Deploying Operating System Images on Latitude™ and Precision™ E-Series Systems using Microsoft® System Center Configuration Manager 2007

A Dell™ Best Practices Paper

**Dell OpenManage™
Systems Management**
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May 2009

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Introduction

IT departments typically manage a heterogeneous mix of decentralized client hardware and various software applications. Administration of large scale enterprises requires the use of centralized systems management processes that use consistent methods for managing the diverse network clients. Some typical I/T administrator activities involve deploying standardized corporate operating system images to client hardware, and using a consistent mechanism to gather application software, hardware, and operating systems (OS) information across the network from a central management console.

The Dell™ Client System Deployment CAB provides the mechanism for an I/T administrator to rapidly develop and deploy a customized corporate image on Dell client systems. This whitepaper provides an overview of using the operating systems deployment capabilities of Microsoft System Center Configuration Manager (SCCM) 2007™ to deploy a customized OS image on Dell client systems in a heterogeneous environment.

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

Dell Client System Deployment CAB Overview

Microsoft System Center Configuration Manager 2007 (MS SCCM) provides centralized systems management capabilities for OS deployment, security patch management, application deployment and asset management using the Windows® Management Services Integration (MSI). This article will discuss how to use the SCCM operating system deployment function to deploy your corporate image on Dell hardware.

The Dell Client System Deployment CAB files that are now available on the Dell support Website offer new levels of ease and flexibility for creating and deploying customized OS images on Dell Latitude E-Series systems.

The key capabilities provided by the Dell Client Systems Deployment CAB are:
- All system applicable drivers in a single archive
- The flexibility to manage and deploy corporate standard images on Dell client systems

With the Dell Client Systems Deployment CAB, an I/T Administrator can perform the following tasks:
- Use Microsoft Windows OS-based PnP enumeration capabilities to install drivers for applicable devices
- Create a system-level optimized deployment sequence
- Setup an appropriate boot control sequence
- Optimize the deployment of targeted system-specific driver packages
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Content Structuring

All Dell CABs use the following file naming structure: <Model>-<OS>-<Version>.cab. So for a Windows Vista® OS CAB for an E4300 Latitude notebook would be named: E4300-Vista-A00.cab. Any of the system CABs can be viewed and/or edited using either Windows Explorer and/or the cabinet SDK tools available for download from the Microsoft Website.

A typical system cabinet file structure for a Latitude E4300 notebook is displayed in Figure 1.

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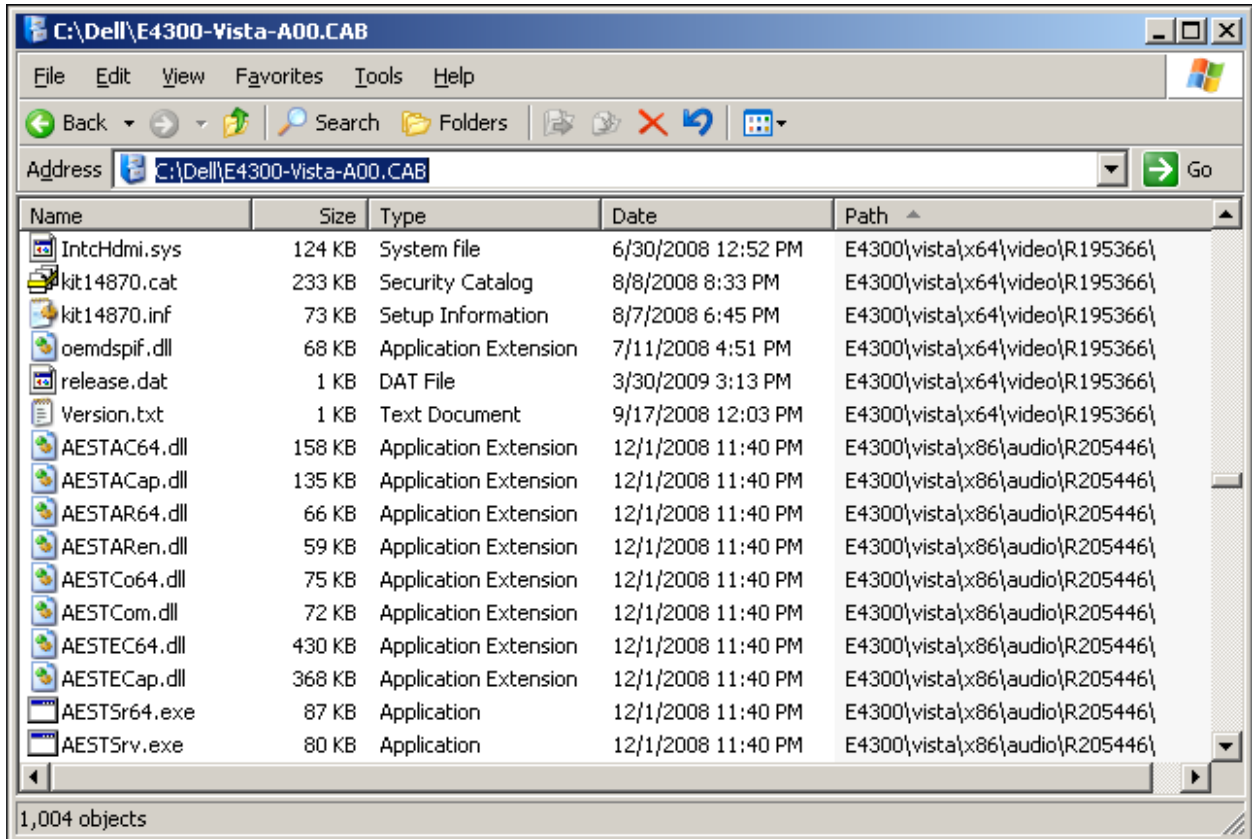
Figure 1: Typical system cabinet file structure

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.

Package Information

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

- Driver versions
- Release date
- Support devices in that particular release

The readme.txt and manifest.xml file location is displayed in Figure 2.
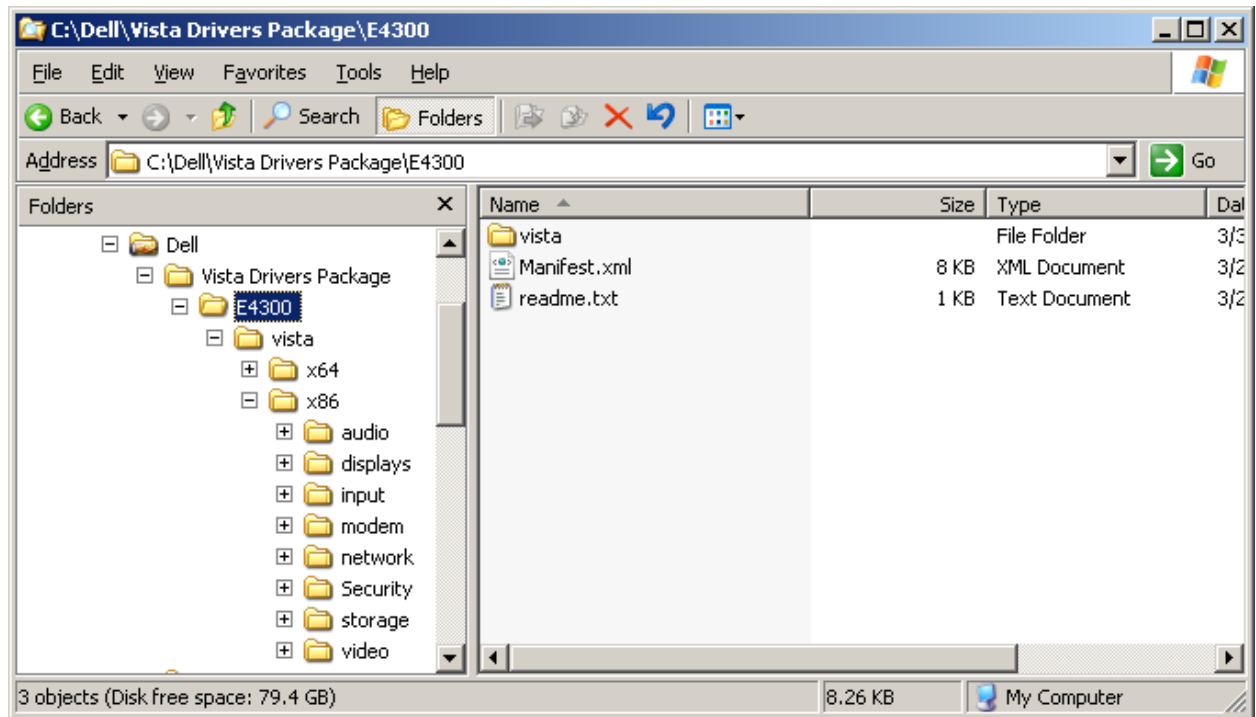
Figure 2: Readme.txt and Manifest.xml file location

Grouping content in this manner provides the customer the ability to remove any architecture-specific folder that is not required for a particular model in their environment. The listing granularity provides the flexibility to replace any archive device drivers in the future if needed. Figure 3 provides an overview of the architecture-specific folder structure.

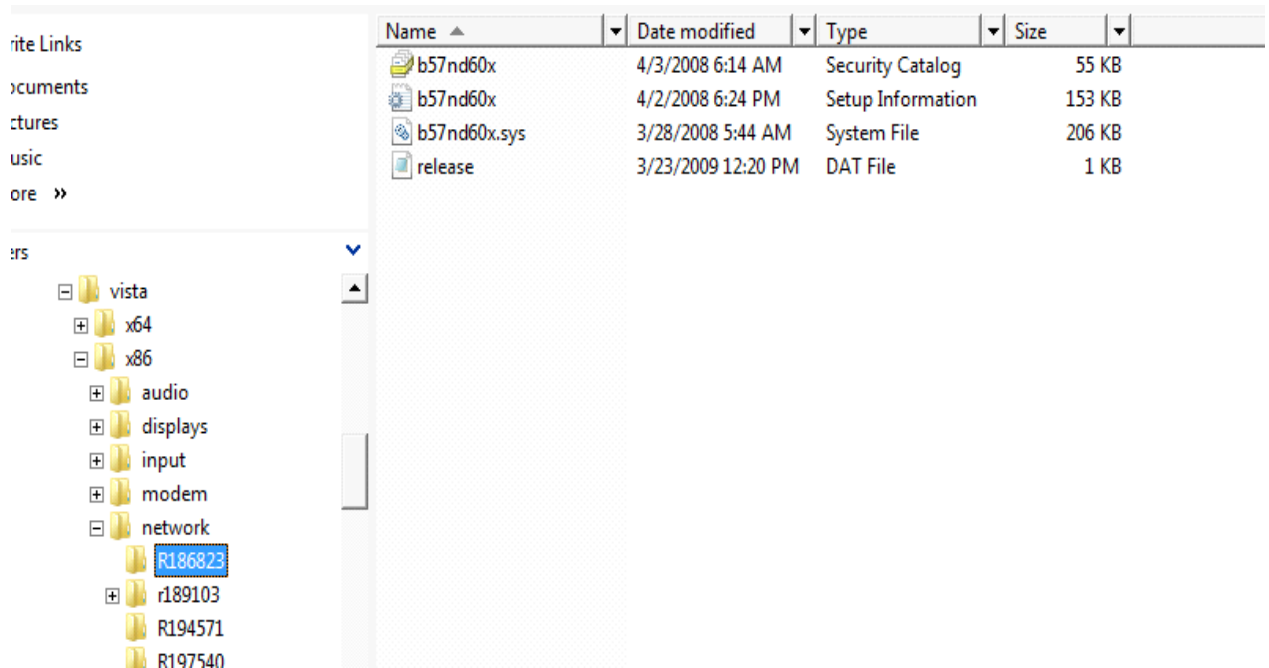| Name ▲	Date modified	Type	Size
b57nd60x	4/3/2008 6:14 AM	Security Catalog	55 KB
b57nd60x	4/2/2008 6:24 PM	Setup Information	153 KB
b57nd60x.sys	3/28/2008 5:44 AM	System File	206 KB
release	3/23/2009 12:20 PM	DAT File	1 KB

Figure 3: Architecture-specific folder structure overview

MS SCCM 2007 Operational Details

The following sections describe how an I/T administrator can customize MS SCCM 2007 to better manage the Dell hardware in their environment.

Heterogeneous customer environments require identification of Dell systems in order to target OS-deployment task sequences. SCCM 2007 provides a built-in capability to group servers/clients by OS types; create groups of all systems running Windows 2008 Advanced Server or Windows XP OS systems in the network. These groups are called manageable collections. A collection represents a single view of network assets based on certain predefined grouping criteria. IT administrators can create hardware-focused grouping criteria using the existing information in the SCCM repository database gathered by the WMI inventory scan on managed systems.

Larger enterprise customers typically have multiple Dell models spanning several generations. Administrators can use the model names/IDs to group by creating their own collection; such as a corporate network that has several hundred Dell E4300s running as part of their managed network.

Such a hardware-centric organization of systems offers following advantages from systems management perspective:

- Better targeting of the Dell systems software released
- Reduced network traffic by targeting only systems that need the software
- Simplify deployment by phasing updates across different collections
- Provide isolation for mission critical systems that can be managed using the same centralized management software

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Network administrators can also set up their own test beds that contain different types of Dell systems for pre-deployment testing of system software update packs that occur before distributing these updates in the production environment.

WinPE Driver Management

Support for a new model may require that corresponding network and mass storage driver support be added to the Windows preinstallation environment (WinPE) within MS SCCM 2007. WinPE modifications entail the addition of network and storage drivers to the native SCCM WinPE image, and creation of a customized WinPE. As a best practice always keep the network and storage drivers in an isolated directory so it can be upgraded only when newer models are added to the network. Figure 4 shows a recommended WinPE driver storage hierarchy for Dell systems in a potentially heterogeneous customer environment.
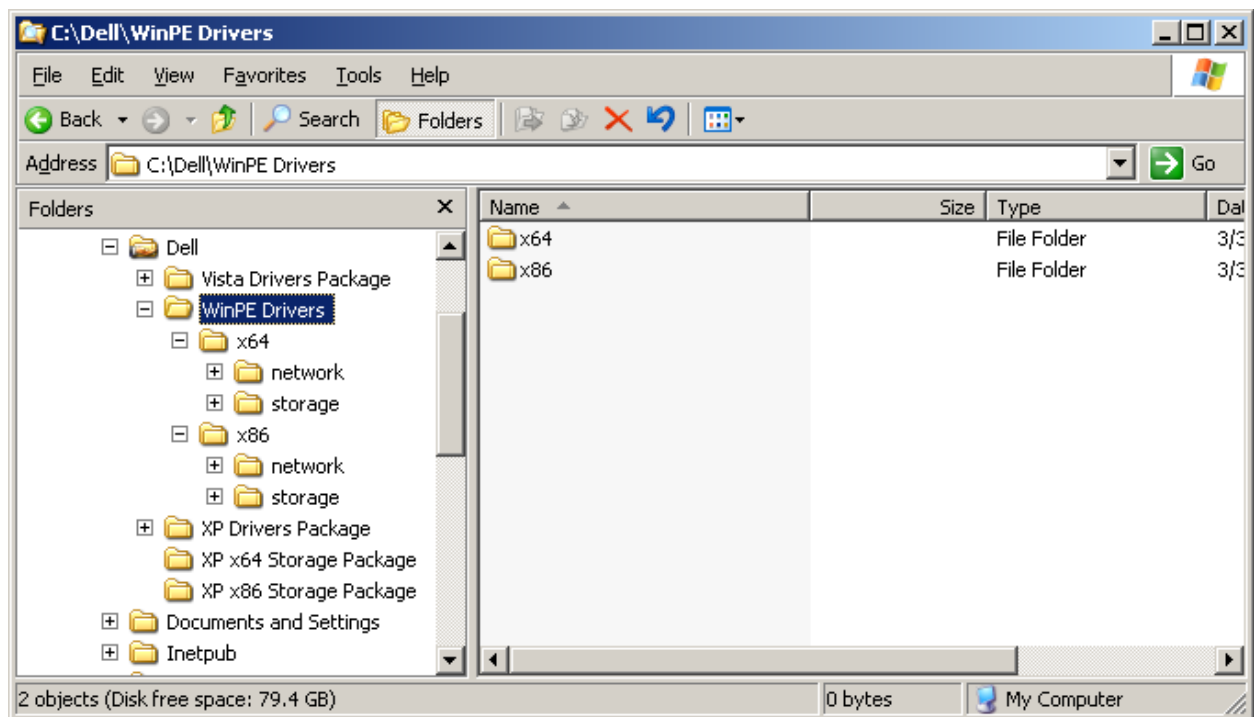

Figure 4: WinPE driver storage

Creation of any custom WinPE results in the finalization of the WinPE Wim that implies that the image no longer can be modified. In order to avoid the need to build a WinPE per client platform, it is recommended to create a directory structure for storage and network drivers. The drivers included in the WinPE directory are the same as the ones used for the system cabs.
NOTE: The WinPE included in MS SCCM 2007 requires the Windows Vista-based storage and network drivers. For more details on the WinPE build process, visit the following Web address:

http://technet.microsoft.com/en-us/library/bb680372.aspx
Dell will also release a WinPE 2.0 Drivers Cab separate from a Platform Cab to help customers easily add support Platform Storage and Network for the Dell Client Platforms. This cab will be released on a quarterly basis and will be backwards compatible. Customers can use this cab to

enable Network and Storage Driver support in their pre-OS environment as needed. For the latest release of the WinPE Drivers Cab, please visit http://support.dell.com or visit Dell Tech Center and search for "WinPE Driver Cab".

Best Practices for Managing Add-On Drivers

MS SCCM 2007 provides several mechanisms for managing system level drivers:

1. Auto-apply drivers by importing in raw format
   a. Uses the Import Drivers wizard and imports each driver from the extracted CAB into the MS SCCM 2007 driver store
   b. Once the drivers have been imported, the OS deployment task sequence can use plug-and-play enumeration to apply needed drivers
2. Auto-apply drivers using categories
   a. Uses the Import Drivers wizard and imports each driver from the extracted CAB into assigned categories
   b. Application of drivers to different models is tied to the predefined categories.
3. Apply driver packages using model/OS combinations
   a. This process involves using the model and/or OS combination to predefine a package
   b. The driver package is then made available to the OS deployment task sequence based on a simple WMI query that matches the model to the driver package set

Dell recommends using model/OS (option 3) combinations for the following reasons:

- Creating the driver package setup helps to maintain different versions of driver package sets as released by Dell
- Individual driver packages using model + OS + architecture provide the flexibility to update only the drivers with known issues

The following screens show the process highlighted in Option 3. This option enables creating Driver Packages without actually importing them into the SCCM Driver Database Repository.
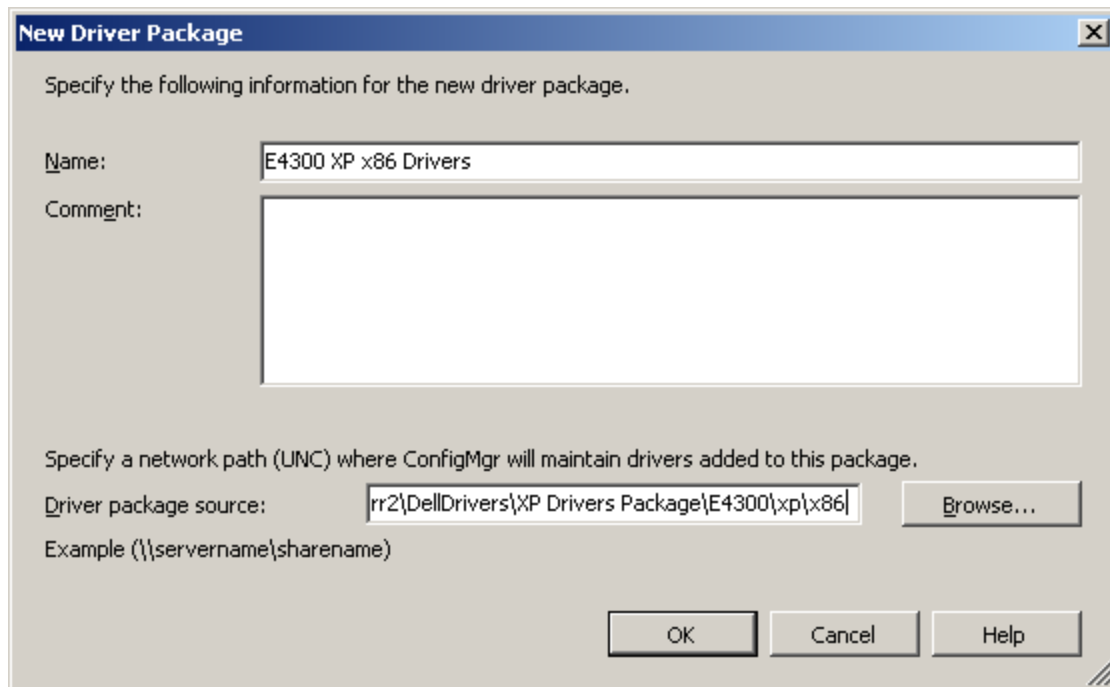
The above example shows an example where the E4300-XP-A00.cab has been extracted to a local directory on the SCCM Host machine. The directory itself is available as a UNC Share for access via the SCCM 'New Driver Package Creation Wizard'. The following section walks through the details of creating a driver package for SCCM Deployment:-

1. Extract the Cab to a shared folder on the Local Server where SCCM is installed.
2. Ensure that the folder is accessible via UNC reference
3. Right Click on 'Driver Packages' in SCCM Console and select the option to create 'New Driver Package'
4. Provide an appropriate name to reflect the contents of Driver package. For e.g. in the above example, the Driver package would be named as 'E4300 XP x86 Drivers'
5. In the Driver Package Source, specify the UNC path to the share. In the example above the UNC path would be \\cosnfigmgrr2\DellDrivers\XP Drivers Package\E4300\xp\x86
6. Once you select 'OK', a driver package will be created.
7. Once the driver package has been created, ensure that the distribution points points are updated for making the drivers available to the task sequence steps.

Setting Up Storage Drivers for OS Boot

Given the way in which mass storage drivers are handled by the operating system prior to Windows Vista, it is recommended that for those operating systems the second option of auto-apply using categories be used. The Windows XP OS setup requires that the mass storage device be physically inserted in order to boot into the deployed OS image. Once the target system OS has booted, it will run the plug-and-play sequence to install the remaining drivers. The following steps show an example of the storage driver setup using categories:

1. Select the driver category and an appropriate name. Figure 5 shows an example of the E4300 XP x86 storage category.
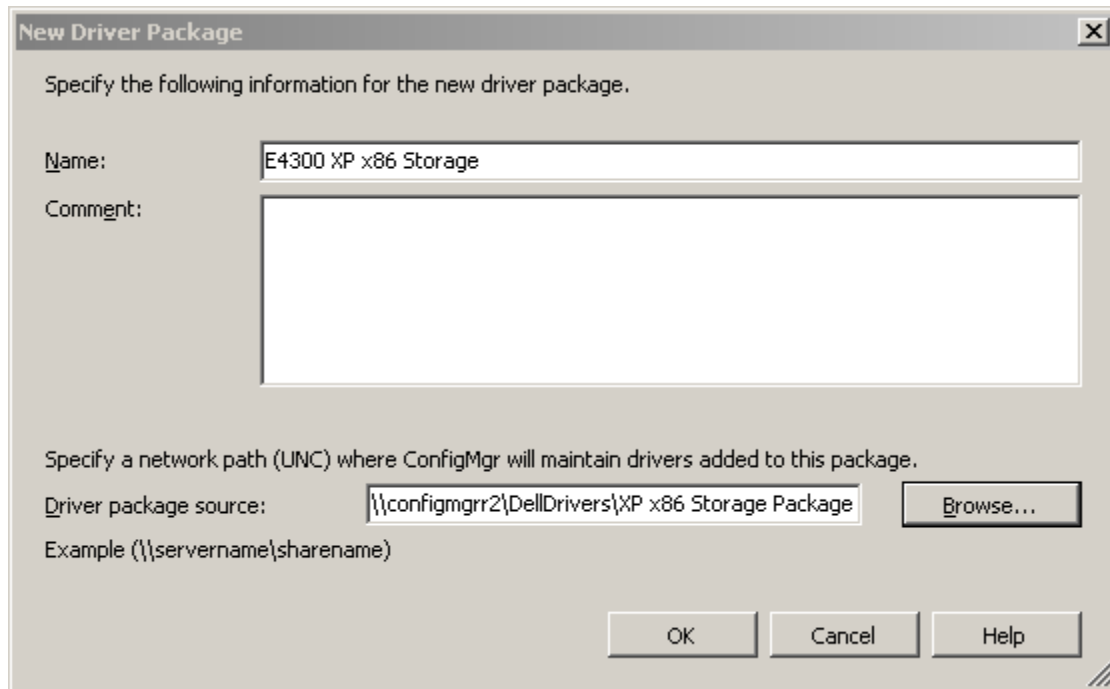
Figure 5: Example of the E4300 XP x86 storage category

2. Select the source for the storage driver. The storage driver source needs to be separate from where the content was extracted. The reason for this is that MS SCCM 2007 will take the entire directory contents and create a GUID to track the package. Figure 6 shows the source selection window.
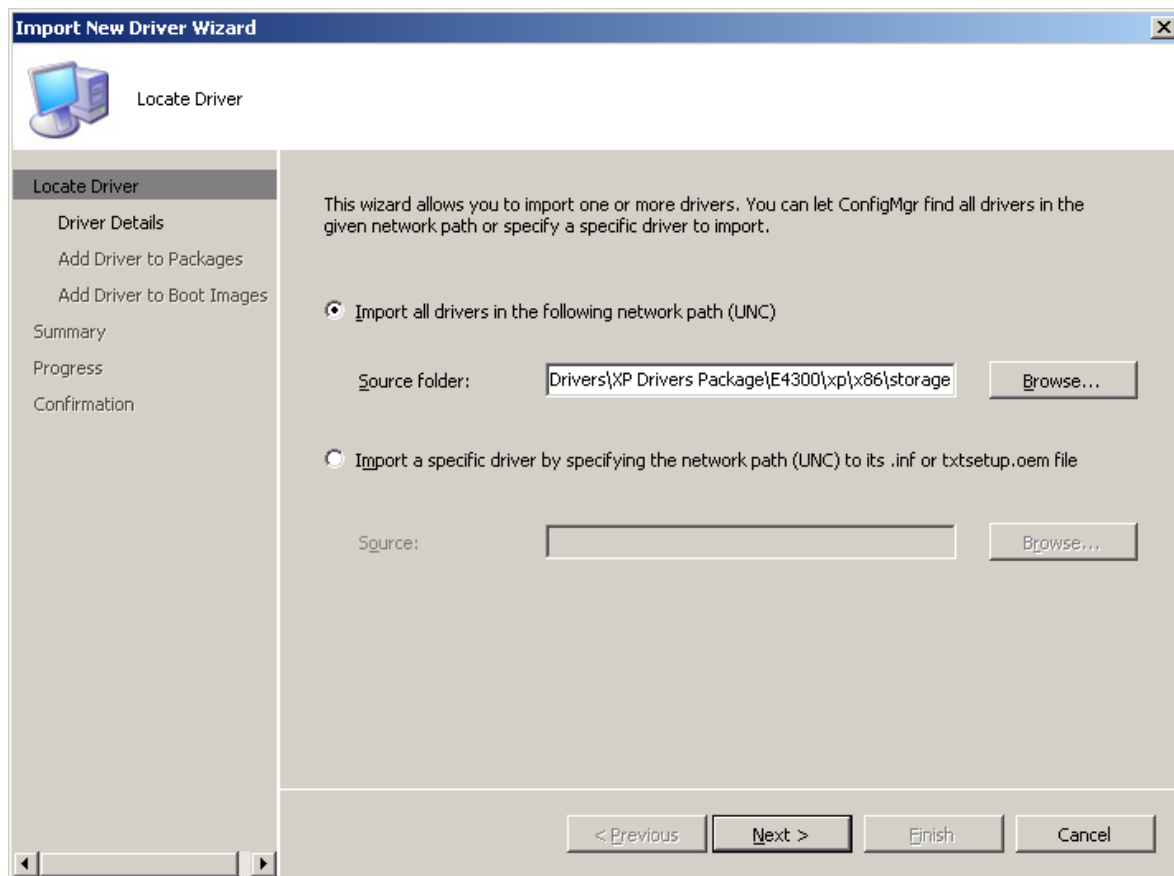
Figure 6: Source selection window

3. Once the drivers have been imported, assign them to the appropriate categories. Assigning drivers to categories provides two benefits:
    a. Create a system-agnostic task sequence, and then assign categories based on WMI queries for hardware detection. Use of categories enables administrators to specify which drivers are available to be applied in an OSD task sequence when using the Auto-Apply-Driver capability.
    b. Ease future database maintenance when the models are decommissioned and the SQL database needs to be cleaned up for older/ non-applicable driver entries.

Figure 7 shows the driver details window where drivers are assigned to categories.
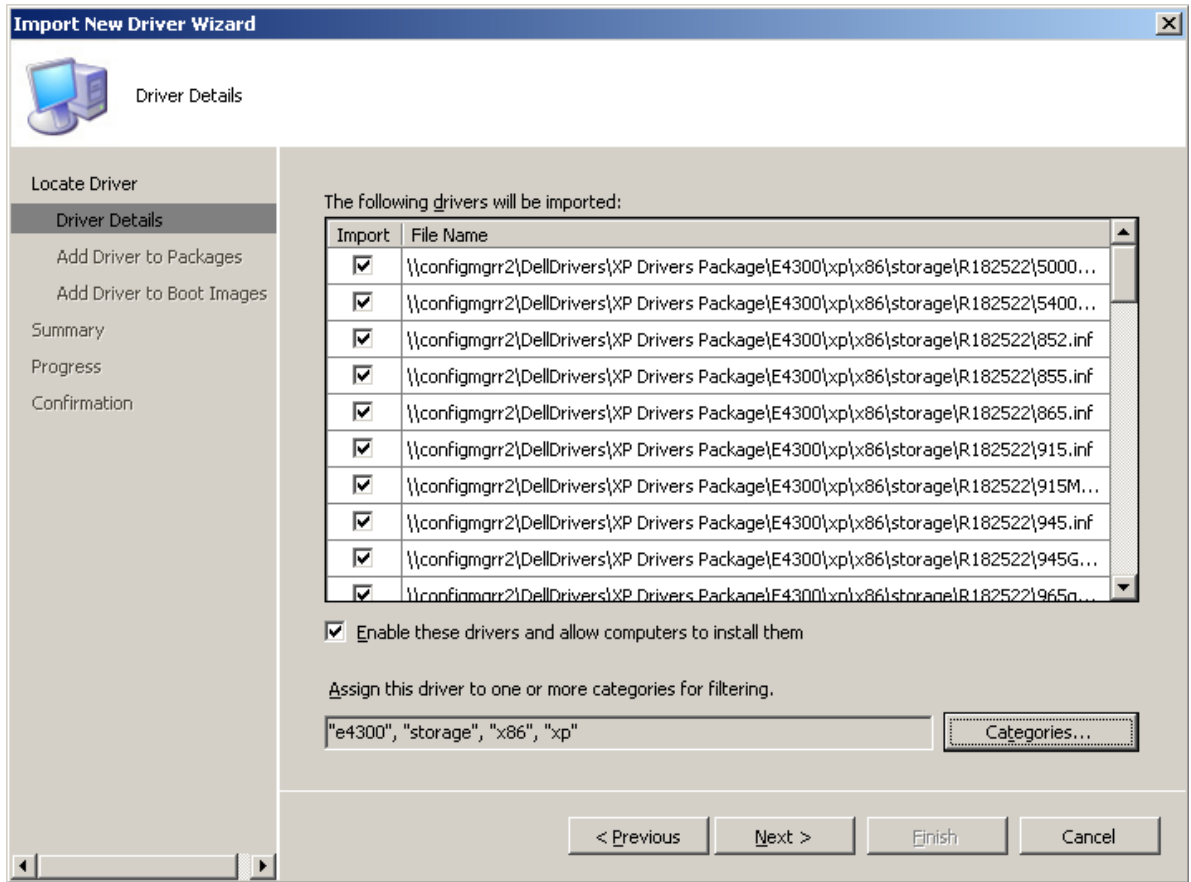
Figure 7: Driver details window

Setting up Hardware-Agnostic Boot Controller Step

For operating systems prior to Windows Vista, mass storage device driver setup step may be required; it will depend upon the native inclusion status of the driver for the boot configuration selected. E-Series platforms support system operation in ATA, AHCI or IRRT mode. Appropriate drivers need to be selected to ensure that the OS image boot occurs correctly. The mass storage device driver selection in each case needs to match the boot device selected in the BIOS.

Table 1 shows the correlation between drivers and the BIOS boot device mode.

Table 1: Driver and BIOS boot device mode

Pre-setup Storage Driver	Model Selection	E-Series BIOS Setting
Intel(R) ESB2 SATA AHCI Controller	Intel(R) ESB2 SATA AHCI Controller	ATA
Intel(R) ESB2 SATA AHCI Controller	Intel (R) ICH9R/DO/DH SATA AHCI Controller	ATA
Intel(R) ESB2 SATA AHCI Controller	Intel (R) ICH9M-E/M SATA AHCI Controller	ATA or AHCI
Intel(R) ESB2 SATA RAID Controller	Intel (R) ESB2 RAID AHCI Controller	ATA
Intel(R) ESB2 SATA RAID Controller	Intel (R) ICH8R/ ICH9R/ ICH10R SATA RAID Controller	ATA
Intel(R) ESB2 SATA RAID Controller	Intel (R) ICH8M-E/ ICH9M-E SATA RAID Controller	ATA or IRRT

Note: Failure to select the appropriate pre-setup storage driver on Windows XP systems may result in a continuous reboot with the following error: 0x0000007B (INACCESSIBLE_BOOT_DEVICE).

Figure 8 is a sample setup to boot any E-series system regardless of the BIOS mode setup.
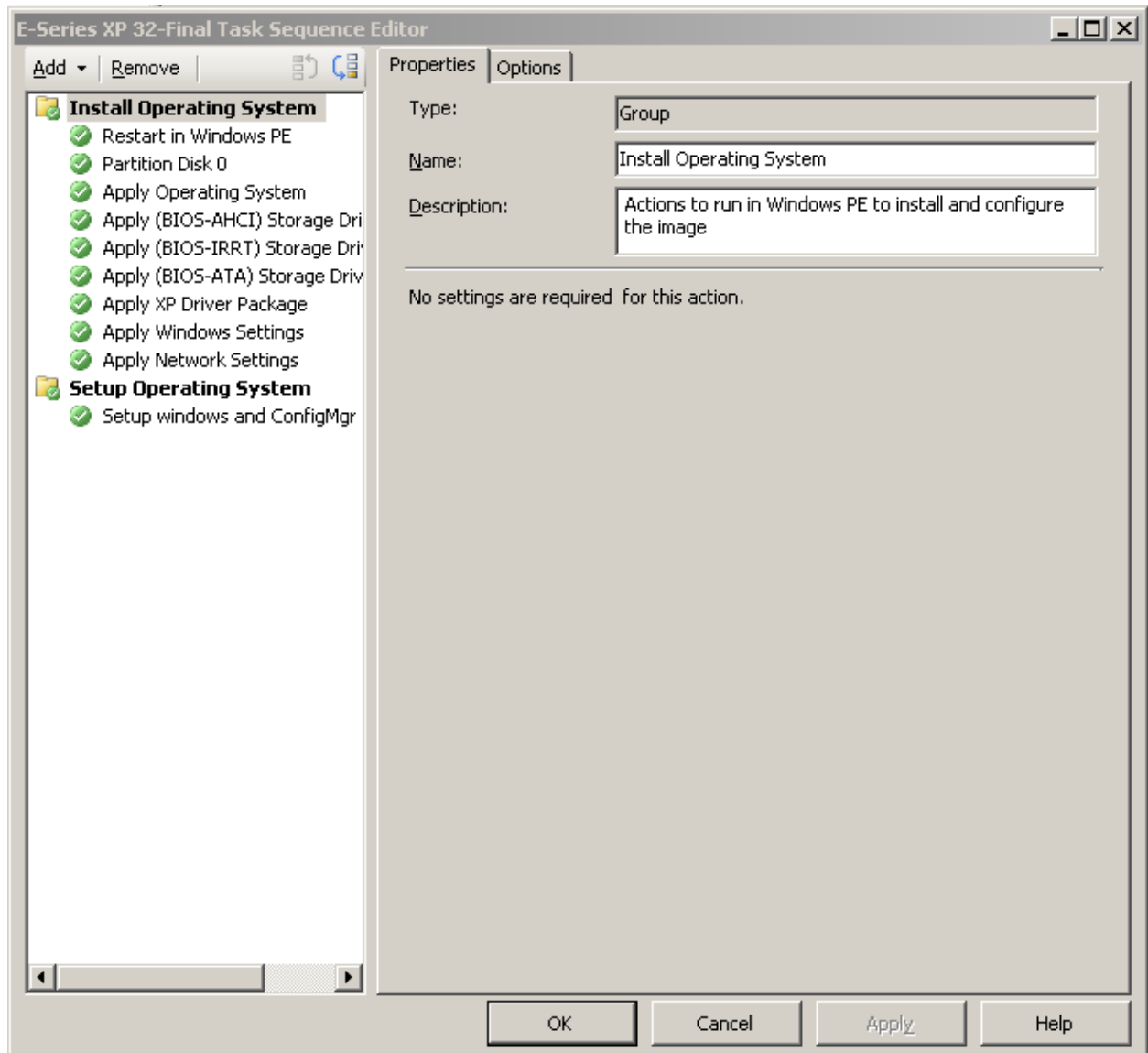
Figure 8: Sample setup to boot E-series system regardless of BIOS mode setup

Figure 9 is an example of a storage driver setup window.
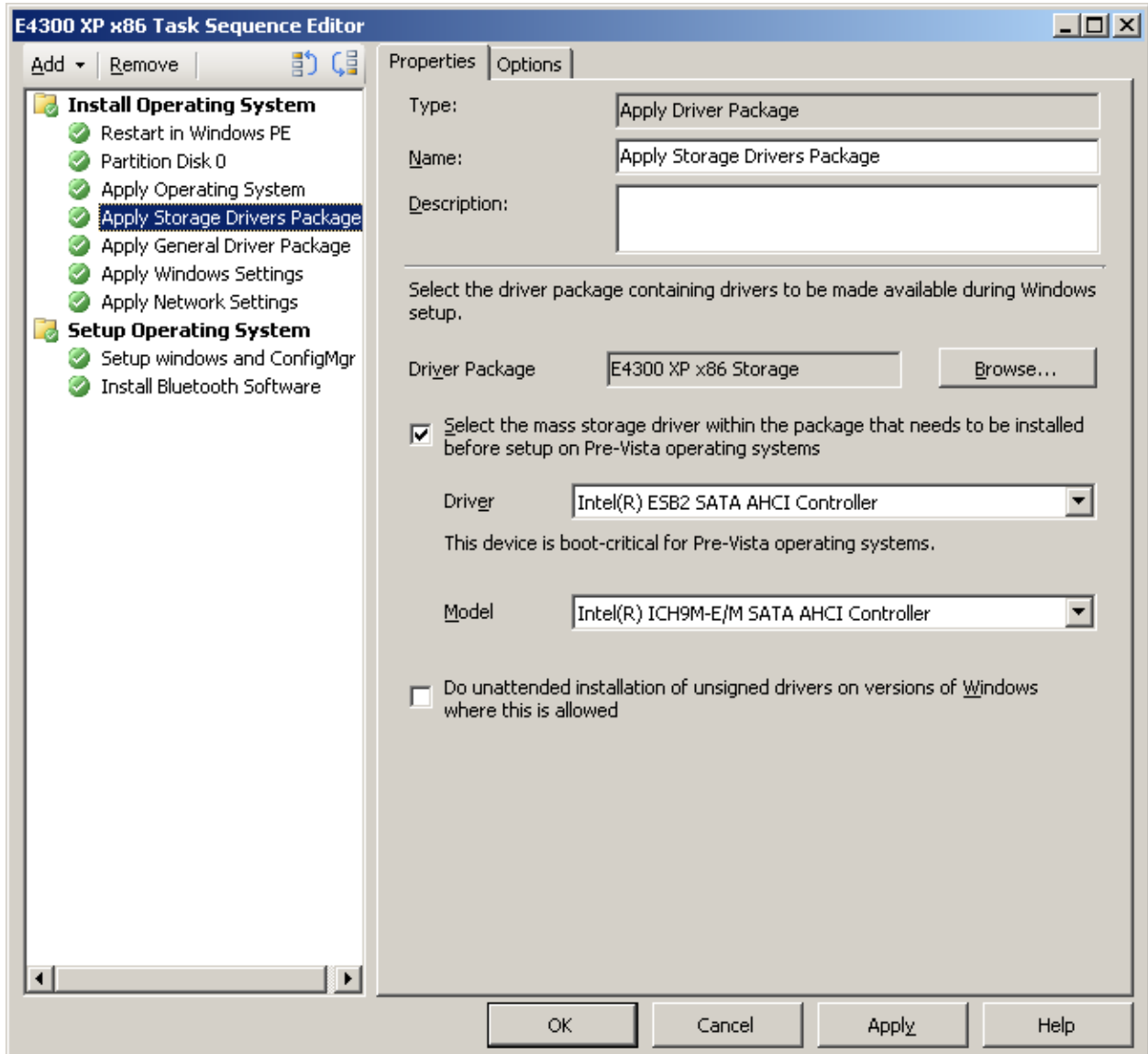
Figure 9: Sample storage driver setup window

'Note: SCCM Infrastructure may sometimes be out-of-date with the Cab signing infrastructure requirements or may be missing QFE which may cause systems to pause or require user intervention for 'validation of unsigned drivers' during Deployment. Dell recommends administrators select the 'unattended installation unsigned drivers' option above to avoid systems halting during deployment for signature validation.

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Apply QFE/Hotfix in OSD Task Sequence

Microsoft releases hot fixes, also called QFE, to fix certain OS-related hardware issues. The release of the QFEs determines whether they will be in the next service pack. Table 2 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 functioning.

Table 2: Required QFEs for audio on E-series systems

OS	QFE	Download Link
Windows XP 64 Bit SP1	KB901105	http://support.microsoft.com/kb/901105
Window XP 32 Bit (SP2 /SP3)	KB835221	http://support.microsoft.com/kb/835221

NOTE: 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 the PnP device enumeration and driver matching occurs during deployment.

Putting it All-Together

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

1. Ensure that the appropriate OS WIM images are in place for deployment.
2. Create a task sequence with appropriate title - E4300 XP SP3 OS Deployment.
3. Let the wizard create the default steps
4. Once the task sequence has been created, choose to edit the task sequence
5. Insert a mass storage device driver setup step using Table 1. As a best practice, add all the 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 previously.
7. Next add steps for additional add-on drivers. Multiple add-on drivers steps to match the driver package with the target OS can be created. This would allow for the same task sequence to be used for multiple Dell systems.
8. A single task sequence can be executed on multiple machines by using the targeted deployment of the driver packages based on the system Model. For example, an XP driver package for E4300 will be applied only if the following WMI query is true: *select Model from Win32_ComputerSystem where Model = "Latitude E4300"*
9. Dell also recommends installing the 'Dell Systems Software'(DSS) to get the latest applicable software updates for your specific system. To download the DSS, please visit http://support.dell.com and select your system model to download the appropriate version for your system.
10. Enabling of Bluetooth functionality for e.g. Wireless on systems that have the Devices included require installation of supporting software 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
11. Dell also recommends downloading the Touch point application software for advanced touchpad functionality from http://support.dell.com/ → System Model → Input Device Drivers.
12. 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 the particular system.

CAB Editing Tools

I/T administrators will need to extract the CABs, and only add drivers that are needed for the configurations they support. Following sections list recommended CAB management tools.

Windows Explorer supports native viewing of CAB contents. Users can also use WinZip to examine the contents of the cab.

Optionally Microsoft provides a couple of tools via the Windows XP Service Pack 2 Support Tools to examine the 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
  Using CabArc to extract the driver contents and maintain directory structure:
  *CabArc.exe -p x <cab file path> *.* <output path>*
  *(e.g. C:\Cabarc.exe –p x C:\E4300-Vista-A00.cab *.* C:\drivers\)*
- Extract Utility from Microsoft
  Once you are in the directory where you want to extract, enter the following command:
  extract /Y /E E4300-Vista-A00.cab

Supported Dell Hardware and Operating Systems

Table 3 lists the operating system support matrix for E-Series system. **N/A** means that the combination has not been qualified for the system model.

	Vista		XP SP3	XP SP2	
	32-Bit	64-bit	32-Bit	32-Bit	64-Bit
Latitude					
E4200	Yes	Yes	Yes	Yes	N/A
E4300	Yes	Yes	Yes	Yes	N/A
E5400	Yes	N/A	Yes	Yes	N/A
E5500	Yes	N/A	Yes	Yes	N/A
E6400	Yes	Yes	Yes	Yes	Yes
E6400 ATG	Yes	Yes	Yes	Yes	Yes
E6500	Yes	Yes	Yes	Yes	Yes
XT2	Yes	Yes	Yes	Yes	N/A

Precision:					
M6400	Yes	Yes	Yes	Yes	Yes
M4400	Yes	Yes	Yes	Yes	Yes
M2400	Yes	Yes	Yes	Yes	Yes
Note: Vista 32 includes all versions of Vista including basic, ultimate, and enterprise. XP2 - 32 bit includes XP Professional					

This list is current as of the release date of this whitepaper. Visit http://support.dell.com for the most up-to-date list. You can also visit the Dell Tech Center (
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 to the various operating systems. The packages are designed to ease the complexity associated with identifying applicable OS deployment drivers, and to have an OS up and running on Dell hardware quickly. This helps minimize administrative downtime by:

- Provide a single component for download with which to manage deployment
- Ensure that the hardware is functional post-deployment without supporting applications
- Provide flexibility to manage and update drivers at a device level

References

SCCM 2007 Product Overview – Microsoft Corporation
Operating System Deployment in Configuration Manager – Microsoft Corporation