

# Deploying Operating System Images on Dell Business Client Systems using Microsoft® Deployment Toolkit (MDT) 2012

A Dell™ Technical White Paper

**Dell OpenManage™  
Systems Management**  
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## Introduction

IT departments typically manage a mix of decentralized client hardware and software applications. I/T administrator activities include deploying standardized corporate operating system images to client hardware. This activity requires using a consistent mechanism to gather application software, hardware, and operating systems (OS) information, and then deploy appropriate software over the network from a central management console.

The Microsoft® Deployment Toolkit (MDT) 2012 provides unified processes and tools for desktop and server OS deployment using a common deployment console and a collection of best practices. The toolkit provides a single mechanism for image creation and an automated installation process to reduce deployment time.

MDT can be used in two different operational environments -

1. Lite Touch Installation (LTI) - Used primarily when software distribution tools like Microsoft Systems Center Configuration Manager (SCCM aka ConfigMgr) 2007/2012 are not available
2. Zero Touch Installation (ZTI) - Used as an extension of the OS deployment capabilities available with ConfigMgr 2007/2012

This technical paper primarily focuses on using the LTI installation mechanism along with Deployment Workbench for deployment of OSs on Dell™ client systems using the Dell driver packs; the Dell Client System Deployment CAB helps simplify the deployment of customized images on Dell hardware. While the installation how-to steps detailed in this white paper are LTI specific, the installation process resembles the ZTI installation method that uses the underlying ConfigMgr capabilities to discover and deploy operating systems.

The intended audiences for this paper are I/T and network administrators or managers who need to understand the technical aspects of creating and deploying their own customized images on Dell client systems.

## Required Software

To complete this guide, the following software is required:

- MDT 2012 update 1 installable  
(<http://go.microsoft.com/fwlink/?LinkId=159061>.)
- Dell WinPE cab
- Dell cabs (system specific cabs)
- Microsoft .NET Framework 3.5 with Service Pack 1 (SP1)
- Windows ADK or Windows AIK for Windows 7
- Windows ADK for Windows 8
- Windows Automated Installation Kit (Windows AIK) version 2.0
- Networking services, including Domain Name System (DNS) and Dynamic Host Configuration Protocol (DHCP)
- Windows XP, Windows 7, Windows 8 and Vista Media

## Dell Client System Deployment CAB Overview

The Dell Client System Deployment CAB (Dell Driver Packs) files now available on the Dell support web site offer new levels of ease and flexibility for creating and deploying customized OS images on Dell systems.

The key capabilities provided by the Dell Client Systems Deployment CAB are:

- Availability of all system-applicable drivers in a single archive
- The flexibility to manage and deploy corporate standard images on Dell client systems by providing drivers in Windows native plug-n-play format (.inf and .sys) that are directly consumable by deployment consoles

With the Dell Client Systems Deployment CAB, I/T Administrators can perform the following tasks:

- Use Microsoft recommended best practices for OS deployment
- Use Microsoft Windows OS-based PnP enumeration capabilities to install drivers for applicable devices
- Create a system-level optimized deployment sequence

The deployment CABS are comprised of two different components:

- a. Microsoft Windows Pre-installation(WinPE) 3.x Driver Pack - the drivers needed for WinPE within MDT to boot the remote client system, access the hardware, and for the network to access the infrastructure
- b. Operating System specific Driver Packs ( Windows XP, Windows 7 Driver Packs etc. ) - driver packs that include the drivers needed to get the target OS functional on a system

Following sections will provide details on the content and intended use of each of these individual driver packs.

### ***Locating the Driver Packs***

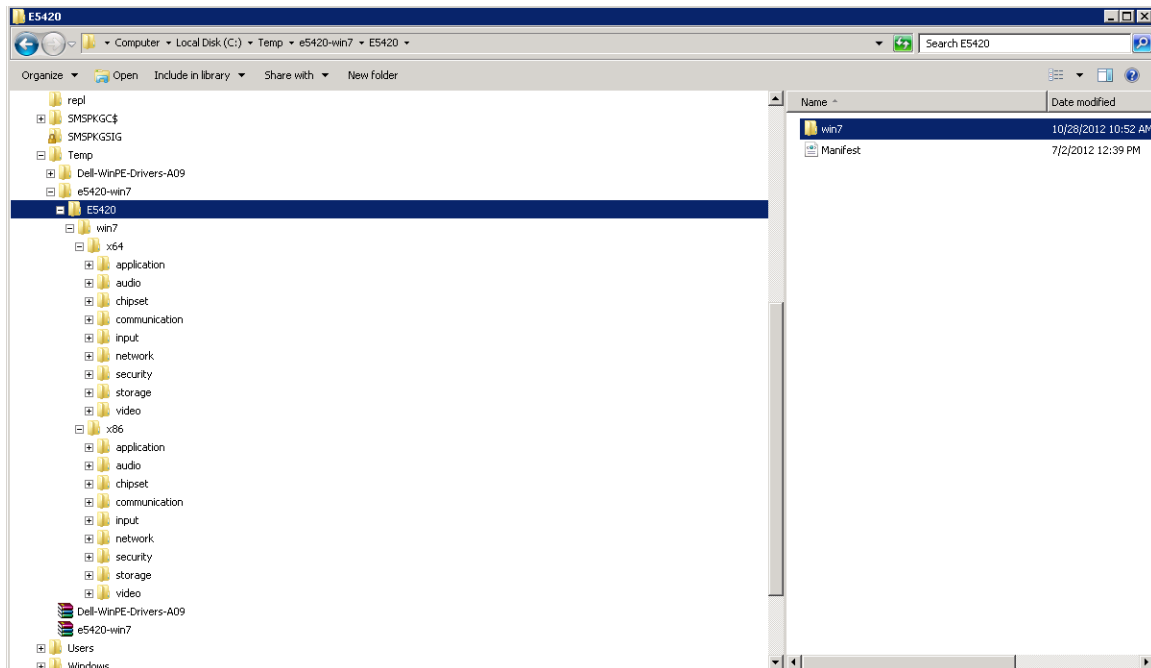
Customers can locate the relevant driver packs for their system using the following steps:

1. Navigate to <http://support.us.dell.com> or your regional Dell Support Website
2. Select the System Model for the OS deployment driver pack. For the purpose of this white paper, we will assume a Latitude E5420 Notebook
3. Next select the Windows OS that is going to be deployed
4. Expand the '*Client Systems Management*' node on the results page to locate the WinPE 3.x driver pack and the OS driver pack ( E5420-Win7-A00.cab)

### ***Driver Pack Content Structure***

All Dell CABS use the following file naming structure: <Model>-<OS>-<Version>.cab. So a Windows XP® OS CAB for an E5420 Latitude notebook would be named: E5420-Win7-A00.cab. Any of the system CABS can be viewed and/or edited using either Windows Explorer or WinZip.

A typical system cabinet file structure for a Latitude E5420 notebook is displayed in Figure 1.



**Figure 1: Typical system cabinet file structure**

Organizations usually provide standardized Windows OS support on a single platform. With that in mind, the 32-bit(x86) and 64-bit(x64) support files are combined into a single CAB file for convenience.

Once the CAB is extracted, the readme.txt and Manifest.xml included in the CAB provides details of the content included in each CAB. The manifest file includes specifics such as:

- Driver versions
- Release date
- Supported devices

The manifest.xml file location is displayed in Figure 1 on the right side of the screenshot.

The content is grouped in this manner to allow customers the flexibility to extract only the content relevant to the OS and architecture that they wish to deploy, while discarding contents not required for their environment.

The layout also provides the ability to replace/upgrade any archive device drivers in the future for added functionality, if needed.

## MDT Operational Details

For the purposes of this white paper, we will walk through the task of deploying a Windows 7 on Dell Latitude E5420 Notebook using MDT 2012 and Windows Deployment Services enabled using PxE infrastructure. For the purposes of this white paper, a user is expected to be familiar with the different MDT OS deployment screens. MDT 2012 *Deployment Shares* contain operating systems, applications, operating system packages and device drivers. Figure below shows an example of a Deployment share tree contents.

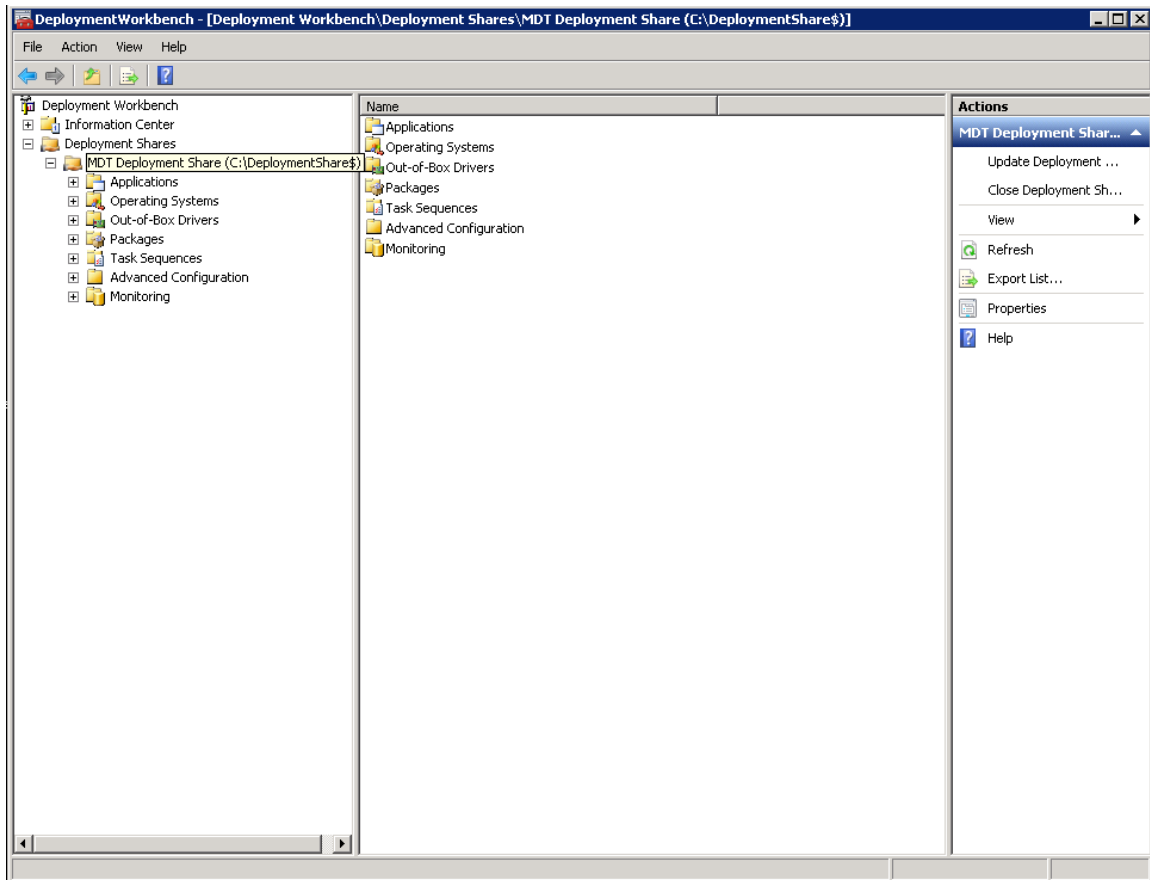


Figure 2 : MDT deployment share tree

## Managing Out of Box Drivers

In order to facilitate driver management, Dell recommends organizing drivers as shown in Figure 3. Right click on the **Out of Box Drivers** and create the folder structure as shown below:

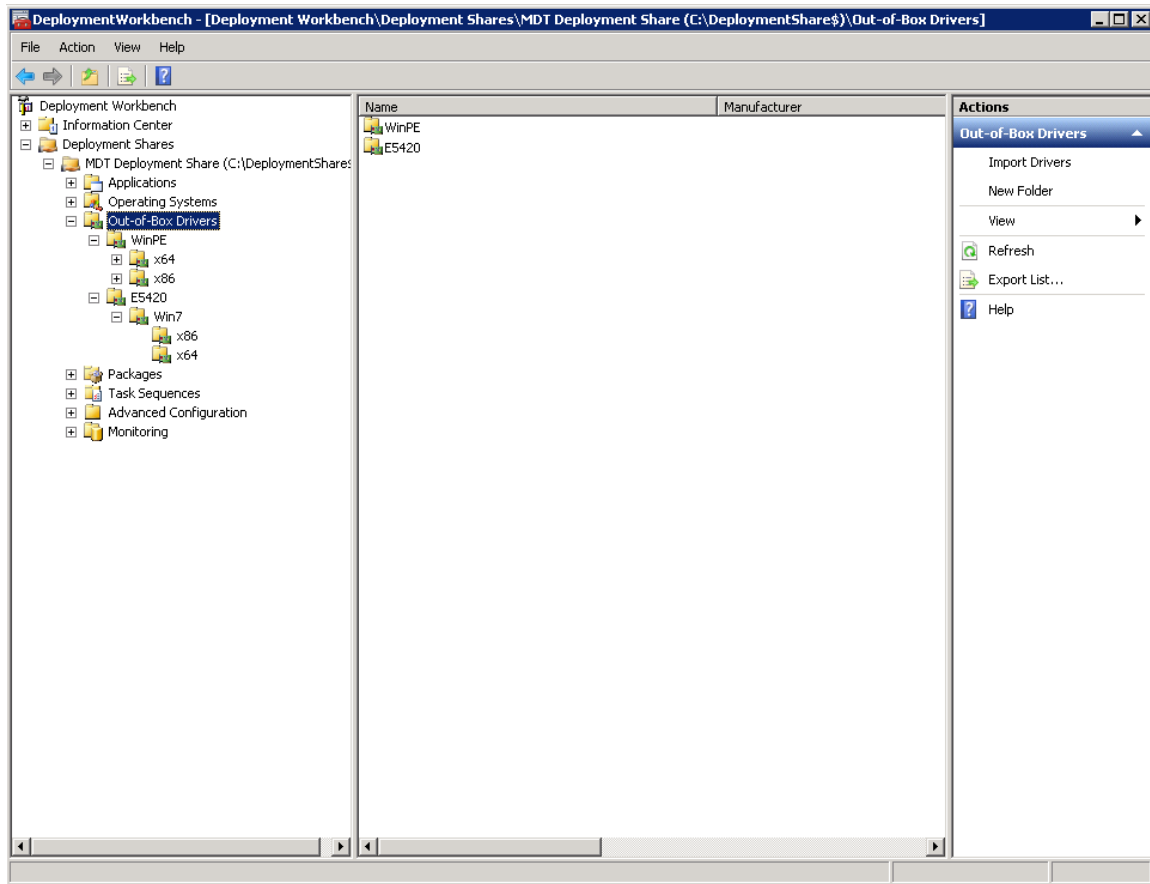


Figure 3: Recommended driver organization

Organizing drivers by putting them into groups provides a few key benefits:

- The ability to manage drivers over time as new OS deployment driver packs become available.
- Removing redundant driver packs from the out-of-box driver category.
- Managing drivers using a system and OS combination, rather than importing them into a flat database.
- Creating targeted deployment sequence by using category grouping.

Dell recommends using the *ModelNos-OS-Architecture-PackageVersion* naming to distinguish different driver groups for a couple of key reasons:

- Grouping content using a model and OS combination provides better targeting
- Since Dell refreshes drivers on a quarterly basis, customers can clean out older revisions from their driver store.



The following figures display a number of driver groups that were created for a suite of systems in the typical customer network.

In MDT 2012, the drivers cabs can be imported directly by pointing to the cab or pointing to the folder containing extracted drivers.

1. Download the Driver Cab from Support.Dell.com into a local directory
2. Select MDT Driver Package import and point the „File Browse“ wizard to the local directory where the cab was downloaded.
3. The Wizard will detect the .Cab File and then extract and import the drivers specified within the cab file.

**NOTE:** A WinPE driver group was created to manage pre-OS deployment separate from the target OS drivers.

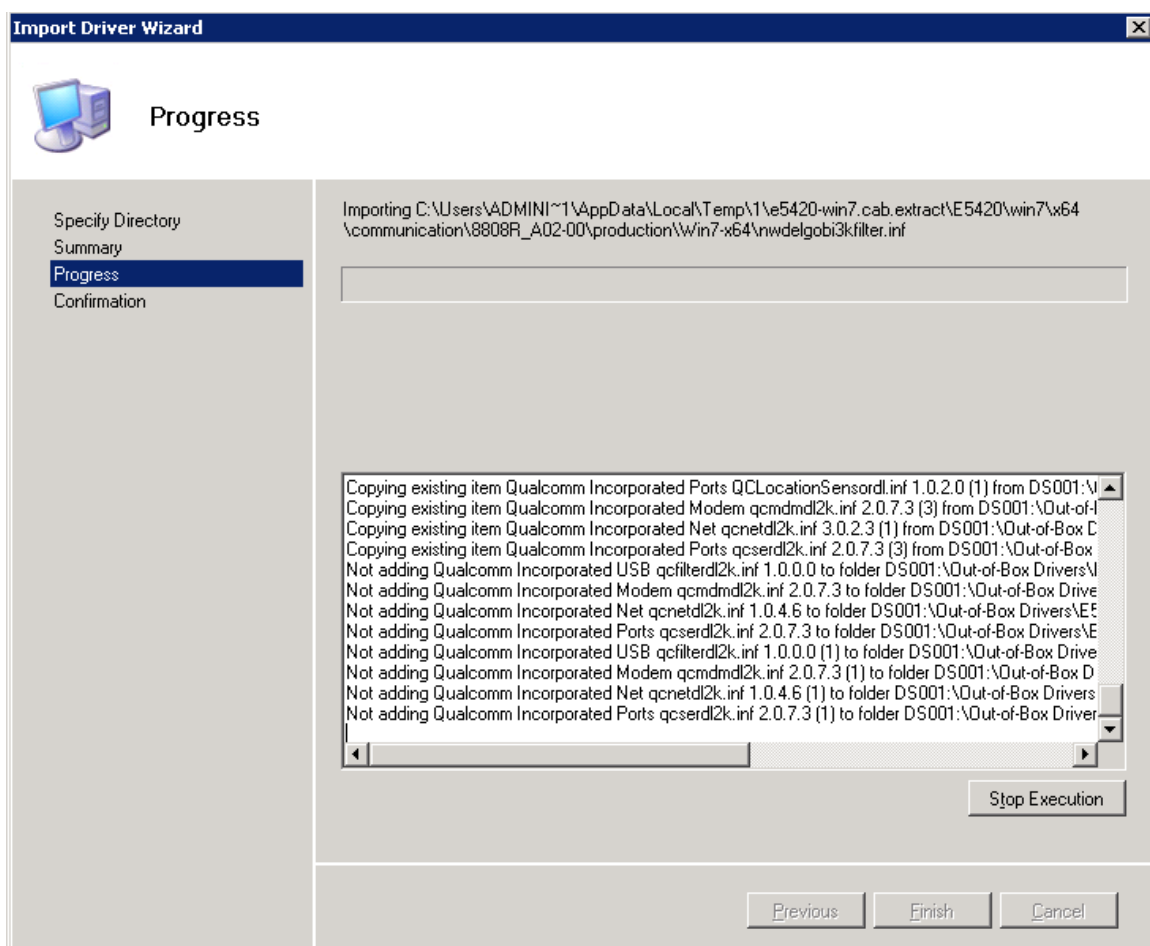


Figure 4: Driver wizard displaying import of driver cabs

In the example above, Latitude E5420 Drivers cab is being imported.

## WinPE Driver Packs

As noted earlier, Dell releases two sets of driver packs. The WinPE driver pack is used to customize the Lite-Touch WinPE available within MDT. The WinPE driver pack provides the necessary network and storage drives for a pre-OS environment setup on Dell clients that allow communication with the MDT Console. The WinPE driver pack also has a read me and manifest .xml files that detail the drivers included within the package.

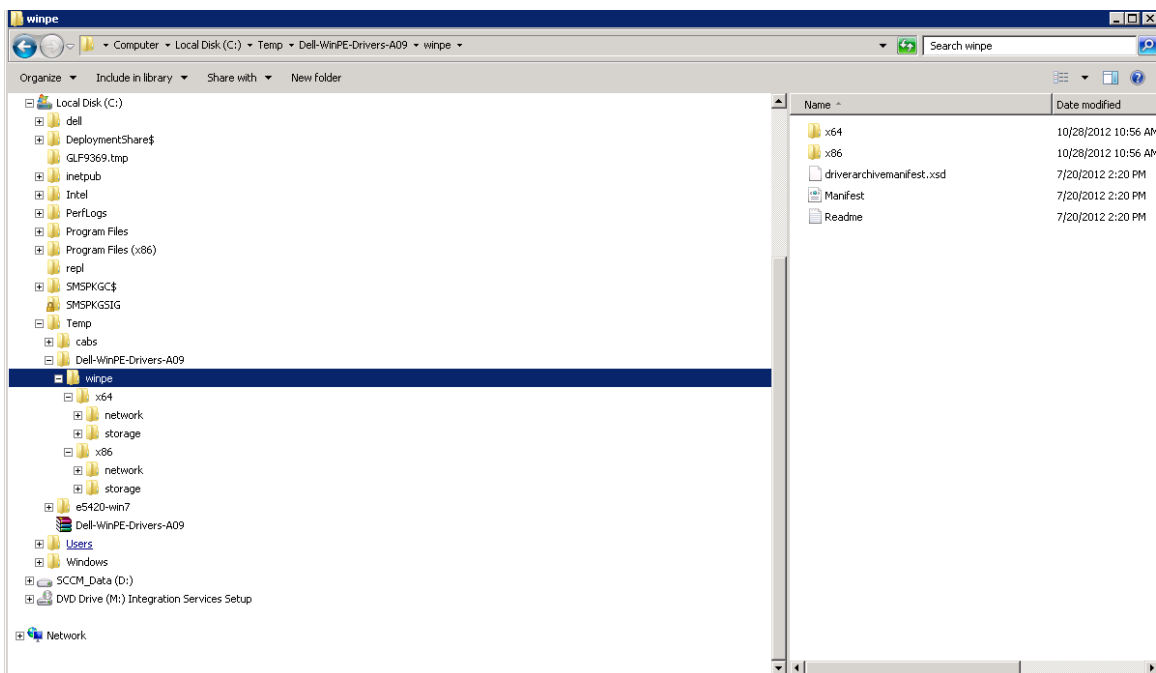


Figure 5: WinPE driver storage

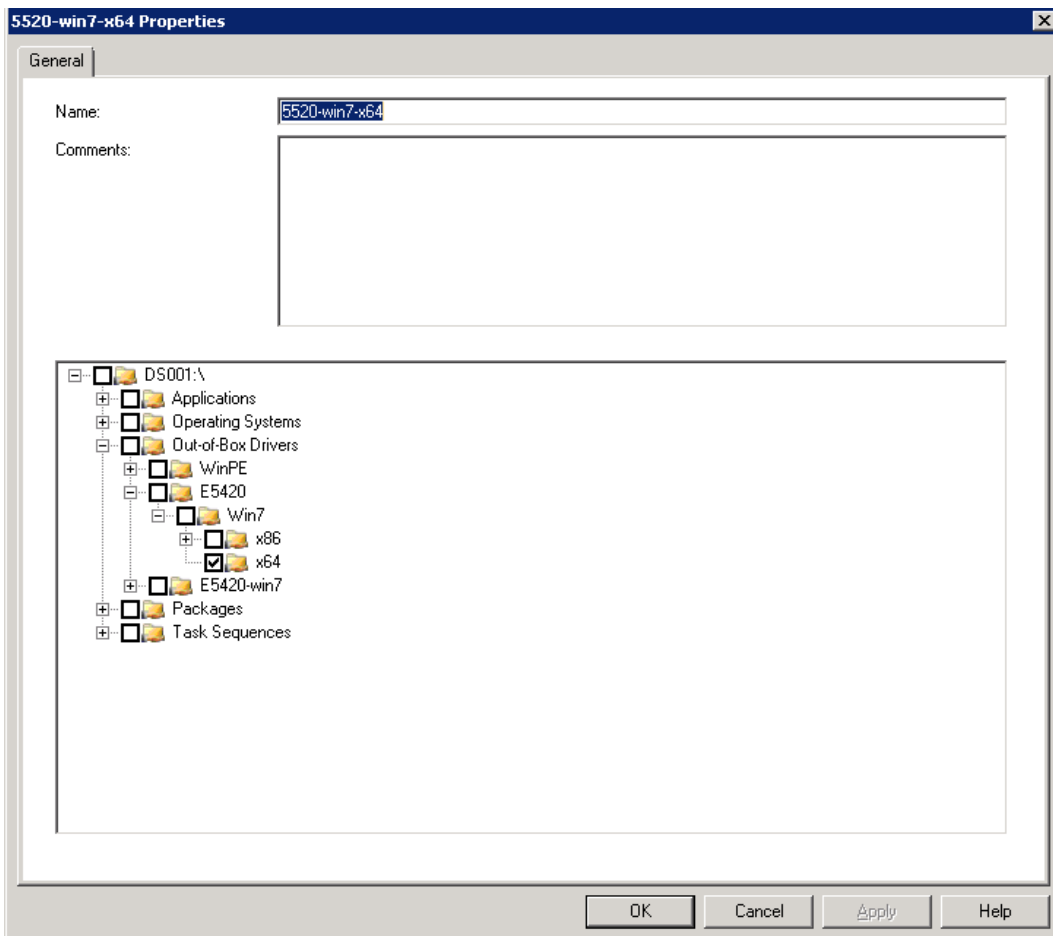
For additional details on building a customized WinPE outside of the MDT environment using the Windows automated installation kit (WAIK), see the 'References' section at the end of this white paper.

For the latest release of the WinPE Drivers Cab, visit <http://support.dell.com> or the Dell Tech Center and search for "WinPE Driver Cab".

## Selection Profiles

MDT 2012 selection profiles allow a user to select one or more folders in the Deployment share to perform specific actions. Selection profiles for example are used with Task Sequence to inject drivers for a specific system and/or WinPE Drivers

The example below shows the creation of a new profile to deploy drivers for a Latitude 5420 Windows 7 operating system. The 5420 folder which was created for Out-of-box driver is being used for this new selection profile.



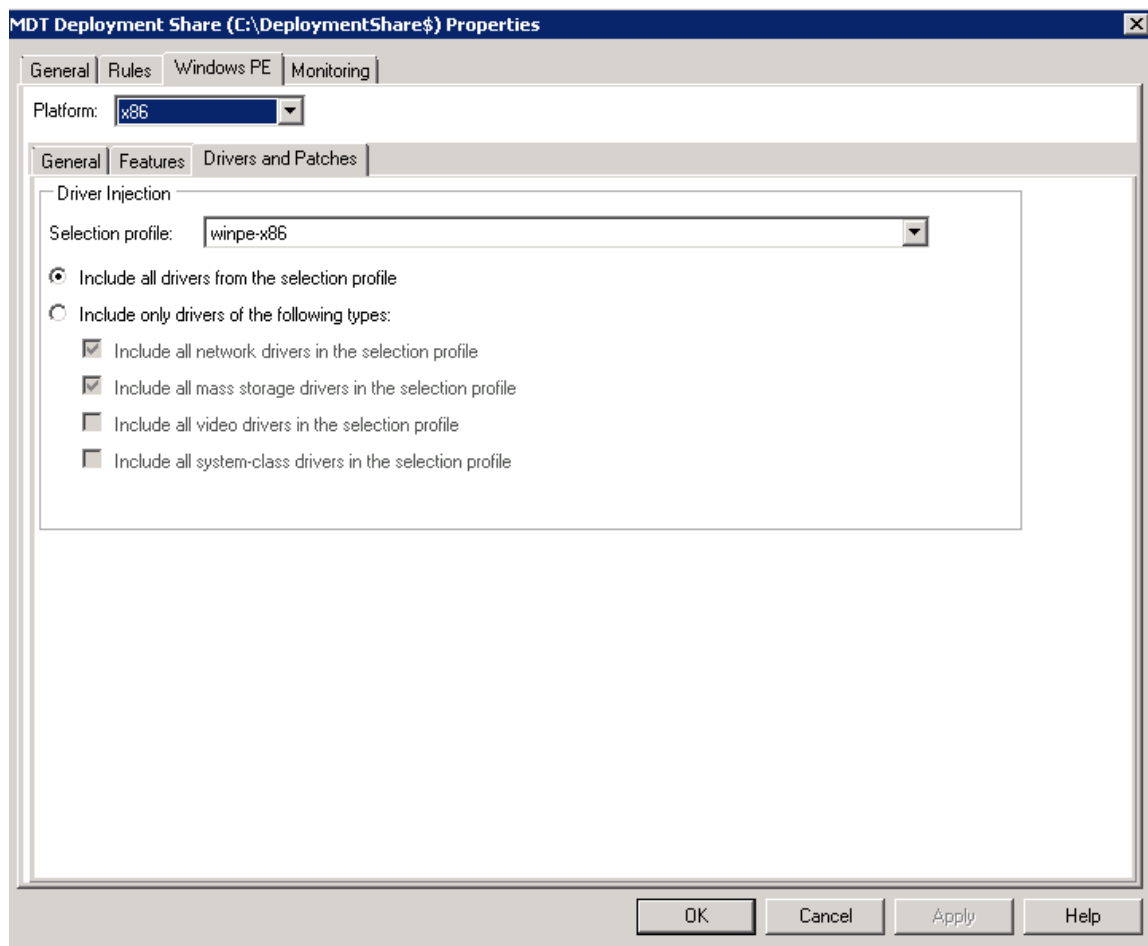
**Figure 6: Creating new Selection Profile containing device driver package.**

There are 5 inbuilt selection profiles which cannot be deleted/edited. A new selection profile can however be created which offer the following flexibility:

- Any new folders created under an included folder (such as a folder created under “5420” above) will also be included by default - no editing of the selection profile is required.
- Any new folders created under an excluded folder will be excluded by default.
- If a folder that had been selected is deleted, it won’t cause any issues - the now-invalid folder listed in the selection profile will be ignored.

## Setting up Lite-Touch WinPE

Once the applicable drivers have been imported, the next step is to create a Lite-Touch WinPE that is needed to launch a pre-installation WinPE OS on the target client system. Right click on the **MDT Deployment Share** -> Select **Properties**, select the **WinPE** Tab. Figure 7 displays the screens shot for selecting x86 profile for WinPE(x86 WinPE) to create a customized WinPE using the imported Dell WinPE Drivers cab. Similarly for x64 WinPE image, select x64 in the drop down box and the corresponding winpe (winpe-x64) profile.



**Figure 7: Creating a customized WinPE**

Once the driver group is selected, the MDT WinPE setup wizard performs the following steps:

1. Generate the WinPE source directory.
2. Selects the drivers for the WinPE image
3. Copies the files necessary to build the ISO image
4. Captures the WinPE Lite WIM image

Be sure to select the option to build the WIM as well as the ISO Image for WinPE; the WIM format will be used by the Windows deployment services for a PXE Boot.

## Setting up Operating System Images

MDT offers multiple ways of setting operating systems options as shown in Figure 8:

1. Original OS installation CD
2. Custom image file in WIM format; captured from a deployed system or a factory installed image
3. Leverage a Windows deployment services image

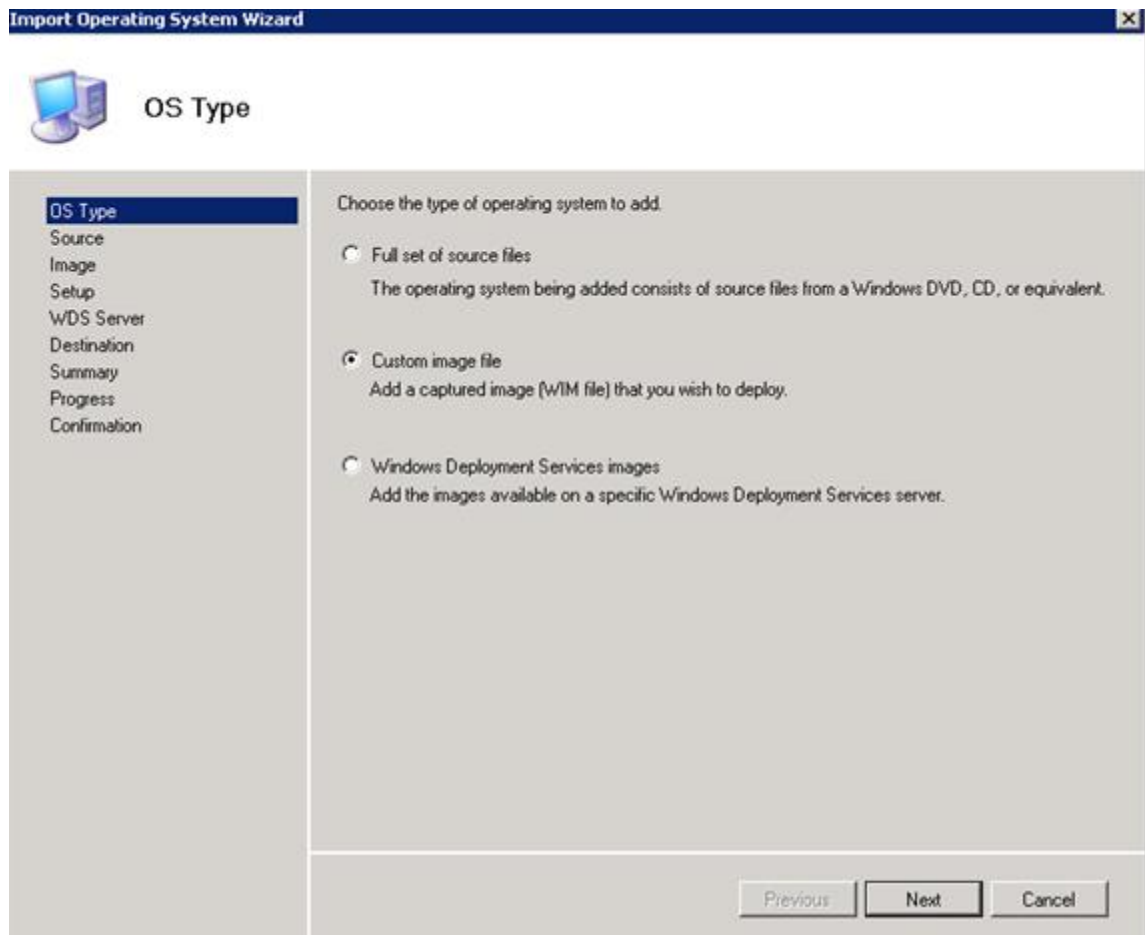


Figure 8: Operating system options

For this white paper, we will use the original Windows OS WIM file released by Microsoft. The screen in Figure 9 shows an example of a Windows OS image imported from OEM installation media.

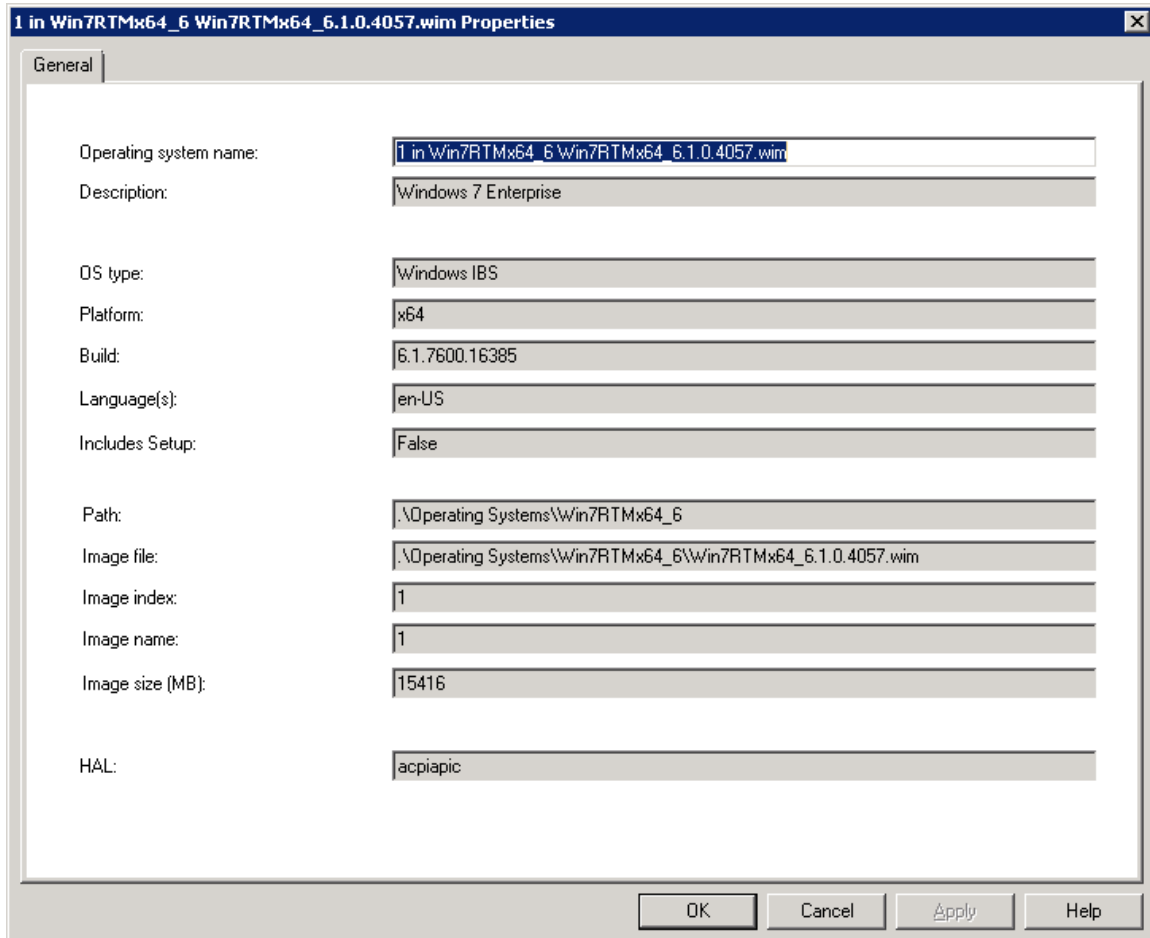
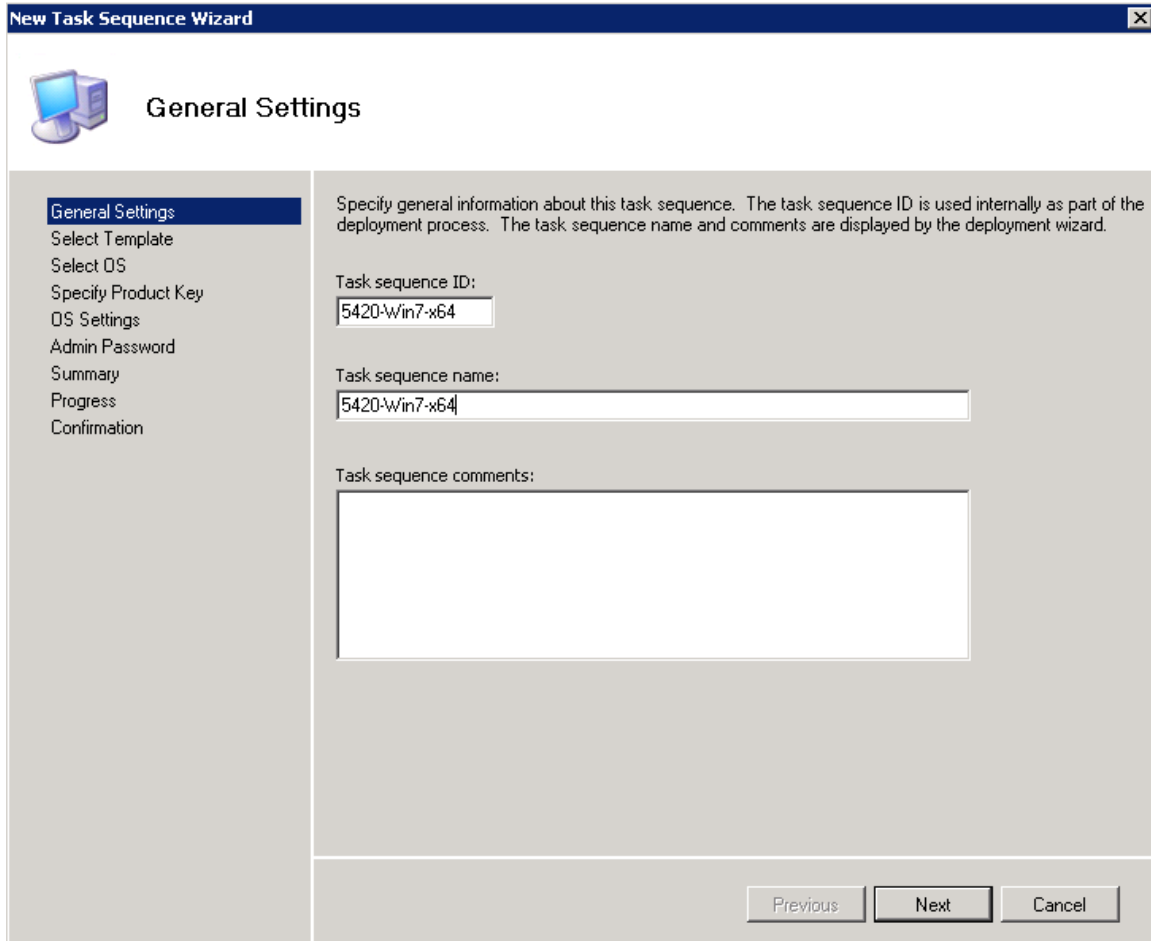


Figure 9: Windows OS image imported from install media

## Setting up Task Sequence

The next step in the process is to set up a task sequence, and update the deployment points. This step involves selecting the OS image, entering any associated product identification key, and then modifying the task sequence itself to select storage and add-on drivers. This is accomplished using the *General Settings* screen, as shown in Figure 10.

Deploying Operating System Images on Dell Business Client Systems using Microsoft®  
Deployment Toolkit (MDT) 2012



The image shows the 'New Task Sequence Wizard' window in Microsoft Deployment Toolkit (MDT) 2012. The window has a title bar with the text 'New Task Sequence Wizard' and a close button. Below the title bar is a header area with a computer icon and the text 'General Settings'. On the left side, there is a vertical list of steps: 'General Settings', 'Select Template', 'Select OS', 'Specify Product Key', 'OS Settings', 'Admin Password', 'Summary', 'Progress', and 'Confirmation'. 'General Settings' is currently selected and highlighted. The main area of the window contains instructions: 'Specify general information about this task sequence. The task sequence ID is used internally as part of the deployment process. The task sequence name and comments are displayed by the deployment wizard.' Below this, there are three input fields: 'Task sequence ID:' with the value '5420-Win7-x64', 'Task sequence name:' with the value '5420-Win7-x64', and 'Task sequence comments:' with an empty text area. At the bottom right, there are three buttons: 'Previous', 'Next', and 'Cancel'.

**New Task Sequence Wizard**

**General Settings**

Specify general information about this task sequence. The task sequence ID is used internally as part of the deployment process. The task sequence name and comments are displayed by the deployment wizard.

Task sequence ID:  
5420-Win7-x64

Task sequence name:  
5420-Win7-x64

Task sequence comments:

Previous Next Cancel

Figure 10: General Settings screen

Once the task has been setup, right click on the task to modify its properties. Figure 11 shows a fully-operational task sequence where profile 5420-win7-x64 needs to be selected as shown below.

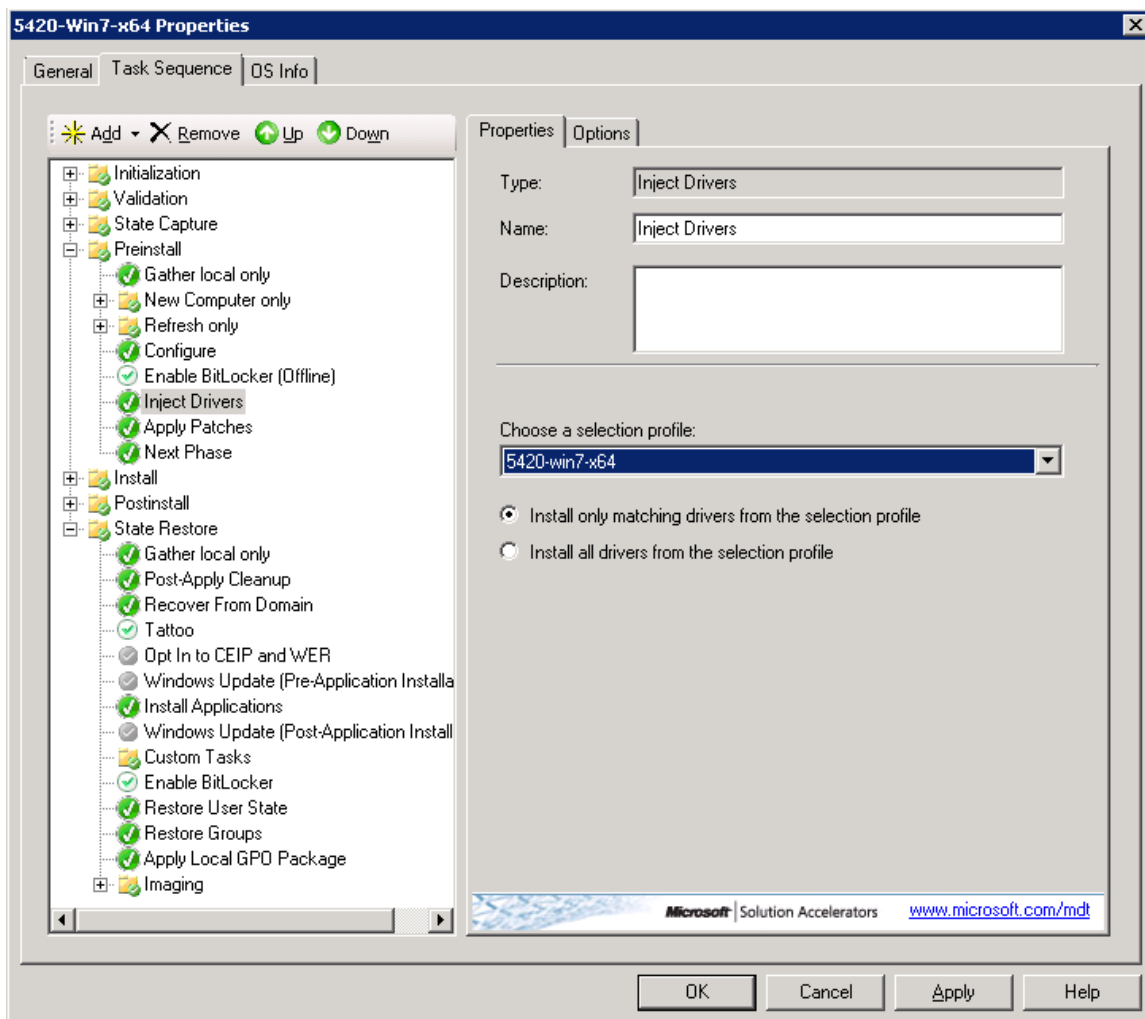


Figure 11: Fully-operational task sequence

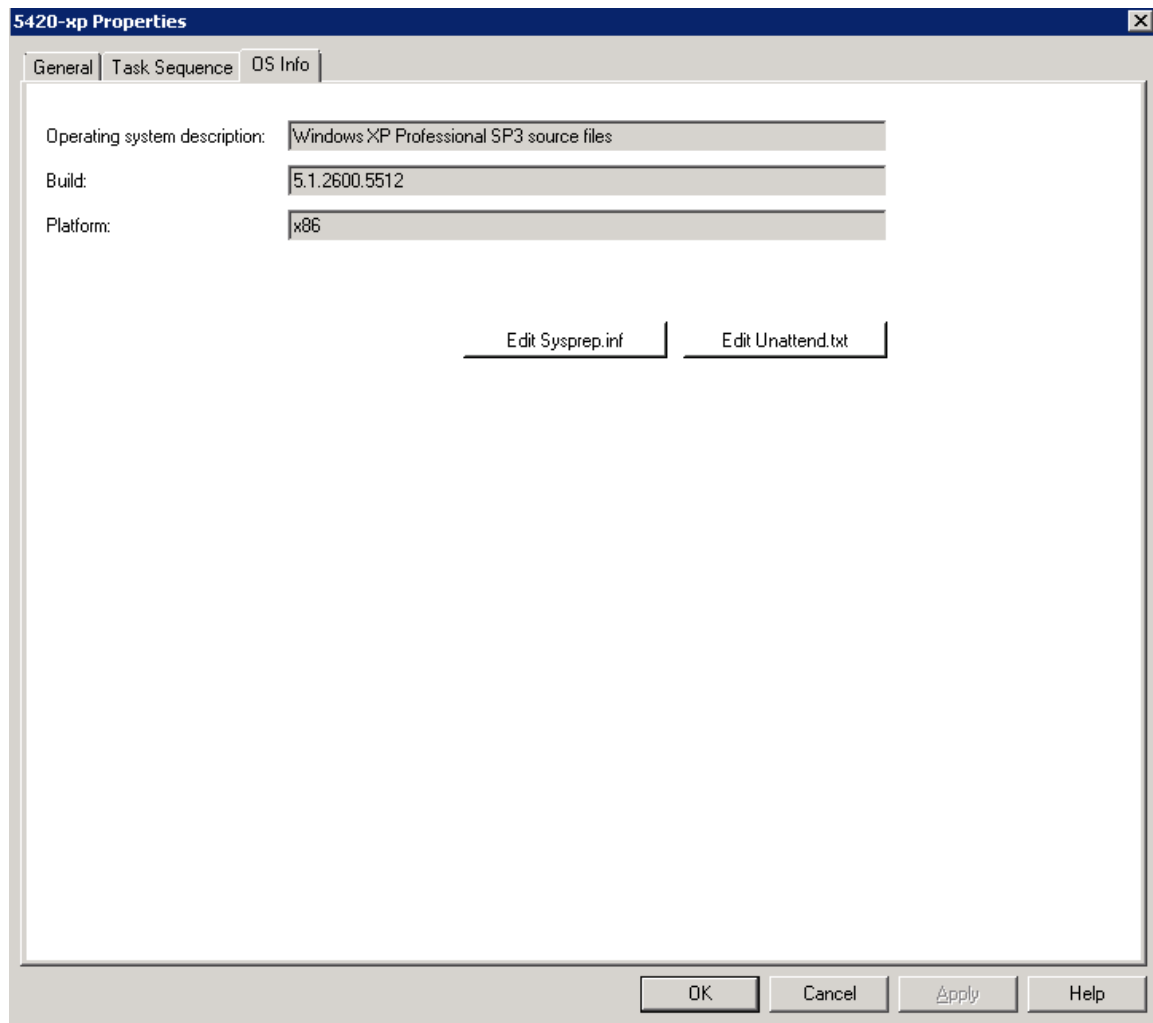
For Windows XP systems a special step needs to be completed; select the mass storage drivers for first boot into the customer OS before any other plug-and-play drivers are selected.

**Note:** Failure to select the appropriate pre-setup Windows XP storage driver may result in a continuous reboot condition with the following error:  
0x0000007B (INACCESSIBLE\_BOOT\_DEVICE).



## Steps for XP deployment

For Windows XP systems a special step needs to be completed: Select the task sequence for XP, click on properties and “OS Info” as shown. You can see edit buttons as below for modifying the Sysprep.inf and Unattend.txt.



**Figure 12: Task sequence properties for XP deployment**

There are 2 mechanisms for introducing storage drivers for XP. By changing the Sysprep.inf or Unattend.txt.

### Selecting mass storage drivers for XP by changing the Sysprep.inf

- Copy all the required mass storage drivers to the reference computer so that they are included in the image.
- Edit the Sysprep.inf to contain entries for each Plug and Play ID listed in the INF file for each driver to be added.

- Edit the Sysprep.inf. Include a BuildMassStorageSection=Yes entry so that all in-box drivers are also supported.
- Run Sysprep to process all the drivers, which places them in the critical device database.
- Capture the image.

#### Selecting mass storage drivers for XP by changing the Unattend.txt

- If it does not already exist, create an \$OEM\$ folder under your distribution folder. For example: X:\I386\\$OEM\$
- Create a folder named TEXTMODE under the \$OEM\$ folder. For example: X:\I386\\$OEM\$\TEXTMODE. Ensure that the TxtSetup.oem file exists in the same directory as the rest of the driver package. Copy all the files to the TEXTMODE folder.
- Edit X:\I386\\$OEM\$\Textmode\Txtsetup.oem file. Enter the following code to configure your Txtsetup.oem file and save:

```
[Disks]
```

```
d1 = "Windows XP", wXPdsk1, \
```

Note the backslash character at the end of the second line.

- Edit the Unattend.txt file. Create the following section:

```
[MassStorageDrivers]
```

```
"string that identifies the controller in the [scsi] section of TXTSETUP.OEM" = "OEM"
```

For example:

```
[MassStorageDrivers]
```

```
"Adaptec Ultra160 Family PCI SCSI Controller (29160)" = "OEM"
```

- Edit Unattend.txt file, create an [OEMBootFiles] section and list the files that you previously copied to the Textmode folder above. For example:

```
[OEMBootFiles]
```

```
Driver.Sys
```

```
Driver.INF
```

```
Driver.CAT
```

```
Txtsetup.oem
```

- Edit Unattend.txt file. Put the following entries in the Unattended section:

```
[Unattended]
```

```
OemPreinstal=Yes.
```

**Note:** Failure to select the appropriate pre-setup Windows XP storage driver may result in a continuous reboot condition with the following error:  
0x0000007B (INACCESSIBLE\_BOOT\_DEVICE).

## QFE/Hotfix in Task Sequence

Microsoft releases hot fixes, also called QFE, to fix OS-related hardware issues. Service pack releases may often pre-empt the release of these QFEs. Table 1 contains a list of QFEs that are not present in the SP2/SP3 XP releases, and are needed to correctly enable audio on E-Series systems. If the identified QFEs aren't part of the base image, they need to be added to the installed OS during an OS-deployment task sequence to ensure proper hardware function. The QFEs can be obtained either from Microsoft, or from Dell systems software (DSS) available on <http://support.dell.com> for your particular model and OS.

**Table 1: Required QFEs for audio on E-series systems**

OS	QFE	Download Link
Windows XP 64 Bit SP1	KB901105	<a href="http://support.microsoft.com/kb/901105">http://support.microsoft.com/kb/901105</a>
Window XP 32 Bit SP2 /SP3	KB835221	<a href="http://support.microsoft.com/kb/835221">http://support.microsoft.com/kb/835221</a>

**NOTE:**

1. The QFEs and hot fixes need to be applied as soon as the OS has booted with the appropriate storage drivers, but before any of the add-on drivers are applied. This will ensure that the appropriate PnP device enumeration and driver matching occurs during deployment.
2. Missing QFEs from an OS could result in a driver that is either not installed, or incorrectly installed, and may render certain devices non-functional.

For a complete list of QFEs required for your system, please visit Dell.com and download the Dell systems software (DSS).

## Windows Deployment Services Configuration

Once the deployment points have been configured, the next step is to download Lite-Touch WinPE to the client for the deployment through the PXE request process. This process involves selecting the WinPE built using the deployment workbench and provisioning it to respond to PXE requests. Figure 12 shows a sample configuration for DHCP:

1. Navigate to the Windows Deployment Configuration Console.
2. Select *Boot Images* and configure the *PXE Response Settings* to respond to all *Known and Unknown*.
3. Check the option to configure *DHCP option 60* to have the server respond to clients.
4. Next select the Lite-Touch image that was built using the deployment workbench console.
5. Once the images have been added, next step is to boot the Client system that needs to have an image deployed.
6. The client on connection to the PxE Server retrieves the specified boot image and kicks off the OS installation steps.

## Deploying Operating System Images on Dell Business Client Systems using Microsoft® Deployment Toolkit (MDT) 2012

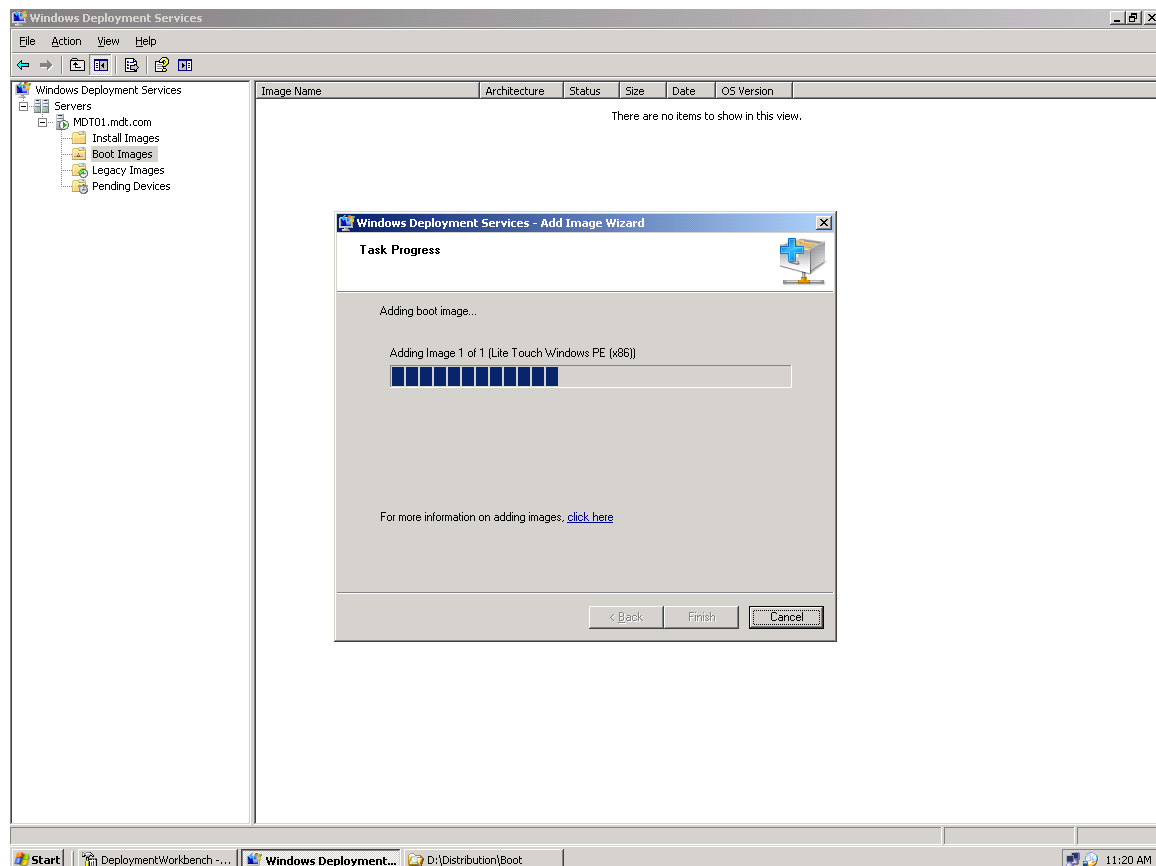


Figure 12: DHCP sample configuration

## Putting it All-Together

Here is a summary of how to step-by-step deploy a custom image created by any organization. For the purposes of the walk-through, a E4300 will have Window XP Professional Service Pack 3 deployed:

1. Ensure that the appropriate OS WIM images are in place for deployment.
2. Setup the WinPE and the OS driver packages as outlined in the previous sections.
3. Create a task sequence using the wizard default steps with appropriate title - E5420 Win7 x64 OS deployment.
4. Once the task sequence is created, select task sequence to edit it.
5. Insert a mass storage device driver setup step using Table 1. As a best practice, add all possible boot device configuration combinations so that the remote target system will be setup regardless of the BIOS boot configuration setup.
6. Add the steps to install the needed QFE as outlined in the previous sections.
7. Add steps for additional add-on drivers; multiple add-on driver steps should match the driver package with the target OS. This would allow for the same task sequence to be used for multiple Dell systems.
8. Dell recommends installing the Dell Systems Software (DSS) to get the latest applicable software updates for your specific system. To download DSS, visit

<http://support.dell.com> and select your system model to download the appropriate version.

9. Enable Bluetooth® functionality for wireless systems that have Bluetooth devices - include required supporting software installation to enable different profiles. Bluetooth application software is not natively included in the cabs, and needs to be downloaded and distributed once the system is operational. Bluetooth application software can be located at <http://support.dell.com> → System Model → Network → Wireless, or alternatively from <http://support.dell.com> → System Model → Communication Category
10. Dell also recommends downloading the Touch point application software for advanced touchpad functionality from <http://support.dell.com/> → System Model → Input Device Drivers.
11. Install any add-on software that is deemed necessary by downloading it from <http://support.dell.com> in a Dell update package (DUP) format.

Once the above steps have been completed, the OS can be kept up-to-date using the Dell update packages for that particular system.

## CAB Editing Tools

I/T administrators will need to extract the CABs and add the drivers that are needed for the configurations they support. The following section lists the recommended CAB management tools. Windows Explorer supports native viewing of CAB contents. You can also use WinZip to examine the contents of the CAB.

Optionally, Microsoft provides a couple of tools in the support pack to examine cabinet files. Extraction tools (CabArc and Extract) are available from Microsoft at the following location

<http://www.microsoft.com/downloads/details.aspx?FamilyId=49AE8576-9BB9-4126-9761-BA8011FABF38&displaylang=en>.

- CAB Management Tool from Microsoft - use CabArc to extract driver contents and maintain directory structure by entering the following command:  
***CabArc.exe -p x <cab file path> \*.\* <output path>***  
(e.g. ***C:\Cabarc.exe -p x C:\5420-Win7-A00.cab \*.\* C:\drivers\***)
- Extract Utility from Microsoft - from the directory where you want to extract enter the following command:  
***extract /Y /E 5420-Win7-A00.cab***

## Supported Dell Hardware and Operating Systems

Table 2 lists the operating system support matrix for E-Series system. **N/A** means that the combination has not been qualified for the system model.

	Win7		Vista		XP		Win8			Win7		Vista		XP		Win8	
	x86	x64	x86	x64	x86	x64	x86	x64		x86	x64	x86	x64	x86	x64	x86	x64
	Latitude									Optiplex							
13	✓	✓	✓		✓				160	✓		✓		✓			
2100	✓		✓		✓				FX160	✓		✓		✓			
2110	✓		✓		✓				360	✓		✓		✓			
2120	✓		✓		✓				380	✓	✓	✓		✓			
E4200	✓	✓		✓	✓				390	✓	✓			✓			
E4300	✓	✓	✓	✓	✓				3010 MLK	✓	✓					✓	✓
E4310	✓	✓	✓	✓	✓	✓			580	✓	✓	✓		✓			
E5400	✓		✓		✓				760	✓	✓	✓		✓			
E5410	✓	✓	✓		✓				780	✓	✓	✓		✓			
E5420	✓	✓	✓	✓	✓	✓			790	✓	✓			✓			
E5420 M	✓	✓			✓	✓			7010	✓	✓			✓		✓	✓
E5430	✓	✓			✓	✓	✓	✓	7010 AIO	✓	✓			✓		✓	✓
E5500	✓		✓		✓				960	✓	✓	✓		✓			
E5510	✓	✓			✓				980	✓	✓	✓		✓			
E5520	✓	✓	✓	✓	✓	✓			990	✓	✓	✓		✓	✓		
E5520 M	✓	✓			✓	✓			9010	✓	✓			✓		✓	✓
E5530	✓	✓			✓	✓	✓	✓	XE	✓	✓	✓		✓			
E6320	✓	✓	✓	✓	✓				Precision								
E6330	✓	✓			✓		✓	✓	M2400	✓	✓	✓	✓	✓	✓		
E6400	✓	✓	✓	✓	✓	✓			M4400	✓	✓	✓	✓	✓	✓		
E6400 ATG	✓	✓	✓	✓	✓	✓			M4500	✓	✓	✓	✓	✓	✓		
E6400 XFR	✓	✓	✓	✓	✓	✓			M4600	✓	✓	✓	✓	✓	✓		
E6410	✓	✓	✓	✓	✓	✓			M4700	✓	✓			✓	✓	✓	✓
E6410 ATG	✓	✓	✓	✓	✓	✓			M6400	✓	✓	✓	✓	✓	✓		
E6420	✓	✓	✓	✓	✓				M6500	✓	✓	✓	✓	✓	✓		
E6420 ATG	✓	✓	✓	✓	✓				M6600	✓	✓	✓	✓	✓	✓		
E6430	✓	✓			✓		✓	✓	M6700	✓	✓			✓	✓	✓	✓
E6430 ATG	✓	✓			✓		✓	✓	R5400	✓	✓	✓	✓	✓	✓		
E6430 Lite	✓	✓			✓		✓	✓	R5500		✓	✓	✓	✓	✓		
E6500	✓	✓	✓	✓	✓	✓			T3500	✓		✓	✓	✓	✓		
E6510	✓	✓	✓	✓	✓	✓			T3600	✓	✓	✓	✓				
E6520	✓	✓	✓	✓	✓				T5500	✓	✓	✓	✓	✓	✓		
E6530	✓	✓			✓		✓	✓	T5600	✓	✓	✓	✓				
XT2	✓	✓		✓	✓				T7500	✓	✓	✓	✓		✓		
XT2 XFR	✓	✓	✓	✓	✓				T7600	✓	✓	✓	✓				
Z600	✓		✓	✓	✓				T1600	✓	✓			✓			
ST	✓								T1650	✓	✓			✓		✓	✓

This list is current as of the release date of this white paper. Visit <http://support.dell.com> for the most up-to-date list.

You can also visit the Dell Tech Center at <http://www.delltechcenter.com/page/Microsoft+System+Center> and search for *Dell System Deployment CABs* for information on additional CABs that may be available.

## Summary

The Dell Client System Deployment CABs provide administrators with consolidated operating system driver packs to deploy various operating systems. The packages are designed to ease the complexity associated with identifying applicable OS deployment drivers, and to facilitate deploying an OS on Dell hardware quickly. The CABs help to minimize administrative downtime by:

- Providing a single deployment management component for download
- Ensuring that the hardware is functional post-deployment without supporting applications
- Providing flexibility to manage and update drivers at a device level

## References

Microsoft Deployment Toolkit 2012 - Microsoft Corporation

[Operating System Deployment in Configuration Manager](#) - Microsoft Corporation

[WinPE Creation Process using WAIK Tools from Microsoft](#) - Microsoft Corporation

[Dell Tech Center](#) - Dell Inc.