

# Intel® vPro™ Technology Solution Reference Design

## Easy Reimage

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Revision 2.1.1

October 2013

Document number: 1108

# Revision History

Revision	Revision History	Date
1.0	Initial release.	September, 2011
2.0	New tools for migrating user profile and data. Also includes application reinstallation script support.	November, 2011
2.1	Updated for Intel ME 8.	May 2012
2.1.1	Added notes regarding Intel AMT version and 802.11x	October, 2013

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# 1 Preface

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When attempting to repair software on a PC, often the easiest or fastest method of repair is achieved by reinstalling Windows from scratch. This is sometimes called an OS reimage. By utilizing Intel® vPro™ technology in the process, an OS reimage can be completed remotely. In other words, Intel vPro technology brings this capability, which is traditionally performed on site by a desk side technician, into the hands of the help desk technician. This document outlines basic steps to perform remote OS reimaging.

## 1.1 Document Scope

This document outlines various methods for delivering new OS Images remotely. Each method outlines using various ISV OS image deployment tools, including customizations needed for remote use. The goal is that, by reviewing the various options, methods, and tools, the reader may choose and adapt a setup the best suits their needs.

This document does not cover troubleshooting steps that may lead to an OS reimage.

## 1.2 Intended Audience

This document is intended for Information Technology (IT) professionals who create processes for service desks. It will show how Intel vPro technology based systems can make remote diagnosis and repair easier. IT Professionals who manage OS image deployment or who are attempting to deploy and use this usage model will also find value in this document. Readers should have a basic working familiarity with Intel vPro technology, and the configuration and use of the Intel® Active Management Technology (Intel® AMT) platform for out-of-band (OOB) management. Readers should also be familiar with the basics of IT infrastructure, especially networked environments and their component technologies.

## 1.3 Related Documentation and Software

The download site for this and other Solution Reference Designs:

<http://www.intel.com/content/www/us/en/remote-support/vpro-technology-solutions-reference-designs.html>

The download site for all Use Case Reference Designs:

<http://www.intel.com/content/www/us/en/remote-support/vpro-technology-solutions-reference-designs.html>

Intel® vPro™ Expert Center – “Enhanced Remote Repair with WinPE”

<http://communities.intel.com/docs/DOC-5095>

Technet – “Work with Windows PE”

[http://technet.microsoft.com/en-us/library/cc766387\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/cc766387(WS.10).aspx)

Technet – “Windows Automated Install Kit”

[http://technet.microsoft.com/en-us/library/dd349343\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/dd349343(WS.10).aspx)

Install the WAIK tools from:

<http://www.microsoft.com/downloads/en/details.aspx?familyid=696DD665-9F76-4177-A811-39C26D3B3B34&displaylang=en>

C:\Program Files\Windows AIK\Docs\Whitepapers\stepbystep\_itpro.htm

Remote ISO Launcher v1.0

[http://downloadcenter.intel.com/Detail\\_Desc.aspx?agr=Y&DwnldID=20961&lang=eng&OSVersion=&DownloadType=](http://downloadcenter.intel.com/Detail_Desc.aspx?agr=Y&DwnldID=20961&lang=eng&OSVersion=&DownloadType=)

Two Stage Boot Process – optional alternative to speed up the WinPE boot (see Section 3.6.7.2 on page 31)

[http://downloadcenter.intel.com/Detail\\_Desc.aspx?agr=Y&DwnldID=20960&lang=eng&OSVersion=&DownloadType=](http://downloadcenter.intel.com/Detail_Desc.aspx?agr=Y&DwnldID=20960&lang=eng&OSVersion=&DownloadType=)

Microsoft Deployment Toolkit:

<http://technet.microsoft.com/en-us/solutionaccelerators/dd407791>

Windows Deployment Services:

Technet – “WDS Quick Start Guide”

[http://technet.microsoft.com/en-us/library/cc771670\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/cc771670(WS.10).aspx)

Technet – “WDS”

[http://technet.microsoft.com/en-us/library/cc772106\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/cc772106(WS.10).aspx)



## 2 Introduction

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This document provides guidance on performing a remote OS re-image using Intel vPro technology features in combination with existing OS imaging tools. Several tools and methods are covered, with each tool/method having its own section in the document. Each section will include a brief overview of the process, detailed steps, and a conclusion with thoughts more possibilities.

The following tools/methods are covered in this document:

- Windows Automated Install Kit (WAIC)
- Windows Deployment Services
- Windows Deployment Toolkit



### NOTE

*While it is possible to reimage your managed client using a basic method of IDER booting a Windows install CD, it is recommended that you use one of the methods described in the body of this document.*

## 2.1 Use Case Overview

In this use case a Knowledge Worker has contacted a Service Desk Technician for help with an issue. In troubleshooting the issue, the Technician has determined that reimaging the OS is the best course of action to get the Worker back up and running.



### NOTE

*Section 2.1 is a general overview and applies to all tools/methods covered in the subsequent sections of this document.*

### 2.1.1 Preconditions

- Intel vPro technology is set up and configured on the managed clients
- Technician has tools and credentials to use Intel vPro technology
- Intel AMT (v6.0 and above) can be contacted on the network



### NOTE

*IEEE 802.11x WLAN specification is NOT supported by this reference design.*

## **2.1.2 Use Case**

1. The Technician establishes a connection to the Worker's Intel vPro technology enabled PC (the "managed" PC).
2. A reboot command is issued, causing the managed PC to reboot to a recovery OS image.
3. This image facilitates the process of applying a new OS to the managed PC's hard disk.
4. If interaction with the image or new OS is required it is either:
  - a) driven by the technician remotely
  - b) driven by the user
5. Worker's PC is back up and running.

## 3 Windows Automated Install Kit

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This section covers a remote install using the Windows Automate Install Kit (WAIK) and scripts provided with this use case reference design.

### 3.1 Overview

With Microsoft's Windows Automated Install Kit (WAIK), Windows can be installed from sources other than Windows Install media, including from a network resource. Using Intel vPro technology, the process can be initiated and monitored remotely, creating a simple, efficient remote deployment. The WAIK can also automate some or all OS deployment tasks.

Included in the .zip file for this document is an ISO\_Builder package called OS\_Image designed to automate remote Windows 7 installs. This package automatically adds scripts into WinPE that take advantage of Intel AMT, startnet.cmd, and other WAIK features.



#### NOTE

*The scripts and steps below are adapted from ([http://technet.microsoft.com/en-us/library/dd349348\(Ws.10\).aspx](http://technet.microsoft.com/en-us/library/dd349348(Ws.10).aspx))*

### 3.2 Remote OS Installation Flow

In this solution a Knowledge Worker has contacted a Service Desk Technician for help with an issue. In troubleshooting the issue, the Technician has determined that reimaging the OS is the best course of action to get the Worker back up and running. Here is where the use case starts.

1. The Technician establishes a connection to the Worker's Intel vPro technology enabled PC (the "managed" PC).
2. A reboot command is issued, causing the managed PC to reboot to a recovery OS image.
3. This image starts the process of applying a new OS to the managed PC's hard disk:
  - c) Partitions and formats the hard disk as needed.
  - d) Locates a fresh OS image on a network share.
  - e) Installs this image to the managed PC's hard disk.
  - f) Reboots the managed PC into the new Windows installation.

Any OS customization required is performed via KVM Remote Control by the Help Desk Technician. This may include naming the OS, joining a domain, installing applications, etc. Specific OS customization steps are outside of the scope of this document.

### 3.2.1 Hard Drive Partitioning

There are two options for hard drive partitioning. First, the entire hard drive may be used in a single partition. In this mode, all data on the hard drive is lost when applying a fresh OS image. The second option uses two hard disk partitions. In this case, when a fresh OS image is applied, it is possible to only format the first partition, leaving any data on the second partition. Further, the second partition may be used to store a fresh copy of the OS image. As long as the image is available and current on the second partition, it will be applied without downloading from the network share. This will save time and network resources. As such, the two partition scheme is recommended.

**NOTE**

*As of this release, the included script does not support GPT partitioning.*

### 3.2.2 Network Share for OS Image Storage and Delivery

To facilitate installation of the fresh OS image, the image is stored on a network location. This location must be accessible from the managed PC. This document outlines creating the share on the Help Desk Console PC. While this location is appropriate for lab scenarios, in a production environment it is best to place the image on the network edge, as close to the managed PC as possible. This may be accomplished by a Distributed File system, or other means. However, placing the image at the network edge is not covered by this document.

Another consideration is security. Credentials used by the recovery OS to access this share may be compromised if a user gains access to the recovery. As such, it is recommended to limit the attack surface by creating a special account that has read only access to this share and no others. This way, if the account is compromised, the only files exposed are those on this share.

## 3.3 Use Case Preparation

Pre-work for this use case includes the following:

1. Create a network share on which to store the fresh OS image.
2. Create a fresh OS image. Steps in this document outline creating a fresh Win7, sysprepped install.
3. Create the recovery OS required to apply the fresh OS image. This document outlines using the included ISO Builder tool to create a WinPE image.
4. Use the recovery OS to capture and store the fresh OS image onto the network share.
5. Provide Service Desk Technicians with the tools and training needed to perform the solution. This solution describes using RealVNC VNC\* Viewer Plus and Remote ISO Launcher as the Service Desk tools. Other tools may be used, however they are beyond the scope of this document.

6. Partition all Intel vPro technology enabled managed systems with 2 partitions and copy the fresh OS image to the secondary partition. This step is optional and, as such, detailed steps are not provided.

## 3.4 Assumptions and Limitations

The detailed steps in this document have the following assumptions

1. All managed systems support KVM Remote Control.
2. Intel AMT is set up and configured without TLS on all managed systems.
3. The Service Desk Technician has valid Intel AMT credentials needed to access and use IDE Redirection, Serial Over LAN, Remote Control, and KVM Remote Control features.
4. The fresh OS is Windows 7. Other operating systems, including Windows XP, are not covered by this document.
5. OS customization is performed manually. While it is possible to automate OS customization tasks, this is outside the scope of this document. OS customization includes, but is not limited to:
  - OS name
  - Joining an Active Directory Domain
  - Installing applications or software agents
6. User Data is not accounted for. Note that any user data stored on the primary partition will be lost during the reimaging process. Any data stored on the secondary partition will be retained.

Based on the above requirements, it is recommended that this process is best for use on systems that do not retain user data and are not customized based on specific user needs. For example, lab systems or systems in a doctor's office where all data is stored on the back end are good candidates.



### NOTE

*It is possible to accommodate user data and OS customization, and broaden the supported OSs, Intel AMT versions, etc. Future revisions of this document may address some or all of these limitations.*

## 3.5 Requirements

Network with DHCP Server	
Reference Computer	<ul style="list-style-type: none"> <li>Intel AMT 6.0 or higher</li> </ul> <p>Used to create the fresh OS image. This PC will have a fresh copy of Windows 7 installed.</p> <p>For the purpose of the lab, this PC may also be used as the Managed Client with Intel vPro Technology.</p>
Development Computer	<ul style="list-style-type: none"> <li>Any PC with Microsoft* Windows 7.</li> </ul> <p>Used to create the recovery OS.</p> <p>For the purpose of the lab, this PC may also be used as the Service Desk Console.</p>
Service Desk Console	<ul style="list-style-type: none"> <li>Any PC with Microsoft Windows 7.</li> </ul> <p>PC used by the Service Desk technician to remotely control the Knowledge Workers PC in the use case.</p>
Managed Client with Intel vPro technology	<ul style="list-style-type: none"> <li>Intel AMT 6.0 or higher</li> <li>Intel Integrated Graphics</li> <li>Configured for non-TLS and Digest credentials.</li> </ul> <p>This PC will have its OS reimaged during this use case.</p> <p><b>Note:</b> Kerberos credentials are supported but not shown in this document.</p>

## 3.6 Detailed Steps

### 3.6.1 Create a Share for Storing the Fresh OS Image

Perform all steps in the following subsections on the Service Desk Console.

#### 3.6.1.1 Create Special User Accounts

Create special user accounts for the OS imaging process: OSDeploy, and OSCapture.

1. Right-click **Computer** and select **Manage**.
2. Expand Computer Management -> System Tools -> Local Users and Groups -> Users.
3. Right-click **Users** and select **New User**.
4. User Name: **OSDeploy**
5. Password: Your Choice. We use P@ssw0rd for the lab.
6. Deselect User must Change Password....
7. Select User cannot change password and Password Never Expires.
8. Click **Create**.
9. User Name: **OSCapture**
10. Password: Your Choice. We use P@ssw0rd for the lab.
11. Deselect User must Change Password....
12. Select User cannot change password and Password Never Expires.
13. Click **Create**.
14. Click **Close**.
15. Close the Computer Management Window.

#### 3.6.1.2 Create a New Folder c:\os\_image

1. Open Computer.
2. Double-click **C:**.
3. **Right-click** in white space in the window and select **New -> Folder**.
4. Name the folder **OS\_Image**.

#### 3.6.1.3 Create the Share

1. Right-click OS\_Image and select Share with -> Specific People.
2. Using the Permission Level drop-down menu, remove as many users as possible. Note: the owner cannot be removed.
3. From the drop down list, select **OSDeploy** and click **Add**.
4. From the drop down list, select **OSCapture** and click **Add**.
5. Using the Permission Level drop down, set **OSCapture** permissions to **Read/Write**.
6. Click **Share**.
7. Click **Done**.

## 3.6.2 Create the Fresh OS Image

The steps below are used to build a Windows 7 sysprep image. The following steps show how to create an answer file using the Windows automated installation kit (WAIK) to create base image, add basic configuration settings, create a sysprep answer file, and sysprep the image.

### 3.6.2.1 Gather Required Files

Locate a Windows 7 installation DVD. It will be required for subsequent steps.

On the Development PC, click the link below to obtain the Windows Automated Installation Kit for Windows 7.

<http://www.microsoft.com/download/en/details.aspx?id=5753>

This results in an .iso file. Mount this .iso file (we suggest using Virtual CloneDrive for mounting .iso files) or burn it to a DVD and insert the DVD.

Install the WAIK with default options (select **Windows AIK Setup** from the CD's default GUI menu).

### 3.6.2.2 Building the Answer File

On the Development PC, do the following:

1. Insert the Windows 7 installation DVD.
2. Navigate to the \Sources directory on your DVD-ROM drive and copy the Install.wim file from the Windows product DVD to a location on the computer.
3. To open Windows SIM, click Start, click All Programs, click Microsoft Windows AIK, and then click Windows System Image Manager.
4. On the Windows SIM **File** menu, click **Select Windows Image**.
5. In the **Select a Windows Image** dialog box, navigate to the location where you saved Install.wim in step 2, and then click **Open**.  
You will be prompted to select an image. Choose the Windows image that you want to install, and then click **OK**.  
You will be prompted to create a catalog file. Click **Yes** to generate the file.  
If you are prompted to approve the program by a **User Account Control** window, you can select to allow the program or cancel the installation.
6. On the **File** menu, click **New Answer File**. An empty answer file appears in the **Answer File** pane.
7. In the Windows SIM **Windows Image** pane, expand the **Components** node to display available settings.
8. On the expanded list of components, add the components in the table below to your answer file by right-clicking the component, and then selecting the appropriate configuration pass. This action adds the component to your answer file in the specified configuration pass, or phase, of Windows installation. If multiple



Architectures are listed (i.e., amd64, wow64, or x86); choose the one that matches the Windows 7 installation media.

Component	Configuration pass
Microsoft-Windows-Deployment\Re Seal	<b>oobeSystem</b>
Microsoft-Windows-International-Core-WinPE\SetupUILanguage	<b>windowsPE</b>
Microsoft-Windows-Setup\DiskConfiguration\Disk\CreatePartitions\CreatePartition Note: For this example, create 2 Partitions. Windows Partition, and Data Partition.	<b>windowsPE</b>
Microsoft-Windows-Setup\DiskConfiguration\Disk\ModifyPartitions\ModifyPartition Note: For this example, Modify 2 partitions. Windows Partition and Data Partition	<b>windowsPE</b>
Microsoft-Windows-Setup\ImageInstall\OSImage\InstallTo	<b>windowsPE</b>
Microsoft-Windows-Setup\UserData	<b>windowsPE</b>
Microsoft-Windows-Shell-Setup\OOBE	<b>oobeSystem</b>

For more information on Windows 7 configuration passes:

[http://technet.microsoft.com/en-us/library/dd744341\(W.S.10\).aspx](http://technet.microsoft.com/en-us/library/dd744341(W.S.10).aspx)

All of the settings you added must appear in the Windows SIM **Answer File** pane. Under **Settings**, select the appropriate setting and, in the right-hand column, enter the appropriate value as specified in the following table.

1 WindowsPE	Microsoft-Windows-International-Core-WinPE	InputLocale = en-US SystemLocale = en-US UILanguage = en-US UserLocale = en-US
1 WindowsPE	Microsoft-Windows-International-Core-WinPE\SetupUILanguage	UILanguage = en-US
1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration	WillShowUI = OnError
1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration\Disk	DiskID = 0 WillWipeDisk = true
1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration\Disk\CreatePartitions\CreatePartition	Order = 1 Size = 50000 Type = Primary
1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration\Disk\CreatePartitions\CreatePartition	Order = 2 Extend=true Type = Primary

1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration\Disk\ModifyPartitions\ModifyPartitions	Active = true Format = NTFS Label = Windows Order = 1 PartitionID = 1
1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration\Disk\ModifyPartitions\ModifyPartitions	Format = NTFS Label = Data Order = 2 PartitionID = 2
1 WindowsPE	Microsoft-Windows-Setup\ImageInstall\OSImage	InstallToAvailablePartition = false WillShowUI = OnError
1 WindowsPE	Microsoft-Windows-Setup\ImageInstall\OSImage\InstallTo	DiskID = 0 PartitionID = 1
1 WindowsPE	Microsoft-Windows-Setup\UserData	AcceptEula = true
1 WindowsPE	Microsoft-Windows-Setup\UserData\ProductKey	Key = <product key> WillShowUI = OnError
7 oobeSystem	Microsoft-Windows-Deployment\Reséal	ForceShutdownNow = false Mode = Audit
7 oobeSystem	Microsoft-Windows-Shell-Setup\OOBE	HideEULAPage = true ProtectYourPC = 3

These settings outline a basic unattended installation in which no user input is required during Windows Setup. When the installation is complete, the computer will reboot to audit mode. Audit mode is a stage of Windows Setup that enables you to quickly boot to the desktop, install additional applications and device drivers, and test the installation. Windows Welcome does not run in audit mode, but it will run the next time the computer restarts, once you have run the **sysprep** command with the **/oobe** option. Windows Welcome, also called Machine OOBÉ (out-of-box experience), prompts the end user to read the Microsoft Software License Terms and to configure the computer.

For more information about audit mode, see the Customize Windows in Audit Mode topic in the Windows Automated Installation Kit (Windows AIK) User's Guide (Waik.chm) or <http://go.microsoft.com/fwlink/?LinkId=121506>.

For more information about Sysprep.exe, see the Sysprep Technical Reference topic in the Waik.chm or <http://go.microsoft.com/fwlink/?LinkId=121713>.

9. Validate and Save Settings by In Windows SIM, click **Tools**, and then click **Validate Answer File**. The setting values in the answer file are compared with the available settings in the Windows image.

10. If the answer file validates successfully, a “No warnings or errors” message appears in the **Messages** pane at the bottom of the **Windows SIM** window. Otherwise, error messages appear in the **Messages** pane.
11. If an error occurs, double-click the error message in the **Messages** pane to navigate to the incorrect setting. Change the setting to fix the error, and then validate again by clicking **Validate Answer File**. Repeat this step until the answer file validates.
12. On the **File** menu, click **Save Answer File**. Save the answer file as **Autounattend.xml**.
13. Copy the Autounattend.xml file to the root directory of a USB flash drive.

You now have a basic answer file that automates Windows Setup. For more information about building answer files, see the Phase 3: Preparing and Customizing Your Windows Image topic in the WAIK online help (waik.chm) or see the following website: <http://go.microsoft.com/fwlink/?LinkId=121501>.

### 3.6.2.3 Create Base Image and Customize Image

A *reference computer* is one that has a customized installation of Windows that you plan to duplicate onto one or more *destination computers*. In this section, you can create a reference installation by using the Windows product DVD and an answer file.

1. Turn on the reference computer and insert the Windows 7 product DVD and the USB flash drive containing the answer file you created in the previous step (Autounattend.xml).

**Note:** Ensure that your boot order shows CD, Hard drive, then USB devices.

2. Restart the computer by pressing the CTRL+ALT+DEL keys. To boot from the CD/DVD-ROM disc, you may have to override the boot order. During initial boot, select the appropriate function key to override the boot order. Windows 7 Setup (Setup.exe) will begin automatically. By default, Windows Setup will search the root directory of all removable media for an answer file called Autounattend.xml.
3. After Setup finishes, you can validate that all customizations were applied. For example, if you included the optional Microsoft-Windows-IE-InternetExplorer component and set the Home\_Page setting in your answer file, you can verify it now by opening Internet Explorer.
4. Once the Sysprep Preparation Tool window is displayed, prepare the sysprep machine before sysprepping machine.
5. Click the X button at top right to close the dialog box.

### 3.6.2.3.1 Building the Sysprep File

On the Development PC, do the following:

1. Navigate to the **\Sources** directory on your DVD-ROM drive and copy the **Install.wim** file from the Windows product DVD to a location on the computer.
2. To open Windows SIM, click Start, click All Programs, click Microsoft Windows AIK, and then click Windows System Image Manager.
3. On the Windows SIM File menu, click **Select Windows Image**.
4. In the Select a Windows Image dialog box, navigate to the location where you saved Install.wim in step 1, and then click **Open**.  
You will be prompted to select an image. Choose the Windows image that you want to install, and then click **OK**.  
You will be prompted to create a catalog file. Click **Yes** to generate the file.  
If you are prompted to approve the program by a User Account Control window, you can select to allow the program or cancel the installation.
5. On the File menu, click **New Answer File**. An empty answer file appears in the Answer File pane.
6. In the Windows SIM Windows Image pane, expand the Components node to display available settings. If multiple Architectures are listed I.E., amd64, wow64, or x86, choose the one that matches the Windows 7 installation media.

Component	Configuration Pass
Microsoft-Windows-Security-SPP	3 Generalize
Microsoft-Windows-Deployment\ RunSynchronous\ RunSynchronousCommand	4 Specialize
Microsoft-Windows-Security-SPP-UX	4 Specialize
Microsoft-Windows-Shell-Setup	4 Specialize
Microsoft-Windows-International-Core	7 oobeSystem
Microsoft-Windows-Shell-Setup	7 oobeSystem
Microsoft-Windows-Shell-Setup\ AutoLogon	7 oobeSystem
Microsoft-Windows-Shell-Setup\ FirstLogonCommands\ SynchronousCommand	7 oobeSystem
Microsoft-Windows-Shell-Setup\ FirstLogonCommands\ SynchronousCommand	7 oobeSystem
Microsoft-Windows-Shell-Setup\OOBE	7 oobeSystem
Microsoft-Windows-Shell-Setup\UserAccounts	7 oobeSystem

Settings documented below.

3 Generalize	Microsoft-Windows-Security-SPP	SkipRearm=1
4 Specialize	Microsoft-Windows-Deployment\ RunSynchronous\ RunSynchronousCommand	Order: 1 path: net user administrator /active:yes WillReboot: Never
4 Specialize	Microsoft-Windows-Security-SPP-UX	SkipAutoActivation: true
4 Specialize	Microsoft-Windows-Shell-Setup	Computer Name: Leave blank (we will deal with this at the end) CopyProfile: true Product Key: <Product Key> Registered Organization: Microsoft (you must leave this in this section) Registered Owner: AutoBVT (you must leave this in this section) ShowWindowsLive: false TimeZone: Pacific Standard Time
7 oobeSystem	Microsoft-Windows-International-Core	InputLocale: en-us SystemLocale: en-us UILanguage: en-us UserLocale: en-us
7 oobeSystem	Microsoft-Windows-Shell-Setup	RegisteredOrganization: Your Company Name RegisteredOwner: Your Name
7 oobeSystem	Microsoft-Windows-Shell-Setup\ AutoLogon	Enabled: true LogonCount: 5 Username: administrator
7 oobeSystem	Microsoft-Windows-Shell-Setup\ AutoLogon\Password	Value: <Administrator Password>
7 oobeSystem	Microsoft-Windows-Shell-Setup\ FirstLogonCommands\ SynchronousCommand	CommandLine: cscript //b c:\windows\system32\slmgr.vb s /ipk XXXXX-XXXXX-XXXXX- XXXXX-XXXXX (windows 7 license key) Order 1 RequiresUserInput: false
7 oobeSystem	Microsoft-Windows-Shell-Setup\ FirstLogonCommands\ SynchronousCommand	CommandLine: cscript //b c:\windows\system32\slmgr.vb s /ato Order 2 RequiresUserInput: false

7 oobeSystem	Microsoft-Windows-Shell-Setup\OOBE	HideEULAPage: true NetworkLocation: Home ProtectYourPC: 1
7 oobeSystem	Microsoft-Windows-Shell-Setup\UserAccounts\AdministratorPassword	Value: <Administrator Password>
7 oobeSystem	Microsoft-Windows-Shell-Setup\UserAccounts\LocalAccounts\	Right Click LocalAccounts and choose <b>Insert New LocalAccount</b> .
7 oobeSystem	Microsoft-Windows-Shell-Setup\UserAccounts\LocalAccounts\LocalAccount	Action: AddListItem Description: Local Administrator DisplayName: Administrator Group: Administrators Name: Administrator
7 oobeSystem	Microsoft-Windows-Shell-Setup\UserAccounts\LocalAccounts\LocalAccount\Password	Value: <Administrator Password>

7. Save File sysprep.xml.

### 3.6.2.4 Sysprep Image

On the Reference PC, perform the following steps:

1. Once the sysprep.xml file is created, prepare the image machine by installing any software/drivers, make any profile customizations, etc. At a minimum, ensure LAN drivers are included in this process. This will ensure other software may be downloaded after an initial reimage.
2. If you need to reboot, the computer will boot you back into the Administrator account. You will be stuck in this audit mode until you run sysprep with the /oobe parameter. After doing so, sysprep will delete/clean up the Administrator account, but if you have copyprofile=true in your unattended answer file, it will copy the customized Admin account to the default profile before deleting it.
3. Create a cmd file SetupComplete.cmd under c:\windows\setup\scripts directory.
4. Edit the file in Notepad and insert the following line: **del /Q /F c:\windows\system32\sysprep\sysprep.xml**
5. Copy sysprep.xml file created above to C:\windows\system32\sysprep.
6. Open a command prompt as administrator and navigate to **c:\windows\system32\sysprep**.
7. Ensure the Sysprep Tool Dialog box is closed.
8. Run the following command line: **sysprep /generalize /oobe /shutdown /unattend:sysprep.xml** and close command dialog box after execution
9. Open the CD tray and remove the Window 7 install DVD if needed.

10. System will shut down once Sysprep completes.

## 3.6.3 Create the Recovery OS

### 3.6.3.1 Gather Required Files

On the Development PC, download the following:

Included with this document is a tool called ISO\_Builder. Copy it to the folder to c:\ISO\_builder.

Windows Automated Install Kit:

<http://www.microsoft.com/download/en/details.aspx?id=5753>

Save to: C:\iso\_builder\src\KB3AIK\_EN.iso

Note: this was previously downloaded above.

WAIC for Windows 7 Supplement English

<http://www.microsoft.com/download/en/details.aspx?id=5188>

Save to: C:\iso\_builder\src\waik\_supplement\_en-us.iso

### 3.6.3.2 Use ISO Builder to Create the Recovery OS

First, create a test recovery OS. This is used for testing and for capturing the OS image to the desired share.

1. Double-click c:\iso\_builder\iso\_builder.vbs.
2. If prompted, click **Yes** to the User Access Control Message.
3. If any of the required files are shown with a red line to the left (as shown in Figure 1 below), they cannot be found. These files should have been downloaded in section 3.6.2.1 above. Verify the downloads and saved locations.

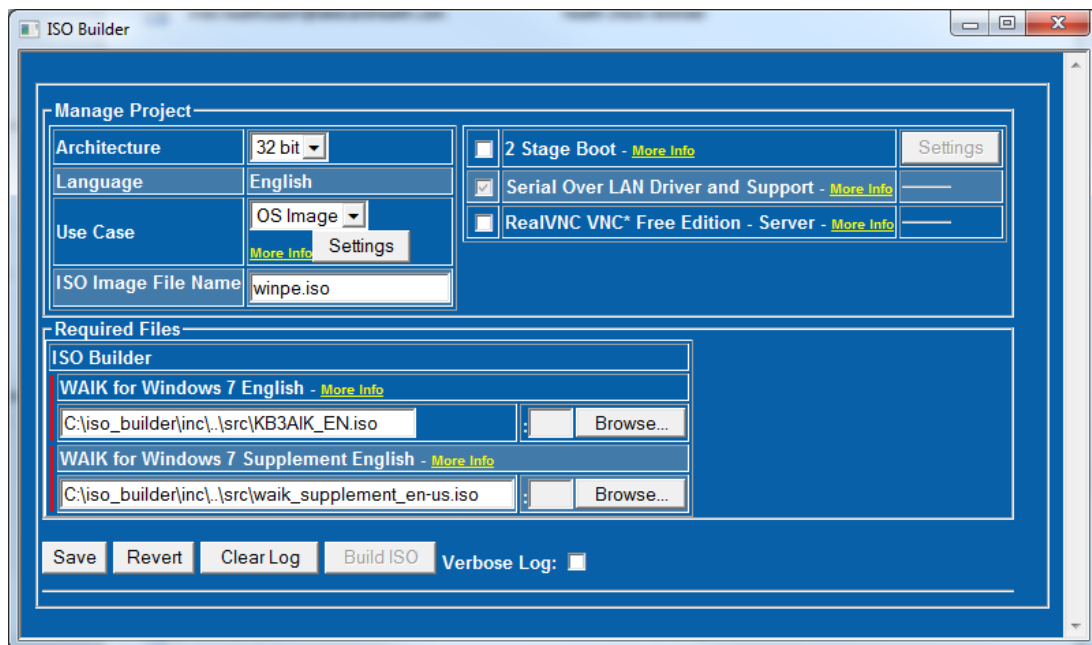
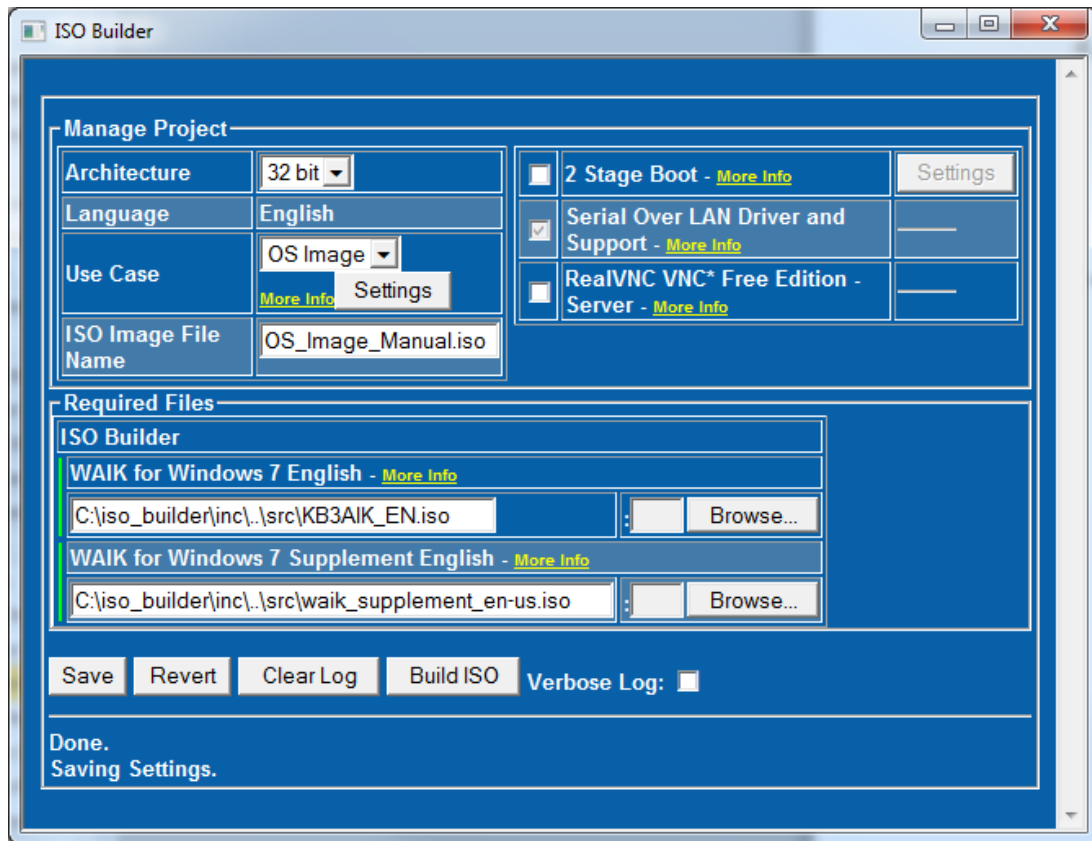


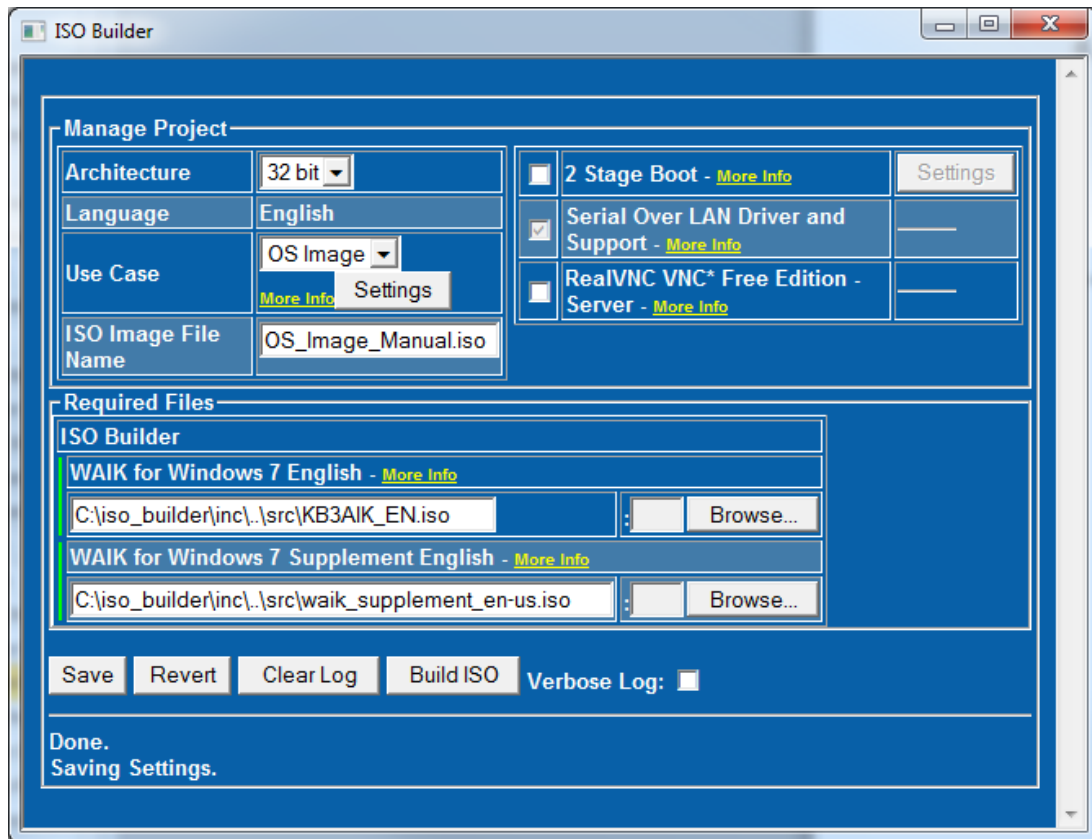
Figure 1: ISO Builder is Ready for Use





4. Figure 2):

- 2 stage boot : Not Selected
- Serial Over LAN Driver and Support. : **Selected**
- RealVNC VNC Free Edition – Server : **Not Selected**
- Use Case : Select **OS Image**
- ISO Image File Name : **OS\_Image\_Manual.iso**



**Figure 2: ISO Builder Settings**

5. Click **Save**.
6. Under OS Image, click **Settings**.

7. Set as follows (Figure 3):
- Capture or Apply : Choose on Boot
  - All other fields may be left blank. Any blank field will be prompted for after the Recovery OS boots.

Settings		
Capture or Apply	Choose on Boot ▾	Will this ISO capture the OS image or Apply the OS Image.
UNC Path to Image		Uniform Naming Convention (UNC) path to the share, including the image name, where the image is stored. Use .wim as the file extension. E.G., \\dc1.vprodemo.com\private\os_images\os_image.wim
User Name		User Name with access to the share. For applying, only read access is required. E.G., itproadmin
Domain		Domain where user account resides. E.G., vprodemo.com.
Password		Password for the user listed above.
Warn Before Formatting	Yes ▾	Optionally display console message before hard drive is repartitioned and formatted.
Force Hard Drive Repartition	No ▾	Force a repartition of the local hard drive. This will reset existing hard drive partitions.
Partition Size	50 GB ▾	Choose the size of the first partition.

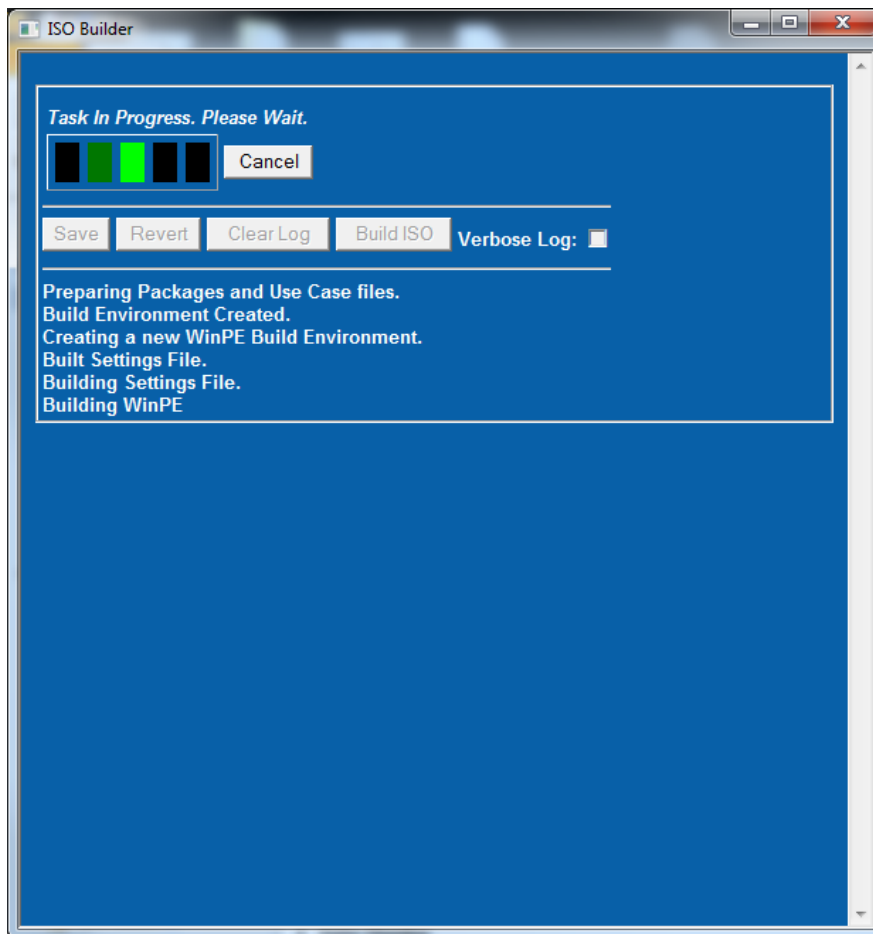
Required Files

Save Revert Clear Log Close

**Figure 3: Settings Screen**

8. Click **Save**.
9. Click **Close**.

10. On the main ISO Builder screen, click **Build ISO**. At this point, ISO Builder will create an ISO file. A log is shown under the tool's buttons. If there is an error, check the log. Also, the log may be made more verbose by selecting **Verbose Log** prior to clicking **Build ISO**.



**Figure 4: ISO Builder Builds the ISO File**

11. When the process completes, the form returns and the ISO image may be found in c:\ISO\_Builder\OS\_Image\_Manual.iso. This is your recovery OS.

### 3.6.4 Capture the Fresh OS Image to the Share

1. Burn the OS\_Image\_Manual.iso file to a CD.
2. Turn on the reference computer, insert the CD you created in the previous step, and perform actions required to boot the PC from the CD.

**Note:** do NOT allow the PC to boot to its hard disk. Otherwise the Sysprep seal will be broken and you will have to perform the sysprep steps again.

After the PC boots, you are prompted with the OS Image settings page:

Settings		
Capture or Apply	Choose on Boot	Will this ISO capture the OS image or Apply the OS Image.
UNC Path to Image		Uniform Naming Convention (UNC) path to the share, including the image name, where the image is stored. Use .wim as the file extension. E.G., \\dc1.vprodemo.com\private\os_images\os_image.wim
User Name		User Name with access to the share. For applying, only read access is required. E.G., itproadmin
Domain		Domain where user account resides. E.G., vprodemo.com.
Password		Password for the user listed above.
Warn Before Formatting	Yes	Optionally display console message before hard drive is repartitioned and formatted.
Force Hard Drive Repartition	No	Force a repartition of the local hard drive. This will reset existing hard drive partitions.
Partition Size	50 GB	Choose the size of the first partition.
Required Files		
<input type="button" value="Save"/> <input type="button" value="Revert"/> <input type="button" value="Clear Log"/> <input type="button" value="Close"/>		

**Figure 5: OS Image Settings Page**

3. Set as follows:

Capture or Apply : **Capture**

UNC Path to Image: \\<name or IP of the Help Desk Console>  
**\OS\_Image\Win7.wim**

(Note: at this point you are naming your image file. In this example, it will be named Win7.wim. If you would like it in a sub directory you can add directory names into the path. Folders will be created if they do not exist.)

User Name: **OSCapture**

Domain: <name or IP of the Help Desk Console>

Password: <Password you assigned> (In the lab example, we use P@ssw0rd).

4. Click **Save and Run**. The OS image will be created and saved on the network share.
5. When completed, click **OK** to the reboot prompt.
6. Type **exit <return>** at the command prompt to reboot the PC. Or, just power the PC off.

## 3.6.5 Setup the Service Desk Console

### 3.6.5.1 Gather and Install Required Files

On the Service Desk Console PC, do the following:

1. Copy OS\_Image\_Manual.iso to c:\ISOs\.

RealVNC VNC Viewer Plus is used to monitor the Reimage Process. Although not covered in this document, you may use alternate KVM Remote Control software for this purpose.

2. Download and install RealVNC's VNC Viewer Plus:

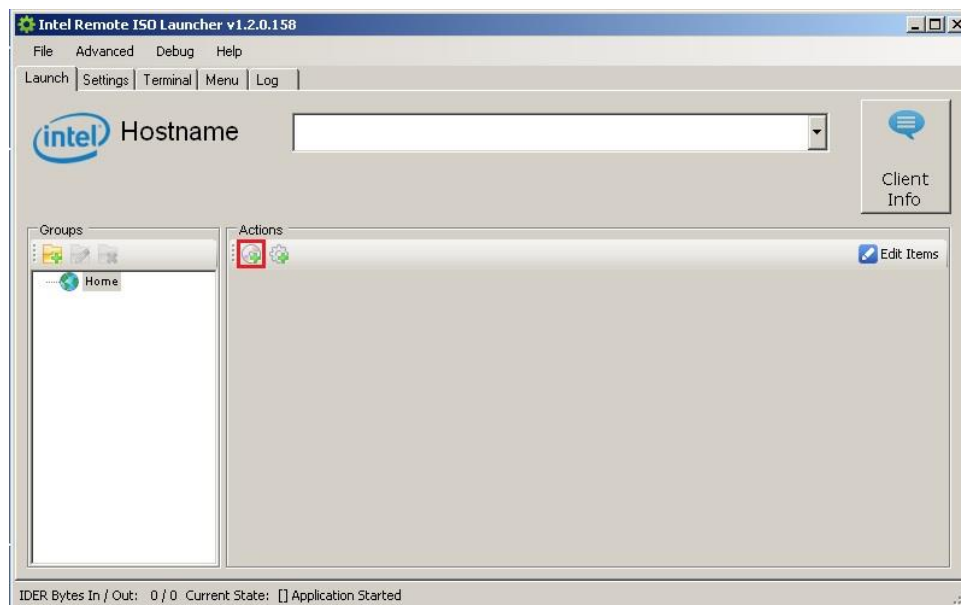
<http://www.realvnc.com/products/viewerplus/index.html>

RIL is used to perform the IDE Redirection process. It also provides automation support. Although not covered, other IDE-R capable software may be used.

3. Download Remote ISO Launcher (RIL):

[http://downloadcenter.intel.com/Detail\\_Desc.aspx?agr=Y&DwnldID=20961&lang=eng&OSVersion=&DownloadType=](http://downloadcenter.intel.com/Detail_Desc.aspx?agr=Y&DwnldID=20961&lang=eng&OSVersion=&DownloadType=) .

4. Extract the RIL files to **c:\RIL**.
5. Launch RIL by double clicking on **c:\RIL\RemoteISOLauncher.exe**.
6. Click the CD icon.



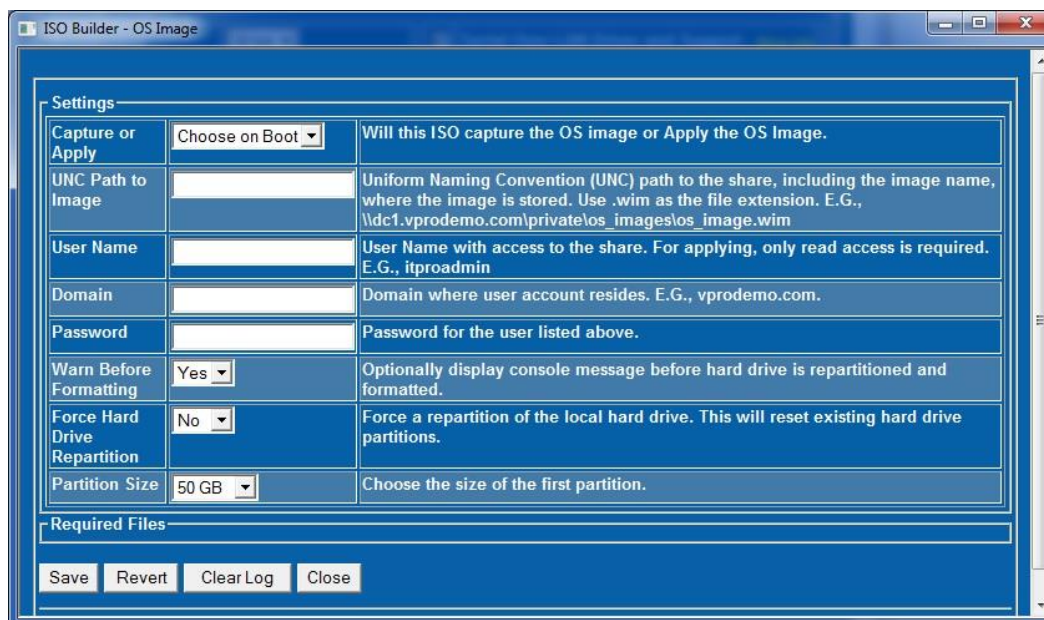
**Figure 6: CD Icon on RIL Interface**

7. Type in a friendly name such as "OS Reimage".
8. Click **Browse**.
9. Select c:\ISOs\OS\_Image\_Manual.iso.
10. Click **Open**.
11. Check the box titled "Reset boot path after launch".
12. Click Optionally select a color for the button.
13. Click **Save**.
14. Close RIL, and save settings when prompted.
15. Optionally create a desktop shortcut to **c:\RIL\RemoteISOLauncher.exe**.

### 3.6.6 Perform a Remote OS Reimage

1. Open VNC Viewer Plus.
2. Enter the IP address of the remotely managed Intel vPro technology based system.
3. Set Connection mode to Intel AMT.
4. Set Encryption to None.
5. Click **Connect**.
6. Click **Yes** to "Is <computer> the expected fully-qualified domain name of <ip>".
7. Enter your Intel AMT Admin credentials and click **OK**.
8. Enter a **User Consent Code** if prompted.
9. You can now interact remotely with the managed PC.
10. Open RIL.
11. In the host name, enter the IP address or FQDN.
12. Select the **Settings** tab.
13. Enter authentication for username and password to Intel AMT.
14. Select the **Launch** tab.
15. Click the **OS Reimage** button in the boot image section.
16. Click **OK** to the warning ("Warning, you are about to reboot the remote machine. If the remote user has any unsaved work it may be lost.").
17. The managed client reboots to the Recovery OS.

18. Upon completion, the managed PC shows the OS Image settings screen (below). Using VNC Viewer Plus, interaction is performed remotely. **Note:** if the VNC session has timed out, simply reconnect.



**Figure 7: OS Image Settings Screen**

19. Set as follows:

- Capture or Apply : **Apply**
- UNC Path to Image: **\\<name or IP of the Help Desk Console>\OS\_Image\Win7.wim**
- User Name: **OSDeploy**
- Domain: **<name or IP of the Help Desk Console>**
- Password: **<Password you assigned>**. (For lab use, we use P@ssw0rd).
- Warn Before Formatting: **<as desired>**. **Note:** this will cause a prompt just prior to performing the hard drive repartition and format. This gives a last chance to opt out before any data on the drive is erased.
- Force Hard Drive Repartition: **<as desired>**. **Note:** If the hard disk has a primary partition named Windows and a Secondary partition named Data, the default action is to leave the Data partition intact. Setting this option to Yes will cause the Data partition to be recreated.
- Partition Size: **<as desired>**. **Note:** This is the size of the first partition (Windows). The second partition (Data) uses the remaining space on the drive. **Note:** if this is set to All, a second partition is not created.

20. Click **Save** and **Run**.

At this point, the managed PC will apply the fresh OS image located at the UNC path listed above. This includes (re)partitioning and formatting the hard drive and applying boot loader files. Upon completion, the PC will reboot and continue with the



Windows 7 out of box experience process. Interact with this process and perform and customization remotely through RealVNC VNC Viewer Plus as needed. Specific steps are not provided.

## 3.6.7 Other Recommendations

This section provides alternative methods that may be helpful in improving solution performance.

### 3.6.7.1 Presetting the Recovery OS

Up to now, the recovery OS has asked for settings once it finished booting. It is possible to preset these settings during the ISO build process. Follow steps in section 3.6.3.2 to view these settings. As long as all settings are filled in, the Recovery OS will not prompt for settings. There are a couple considerations.

First, the credentials for OS Reimaging, including the password, are stored in clear text in the ISO Builder settings files and in the Recovery OS itself. In order to limit vulnerability, it is recommended that this user account have read only access to the OS\_image share, and no other access. This way, if the credentials are compromised, the only compromised files are those stored in the OS\_Image share. Another option is to fill all information except the user credentials. Then during use the Service Desk Technician can enter the credentials. In this way the credentials are not stored. However, all Service Desk Technicians who will use the account must know these credentials.

Another consideration is the Warn Before Formatting option. If this is set to **Yes**, the Recovery OS will prompt before formatting. Thus, the process will require interaction, despite having all values set.

### 3.6.7.2 Two Stage Boot

When possible, it is recommended to use two stage boot to speed the loading of the recovery OS. Two stage boot works by using an intermediary boot image. This image is very small and thus, boots quickly. Once this image is loaded, it handles booting of the recovery OS. The recovery OS can then be located on the managed PC's hard drive or on a nearby network share. This decreases overall boot time, speeding time to repair.

More information on Two stage boot can be downloaded here:

[http://downloadcenter.intel.com/Detail\\_Desc.aspx?agr=Y&DwnldID=20960&lang=eng&OSVersion=&DownloadType=](http://downloadcenter.intel.com/Detail_Desc.aspx?agr=Y&DwnldID=20960&lang=eng&OSVersion=&DownloadType=)

The following sections contain "quick start" steps to try two stage boot.

### 3.6.7.2.1 Two stage boot setup

On the Development PC, do the following:

1. Launch c:\iso\_builder\iso\_builder.vbs.
2. Select 2 stage boot.
3. Click Settings.
4. Complete the form as follows (shown in Figure 8 below).
  - Try Local Hard Drive: **Yes**
  - Image: **OS\_Image\_Manual.iso**
  - Try Network Resource: **Yes**
  - Take input from: **KVM Session**
  - Download Type: **Share Drive**
  - Username: **OSImage**
  - Password: **<Password you assigned above>**
  - Domain: **<IP or name of Service Desk PC>**
  - Path: **<IP or name of Service Desk PC>\os\_image**
  - Image: **OS\_Image\_Manual.iso**

**2 Stage Boot ISO Builder**

**Boot from Local Hard Drive**

Try Local Hard Drive: **Yes** Instructs first stage ISO to look for second stage image or tool on the managed client's hard drive (in the partition root). If bootable image not found, will default to network resource.

Image: **Image\_Manual.iso** File name of the second stage image or tool to boot (must be in partition root).

**Boot from Network Resource**

Try Network Resource: **Yes** Instruct first stage ISO to look for second stage image or tool on a network resource.

Take input from: **KVM Session** Specify where to take input from (SOL terminal, KVM session, or specify source at time of image load).

Download Type: **Share Drive** Web Server or Shared Drive.

Username: **OSImage** The user name that can log into the specified network resource where the second stage image file(s) reside. Only needs read access.

Password: **\*\*\*\*\*** The password for the specified user name.

Domain: **vprodemo.com** The Active Directory domain for the user. (e.g., vprodemo.com)  
Note: leave blank if there is no domain.

Path: **mo.com\os\_image** The share name and UNC path to the folder where the second stage image file(s) reside. (e.g., \\dc1.vprodemo.com\ider)

Image: **Image\_Manual.iso** The file name of the image file to boot in stage two.

**Save Settings** **Close**

**Figure 8: ISO Builder Settings for Two Stage Boot**

5. Click Save Settings.
6. Click **Close**.
7. In ISO Builder, click **Build ISO**.

Upon completion there are now two .iso files, OS\_Image\_Manual.iso, and ifast\_OS\_Image\_Manual.iso. The second one is the 2 stage boot image.

1. Copy **OS\_Image\_Manual.iso** to **c:\OS\_Image\** on the Service Desk Console PC.
2. Copy **OS\_Image\_Manual.iso** to **d:\** on the managed PC.
3. Copy **ifast\_OS\_Image\_Manual.iso** to **c:\ISOs\** on the Service Desk PC.
4. Reboot the managed PC via Windows Start menu after the copy is complete.

On the Service Desk PC, add a new button in RIL as outlined above. Name the button "OS Image via 2 Stage" and use c:\ISOs\ifast\_OS\_Image\_Manual.iso as the target ISO image.

### 3.6.7.2.2 Using Two Stage Boot

#### Local Boot Option

On the Service Desk PC, in Remote ISO Launcher, do the following:

1. Enter the IP address for the managed PC.
2. Click OS Reimage via 2 Stage.

The managed PC will boot the two stage boot ISO image. The image will scan the managed PC's hard drive for OS\_Image\_Manual.iso. Since it was placed there in the steps above, it will be found and booted. Note that if the image is not found, the network boot option will be tried next.

#### Network boot option

On the managed PC, do the following:

1. If needed, reboot the managed PC to Windows 7.
2. Delete d:\OS\_Image\_Manual.iso. When the delete is finished, reboot the managed PC via the Windows start menu.

On the Service Desk PC, in Remote ISO Launcher, do the following:

1. Enter the IP address for the managed PC.
2. Click OS Reimage via 2 Stage.

The managed PC will boot the two stage ISO image. The image will scan the managed PC's hard drive for OS\_Image\_Manual.iso. Since it was just deleted, it will not be found. Two stage boot will then boot a small Linux OS. This OS will map to the OS Image share, download OS\_Image\_Manual.iso to RAM, and reboot to OS\_Image\_Manual.iso.

### 3.6.7.3 Customize the OS Image

The instructions included here are generic. Each environment is different, with its own needs. By customizing the OS image to suite your needs up front, manual steps at OS reimage time are reduced. For example, install drivers and applications during steps in section 3.6.2.4. Other options include adding scripts to the image to do things like join an active directory domain.

#### **3.6.7.4 OS\_Image Share at network edge**

The OS Image is a large file. To decrease the time needed to apply the image, it should be stored at the network edge. This may be accomplished via DFS, or other means. Steps are not provided by this document. Rather, this is called out so it will be considered during planning for a final deployment.

## 4 Windows Deployment Services

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This section provides instructions on performing a remote OS re-image using Windows Deployment Services (WDS).

### 4.1 Overview

Windows Deployment Services (WDS) provides an easy method for managing and deploying OS images from a remote network location using PXE boot as a starting point. This allows for bare metal OS installs, as well as re-installs over the top of existing hard drives. WDS can also be incorporated with Microsoft Deployment Toolkit (MDT), and other OS deployment tools for added functionality. See WDS documentation for more details on WDS.

Intel vPro technology based systems can be used to perform a Windows install remotely. Below are basic steps to accomplish this use case. This includes a basic installation and setup of WDS for a Lite Touch OS Deployment, setting up a help desk console, and performing this use case. The section concludes with discussion of deploying this into a production environment.



#### **NOTE**

*This does not include backup up user data, installing OSs, customizing an installed OS, etc. While all this is possible, it is outside the scope of this document. See WDS documentation for more details.*

[http://technet.microsoft.com/en-us/library/cc772106\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/cc772106(WS.10).aspx)

## 4.2 Requirements

Network with DHCP Server	Document uses Windows 2008 R2 server
Active Directory	Document uses Windows 2008 R2 server
WDS	Document uses Windows 2008 R2 server
Service Desk Console	<ul style="list-style-type: none"> <li>Any PC with Microsoft Windows 7.</li> </ul> PC used by the Service Desk technician to remotely control the Knowledge Workers PC in the use case.
Managed Client with Intel vPro technology	<ul style="list-style-type: none"> <li>Intel AMT 6.0 or higher</li> <li>Intel Integrated Graphics</li> <li>Configured for non-TLS and Digest credentials.</li> </ul> This PC will have its OS reimaged during this use case. <b>Note:</b> Depending on your WDS setup, all data in this system will be erased. Use a non-critical system with non-critical data. <b>Note:</b> Kerberos credentials are supported but not shown in this document.

## 4.3 Set Up WDS

The following steps are derived from the WDS Documentation, and provided as a means of quickly getting up and running. Please refer to the WDS quick start guide for more details: [http://technet.microsoft.com/en-us/library/cc771670\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/cc771670(WS.10).aspx)

These steps were written using Windows Server 2008R2 Enterprise 64 bit. Adjust as needed for your specific configuration.

### 4.3.1 Gather Required Supporting Files

On the WDS Server, do the following:

#### **Win7 DVD**

Locate a Windows 7 installation DVD. It will be required for subsequent steps.

#### **WAIK**

On the WDS Server, click the link below to obtain the Windows Automated Installation Kit for Windows 7.

<http://www.microsoft.com/download/en/details.aspx?id=5753>

This results in an .iso file. Mount this .iso file (we suggest using Virtual CloneDrive for mounting .iso files) or burn it to a DVD and insert the DVD.

Install the WAIK with default options (select **Windows AIK Setup** from the CD's default GUI menu).

### WAIK SP1

Note, if you do not have a DVD with SP1, skip steps for installing WAIK SP1.

Download the WAIK for Windows 7 Supplement English

<http://www.microsoft.com/download/en/details.aspx?id=5188>

This results in an .iso file. Mount this .iso file (we suggest using Virtual CloneDrive for mounting .iso files) or burn it to a DVD and insert the DVD.

Open a command prompt as administrator and run xcopy <drive>:\ "C:\Program Files\Windows AIK\Tools\PETools" /ERDY, where <drive>: is the drive letter representing WAIK SP1.

## 4.3.2 Install WDS

On WDS server, do the following:

1. Ensure the service is joined to the domain.
2. Click Start -> Programs -> Administrative Tools -> Server Manager.
3. Expand Server Manager -> Roles and select Roles.
4. Click Add Roles.
5. On the Before You Begin screen click **Next**.
6. Select Windows Deployment Services and click **Next**.
7. On the Overview of Windows Deployment Services click **Next**.
8. On the Select Role Services screen click **Next**.
9. On the Confirm Installation Selections screen click **Install**.
10. On the Installation Results screen click **Close**.
11. Close the Server Manager Window.

## 4.3.3 Configure WDS

On WDS Server, do the following:

1. Click Start -> Programs -> Administrative Tools -> Windows Deployment Services.
2. Expand the Windows Deployment Services -> Servers -> <Your WDS Server> tree and select <Your WDS Server>.
3. Right-click <Your WDS Server> and select Configure Server.
4. On the Before You Begin screen, ensure the requirements listed are met. Then click **Next**.
5. On the Remote Installation Folder Location screen, leave defaults and click **Next**.
6. If a "System Volume Warning" appears, click **Yes**.
7. On the PXE Server Initial Settings screen, select **Respond to all client computers (known and unknown)** and click **Next**.
8. Deselect Add Images to the server now and click Finish.

### 4.3.4 Add OS Image

On WDS Sever, do the following:

1. Insert your Windows 7 DVD into the WD Server.
2. On the Windows Deployment Services screen, expand Windows Deployment Services -> Servers -> <Your WDS Server> -> Install Images.
3. Right-click Install Images and select Add Install Image.
4. On the Image Group screen, click **Next**.
5. On the File Location screen, enter <drive>:\sources\install.wim where <drive>: is the drive representing the Windows 7 DVD.
6. On the Available Images screen, click **Next**.
7. On the Summary screen, click **Next**.
8. When the task completes, click **Finish**.

### 4.3.5 Add Boot Image

On WDS Sever, do the following:

1. Insert your Windows 7 DVD into the WD Server.
2. In Windows Deployment Services window, expand Windows Deployment Services -> Servers -> <Your WDS Server> -> Boot Images.
3. Right-click **Boot Images** and select **Add Boot Image**.
4. On the File Location screen, enter <drive>:\sources\boot.wim where <drive>: is the drive representing the Windows 7 DVD.
5. On the Image Metadata screen, click **Next**.
6. On the Summary screen, click **Next**.
7. When the task completes, click **Finish**.

### 4.3.6 Add Drivers

The WDS manages drivers for the target systems. As such, any drivers may be added. However, the LAN and MEI drivers are required for WDS to be successful. On the Server running WDS.

1. Copy the LAN Driver pack and MEI Driver pack from this UCRD's download file to **c:\drivers\**.
2. In the Windows Deployment Services window, expand Windows Deployment Services -> Servers -> <your WDS Server> -> drivers.
3. Right-click **Drivers** and select **Add Driver Package**.
4. Click **Browse**.
5. Browse to c:\drivers\LAN\PRO1000\Win32\NDIS62 and select e1c6232.inf.
6. In the remaining screens, click **Next** to accept defaults; click **Finish** in the final screen.



7. Repeat steps 4– 6 for the following:
  - c:\drivers\LAN\PRO1000\Win32\NDIS62\e1k6232.inf
  - c:\drivers\LAN\PRO1000\Winx64\NDIS62\e1c62x64.inf
  - c:\drivers\LAN\PRO1000\Winx64\NDIS62\e1k62x64.inf
  - c:\drivers\MEI\8\MEI\heci.inf
  - c:\drivers\MEI\7\MEI\heci.inf
  - c:\drivers\MEI\6\MEI\heci.inf
8. Click **Boot Images** in the navigation tree.
9. Right-click the boot image added above and choose **Add Driver Package to Image**.
10. Click **Next**.
11. Click Search for Packages.
12. If your image is a 32 bit image, deselect all but the following:
  - e1c6232.inf
  - e1k6232.inf
  - heci.inf (all instances)
13. If your image is a 64 bit image, deselect all but the following:
  - e1c62x64.inf
  - e1k62x64.inf
  - heci.inf (all instances)
14. Click **Next**, then click **Next** again.
15. Wait for the process to complete and click **Finish**.

The WDS boot image now contains LAN drivers for Intel vPro systems with Intel AMT 6 and 7.

### 4.3.7 Configure DHCP Server

PXE works by booting to the server and image file listed in DHCP options 66 and 67 respectively. The following instructions step through this configuration for a DHCP Server in Windows 2008R2. Adjust these steps based on your DHCP server.

On the DHCP Server, do the following:

1. Click Start -> Programs -> Administrative tools -> DHCP.
2. Expand DHCP -> <your DHCP Server> -> IPv4 -> <scope vPro is using> -> Scope Options.
3. Right-click Scope Options and select Configure Options.
4. In the General tab, scroll down to and select **066 Boot Server Host Name**. For **String Value** set the FQDN of your WDS Server.
5. In the General tab, scroll down and select **067 Boot File Name**. For **String Value** enter **boot\x86\wdsnbp.com**.
6. Click **OK**.

At this point WDS is ready to perform OS Deployments that are initiated locally by booting to PXE. See WDS documentation for more details.

### 4.3.8 Create an WDSUnattend.xml for a basic unattended install



#### NOTE

*This step is not strictly required. However, it will further automate the install of Windows 7, including hard disk partitioning. If you skip this step, it is highly recommended that Windows be installed to the first partition of the hard disk. If it is not installed to the first partition, the "use data backup" task sequence in the MDT section will not work.*

1. Insert the Windows 7 SP1 installation DVD used above.
2. To open Windows SIM, click Start, click All Programs, click Microsoft Windows AIK, and then click Windows System Image Manager.
3. On the Windows SIM **File** menu, click **Select Windows Image**.
4. In the **Select a Windows Image** dialog box, navigate to <DVD drive>:\sources\Install.wim, and then click **Open**.  
You will be prompted to select an image. Choose the Windows image that you want to install, and then click **OK**.  
You will be prompted to create a catalog file. Click **Yes** to generate the file.  
If you are prompted to approve the program by a **User Account Control** window, you can select to allow the program or cancel the installation.
5. On the **File** menu, click **New Answer File**. An empty answer file appears in the **Answer File** pane.
6. In the Windows SIM **Windows Image** pane, expand the **Components** node to display available settings.
7. On the expanded list of components, add the components in the table below to your answer file by right-clicking the component, and then selecting the appropriate configuration pass. This action adds the component to your answer file in the specified configuration pass, or phase, of Windows installation.

Component	Configuration pass
Microsoft-Windows-International-Core-WinPE\SetupUILanguage	<b>windowsPE</b>
Microsoft-Windows-Setup\DiskConfiguration\Disk\CreatePartitions\CreatePartition	<b>windowsPE</b>
Microsoft-Windows-Setup\DiskConfiguration\Disk\ModifyPartitions\ModifyPartition	<b>windowsPE</b>
Microsoft-Windows-Setup\WindowsDeploymentServices\ImageSelection\InstallTo	<b>windowsPE</b>

For more information on Windows 7 configuration passes:

[http://technet.microsoft.com/en-us/library/dd744341\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/dd744341(WS.10).aspx)

8. All of the settings you added must appear in the Windows SIM **Answer File** pane. In the far right pane, under **Settings**, select the appropriate setting and, in the right-hand column, enter the appropriate value as specified in the following table.

1 WindowsPE	Microsoft-Windows-International-Core-WinPE	InputLocale = en-US SystemLocale = en-US UILanguage = en-US UserLocale = en-US
1 WindowsPE	Microsoft-Windows-International-Core-WinPE\SetupUILanguage	UILanguage = en-US
1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration	WillShowUI = OnError
1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration\Disk	DiskID = 0 WillWipeDisk = true
1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration\Disk\CreatePartitions\CreatePartition	Order = 1 Extend = true Type = Primary
1 WindowsPE	Microsoft-Windows-Setup\DiskConfiguration\Disk\ModifyPartitions\ModifyPartition	Active = true Format = NTFS Label = Windows Order = 1 PartitionID = 1
1 WindowsPE	Microsoft-Windows-Setup\WindowsDeploymentServices\InstallT0	DiskID = 0 PartitionID = 1

These settings outline a basic WDS unattended installation, including hard disk partitioning. Optionally, other settings may be added. See [http://technet.microsoft.com/en-us/library/cc771830\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/cc771830(WS.10).aspx) for more details.

1. Validate and Save Settings by In Windows SIM, click **Tools**, and then click **Validate Answer File**. The setting values in the answer file are compared with the available settings in the Windows image.
2. If the answer file validates successfully, a "No warnings or errors" message appears in the **Messages** pane at the bottom of the **Windows SIM** window. Otherwise, error messages appear in the **Messages** pane.
3. If an error occurs, double-click the error message in the **Messages** pane to navigate to the incorrect setting. Change the setting to fix the error, and then validate again by clicking **Validate Answer File**. Repeat this step until the answer file validates.
4. On the File menu, click Save Answer File. Save the answer file as c:\RemoteInstall\WdsClientUnattend\WDSunattend.xml.

You now have a basic answer file that automates Windows Setup from WDS. Now configure WDS to use it.

1. In the Windows Deployment Services window, expand Windows Deployment Services -> Servers -> <your WDS Server>.
2. Right-click on the WDS server and choose **Properties**.
3. Click the Client tab.
4. Select Enable unattended installation.
5. In the row matching the Windows 7 DVD architecture click **Browse...**
6. Navigate to c:\RemoteInstall\WdsClientUnattend\WDSunattend.xml and click Open.
7. Click **OK**.

## 4.4 Remote OS Image from the Service Desk Console

At this point WDS is ready to perform OS Deployments that are initiated locally by booting to PXE. However, this use case is about performing the OS Deployment remotely. These steps get the service desk console ready for that task.

There are two alternative methods to start the process remotely. The first uses Intel vPro technology's KVM Remote Control feature to initiate a PXE boot. The second uses WDS Discovery Media with Intel vPro technology's IDE Redirection.



### NOTE

*Before proceeding, decide whether you wish to perform method 1, KVM Remote Control and PXE boot (section 4.4.1) or method 2, WDS Discovery Media with IDE-R (section 4.4.3).*

### 4.4.1 Method 1 Overview- KVM Remote Control and PXE Boot

The following high level steps are described in detail in section 0 below.

1. Install RealVNC VNC Viewer Plus.
2. Connect to the managed client PC.
3. Reboot the managed client PC.
4. Press BIOS keys required to trigger a PXE boot.
5. Press F12 to trigger WDS.
6. Interact with WDS's OS install process via KVM Remote Control.

## 4.4.2 Perform Method 1

On the Service Desk Console, do the following:

If needed, install RealVNC VNC Viewer Plus:

<http://www.realvnc.com/products/viewerplus/index.html>

1. Open VNC Viewer Plus.
2. These steps are optional. They will prevent the VNC session from timing out.
  - Click **Options**.
  - Click **Advanced**.
  - Select the Expert tab.
  - Set **AMTSessionTimeout** to **0**.
  - Click **OK**.
3. Enter the IP address of the remotely managed client PC.
4. Set Connection mode to Intel AMT.
5. Set Encryption to None.
6. Click **Connect**.
7. If prompted, Click **Yes** to "Is <computer> the expected fully-qualified domain name of <ip>?"
8. Enter your Intel AMT Admin credentials and click **OK**.
9. Enter a **User Consent Code** if prompted.
10. You can now interact remotely with the managed PC.
11. Move the mouse to the top center of the window. A menu will drop down.
12. Click the Power button (red circle).
13. Click **Reset**.
14. With **Boot to OS** selected, click **Reset**.
15. As the managed client PC goes through BIOS post, press key strokes to trigger a network boot. These key strokes vary by system. Check with system documentation for details. Here are two examples:

On a Lenovo T420:

- Press <Enter>
- When a boot menu appears, press F12 to select a temporary boot device
- From the Boot menu, select PCI LAN: IBA... and press <Enter>

On an Intel DQ67EP motherboard:

- Press F12 for network boot

**Note:** If network boot is not listed, it must be enabled in BIOS. This can also be performed from the KVM Remote Control session. See the system vendor's documentation for the steps required to perform this action.

16. As WDS boots, it will prompt to "Press F12 for network boot". Press F12 now.
17. If prompted, select the boot image added above.

From here, the managed client PC will boot the WDS boot image. Since KVM Remote Control is connected, any required interaction can take place remotely. Any automation provided with WDSUnattend.xml will take place automatically.

**NOTE**

*By default, Windows 7 installs with a 100 MB partition for recovery operations. This partition makes remote deployment and recovery more challenging. Specifically, this will cause the Microsoft Deployment Toolkit task sequence for User Data Back to fail. If you did not use the WDSUnattend.xml file above, avoid the 100 MB partition do the following:*

1. *When booted to WDS media press <Shift> - <F10> at the same time.*
2. *A command prompt opens.*
3. *Use diskpart to create and format a single partition that fills the hard drive.*
4. *Type exit to close the command prompt*
5. *Continue with WDS install and install to the partition created above.*

### 4.4.3 Method 2 Overview – WDS Discovery Media with IDE-R

The following high level steps are described in detail in section 4.4.4 below.

1. Create Discovery Media.
2. Install RealVNC VNC Viewer Plus, RIL, and 2 stage boot.
3. Connect to the managed client PC.
4. Reboot the managed client PC to Discovery Media.
5. Interact with WDS's OS install process via KVM Remote Control.

### 4.4.4 Perform Method 2

#### 4.4.4.1 Setup a share for 2 stage

Now create a share to store the Discovery Media. This is used by the 2 stage boot process to boot the media remotely.

1. Create a folder **c:\2stage**.
2. Right-click and choose **Share with specific people**. Be sure an administrator account has at least read access and click **Share**.
3. When complete, click **Done**.

**NOTE**

*Discovery Media can be placed on any share, a web server, or even the managed client system's local hard drive for use with 2 stage boot. See 2 stage boot documentation for details.*

#### 4.4.4.2 Create the discovery media

On the Server with WDS, do the following:

1. Click Start -> Programs -> Administrative Tools -> Windows Deployment Services.
2. Expand Windows Deployment Services -> Servers -> <your WDS Server> -> Boot Images.
3. Right-click the boot image added above and click **Create Discover Image**.
4. In Location and file name, enter **c:\discover.wim**. In the WDS Server field, enter the IP address or FQDN of your WDS server. Click **Next**.
5. When the process completes, click **Finish**.



#### NOTE

*The following steps use the WAIK, as installed above.*

6. Right-click Start -> Programs -> Microsoft Windows AIK -> Deployment Tools Command Prompt and select Run as Administrator.
7. If your Windows 7 SP1 DVD is 32 bit, execute the following command:  
`copyype.cmd x86 c:\winpe\`
8. If your Windows 7 SP1 DVD is 64 bit, execute the following command:  
`copyype.cmd amd64 c:\winpe\`
9. Execute the following commands:  
`copy /y c:\discover.wim c:\winpe\iso\sources\boot.wim`  
`del /f c:\winpe\iso\boot\bootfix.bin`  
**Note:** removing this file removes the "Press Any Key to Continue" message.  
`oscdimg -n -bc:\winpe\etfsboot.com c:\winpe\iso c:\2stage\discover.iso`

#### 4.4.4.3 Set Up the Service Desk Console

**RealVNC VNC Viewer Plus** is used to monitor the Reimage Process. Although not covered in this document, you may use alternate KVM Remote Control software for this purpose.

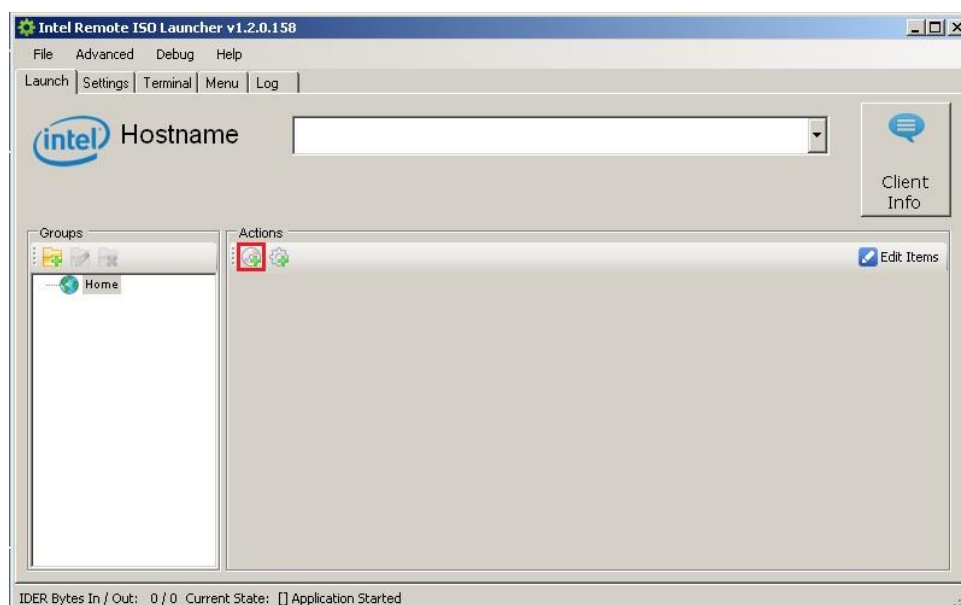
**2 stage boot** is used to speed the remote booting process.

**Remote ISO Launcher (RIL)** is used to perform the IDE Redirection process. It also provides automation support.

On the Service Desk Console, install VNC Viewer Plus, 2 Stage Boot, and RIL by performing the following steps:

1. Download and install RealVNC's VNC Viewer Plus:  
<http://www.realvnc.com/products/viewerplus/index.html>

2. Download the 2 Stage Boot software and documentation from [http://downloadcenter.intel.com/Detail\\_Desc.aspx?agr=Y&DwnldID=20960&lang=eng&OSVersion=&DownloadType=](http://downloadcenter.intel.com/Detail_Desc.aspx?agr=Y&DwnldID=20960&lang=eng&OSVersion=&DownloadType=)
3. Extract to **c:\ifast**.
4. Run **c:\ifast\ifast.hta**.
5. Complete the form as desired. This document uses:
  - Try Local Hard Drive: **No**
  - Try Network Resource: **Yes**
  - Take Input From: **KVM Session**
  - Download Type: **Share Drive**
  - Username: **<itproadmin>**
  - Password: **<P@ssw0rd>**
  - Domain: **<IP of WDS>**
  - Path: **\\<IP of WDS>\2stage**
  - Image: **discovery.iso**
6. Click **Save**.
7. Click **Build ISO**. The file **c:\ifast\ifast.iso** is created.
8. Download Remote ISO Launcher (RIL):  
[http://downloadcenter.intel.com/Detail\\_Desc.aspx?agr=Y&DwnldID=20961&lang=eng&OSVersion=&DownloadType=](http://downloadcenter.intel.com/Detail_Desc.aspx?agr=Y&DwnldID=20961&lang=eng&OSVersion=&DownloadType=).
9. Extract the RIL files to **c:\RIL**.
10. Launch RIL by double clicking on **c:\RIL\RemoteISOLauncher.exe**.
11. Click the CD icon as shown below.



**Figure 9: CD Icon on RIL Interface**

12. Type in a friendly name such as "OS Reimage".



13. Click **Browse**.
14. Select c:\ifast\ifast.iso.
15. Click **Open**.
16. Check the box titled "Reset boot path after launch".
17. Click Optionally select a color for the button.
18. Click **Save**.
19. Close RIL, and save settings when prompted.
20. Optionally create a desktop shortcut to **c:\RIL\RemoteISOLauncher.exe**.

#### 4.4.4.4 Perform the Remote OS Install

1. Open VNC Viewer Plus.
2. These steps are optional. They will prevent the VNC session from timing out.
  - Click **Options**.
  - Click **Advanced**.
  - Select the Expert tab.
  - Set **AMTSessionTimeout** to **0**.
  - Click **OK**.
3. Enter the IP address of the remotely managed client system.
4. Set Connection mode to Intel AMT.
5. Set Encryption to None.
6. Click **Connect**.
7. If prompted, Click **Yes** to "Is <computer> the expected fully-qualified domain name of <ip>?"
8. Enter your Intel AMT Admin credentials and click **OK**.
9. Enter a **User Consent Code** if prompted.
10. You can now interact remotely with the managed PC.
11. This step is optional. It will ensure Windows is not forcefully shutdown. In the VNC Session, perform a graceful Windows shutdown.
12. Open RIL.
13. In the **Host Name** field, enter the IP address or FQDN of the managed client PC.
14. Select the **Settings** tab.
15. Enter authentication for username and password to Intel AMT.
16. Select the **Launch** tab.
17. Click the **OS Reimage** button in the boot image section.
18. If prompted, click **OK** to the warning ("Warning, you are about to reboot the remote machine. If the remote user has any unsaved work it may be lost.").
19. The managed client reboots first to **iFast.iso**, then to the Discovery Media on WDS.

From here, the managed client PC will boot the WDS boot image. Since KVM Remote Control is connected, any required interaction can take place remotely. Any automation provided with WDSUnattend.xml will take place automatically.

**NOTE**

*By default, Windows 7 installs with a 100 MB partition for recovery operations. This partition makes remote deployment and recovery more challenging. Specifically, this will cause the Microsoft Deployment Toolkit task sequence for User Data Back to fail. If you did not use the WDSUnattend.xml file above, avoid the 100 MB partition do the following:*

- 1. When booted to WDS media press <Shift> - <F10> at the same time.*
- 2. A command prompt opens.*
- 3. Use diskpart to create and format a single partition that fills the hard drive.*
- 4. Type exit to close the command prompt*
- 5. Continue with WDS install and install to the partition created above.*

## 4.5 Additional Considerations

### 4.5.1 Further Automation

Intel vPro technology is used to initiate a boot to WDS media remotely and to interactively monitor the OS install process. All other functions are handled by WDS. As such, any automation supported by WDS can be used remotely. While automating WDS is outside the scope of this document, here are some ideas:

- WDS can be integrated with MDT and Microsoft System Center Configuration Manager to aide in automation.
- Images can have unattend.xml files attached for auto-configuring Windows.
- WDS can capture gold images from existing computers for easier deployments.
- WDS can manage drivers for automatic installation into Windows.

The more automation, the less interaction is required from the help desk user.

#### 4.5.1.1 Boot to PXE in Intel vPro

Intel vPro technology has a feature by which a boot one time to PXE can be set without KVM interaction. This requires PXE to be enabled in BIOS and console application support. If a WDS install were fully automated, it would be possible to trigger a PXE boot that would then fully, automatically deploy Windows with no user interaction required.

### 4.5.2 Scalability

To scale to large deployments, multiple WDS servers may be configured. Consult WDS documentation for more information.

When using the WDS PXE method above, no adjustments are needed to support a multi-server configuration. WDS Discovery Media, however, takes a little more planning. The recommendation is to create a Discovery media and ifast.iso pair for

each server. Then, in RIL, add a button for each pair with a friendly name that denotes the server location. By doing so, a help desk technician can start the process using the server nearest to the managed client PC in need of service.

It is also recommended that you place the file discover.iso on a web server because downloading from a web server is usually faster than from a shared drive. See 2 stage boot documentation for a web server based setup.

Another consideration with WDS is its ability to do multicasting. This reduces network load when performing multiple OS deployments at once. Multicast will work when performing a remote deployment as described above. See WDS documentation for performing a multicast install.

## 5 Microsoft Deployment Toolkit

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This section provides instructions on performing a remote OS re-image using Microsoft Deployment Toolkit (MDT).

### 5.1 Overview

The Microsoft Deployment Toolkit provides an easy method for managing and deploying OS images, yet is very flexible allowing support for almost any situation. This includes the ability to perform OS imaging remotely on Intel vPro based managed systems. Below are basic steps to accomplish this use case. This includes a basic installation and setup of the MDT for a Lite Touch OS Deployment, setting up for capturing user data, setting up a help desk console, and performing this use case. The section concludes with discussion of deploying this into a production environment.

### 5.2 Requirements

Network with DHCP Server	
Reference Computer	<ul style="list-style-type: none"> <li>Intel AMT 6.0 or higher</li> </ul> <p>Used to create the fresh OS image. This PC will have a fresh copy of Windows 7 installed.</p> <p>For the purpose of the lab, this PC may also be used as the Managed Client with Intel vPro Technology.</p>
Service Desk Console	<ul style="list-style-type: none"> <li>Any PC with Microsoft Windows 7.</li> </ul> <p>Runs the MDT</p> <p>PC used by the Service Desk technician to remotely control the Knowledge Worker's PC in the use case.</p>
Target Computer / Managed Client with Intel vPro technology	<ul style="list-style-type: none"> <li>Intel AMT 6.0 or higher</li> <li>Intel Integrated Graphics</li> <li>Configured for non-TLS and Digest credentials.</li> </ul> <p>This PC will have its OS reimaged during this use case.</p> <p><b>Note:</b> Kerberos credentials are supported but not shown in this document.</p>

## 5.3 Setup Service Desk Console

In this section, the service desk console is configured, the MDT is installed, and all OS images are saved.

### 5.3.1 Gather Required Supporting Files

On the Service Desk Console, do the following:

#### **Win7 DVD**

Locate a Windows 7 installation DVD. It will be required for subsequent steps.

#### **WAIK**

On the Development PC, click the link below to obtain the Windows Automated Installation Kit for Windows 7.

<http://www.microsoft.com/download/en/details.aspx?id=5753>

This results in an .iso file. Mount this .iso file (we suggest using Virtual CloneDrive for mounting .iso files) or burn it to a DVD and insert the DVD.

Install the WAIK with default options (select **Windows AIK Setup** from the CD's default GUI menu).

#### **WAIK SP1**

**Note:** if you do not have a DVD with SP1, skip steps for installing WAIK SP1.

Download the WAIK for Windows 7 Supplement English

<http://www.microsoft.com/download/en/details.aspx?id=5188>

This results in an .iso file. Mount this .iso file (we suggest using Virtual CloneDrive for mounting .iso files) or burn it to a DVD and insert the DVD.

Open a command prompt as administrator and run `xcopy <drive>:\ "C:\Program Files\Windows AIK\Tools\PETools" /ERDY`, where <drive>: is the drive letter representing WAIK SP1.

### 5.3.2 Set Up MDT

The following steps are derived from the MDT documentation, and provided as a means of quickly getting up and running. Please refer to the MDT documentation for more details: Print-ready documentation is available at this link:

<http://www.microsoft.com/download/en/details.aspx?displaylang=en&=tm&id=25175>

These steps were written using Windows 7 SP1 Enterprise 64 bit and MDT 2010 Update1. Adjust as needed for your specific configuration.



#### **NOTE**

*The steps in the following subsections (5.3.2.x) are to be performed on the Service Desk Console.*

### 5.3.2.1 Install MDT

1. Download MDT 2010 Update 1. Be sure to get the appropriate version for the architecture of your Windows 7 installation, 32 bit or 64 bit:  
<http://www.microsoft.com/download/en/details.aspx?displaylang=en&tm&id=25175>
2. Install MDT with default options.

### 5.3.2.2 Create a Deployment Share

1. Open MDT Workbench by clicking Start -> Programs -> Microsoft Deployment Toolkit -> Deployment Work Bench.
2. In the navigation tree, right-click **Deployment Shares** and select **New Deployment Share**.
3. Complete the New Deployment Share Wizard with the default options. This results in a new folder named **c:\DeploymentShare**. It is shared as **DeploymentShare\$**.
4. Expand **Deployment Shares** and verify that MDT Deployment Share (c:\DeploymentShare) exists.

### 5.3.2.3 Configure the Deployment Share

In this step, default values for the deployment share UNC path are changed to use the FQDN, instead of just the system name.

1. In the Deployment Workbench, expand Deployment Workbench -> Deployment Shares -> MDT Deployment Share (c:\DeploymentShare).
2. Right-click MDT Deployment Share (c:\DeploymentShare) and click Properties.
3. Adjust the Network (UNC) path so that the FQDN of the Service Desk Console is used. For example: [\\dtools.ent.vprodemo.com\DeploymentShare\\$](\\dtools.ent.vprodemo.com\DeploymentShare$).
4. Click the Rules tab.
5. Click Edit Bootstrap.ini.
6. Notepad opens. Set the DeployRoot value so that the FQDN of the Service Desk Console is used. For example: [\\dtools.ent.vprodemo.com\DeploymentShare\\$](\\dtools.ent.vprodemo.com\DeploymentShare$).
7. Close Notepad. When prompted, save changes.
8. Click **OK**.

### 5.3.2.4 Add a Source OS

1. Insert your Windows 7 SP1 DVD Media.
2. In the Deployment Workbench, expand Deployment Workbench -> Deployment Shares -> MDT Deployment Share (c:\DeploymentShare) and select Operating Systems.
3. Right-click Operating Systems and select Import Operating System.
4. Select Full set of Source Files and click Next.
5. In the Source Directory screen, enter the drive letter that corresponds to the Windows 7 SP1 DVD. For example: **E:\**.
6. For the remaining screens, click **Next** to accept defaults; in the final screen click **Finish**.

### 5.3.2.5 Add Drivers for vPro LAN and MEI

The MDT manages drivers for the target systems. As such, any drivers may be added. However, the LAN drivers are required for this use case to be successful. These steps only cover adding the LAN Drivers. See the MDT documentation for more details on using MDT to manage and install drivers.

1. Copy the LAN Driver pack and MEI Driver pack from this UCRD's download file to **c:\drivers\**.
2. In the DeploymentWorkbench, expand Deployment Workbench -> Deployment Shares -> MDT Deployment Share (c:\DeploymentShare) and select Out-of-Box Drivers.
3. Right-click Out of Box Drivers and select Import Drivers.
4. In the Driver source directory screen, enter one of the following:
  - For a 32 bit source Windows 7 SP1 DVD:  
**c:\drivers\LAN\PRO1000\Win32\NDIS62**
  - For a 64 bit source Windows 7 SP1 DVD:  
**c:\drivers\LAN\PRO1000\Winx64\NDIS62**
5. Click **Next**.
6. For the remaining screens, click **Next** to accept defaults; in the final screen click **Finish**.
7. In the DeploymentWorkbench, expand Deployment Workbench -> Deployment Shares -> MDT Deployment Share (c:\DeploymentShare) and select Out-of-Box Drivers.
8. Right-click Out of Box Drivers and select Import Drivers.
9. In the Driver source directory screen, enter **c:\drivers\MEI\7\MEI**
10. Click **Next**.
11. For the remaining screens, click **Next** to accept defaults; in the final screen click **Finish**.
12. In the DeploymentWorkbench, expand Deployment Workbench -> Deployment Shares -> MDT Deployment Share (c:\DeploymentShare) and select Out-of-Box Drivers.
13. Right-click Out of Box Drivers and select Import Drivers.
14. In the Driver source directory screen, enter **c:\drivers\MEI\6\MEI**
15. Click **Next**.
16. For the remaining screens, click **Next** to accept defaults; in the final screen click **Finish**.

### 5.3.2.6 Add a Task Sequence for a Windows 7 Deployment

1. In the Deployment Workbench, expand **Deployment Workbench -> Deployment Shares -> MDT Deployment Share (c:\DeploymentShare)** and select **Task Sequences**.
2. Right-click **Task Sequences** and select **New Task Sequence**.
3. Set as follows:
  - Task Sequence ID: BASEW7SP1
  - Task Sequence Name: Base Windows 7 SP1 Install
4. Click **Next**.
5. Choose the Standard Client Task Sequence and click **Next**.
6. Select the OS Image you imported earlier and click **Next**.
7. You do not need to enter a serial number; click **Next**.
8. Set an Organization. This document uses **vprodemo**. Click **Next**.
9. Select Do not specify and Administrator Password at this time and click **Next**.
10. On the Summary screen, click **Next**.
11. When complete, click **Finish**.

### 5.3.2.7 Optionally add an application

This step is optional. It illustrates how to add an application like Notepad2 to be installed as part of the OS Deployment. See the MDT documentation for selecting specific applications for a specific deployment.

From <http://www.flos-freeware.ch/notepad2.html> download the x86 and x64 setup programs and save them to **c:\apps\notepad2\<arch>** where **<arch>** is x86 or x64. At the time of this writing the latest version is 4.2.25.

Once install package is obtained, command line parameters must be determined to perform a silent install. Sometimes this can be done by running the installer executable from a command line with the **/?** argument or by looking at the software's included documentation. In this case the command line we want is **Notepad2\_4.2.25\_<arch>.exe /SILENT**.



#### NOTE

*Write down the command line parameter information. It will be used later in this procedure.*

1. In the Deployment Workbench, expand **Deployment Workbench -> Deployment Shares -> MDT Deployment Share (c:\DeploymentShare)** and select **Applications**.
2. Right-click **Applications** and select **New Application**.
3. Select **Application with source files** and click **Next**.
4. Complete the form as follows:
  - Publisher: Flos Freeware
  - Application Name: Notepad2 x86



- Version: 4.2.25
  - Language: English
5. Click **Next**.
  6. For Source Directory enter **c:\apps\notepad2\x86**.
  7. Click **Next**.
  8. Click **Next**.
  9. For Command Line enter **Notepad2\_4.2.25\_x86.exe /SILENT**.
  10. Click **Next**.
  11. On the Summary screen, click **Next**.
  12. When complete, click **Finish**.
  13. Double-click the newly created application.
  14. Click the Details tab.
  15. Select This can only run on the specified client platforms.
  16. Select **All x86 Vista and Newer** (near the bottom of the list)
  17. Select **All x86 Pre-Vista** (near the bottom of the list).
  18. Click **OK**.
  19. Repeat this process for the x64 version of Notepad2.

### 5.3.2.8 Optionally add a custom script

This step is optional. While the default settings can get the job done in many cases, the MDT is highly customizable. This illustrates how to add a custom, post install script to the task sequence. See the MDT documentation for detailed information on adding custom scripts, task sequence steps, automating a Lite Touch Deployment, customizing the Lite Touch Wizard, etc.

This will execute a command to disable User Account Control, and then reboot the system so the change will take effect.

1. In the Deployment Workbench, expand **Deployment Workbench -> Deployment Shares -> MDT Deployment Share (c:\DeploymentShare)** and select **Task Sequences**.
2. Double-click **Base Windows 7 SP1 Install Properties**.
3. Click the Task Sequence tab.
4. In the navigation tree, expand **State Restore -> Custom Tasks** and select **Custom Tasks**.
5. Click **Add -> General -> Run Command Line**.
6. In Command Line, enter the following:
 

```
%windir%\System32\cmd.exe /c %windir%\System32\reg.exe ADD
HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\
System /v EnableLUA /t REG_DWORD /d 0 /f
```
7. Select **Custom Tasks**.
8. Click **Add -> General -> Restart Computer**.
9. Click **OK**.

### 5.3.2.9 Optionally add a task sequence to perform data backup

This step is optional. Using the task sequence created above will cause a new copy of Windows to be installed. In some scenarios, it is desirable to first capture any user data and OS settings and/or create a full computer backup before installing the new OS. To accomplish this goal on a system that will not boot into Windows, a custom task sequence must be created. If user data backup is not desired, skip these steps.



#### NOTE

*User data is backed up using the User State Migration Tool. Following these steps will use the default USMT configuration. See the MDT documentation for details on customizing user data backup with the USMT and for other options related to system backup and restore.*



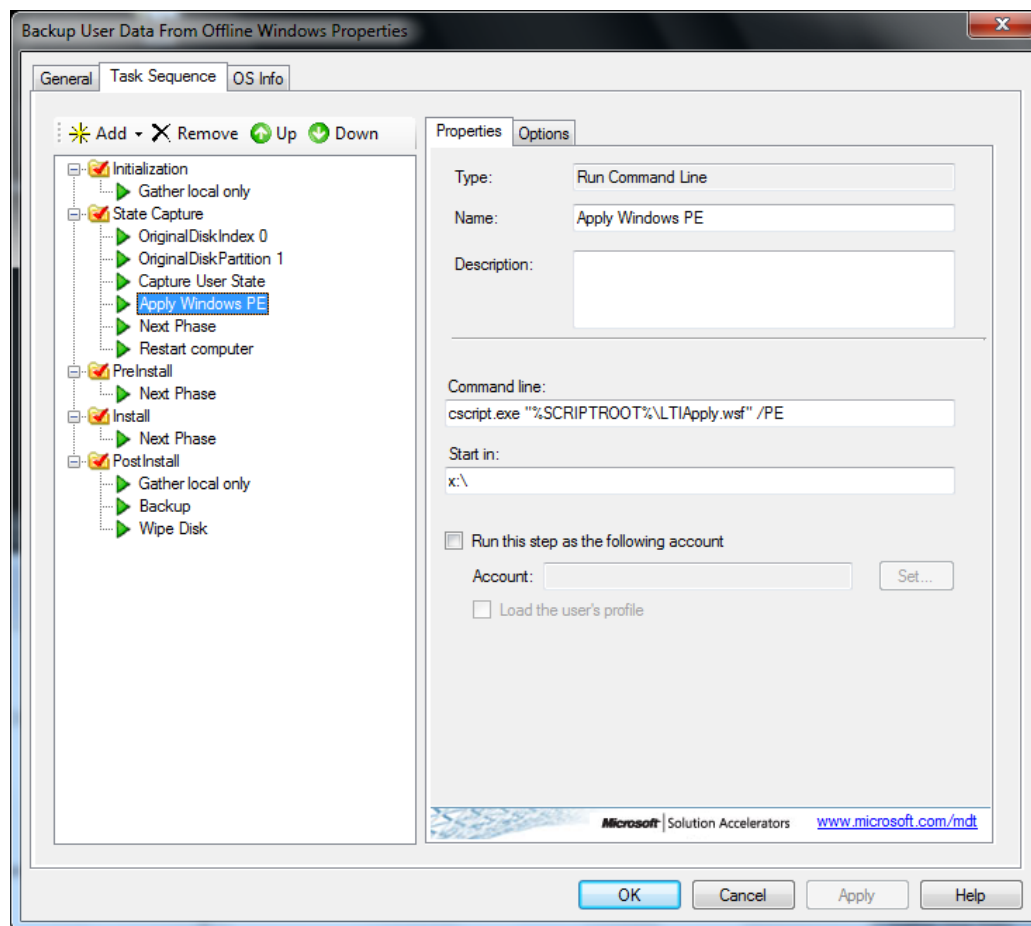
#### NOTE

*This task sequence is designed for use when Windows is installed on the first partition of the first hard drive in the system. When performing the initial OS install using the instructions in this document, this will be the case. However, when Windows 7 is installed manually with the default partition options the first partition will be a hidden, 100 MB partition. This will cause the task sequence below to fail. As such, it is recommended not to use the 100 MB partition. See the MDT and Microsoft Windows documentation for more details.*

1. In the Deployment Workbench, expand **Deployment Workbench -> Deployment Shares -> MDT Deployment Share (c:\DeploymentShare)** and select **Task Sequences**.
2. Right-click **Task Sequences** and select **New Task Sequence**.
3. Set an ID and Name. The document example uses:
  - **USERDATABACKUP** for **ID**
  - **Backup User Data From Offline Windows** for **Name**
4. Click **Next**.
5. For Template, select **Standard Client Replace Task Sequence** and click **Next**.
6. On the Summary screen, click **Next**.
7. Click **Finish**.
8. Double-click the new Task Sequence created above.
9. Click the Task Sequence tab.
10. From the navigation tree, select **State Capture**.
11. Click **Add -> General -> Set Task Sequence Variable**.
12. Set the new step as follows
  - Name: OriginalDiskIndex 0
  - Task Sequence Variable: OriginalDiskIndex
  - Value: 0
13. Click the **Up** button until this step is the first item under **State Capture**.

14. From the navigation tree, select **State Capture**.
15. Click **Add -> General -> Set Task Sequence Variable**.
16. Set the new step as follows:
  - Name: OriginalDiskPartition 1
  - Task Sequence Variable: OriginalDiskPartition
  - Value: 1
17. Click the **Up** button until this step is the second item under **State Capture**.
 

**Note:** these settings define from which hard drive and partition user data and settings backed up. These settings work for the default partition scheme used by MDT. These match the default MDT hard drive partitioning scheme, adjust these values as needed.
18. Select **Capture Groups** and click **Remove**.
19. Select **Apply Windows PE**.
20. Enter **x:\** in the **Start in:** field, as shown in Figure 10 below.



**Figure 10: Task Sequence Screen**

21. Click **OK**.

Now create a share to store any data that is backed up.

1. Create a folder **c:\migdata**.
2. Right-click and choose share with specific people. Be sure an administrator account has read/write access and click **Share**.
3. When complete, click **Done**.



#### NOTE

*Consult the MDT documentation for details on setting security on this share as well as for space requirements planning.*

### 5.3.2.10 Create the LiteTouch bootable media

1. In the Deployment Workbench, expand **Deployment Workbench -> Deployment Shares** and select **MDT Deployment Share (c:\DeploymentShare)**.
2. Right-click **MDT Deployment Share (c:\DeploymentShare)** and select **Update Deployment Share**.
3. Select **Completely regenerate the boot images**.
4. On the Summary screen, click **Next**.
5. When complete, click **Finish**.

### 5.3.3 Additional Work for Remote Use

At this point, the LiteTouch bootable media could be burned to a disk and then used to start and complete an OS deployment. However, this use case is about performing the OS Deployment remotely. These steps get the service desk console ready.

**RealVNC VNC Viewer Plus** is used to monitor the Reimage Process. Although not covered in this document, you may use alternate KVM Remote Control software for this purpose.

**ISO Builder** helps create WinPE ISO images for Remote use. In this case it's used to create new lite touch media that does not ask to "Press Any Key to Boot".

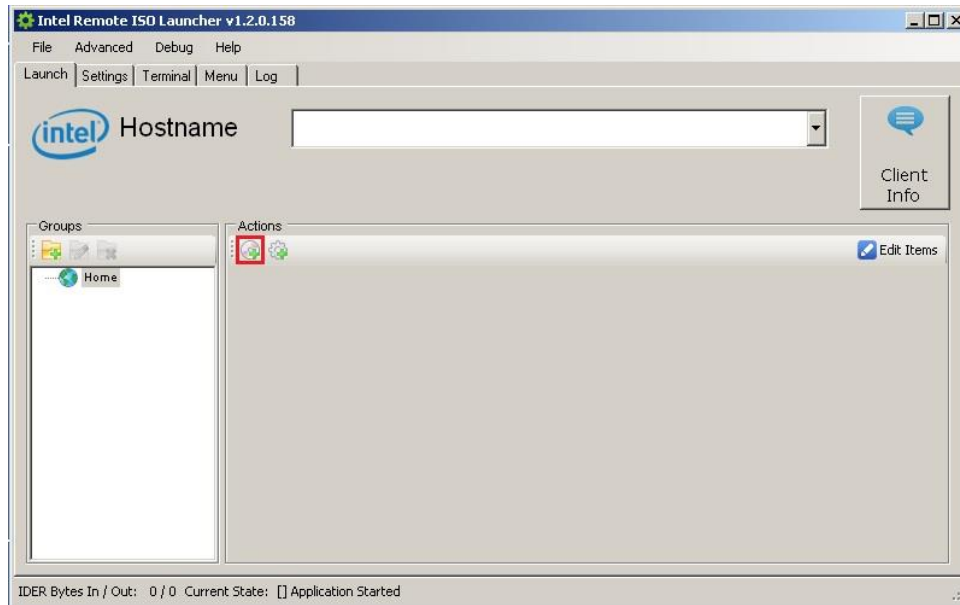
**2 stage boot** is used to speed the remote booting process.

**Remote ISO Launcher (RIL)** is used to perform the IDE Redirection process. It also provides automation support.

On the Service Desk Console, perform the following steps to install VNC Viewer Plus, ISO Builder, 2 stage boot, and RIL.

1. Download and install RealVNC's VNC Viewer Plus:  
<http://www.realvnc.com/products/viewerplus/index.html>
2. Included with this document is the ISO\_Builder package. Copy it to c:\ISO\_Builder

3. Drag and drop **c:\DeploymentShare\boot\LiteTouchPE\_x86.iso** onto **c:\ISO\_Builder\no\_pak.bat**. This will create **c:\DeploymentShare\boot\LiteTouchPE\_x86.iso.no\_pak.iso**.
4. Repeat step 3 for **c:\DeploymentShare\boot\LiteTouchPE\_x64.iso**.
5. Download 2 stage boot from [http://downloadcenter.intel.com/Detail\\_Desc.aspx?agr=Y&DwnldID=20960&lang=eng&OSVersion=&DownloadType=.](http://downloadcenter.intel.com/Detail_Desc.aspx?agr=Y&DwnldID=20960&lang=eng&OSVersion=&DownloadType=_.)
6. Extract to **c:\ifast**.
7. Run **c:\ifast\ifast.hta**.
8. Complete the form as desired. This document uses:
  - Try Local Hard Drive: **No**
  - Try Network Resource: **Yes**
  - Take Input From: **KVM Session**
  - Download Type: **Share Drive**
  - Username: **<itproadmin>**
  - Password: **<P@ssw0rd>**
  - Domain: **<IP of Service Desk>**
  - Path: **\\<IP of Service Desk>\DeploymentShare\$\boot**
  - Image: **LiteTouchPE\_<arch>.iso.no\_pak.iso**. Note: Be sure **<arch>** matches the architecture of your Windows 7 install.
9. Click **Save**.
10. Click **Build ISO**. The ISO file **c:\ifast\ifast.iso** is created.
11. Download Remote ISO Launcher (RIL):  
[http://downloadcenter.intel.com/Detail\\_Desc.aspx?agr=Y&DwnldID=20961&lang=eng&OSVersion=&DownloadType=.](http://downloadcenter.intel.com/Detail_Desc.aspx?agr=Y&DwnldID=20961&lang=eng&OSVersion=&DownloadType=_.)
12. Extract the RIL files to **c:\RIL**.
13. Launch RIL by double clicking on **c:\RIL\RemoteISOLauncher.exe**.
14. Click the CD icon.



**Figure 11: CD Icon on RIL Interface**

15. Type in a friendly name such as "OS Reimage".
16. Click **Browse**.
17. Select c:\ifast\ifast.iso.
18. Click **Open**.
19. Check the box titled "Reset boot path after launch".
20. Click Optionally select a color for the button.
21. Click **Save**.
22. Close RIL, and save settings when prompted.
23. Optionally create a desktop shortcut to **c:\RIL\RemoteISOLauncher.exe**.

## 5.4 Perform the Remote OS Install

### 5.4.1 Optionally Perform User Data and System backup for later migration

In this step, user data and possibly the entire system is backed up using the **Backup User Data From Offline Windows** task sequence created above. This step is optional. If run, the following step will replace any data that was backed up.



#### NOTE

*This task sequence is designed for use when Windows is installed on the first partition of the first hard drive in the system. When performing the initial OS install using the instructions in this document, this will be the case. However, when Windows 7 is installed manually with the default partition options the first partition will be a hidden, 100 MB partition. This will cause the task sequence below to fail. As such, it is recommended not to use the 100 MB partition. See the MDT and Microsoft Windows documentation for more details.*

On the Service Desk Console, do the following:

1. Open VNC Viewer Plus.
2. These steps are optional. They will prevent the VNC session from timing out.
  - Click **Options**.
  - Click **Advanced**.
  - Click the **Expert** tab.
  - Set **AMTSessionTimeout** to **0**.
  - Click **OK**.
3. Enter the IP address of the remotely managed client system.
4. Set **Connection mode** to **Intel AMT**.
5. Set **Encryption** to **None**.
6. Click **Connect**.
7. If prompted, Click **Yes** to "Is <computer> the expected fully-qualified domain name of <ip>?"
8. Enter your Intel AMT Admin credentials and click **OK**.
9. Enter a **User Consent Code** if prompted.
10. You can now interact remotely with the managed PC.
11. This step is optional. It will ensure windows is not forcefully shutdown. In the VNC Session, perform a graceful Windows shutdown.
12. Open RIL (**c:\RIL\RemoteISOLauncher.exe**).
13. In the **Host Name** field, enter the IP address or FQDN.
14. Select the **Settings** tab.
15. Enter authentication for username and password to Intel AMT.
16. Select the **Launch** tab.
17. Click the **OS Reimage** button in the boot image section.

18. If prompted, click **OK** to the warning ("Warning, you are about to reboot the remote machine. If the remote user has any unsaved work it may be lost.").
19. The managed client reboots first to iFast.iso, then to the Lite Touch Media on the deployment share.
20. Upon boot, the Welcome Windows Deployment window appears. Click **Run the Deployment Wizard** to install a new operating system.
21. Enter administrator credentials for the deployment share. For example, the administrator username and password for the Service Desk Console.
22. Click **OK**.
23. If you want to back up just the user data, not a full computer backup, choose the **Backup User Data From Offline Windows** task sequence. Otherwise skip ahead to step 25.
24. Specify a location as `\\<ip address of service desk>\migdata` and click **Next**.
25. If you wish to create a full computer backup, specify a location as `\\<ip address of service desk>\migdata`. Otherwise select **Do not back up the existing computer**. Click **Next**.
26. Click **Begin**. The task sequence runs, backing up user data and setting, and optionally creating a full backup of the computer. This may include automatic system reboots.
27. When the process completes, click **Finish**.  
**Note:** if you do not click **Finish** before the next step, the computer will re-run the backup task sequence again.

## 5.4.2 Erase the Client Hard Disk with diskpart

The MDT is designed to repartition the hard disk as part of its process. However, there are circumstances where the MDT will not be able to continue unless the hard disk has already been erased. Further, performing a manual erase ensures any issues in the partitioning scheme are cleared. As such, it is recommended to perform a manual hard disk erase using diskpart, as follows, prior to the actual Windows install.

On the Service Desk Console, do the following:

1. Open VNC Viewer Plus.
2. These steps are optional. They will prevent the VNC session from timing out.
  - Click **Options**.
  - Click **Advanced**.
  - Click the Expert tab.
  - Set **AMTSessionTimeout** to **0**.
  - Click **OK**.
3. Enter the IP address of the remotely managed client system.
4. Set **Connection mode** to **Intel AMT**.
5. Set **Encryption** to **None**.
6. Click **Connect**.
7. If prompted, Click **Yes** to "Is <computer> the expected fully-qualified domain name of <ip>?"



8. Enter your Intel AMT Admin credentials and click **OK**.
9. Enter a **User Consent Code** if prompted.
10. You can now interact remotely with the managed PC.
11. Open RIL (**c:\RIL\RemoteISOLauncher.exe**).
12. In the Host Name field, enter the IP address or FQDN.
13. Select the **Settings** tab.
14. Enter authentication for username and password to Intel AMT.
15. Select the **Launch** tab.
16. Click the **OS Reimage** button in the boot image section.
17. If prompted, click **OK** to the warning ("Warning, you are about to reboot the remote machine. If the remote user has any unsaved work it may be lost.").
18. The managed client reboots first to iFast.iso, then to the Lite Touch Media on the deployment share.
19. Upon boot, the Welcome Windows Deployment window appears. Click **Command Prompt** to gain access to a command prompt. **Note:** if this screen does not appear, a plain WinPE boot disk may be used instead. See [http://downloadcenter.intel.com/Detail\\_Desc.aspx?agr=Y&DwnldID=20957&lang=eng&OSVersion=&DownloadType=](http://downloadcenter.intel.com/Detail_Desc.aspx?agr=Y&DwnldID=20957&lang=eng&OSVersion=&DownloadType=) for creating and using WinPE.
20. At the command prompt, execute the following commands. **Note:** these assume the system has a single hard disk.  
**Warning:** *All data on this disk will be erased!*
  - Diskpart
  - Select disk 0
  - Clean
  - Exit
  - Exit

All data and partition information has now been erased.

### 5.4.3 MDT Windows install

On the Service Desk Console, do the following:

1. Open VNC Viewer Plus.
2. These steps are optional. They will prevent the VNC session from timing out.
  - Click **Options**.
  - Click **Advanced**.
  - Click the Expert tab.
  - Set **AMTSessionTimeout** to **0**.
  - Click **OK**.
3. Enter the IP address of the remotely managed client system.
4. Set **Connection mode** to **Intel AMT**.
5. Set **Encryption** to **None**.
6. Click **Connect**.
7. If prompted, Click **Yes** to "Is <computer> the expected fully-qualified domain name of <ip>?"
8. Enter your Intel AMT Admin credentials and click **OK**.
9. Enter a **User Consent Code** if prompted.
10. You can now interact remotely with the managed PC.
11. This step is optional. It will ensure windows is not forcefully shutdown. In the VNC Session, perform a graceful windows shutdown.
12. Open RIL (**c:\RIL\RemoteISOLauncher.exe**).
13. In the Host Name field, enter the IP address or FQDN.
14. Select the **Settings** tab.
15. Enter authentication for username and password to Intel AMT.
16. Select the **Launch** tab.
17. Click the **OS Reimage** button in the boot image section.
18. If prompted, click **OK** to the warning ("Warning, you are about to reboot the remote machine. If the remote user has any unsaved work it may be lost.").
19. The managed client reboots first to iFast.iso, then to the Lite Touch Media on the deployment share.
20. Upon boot, the Welcome Windows Deployment window appears. Click **Run the Deployment Wizard** to install a new operating system.
21. Enter administrator credentials for the deployment share. For example, the administrator username and password for the Service Desk Console.
22. Click **OK**.
23. Select **Base Windows 7 SP1 install** and click **Next**.
24. Enter a name for this computer and click **Next**.
25. Optionally enter desired options to join a domain. This document uses the default workgroup setting. Click **Next**.
26. If data was backed up above, specify a location as **\\<ip address of service desk>\migdata**. Otherwise, leave the default option. Click **Next**.
27. Optionally set language and other preferences. This document uses the default settings. Click **Next**.
28. Optionally set a time zone. This document uses the default settings. Click **Next**.

29. If applications were added above, they will now be listed. Select the desired applications and click **Next**.
30. Select **Do not capture an image of this computer** and click **Next**.
31. Select **Do not enable Bitlocker for this computer** and click **Next**.
32. Click **Begin**. The task sequence will now run with the selected options. This will include formatting the hard disk, apply the Windows 7 OS, setting any custom settings, installing applications, restoring user information, etc. This will include multiple automatic reboots.

Congratulations, you have successfully reimaged a PC remotely.



## NOTE

*Upon a successful install it is recommended to click "Finish" on the wizard dialog and then perform a graceful Windows reboot. See Appendix A under the error message "The task sequence has been suspended" for more information.*

## 5.5 Additional Considerations

### 5.5.1 Scalable Deployments

The steps above have the Deployment share placed on the same PC as the Service Desk Console. In a live deployment, the more likely scenario is that the deployment share is hosted on a fast server, or multiple fast servers. MDT documentation outlines various methods to creating a scalable deployment. To adapt such a deployment for remote use, it is recommended to create multiple ifast.iso files, one for each deployment share. Then, in RIL, add each one with a friendly name that tells the Service Desk Technician where the server is. In this way, the closest share to a user can be easily chosen.

### 5.5.2 Security

The steps above use an administrator account for accessing the Deployment Share and the data migration share. In general, it is best to use the least amount of privilege possible. Further, it may be advantageous to grant permissions to service desk users based on their credentials, rather than using a universal login. Refer to the MDT documentation on how this may be accomplished.

### 5.5.3 Further Automation

The MDT is capable of nearly 100% automation of OS deployment, once the LTI media has booted. For example, task sequences, language, domain settings, and more can

be preset, selected based on computer type, and more. While this is beyond the scope of this document, using the “Setup for remote use” steps above will make any deployment scenario available remotely.

#### **5.5.4 Additional MDT tips**

When the LTI Media created above first loads, it displays options to enter the recover environment and to open a command prompt. Both of these tools can be used to remotely diagnose and repair the offline Windows OS or perform manual tasks like disk repartition or disk wiping.

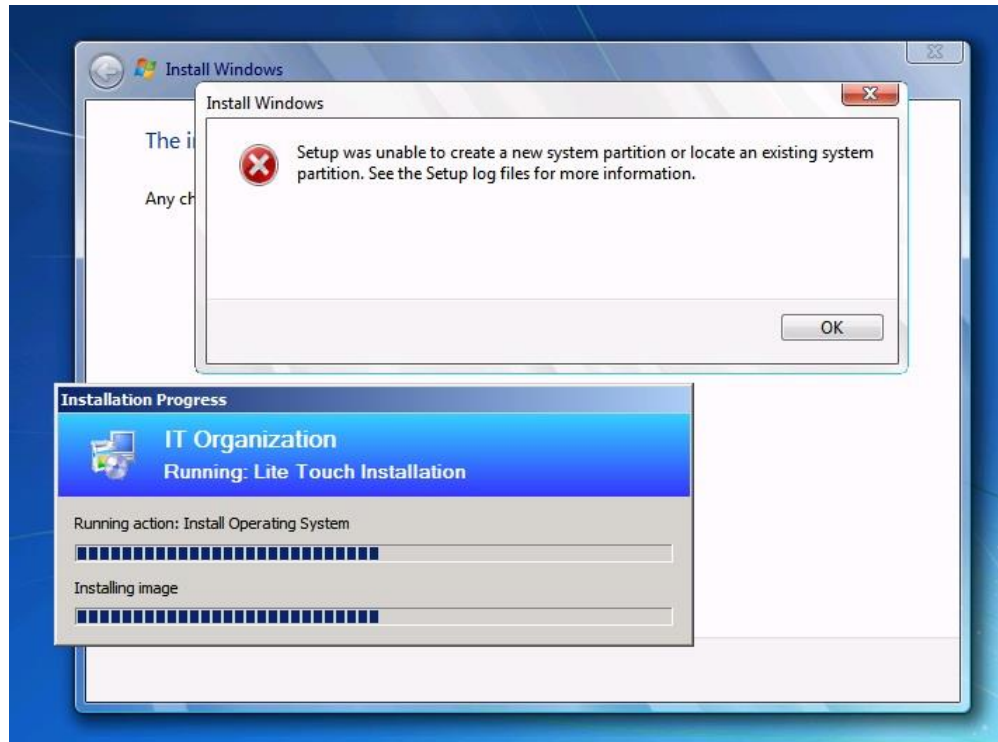
## A Appendix A: Troubleshooting

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This section provides information on the various error messages that may be encountered.

**Error:** During MDT Install, "Setup was unable to create a new system partition or local an existing system partition. See the Setup log files for more information."

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**Error:** During WDS Install, "Setup was unable to create a new system partition or local an existing system partition. See the Setup log files for more information."

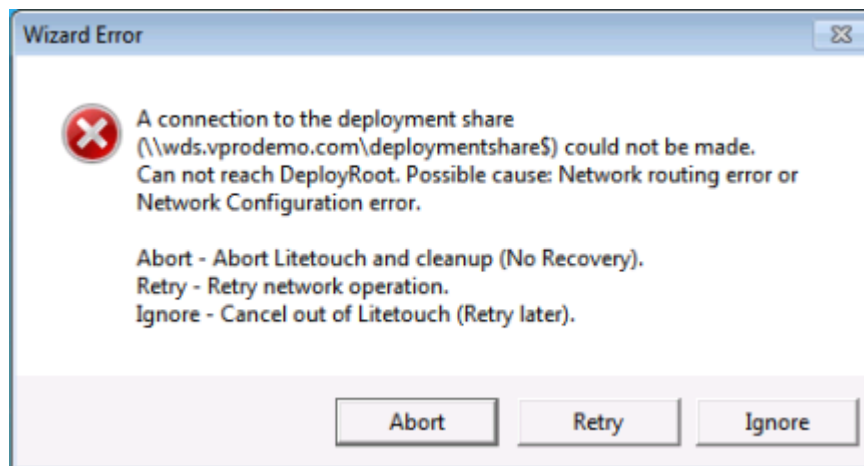
**Information:** This error is coming from Windows installer. It does not detect the local hard drive as a bootable device. In testing, this was observed on some Dell laptops, only when the hard drive controller is set to AHCI.

**Error:** MDT Lite Touch Media or WDS Discover media fails to fully boot when using 2 stage boot to pull the media from a network location.

**Information:** Some BIOSs are not fully compatible with 2 stage boot. This issue was specifically observed on a Dell E6420 laptop. Either:

- Use 2 stage boot to pull the media from the local hard disk
- Do not use 2 stage boot. Instead, use RIL to IDEr boot the desired media directly.

**Error:** When installing via MDT, a Wizard Error occurs (see figure below) during the Windows login process.



**Information:** There is an intermittent timing issue where the MDT script runs before the network driver has initialized, causing the script to stop. There may other causes for this issue as well, such a DHCP configuration issue or a missing or broken network driver. See Microsoft documentation for more details. To work around the timing issue either:

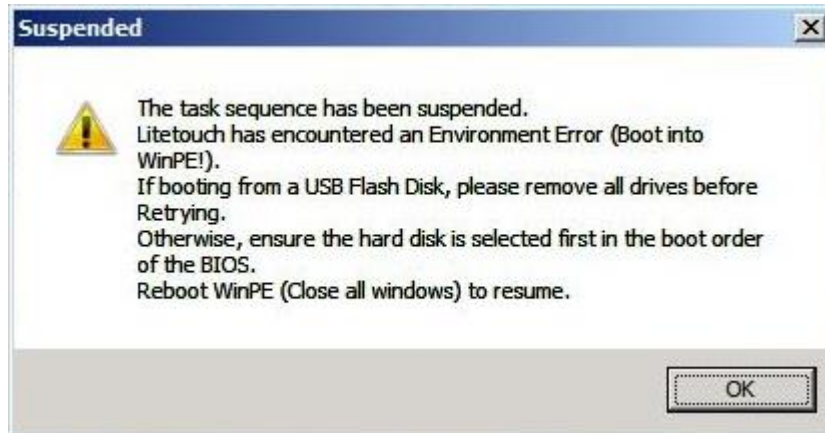
- Click **Retry** on the dialog. The script will check again, find the network adapter, and continue normally.
- Add a delay to the MDT script that checks for network connectivity as follows:

On the Service Desk Console,

1. Open Notepad as administrator
2. In Notepad, open c:\Deploymentshare\scripts\ZTIUtility.vbs
3. Find Line 2307. It is in the Function ValidateNetworkConnectivity, just below the comment 'check for network adapters present. Note: the line number may change if Microsoft Updates the MDT.

4. Add the following at this line:  
On error resume next  
Wscript.sleep(10000)  
On error goto 0

**Error:** If you are testing MDT in a lab, doing multiple back to back remote reimages, you may experience an error, "The task sequence has been suspended." This error occurs when booting the Lite Touch Media.



**Information:** There is left over task sequence information on the system's hard disk. To clear this issue, simply erase the hard disk prior to performing the MDT install. See <http://social.technet.microsoft.com/Forums/en-US/mdt/thread/878b1938-2da8-4fec-9611-2a0b7efb3cd3> for more information.

To avoid this issue altogether; after every MDT Remote OS install, be sure to click **Finish** at the Lite Touch wizard completion and then perform a graceful OS reboot. This appears to clear any leftover task sequence information on the hard disk.