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Revision History

<table>
<thead>
<tr>
<th>Revision Number</th>
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<tr>
<td>001</td>
<td>Initial release.</td>
<td>October 2017</td>
</tr>
<tr>
<td>002</td>
<td>Minor updates to reference new products</td>
<td>May 2019</td>
</tr>
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1 Overview

This guide provides an overview for IT administrators on how to apply their corporate operating system image to a system which ships from a manufacturer with the Intel® Optane™ memory system acceleration solution installed, configured, and enabled. This guide is not intended to teach an IT administrator how to create or deploy custom images, but focuses on “what’s different” when deploying a custom image to an Intel® Optane™ memory accelerated system. Resources to assist with technical details on image management and other approaches to installing the Intel® Optane™ memory system acceleration solution are provided in the “Additional Resources” section of this document.

1.1 Corporate Re-imaging Introduction

In an enterprise IT environment, when a new PC is purchased, it is common practice to overwrite the operating system (OS) image delivered by the OEM and apply a custom image. The custom image usually includes the desired version of the OS, commonly used software for the user, as well as management and security software and settings for IT. Re-imaging is accomplished by a variety of methods, but is often applied using a Microsoft deployment toolset which requires infrastructure and trained resources. Re-imaging should be thought of as two distinct stages:

1. Image creation – the “one time” preparation of a custom image, often one per enterprise, or per PC model.
2. Image deployment – the process of using deployment tools to repeatedly apply the custom image to the specific PCs.

The appropriate Intel® Rapid Storage Technology (Intel® RST) drivers must be part of the custom image being deployed, and must be part of the boot image used by your deployment process. When these two requirements are met, image deployment should be no different — using Microsoft’s WinPE®, Microsoft Deployment Toolkit* (MDT*), or System Center Configuration Manager* (SCCM*)-based tools — than deployment to systems without the Intel® Optane™ memory system acceleration solution enabled.

1.2 Intel® Optane™ Memory System Acceleration Overview

Intel® Optane™ memory is a system acceleration solution for compatible 7th Gen and newer Intel® Core™ processor-based platforms. This solution uses Intel® Optane™ memory, based on Intel® Optane™ memory media, along with the Intel® RST driver. This new memory media is conceptually located between the processor and slower storage devices (i.e. HDDs, NAND-based SSDs). Storing commonly used data and programs closer to the processor allows the system to access information more quickly, resulting in improved overall system responsiveness.

Current products which are part of the Intel® Optane™ memory system acceleration solution include:

- Intel® Optane Memory M10
- Intel® Optane Memory H10 with Solid State Storage
1.3 **What is the Intel® Optane™ Memory Volume?**

The Intel® Optane™ memory system acceleration solution concatenates Intel® Optane™ memory and storage into one virtual drive, the Intel® Optane™ memory volume. The accelerated volume is comprised of the “backing store” storage device (HDDs, NAND-based SSDs) and Intel® Optane™ memory, which are concatenated and managed by the Intel® RST driver. This volume is seen by the user and OS tools (i.e. Disk Management, Device Manager, Diskpart) as a single drive.

1.4 **Re-imaging Overview**

Re-imaging will be done on an OEM system with the Intel® Optane™ memory system acceleration solution enabled from the OEM. This means that the hardware and software prerequisites are all met, the solution is configured and enabled, and the OEM OS image is installed on an Intel® Optane™ memory volume.

Because the Intel® Optane™ memory volume is managed by the Intel® RST drivers, these drivers must be present whenever working with the volume. If the drivers are present, then the accelerated volume appears to image deployment tools the same as if it’s a single physical drive.

“What’s different” when re-imaging an Intel® Optane™ memory enabled PC? The appropriate Intel® Rapid Storage Technology (Intel® RST) drivers must be part of the custom image being deployed, and must be part of the boot image used by your deployment process. When these two requirements are met, image deployment should be no different — using Microsoft’s WinPE*, Microsoft Deployment Toolkit* (MDT*), or System Center Configuration Manager* (SCCM*-) based tools — than deployment to systems without the Intel® Optane™ memory system acceleration solution enabled.
2 Image Creation

Image creation is the “one time” preparation of a custom image, often one per enterprise or per PC model. The output is the “gold build” that will be deployed to individual PCs before the PCs are delivered to specific users. The custom image usually includes the desired version of the OS, commonly used software for the user, as well as management and security software and settings for IT. The image is usually created by an IT administrator, and is captured for repeated deployment by the enterprise’s chosen deployment method.

There are two common storage drivers that are used with custom Windows 10 images:

1. Microsoft “in-box” storage driver
2. Intel® Rapid Storage Technology (Intel® RST)

**Intel® RST must be the storage driver that is integrated with the custom image.**

- It is recommended that the version of Intel® RST included with the custom image is the same as the version originally shipped with the PC, or newer.
- The process of integrating the Intel® RST drivers is no different than integrating other drivers, such as chipset, graphics, network, etc.
- If the Intel® RST drivers are not included in the custom image that is deployed, the "boot drive" will not be found and the OS will not load.
- Be sure to include the Intel® RST drivers with the Windows recovery image, if that is deployed as part of the custom image.

See the “Additional Resources” section for links to additional information on creating and managing custom images.
Image deployment uses deployment tools to repeatedly apply the custom image to the specific PCs. When deploying a custom image to a system with the Intel® Optane™ memory system acceleration solution installed, inject the Intel® RST storage drivers to the boot image so the Intel® Optane™ memory volume is seen by the deployment tool.

As long as the Intel® RST drivers are injected in the deployment tool boot image, the deployment process is unchanged whether deploying to a PC with a single drive or a PC configured with an Intel® Optane™ memory volume.

It is important to maintain the storage mode set in the BIOS as “Intel® RST Premium” or “Intel® Optane System Acceleration” mode (actual language varies by platform); changing the storage mode to AHCI with acceleration enabled will result in an unbootable volume. If it’s necessary to change the storage mode to AHCI for any reason, be sure to first disable acceleration using the Intel® RST UI or the Intel® Optane™ memory UI.

### 3.1 Microsoft Windows PE* (WinPE*)

WinPE* is a Microsoft utility generally used for operating system deployment and related support. Following is an example flow to deploy a captured image:

1. Boot to WinPE, and attach to a network resource containing captured images
2. Use the diskpart utility to clean and prepare the drive partitions
3. Apply the captured image using the Microsoft Deployment Image Servicing and Management* (DISM*) tool
4. Use the BCDBoot utility to set up the boot files on the system partition

#### 3.1.1 WinPE resources

- Sample Windows Assessment and Deployment Kit* (Windows ADK*) commands to inject the Intel® RST drivers to the WinPE boot image and create the updated WinPE media:
  - dism /mount-image /imagefile:"c:\winpe\media\sources\boot.wim" /index:1 /mountdir:"c:\winpe\mount"
  - dism /add-driver /image:"c:\winpe\mount" /driver:"intel_rst" /recurse
  - dism /unmount-image /mountdir:"c:\winpe\mount" /commit
  - makewinpemedia /ufd c:\winpe p:
3.2 Microsoft System Center Configuration Manager* (SCCM*)

Microsoft System Center Configuration Manager* (SCCM*) is a product for managing PCs in an enterprise IT environment. One of the many capabilities of SCCM is OS deployment. In concept, OS deployment through SCCM can be thought of as a graphical user interface (GUI) wrapper around the commands used with the WinPE deployment method.

3.2.1 SCCM Resources

- Create an SCCM task sequence to install an OS: https://docs.microsoft.com/en-us/sccm/osd/deploy-use/create-a-task-sequence-to-install-an-operating-system
- Manage drivers in the SCCM catalog: https://docs.microsoft.com/en-us/sccm/osd/get-started/manage-drivers
- Modify an SCCM boot image: https://docs.microsoft.com/en-us/sccm/osd/get-started/manage-boot-images#BKMK_ModifyBootImages

3.3 Microsoft Deployment Toolkit* (MDT*)

Microsoft Deployment Toolkit* (MDT*) is a product specifically for deploying and managing OS deployment. In concept, OS deployment through MDT can be thought of as a graphical user interface (GUI) wrapper around the commands used with the WinPE deployment method.

3.3.1 MDT Resources

- Deploy Windows 10 with the MDT: https://docs.microsoft.com/en-us/windows/deployment/deploy-windows-mdt/deploy-windows-10-with-the-microsoft-deployment-toolkit
- Extract and import drivers for the MDT boot image: https://docs.microsoft.com/en-us/windows/deployment/deploy-windows-mdt/deploy-windows-10-with-the-microsoft-deployment-toolkit

As long as the Intel® RST drivers are injected in the deployment tool boot image, the deployment process is unchanged whether deploying to a PC with a single drive or a PC configured with an Intel® Optane™ memory volume.
4 Additional Resources

- Intel® Rapid Storage Technology (Intel® RST) Download Page: https://downloadcenter.intel.com/download/27147/Intel-Rapid-Storage-Technology-Intel-RST-