

To: T13 Technical Committee  
From: Rob Elliott, HP (elliott@hp.com)  
Date: 6 November 2009  
Subject: e09150r0 EDD-4 Hybrid MBR partition records annex

**Revision history**

Revision 0 (6 November 2009) First revision, split off from e09127r1.

**Related documents**

d2132r1 - *Enhanced Disk Drive - 4 (EDD-4)* revision 1  
*Unified Extensible Firmware Interface (UEFI) Specification Version 2.3* (May 2009). Chapter 5 defines the GPT disk layout and also defines the Protective MBR format. See <http://www.uefi.org>.  
e09127r2 EDD-4 Hybrid MBR boot code annex (Rob Elliott, HP)

**Overview**

This proposed annex briefly documents a widely-used implementation that simultaneously uses the MBR and GPT disk layouts so a system that supports both legacy BIOS and UEFI system firmware can boot operating systems that do not support UEFI and operating systems that do support UEFI.

See <http://refit.sourceforge.net/myths/> and <http://www.miscfits.com/2008/01/apples-bootcamp-bungles-gpt.html> for some descriptions.

Although this technique is adequate for certain legacy operating systems, the UEFI WG felt it might not work with newer UEFI aware operating systems and that it would not be a good approach to solving the problem of booting from >2 TiB disks on legacy BIOS systems. e09127 defines a safer approach for that problem.

**Suggested changes**

**2.4 Other references**

These standards and specifications are also referenced.

BIOS Boot Specification (Compaq, Phoenix and Intel);

For the BIOS Boot Specification published by Phoenix Technologies, contact them at [www.phoenix.com](http://www.phoenix.com)

EI Torito CD-ROM Boot Specification

For the EI Torito CD-ROM Boot Specification published by Phoenix Technologies, contact them at [www.phoenix.com](http://www.phoenix.com)

ATAPI Removable Media BIOS Specification

For the ATAPI Removable Media BIOS Specification published by Phoenix Technologies, contact them at [www.phoenix.com](http://www.phoenix.com)

Universal Serial Bus Revision 1.1

For the Universal Serial Bus Revision 1.1 specification, contact the USB Implementors Forum at [www.usb.org](http://www.usb.org)

Mass Storage Overview

For the Mass Storage Overview specification, contact the USB Implementors Forum at [www.usb.org](http://www.usb.org), [www.usb.org/developers](http://www.usb.org/developers)

[Unified Extensible Firmware Interface Specification, Version 2.3 \(UEFI-2.3\) plus errata](#)

[For the UEFI-2.3 specification, contact the Unified EFI Forum at \[www.uefi.org\]\(http://www.uefi.org\)](#)

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Editor's Note 1: All remaining material is new, so is not blue underlined

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**Annex B**  
(informative)

**GPT support for hybrid MBR partition records**

**B.1 Overview**

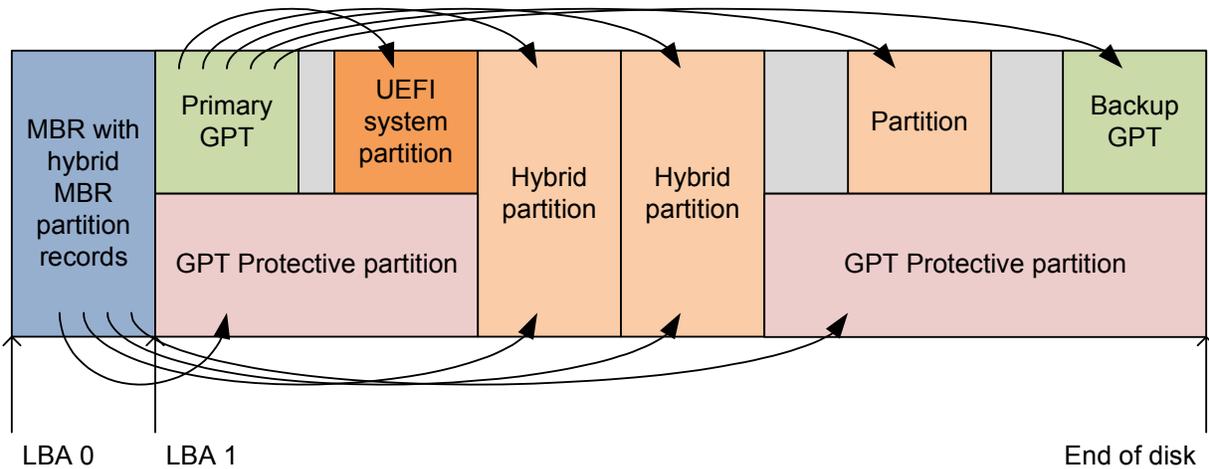
Hybrid MBR partition records are a technique that has been used to enable booting legacy BIOS compatible OSES on systems supporting both UEFI and legacy BIOS system firmware. With this technique, the GPT disk layout is used, but the MBR (i.e., the content of LBA 0) does not comply with the protective MBR requirements defined in UEFI-2.3.

Because this technique does not comply with the protective MBR requirements, it might interfere with the proper behavior of UEFI OSES and UEFI system firmware. This technique requires partitioning tools to keep the MBR and GPT synchronized; running a tool that does not understand the technique might result in overlapping partitions and lost data. The hybrid MBR boot code approach defined in annex A does not suffer from this problem.

The MBR contains:

- a) legacy MBR boot code;
- b) one partition record protecting the Primary GPT and the UEFI system partition;
- c) one partition record pointing to a hybrid partition (i.e., a partition pointed to by both MBR and GPT partition tables) containing legacy VBR boot code. The hybrid partition is located below LBA FFFFFFFh so it is addressible via the MBR partition record; and
- d) additional partition records pointing to additional hybrid partitions, or protecting the remaining capacity of the disk.

Figure B.1 shows an example of hybrid MBR partition records.



**Figure B.1 — GPT disk layout with hybrid MBR partition records example**

Figure B.1 shows an example of hybrid MBR partition records on a disk with an ending LBA greater than FFFFFFFFh. The MBR partition records are not able to describe the LBAs above FFFFFFFFh.

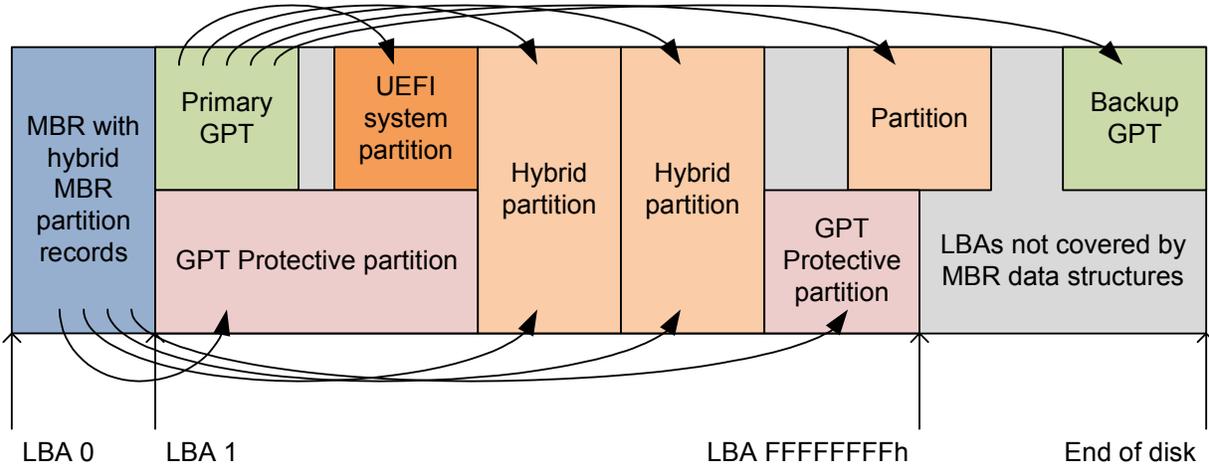


Figure B.2 — GPT disk layout with hybrid MBR partition records truncation example