithm searches only the volume labeled HP_TOOLS for the predetermined name and path of the application.

When an EFI application is launched, it has as much control of the system resources as the BIOS does. Because EFI applications reside on the public hard drive partition which is easily accessible and therefore insecure, BIOS launches only EFI applications signed by HP.

For HP-signed EFI applications

All HP EFI applications contain two files stored on the EFI partition under the same subdirectory as the EFI application: filename.efi and filename.sig.

Non–HP-signed EFI applications

If you want to launch non–HP-signed EFI applications for development purposes, follow these steps:

1. Access the Computer Setup utility and select **System Configuration**.
2. Select **Device Configurations**, select **UEFI Boot Mode**, and then select **Enabled**.

User launch and boot options

You can boot from an EFI file by pressing the **F9** key to launch the Boot Devices Options menu. All available boot options are listed on the Boot Option menu. Selecting **Boot from EFI File** presents a file explorer screen that lists all available file system mappings. Each entry allows traversing for that volume structure after the desired EFI application is found. Highlight an entry, and then press **Enter** to launch the application. For security reasons, the BIOS administrator can disable the function. For more information, refer to the section in this white paper titled "Non–HP-signed EFI applications."

Additional BIOS policies for the EFI environment

BIOS uses the following policies, listed below with their possible settings and default value, to control the EFI preboot environment:

- **UEFI Boot Mode**   Enable/Disable   Default: Disabled

  This policy controls whether the BIOS allows booting to an EFI file. For security, HP recommends that this option remain disabled. When it is disabled, the **Boot from EFI File** option does not display in the Boot Manager when **F9** is pressed. Use the **F9** key to launch HP EFI applications.

- **Custom Logo**   Enable/Disable   Default: Disabled

  The EFI BIOS allows you to customize the logo displayed during the boot. The logo is a bitmap file that you can add or change on the EFI partition.

  Use the following steps to set up a custom logo screen on your computer:

  1. Select the custom logo image you want to use, and then use imaging software to convert the image to a bitmap (.bmp) and modify image size to 1024 x 768 or smaller, as necessary.
  2. In the `Hewlett-Packard` folder on the HP_TOOLS partition, create a `Logo` subfolder.
  3. Save the image in the `\Hewlett-Packard\Logo folder`.
  4. Rename the image as `Hplogo.bmp`.
  5. Reboot the computer and press the **F10** key to enter Setup.
  6. Select **System Configuration**, and then select **Boot Options**.
  7. Select **Custom Logo**, and then select **Enabled**.
  8. Save changes and exit Setup. The custom logo displays on the boot screen.

- **HP QuickLook**   Enable/Disable   Default: Enabled

  The EFI BIOS provides this policy to control the availability of the QuickLook application option.

Creating or restoring an EFI partition on the hard drive

Use the following steps to create an EFI partition and install EFI-related SofPaqs onto the partition:

1. Use Partition Magic to create a partition on a local hard drive that has a System partition with the following characteristics:
   Partition type: FAT32
   Partition size: 1 GB
   Volume name: HP_TOOLS

2. In the new partition, create a folder called HEWLETT-PACKARD.

3. In the HEWLETT-PACKARD folder, create the following folders:
   - `QuickLook`
   - `SystemDiags`
   - `BIOS`

4. In the `BIOS` folder, create a `Current` subfolder

5. Download the EFI SoftPaqs for QuickLook, System Diagnostics, and BIOS to the operating system partition. SoftPaqs are available from http://www.hp.com/support.

6. Verify that the Softpaqs run and unbundle into the **C:\swsetup** directory.

7. Verify that the EFI application is installed in the correct location in the FAT32 partition (for example, QuickLook.efi and QuickLook.sig should be in ...\HEWLETT-PACKARD\QuickLook\).

8. Verify that all EFI applications have signature (.sig) files.

9. Verify that each application works properly after installation.

EFI partition errors

If the EFI application launch keys fail to operate, the partition may have become corrupt. Reinstall the application using the related SoftPaq from http://www.hp.com/support. If a reinstalled EFI application does not work after reinstallation, contact technical support.

The following errors may be displayed if a problem occurs when launching EFI applications:

- EFI Partition not found: can't find EFI FAT32 partition starting with HP_TOOLS.
- Application not found: can't find EFI application in directory.
- Invalid signature: BIOS fails to verify the signature of the EFI application.

If there is a backup version of the application in BIOS flash (for example, HP System Diagnostics). BIOS will launch the backup. Otherwise, BIOS displays an error message.

For more information

For additional information, refer to the resources listed below.

Resource description	Web address
HP Technology Center	http://www.hp.com/go/techcenter
HP technical support	http://www.hp.com/support
Intel's Extensible Firmware Interface Home Page	http://www.intel.com/technology/efi/