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# Deploying an Operating Systems Image on Dell Business Client Systems Using Microsoft System Center 2012 Configuration Manager

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*A Dell™ OpenManage™ Technical White Paper*

## **Systems Management**

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## Introduction

IT administrators of large scale enterprises use centralized systems management processes for managing the heterogeneous network of clients. Common administrative 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 like Microsoft System Center 2012 Configuration Manager (Configuration Manager 2012).

These administrators are often faced with the complex task of managing generations of client hardware systems and making sure that their image management strategy and deployment processes continue to work across these changing hardware technologies.

The Dell™ Client System Deployment CABs (Driver CABs) provide a convenient mechanism for an IT professional to rapidly develop and deploy customized corporate OS images on Dell client systems. This white paper provides an overview of how to leverage the operating system deployment (OSD) capabilities of Microsoft® System Center 2012 Configuration Manager in conjunction with the Dell™ Client System Deployment CABs to deploy a customized OS image on Dell client systems.

The intended audiences for this white paper are IT and network administrators or managers who use Configuration Manager 2012 operating system deployment tools and processes for building and managing images. The reader is expected to have a basic understanding of Configuration Manager 2012 OSD and has a task sequence created for a bare metal deployment.

## Client system deployment CAB overview

The Dell Client System Deployment CAB files that are now available on the Dell Support Web site and the Dell Technical Center Web site 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 either by model or by generations of systems

With the Dell Client Systems Deployment CAB, IT 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
- Set up an appropriate boot control sequence
- Optimize the deployment of targeted system-specific driver packages

## Content structuring

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

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.

## CAB editing tools

IT administrators need to extract the CABs, and only add drivers that are needed for the configurations they support. The following sections list recommended CAB management tools. Windows Explorer supports native viewing of CAB contents, or use WinZip to examine the contents of the CAB.

Optionally, Microsoft provides a couple of tools using 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>
```

(For example, 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
```

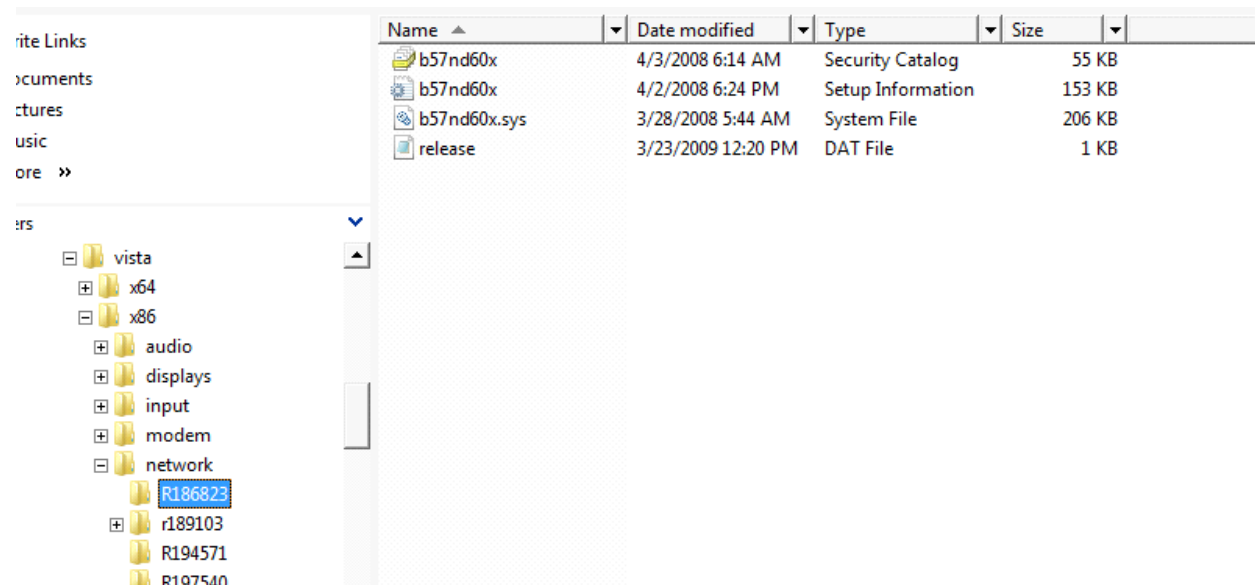
## Driver cab package information

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

Grouping content in this manner provides you 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 1 provides an overview of the architecture-specific folder structure.

Figure 1. Architecture-specific folder structure overview



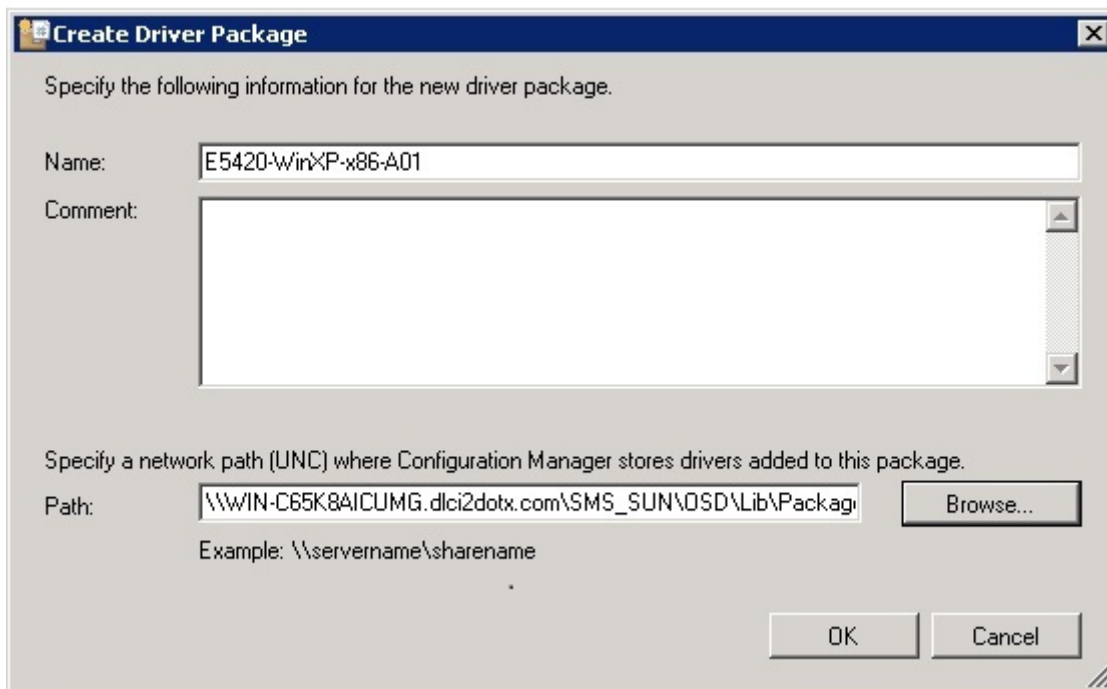
## Driver management using Configuration Manager

Configuration Manager 2012 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 Configuration Manager 2012 driver store.
  - b. Once the drivers have been imported, the OS deployment task sequence uses 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.

The following wizards walk through the process of using option 1 to import drivers into a package and also into the boot images.

Figure 2. The E5420-WinXP-A01.cab extraction to local directory



The above example shows where the E5420-WinXP-A01.cab was extracted to a local directory on the System Center Configuration Manager (SCCM) host machine. The directory itself is available as a UNC share for access using the *SCCM New Driver Package Creation Wizard*. The following section walks through the details of creating a driver package for Configuration Manager Deployment:

1. Extract the Cab to a shared folder on the local server where Configuration Manager is installed.
2. Make sure that the folder is accessible using UNC reference.
3. Right-click **Driver Packages** in the SCCM Console and select the option to create *New Driver Package*.
4. Provide an appropriate name to reflect the contents of driver package. In the example above, the Driver package would be named as *E5420-WinXP-A01 Drivers*.
5. In the Driver Package Source, specify the UNC path to the share. In the example above, the UNC path would be:  
`\\WIN-C65K8AICUMG.dlci2dotx.com\SMS_SUN\OSD\Lib\Packages\Deployment\Dell\Client\E5420-WinXP-X86`
6. To create a driver package, click **OK**.
7. Once the driver package is created, make sure that the distribution points are updated for providing the drivers to the task sequence steps.

## Import drivers to driver packs and boot images

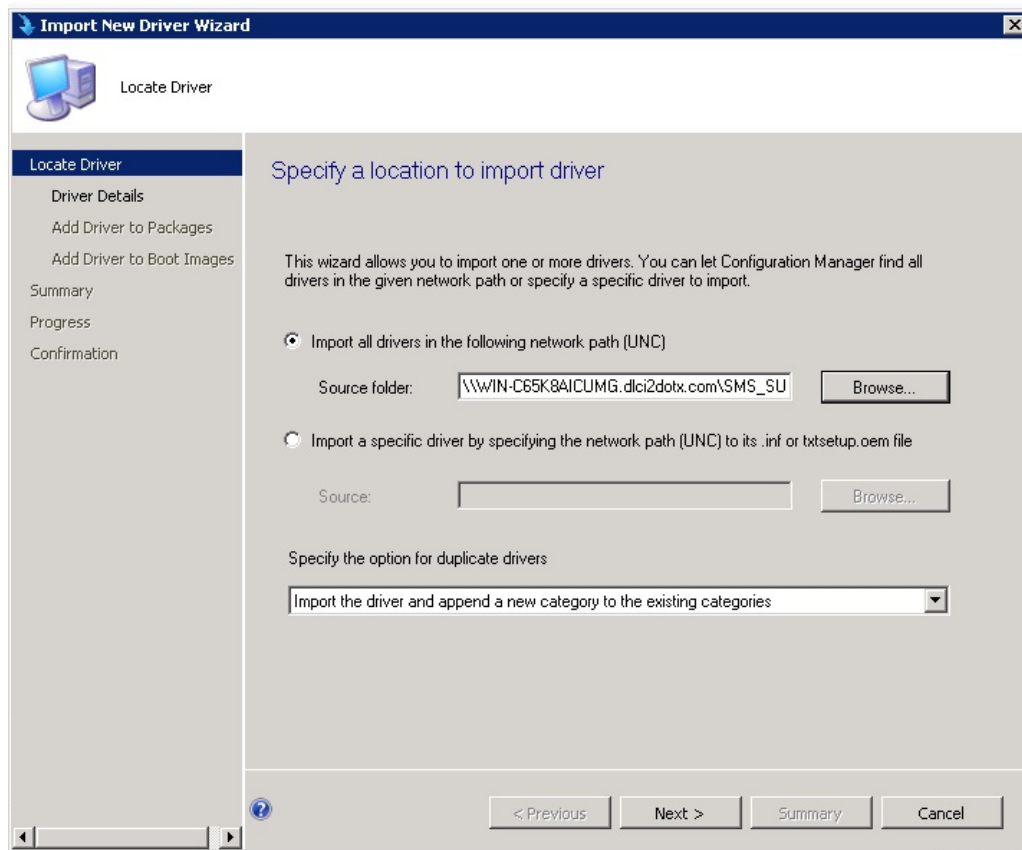
The following screen shots walk you through the process of creating driver packs by model. In addition, Dell provides single monolithic CABs for drivers across a generation of systems. While the screenshots



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below are specific to importing driver CABs for a particular model of hardware, the steps are extended to importing the monolithic CABs.

Figure 3. Specifying an import driver location



Once the drivers have been imported, assign them to the appropriate categories. Assigning drivers to categories:

- Creates a system-agnostic task sequence, and then assigns categories based on WMI queries for hardware detection. Use of categories enables you to specify which drivers are available for application in an OSD task sequence when using the Auto-Apply-Driver capability.
- Eases future database maintenance when the models are decommissioned and the SQL database needs to be cleaned up for older/ non-applicable driver entries.

Figure 4. Specifying the import driver details

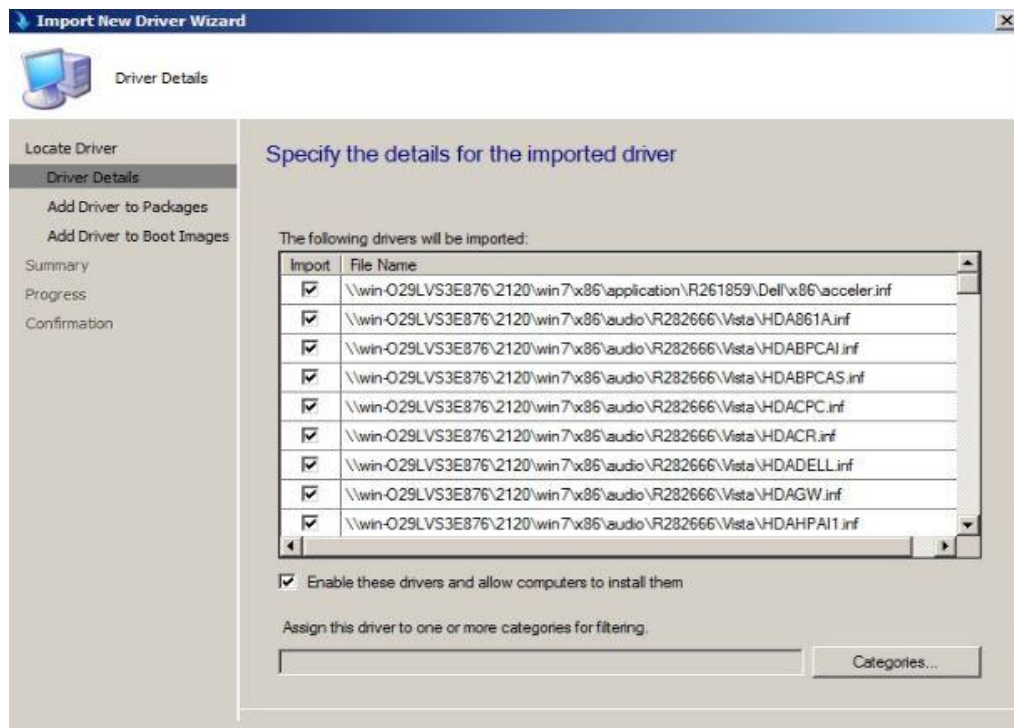
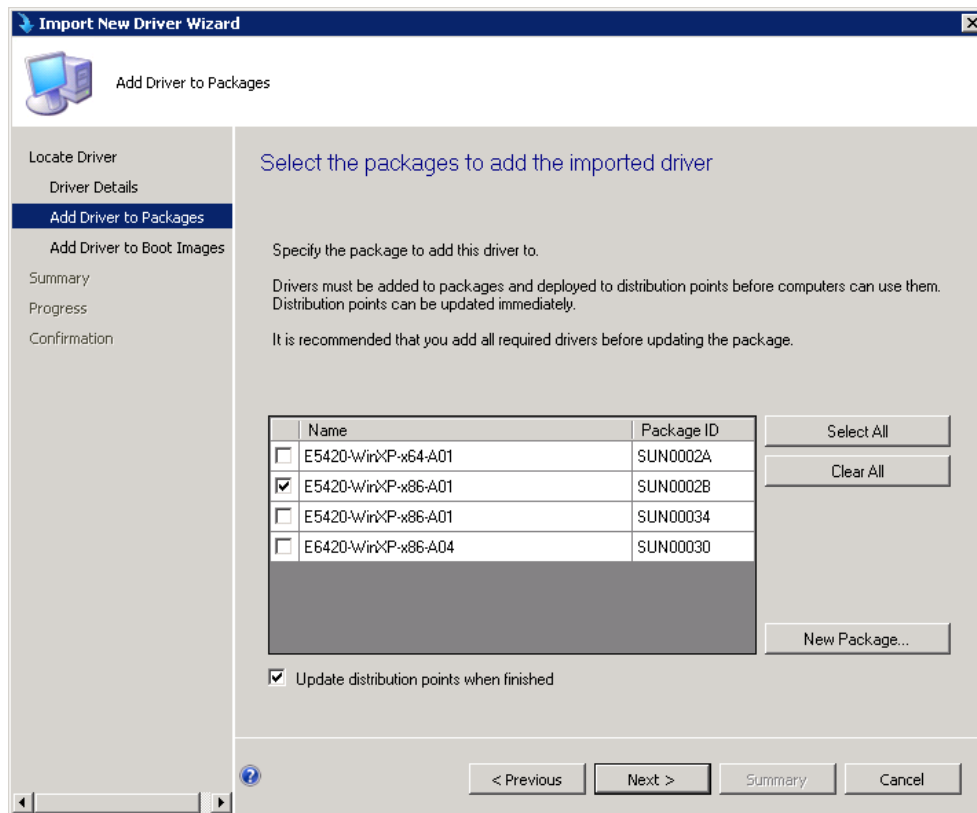


Figure 5. Available driver packages

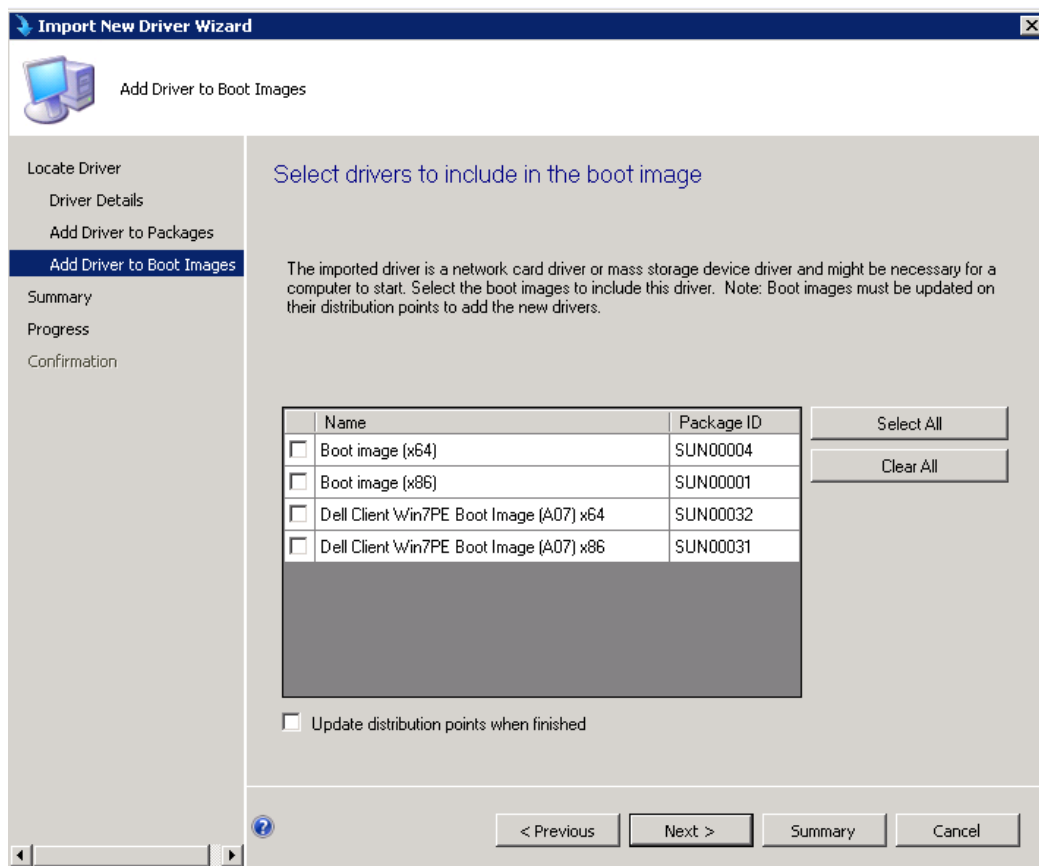


Select the package to which to add these drivers.

## Importing drivers to boot images

The Driver Import Wizard allows the network and mass storage drivers to be injected into WinPE boot image. Select any boot image in which drivers are added. This step is optional if you plan on using the WinPE Driver cab provided by Dell separately from this wizard. See the section titled “WinPE Driver CAB” for additional details. After a driver is added to the boot image update it’s using the *Update the distribution points when finished* option.

Figure 6. Selecting drivers for the boot image



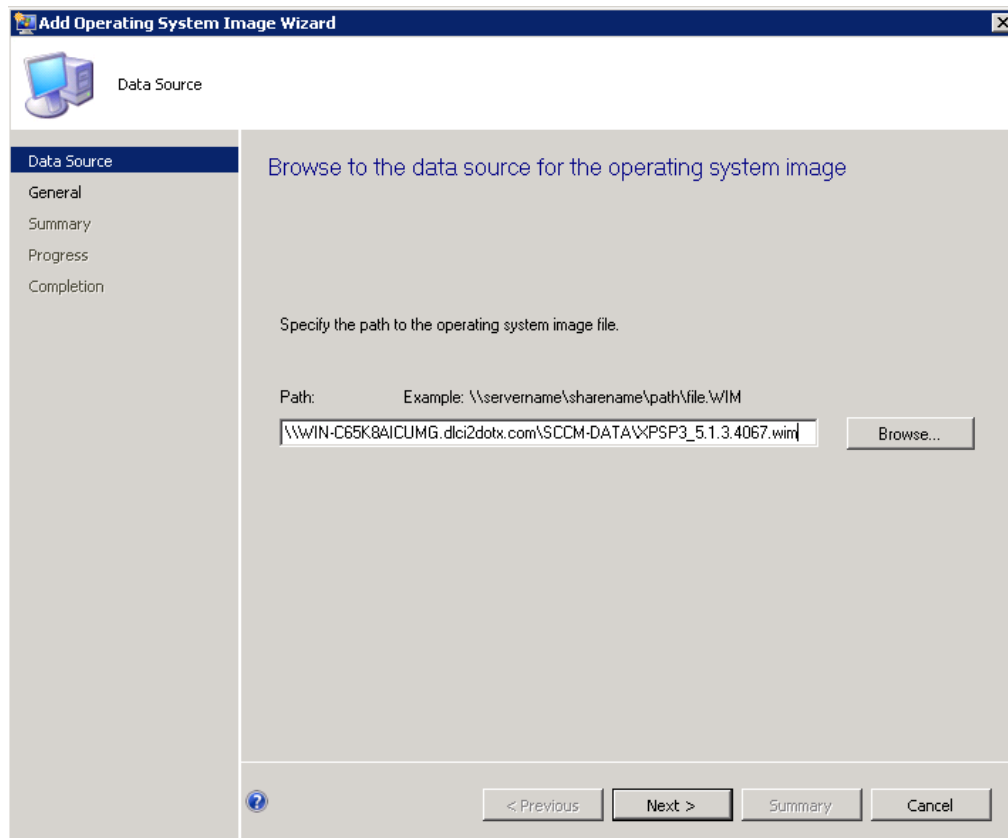
## WinPE Driver CABs

WinPE Driver CAB, separate from a platform OS specific CAB, helps you easily add storage and network support for client platforms. The following link details the importing of these drivers using the dism tool from Microsoft. (<http://technet.microsoft.com/en-us/library/bb680372.aspx>). These CABs are released in line with version numbers that follow the naming convention used for Microsoft Windows PE (for example Windows Vista-based PE -2.x, Windows - based PE-3.x and so forth). Make sure that you use the appropriate version of the PE driver CAB corresponding to the version of WinPE that is enabled by using System Center service packs.

## Operating system images

The following screen lets you specify the WIM file to use for OS deployment. Starting with Windows XP Service Pack 3 the base OS images on MSDN media are available in the compressed .WIM format.

Figure 7. Browsing to the OS image data source



## Setting up hardware-agnostic boot controller step

For operating systems prior to Windows Vista, the mass storage device driver setup step may be required. A mass storage device driver setup depends upon the native inclusion status of the driver for the boot configuration selected. Latitude E-Series platforms, for example, support system operation in ATA, AHCI, or IRRT mode. You need to select the appropriate drivers to make sure 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. Correlation between Drivers and BIOS Boot Device Mode**

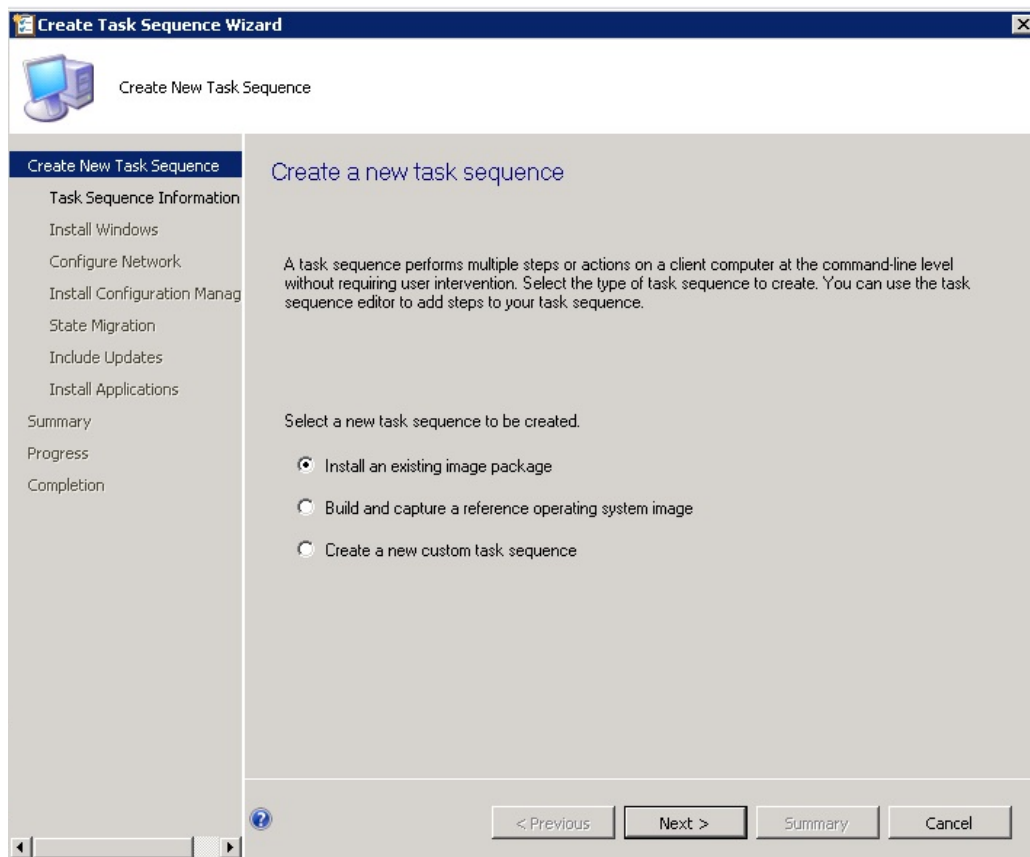
Dell System	BIOS Setting for SATA Operation	OSD Driver Name	OSD Model Name
<b>Desktops</b>			
Optiplex™ 755	RAID Autodetect/ AHCI (factory default)	Intel® 82801 FBM SATA AHCI Controller	Intel® ICH9 SATA AHCI Controller (Desktop ICH9R)
Optiplex 760/780/960/980	RAID Autodetect/ AHCI	Intel® ESB2 SATA AHCI Controller	Intel® ICH10D/DO SATA AHCI Controller
Optiplex 760/780/960/980	RAID Autodetect/ ATA	Intel® ESB2 SATA AHCI Controller	Intel® ICH10D/DO SATA AHCI Controller
Optiplex 760/780/960/980	RAID On (factory default)	Intel® ESB2 SATA RAID Controller	Intel® ICH8R/ICH9R/ICH10R/DO SATA RAID Controller
Precision Workstations (x90)	RAID Autodetect/AHCI (Factory Default) RAID Autodetect/ATA	Intel® 82801 FBM SATA AHCI Controller	Intel® 631xESB/632xESB SATA AHCI Controller (Server/Workstation ESB2)
Precision Workstations (x90)	RAID On	Intel® 82801 HEM SATA RAID Controller	Intel® 631xESB/632xESB SATA RAID Controller (Server/Workstation ESB2)
Precision Workstations	AHCI	Intel® ESB2 SATA AHCI Controller	Intel® ICH9R/DO/DH SATA AHCI Controller
Precision Workstations	RAID	Intel® ESB2 SATA RAID Controller	Intel® ICH8R/ICH9R/ICH10R/DO SATA RAID Controller
Precision Workstations	SAS Controller ON	Dell SAS 5/E Adapter Controller	Dell SAS 5x and SAS 6x Controller Driver (Windows XP 32-bit)
Precision Workstations	PERC Controller ON	Dell PERC 5/E Adapter RAID Controller	Dell PERC5 and PERC6/CERC6 RAID Controller Driver (Windows XP)
<b>Notebooks</b>			
Latitude Dx30	AHCI	Intel® 82801FR SATA AHCI Controller	Intel® 82801 HEM/HBM SATA AHCI Controller (Mobile ICH8M-E/M)
Latitude E and Precision Mx4x0	ATA	Intel® ESB2 SATA AHCI Controller	Intel® ICH9M-E/M SATA AHCI Controller
Latitude E and Precision Mx4x0	AHCI	Intel® ESB2 SATA AHCI Controller	Intel® ICH9M-E/M SATA AHCI Controller
Latitude E and Precision Mx4x0	IRRT (factory default)	Intel® ESB2 SATA RAID Controller	Intel® ICH8-M-E/ICH9M-E SATA RAID Controller

## Driver and BIOS boot device mode

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). See the reference section link number 2 to get the combination for the latest models that may have been launched since the release of this white paper.

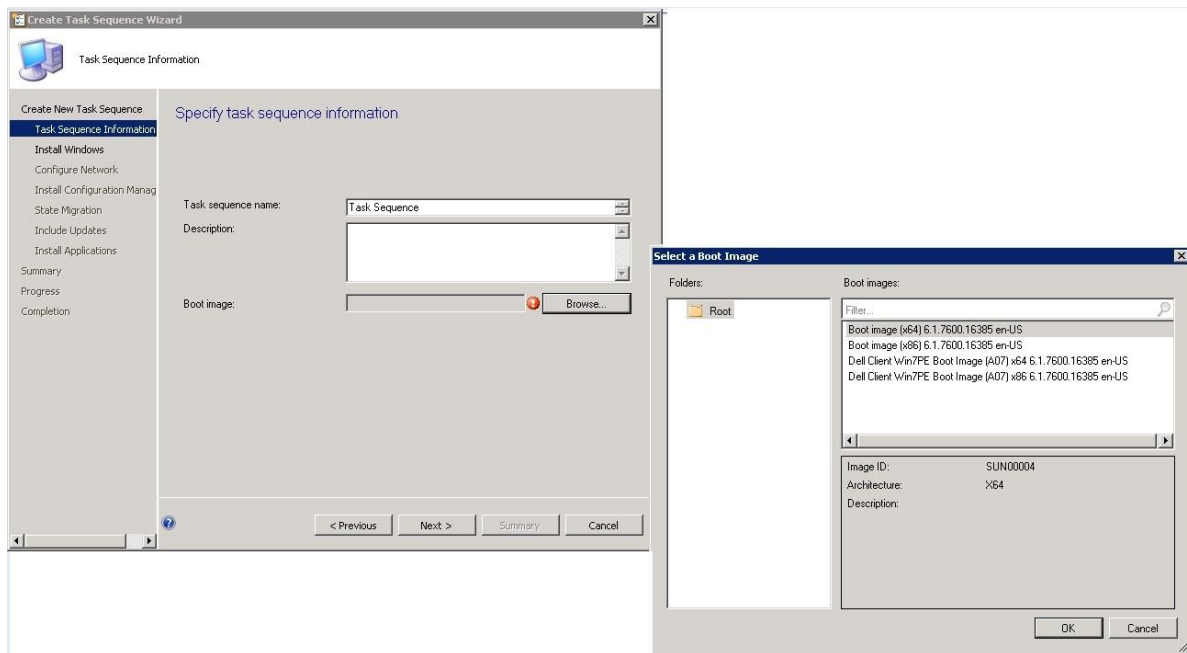
## Task sequence creation walkthrough

1. Create Task Sequence Wizard
  - a. Specify the type of task sequence you want to create.



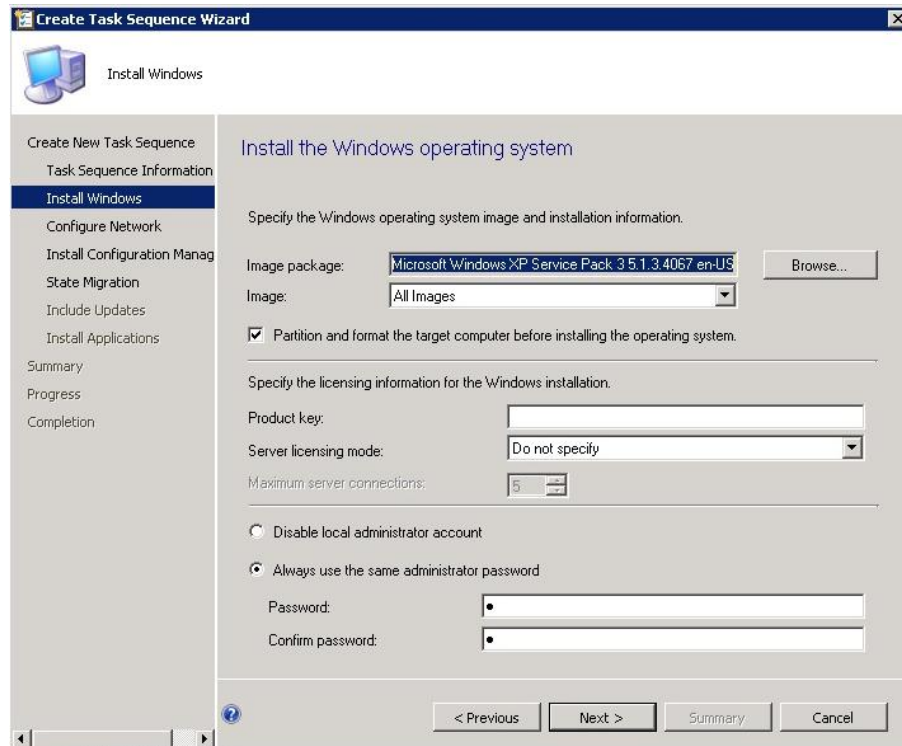
2. Provide task sequence information:
  - a. Provide the task sequence name.
  - b. Select the Boot Image associated with the task sequence.

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### 3. Install Windows:

- a. Select the OS Image to be associated with the task sequence.
- b. Provide the local administrator password.



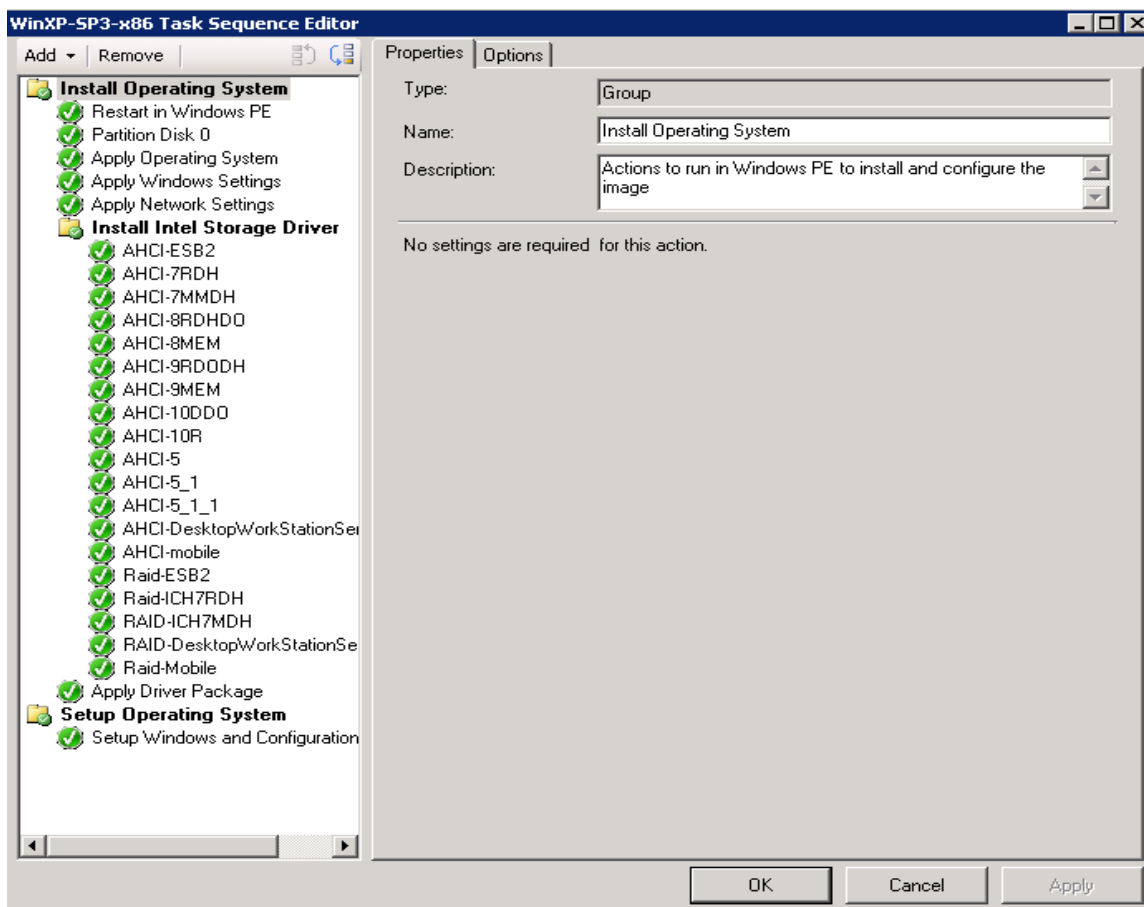


4. Select to configure the network connectivity options.
5. Walk through the rest of the Wizard to install the Configuration Manager client package and specify addition settings like the choice to allow user state migration in case of upgrade scenarios.

## Mass storage controller/model combination

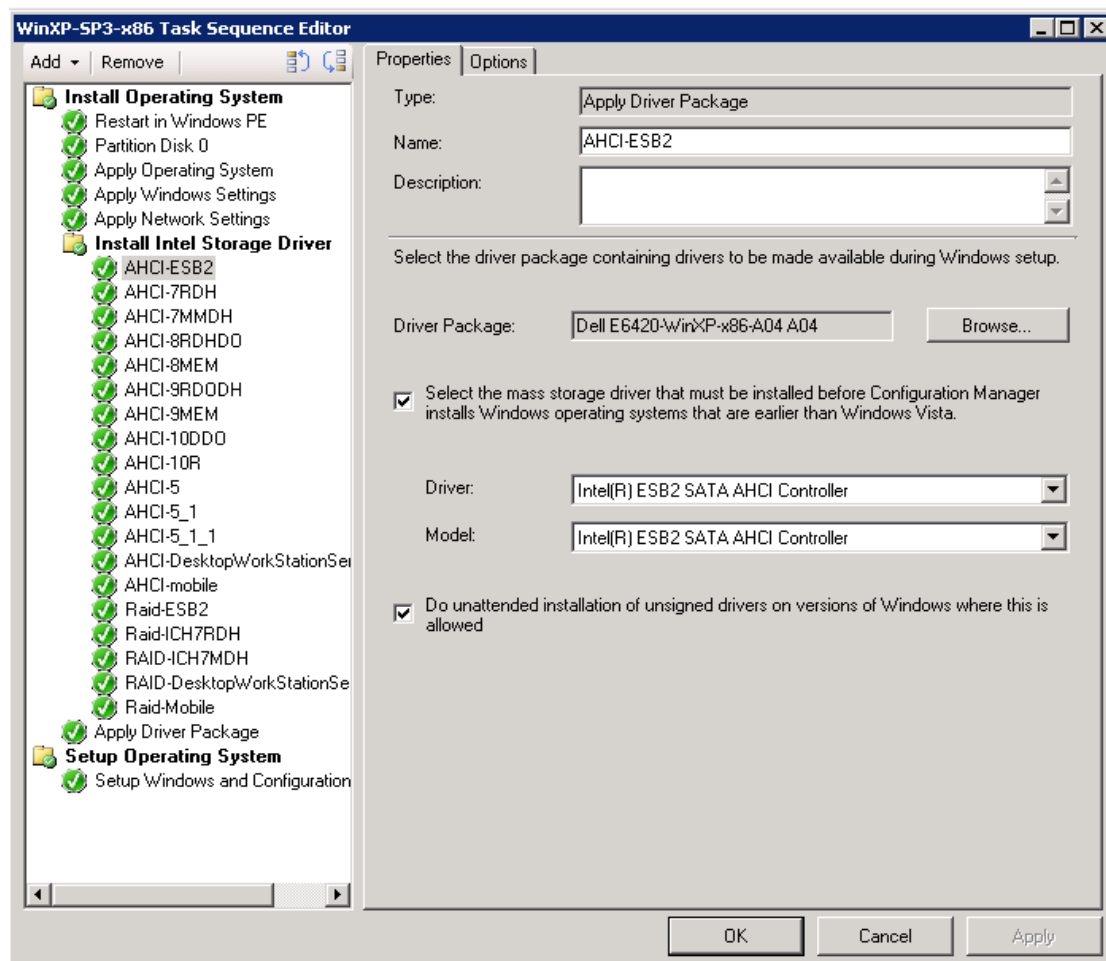
This section is only applicable for Windows XP OS deployment.

1. Once the task sequence is created, edit the task sequence options.



2. Use Table 1 to specify the above and to determine the boot controller combination that you have selected for your deployment. Dell also provides a Client Configuration Toolkit to change the BIOS Storage controller setting prior to OS deployment. For example, you can switch between AHCI/ATA or IRRT mode. The change of controller prior to OS deployment is necessary so the correct set of mass storage drivers get deployed during the OS installation.

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### WMI query for selective mass storage driver

OSD allows WMI queries to be run during deployment to determine the boot controller mode (for example, ATA/AHCI/IRRT) that was selected. Each mode has a unique Device ID in the driver inf file. The following screen shows the use of wild card to cover a series of Device ID for a particular mass storage model driver combination.

Figure 8. WMI Query Properties

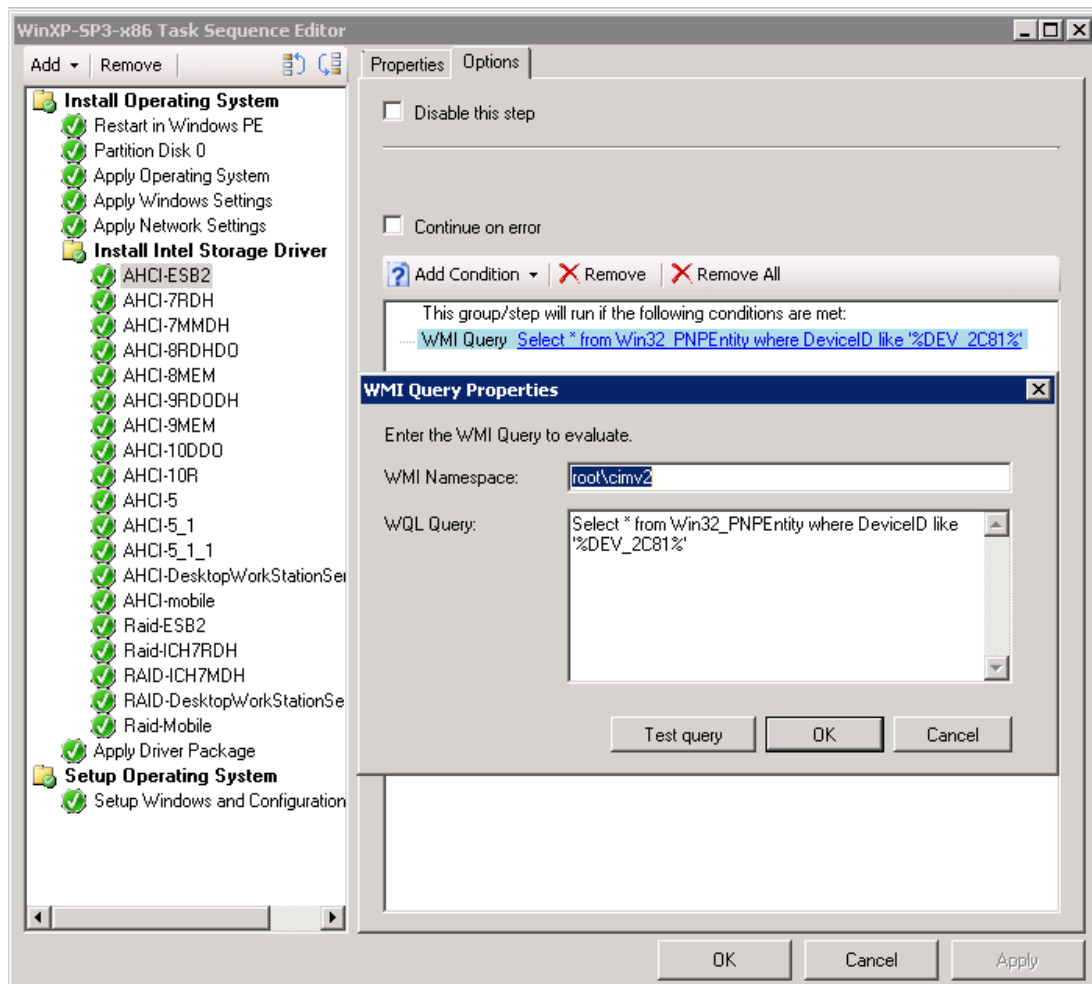
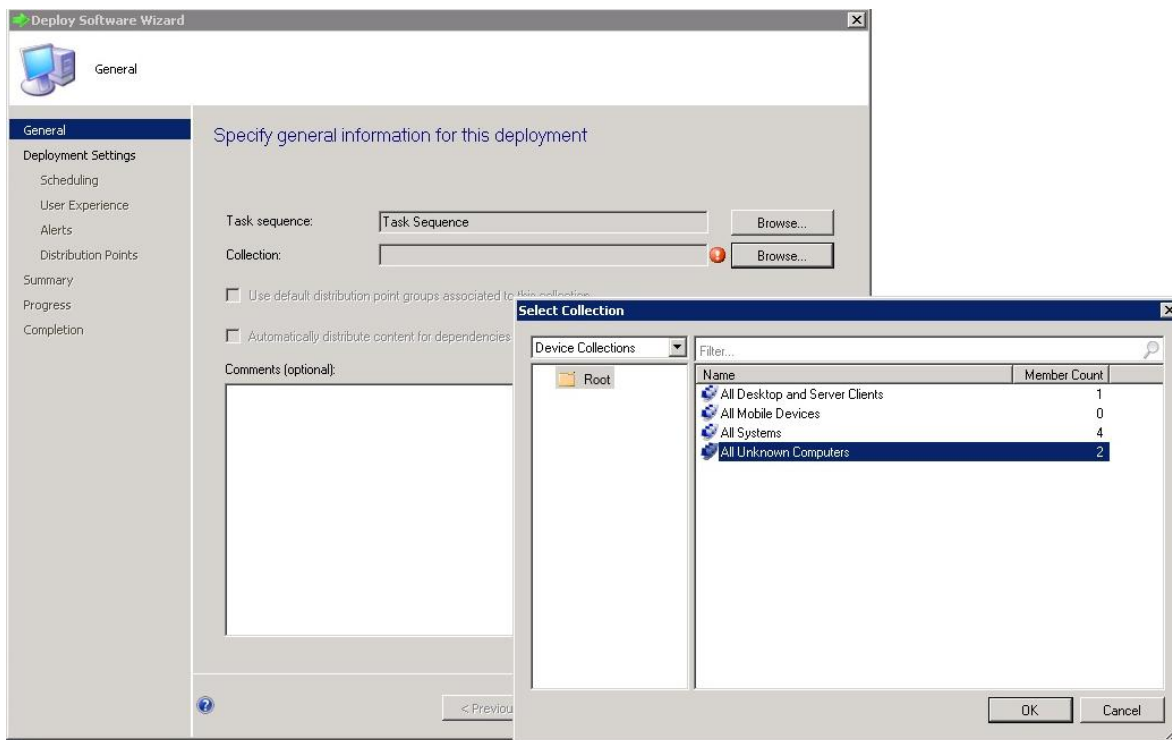


Figure 9. Deploying the task sequence and assigning the appropriate collection



## Client Configuration Toolkit (CCTK)

During OS deployment, you may want to confirm BIOS settings. For example:

- Change the Boot controller mode between AHCI/ATA/IRRT
- Enable/Disable TPM

Dell™ Client Configuration Toolkit (CCTK) is packaged software that provides BIOS configuration capabilities for Dell Business Client Platforms - OptiPlex, Latitude and Precision™. The product provides a graphical interface to create a self-contained package for distribution within the Systems Center environment. You can use the generated package in a pre or post OS deployment environment.

Alternatively, CCTK has a command-line utility to enable BIOS configuration using scripting facilities provided within Microsoft Windows Preinstallation Environment (Windows PE). For the client systems that do not have an operating system installed, you can create a bootable image that contains the latest version of CCTK to run BIOS configuration actions.

## OSD checklist

The following is a step-by-step deployment summary for 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. Complexities presented by Step 5 can be completely eliminated for operating systems that are Windows Vista or newer.

1. Make sure that the appropriate OS WIM images are in place for deployment.

2. Create a task sequence with an appropriate title, for example - E4300 XP SP3 OS Deployment.
3. Let the wizard create the default steps.
4. Once the task sequence is 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 is set up regardless of the BIOS boot configuration setup.
6. Add steps for additional add-on drivers. You can create multiple add-on drivers steps to match the driver package with the target OS. This allows the same task sequence to be used for multiple Dell systems.
7. A single task sequence can be run on multiple machines by using the targeted deployment of the driver packages based on the system model. For example, an XP driver package for Latitude E4300 is applied only if the following WMI query is true:  

```
select Model from Win32_ComputerSystem where Model = "Latitude E4300"
```
8. Install any add-on software that is deemed necessary by downloading it from <http://support.dell.com> in a Dell Update Package (DUP) format.

## 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:

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

## References

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<http://en.community.dell.com/techcenter/enterprise-client/w/wiki/2065.dell-driver-cab-files-for-enterprise-client-os-deployment.aspx>
2. XP Mass Storage Boot Controller/Model Combination  
<http://en.community.dell.com/techcenter/os-applications/w/wiki/2561.operating-system-deployment-xp-mass-storage-driver-reference.aspx>
3. Dell Client Configuration Tool kit  
<http://www.delltechcenter.com/page/Dell+Client+Configuration+Toolkit>

4. Deploying Operating System Images on Dell Business Client Systems using Microsoft® Deployment Toolkit (MDT) 2008

[http://www.dell.com/downloads/global/power/Automating\\_Image\\_Deployements\\_with\\_MDT.pdf](http://www.dell.com/downloads/global/power/Automating_Image_Deployements_with_MDT.pdf)

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<http://blogs.technet.com/mniehaus/archive/2009/05/26/piles-and-piles-of-dell-drivers.aspx>