## Introduction

Microsoft delivers many drivers on their installation media, but due to the time between when the installation media is created by Microsoft and the time you wish to use it, it may have some outdated drivers. Having distribution media with updated drivers ensures more rapid and consistent deployment of the Windows operating system. This method also allows you to preload the Intel chipset drivers – drivers which are never included in a regular Windows installation media. This ensures devices on the motherboard are properly recognized and available.

The purpose of the document is to assist with the creation of a Windows Install DVD that contains Cisco UCS Drivers embedded within them to make it easier to deploy windows when using physical media or the integrated KVM virtual media feature of the UCS B and C Series. Currently, if you are using a standard distribution from Microsoft, it is necessary during the installation to stop the installation process and load the required drivers. Using a copy of the installation media that has been updated with the appropriate Cisco drivers will speed installation and make for more consistent installations.

The below example demonstrates the function for Windows Server 2016 but should work for earlier Windows Server versions by selecting the correct drivers. So if using a Windows version other than 2016, replace all references in the below document to 'Windows Server 2016' with your OS version.

## Environment

The first step is to create a series of folders to hold the various elements for the build. For purposes of this document, the folders are stored under E:\Share

Create the following folders:

- E:\Share\SlipStream
- E:\Share\SlipStream\Drivers
- E:\Share\SlipStream\FinishedISO
- E:\Share\SlipStream\Mount
- E:\Share\SlipStream\WindowsISO

Mount the Windows Server ISO and extract the contents to the E:\Share\SlipStream\WindowsISO folder.

Copy all the Cisco drivers to E:\Share\SlipStream\Drivers. Just to keep things straight, you might want to keep the components of each driver in its own subdirectory. If you are working with both B and C series servers, you may want to consider putting all drivers into a single image, or you can repeat this process to create two final images, one for B-series and the other for C-series.

To create the environment with all the requisite tools from Microsoft, it is recommended to install the latest version of the Assessment and Deployment Kit

(ADK). The latest kit available at the time of this writing is for Windows 10 Version 1411. Download the Windows ADK for Windows 10 (http://go.microsoft.com/fwlink/p/?LinkId=526740).

A previous document posted to Cisco Communities (https://communities.cisco.com/docs/DOC-66147) provides the details for installation and configuration of the ADK. Also included in that previous document are instructions for extracting the Intel chipset drivers that can be included in this process.

Launch Windows Deployment and Imaging Tools Environment as administrator. Execute the commands listed in this document from the command window that launches when you start the Windows Deployment and Imaging Tools Environment.

NOTE: The commands provided in this document assume a specific directory structure. If you use a different structure, you will need to alter the commands to reflect your structure.

## Driver Injection

There are two different files on the Windows ISO media that need modification to contain the Cisco UCS drivers. Boot.wim is used to start the installation, performing functions such as formatting the installation disk. Therefore, disk drivers are needed to ensure disks are visible for the installation. Install.wim contains the actual installation options for the Windows operating system. There are multiple entries in each of these wim files, and each entry needs the drivers.

### Boot.wim

```
Dism /Get-Wiminfo /Wimfile:E:\Share\SlipStream\WindowsISO\sources\boot.wim
```

Running this command will determine how many times you will have to slipstream drivers into each boot.wim element. For Windows Server 2016 the expected value is 2.

```
Dism /Mount-Image /ImageFile:E:\Share\SlipStream\WindowsISO\sources\boot.wim
/index:1 /MountDir:E:\Share\SlipStream\Mount
Dism /Image:E:\Share\SlipStream\Mount /Add-Driver
/Driver:E:\Share\SlipStream\Drivers /Recurse
Dism /Unmount-Wim /Mountdir:E:\Share\SlipStream\Mount /Commit

Dism /Mount-Image /ImageFile:E:\Share\SlipStream\WindowsISO\sources\boot.wim
/index:2 /MountDir:E:\Share\SlipStream\Mount
Dism /Image:E:\Share\SlipStream\Mount /Add-Driver
/Driver:E:\Share\SlipStream\Drivers /Recurse
Dism /Unmount-Wim /Mountdir:E:\Share\SlipStream\Mount /Commit
```

### Install.wim

Running the following command determine how many times you will have to slipstream drivers into each install.wim eentry. For Windows Server 2016, the expected value is 4.

```
Dism /Get-Wiminfo /Wimfile:E:\Share\SlipStream\WindowsISO\sources\install.wim
```

This command mounts the first entry of the install.wim file so drivers can be added to them.

```
Dism /Mount-Image /ImageFile:E:\Share\SlipStream\WindowsISO\sources\install.wim
/index:1 /MountDir:E:\Share\SlipStream\Mount
```

This command takes install.wim entry mounted in the previous command and adds all the drivers in the Drivers directory to the install.wim file.

```
Dism /Image:E:\Share\SlipStream\Mount /Add-Driver
/Driver:E:\Share\SlipStream\Drivers /Recurse
```

The command unmounts the install.wim file with all the new drivers embedded.

```
Dism /Unmount-Wim /Mountdir:E:\Share\SlipStream\Mount /Commit
```

Repeat the process for the other entries in the wim file.

```
Dism /Mount-Image /ImageFile:E:\Share\SlipStream\WindowsISO\sources\install.wim
/index:2 /MountDir:E:\Share\SlipStream\Mount
Dism /Image:E:\Share\SlipStream\Mount /Add-Driver
/Driver:E:\Share\SlipStream\Drivers /Recurse
Dism /Unmount-Wim /Mountdir:E:\Share\SlipStream\Mount /Commit

Dism /Mount-Image /ImageFile:E:\Share\SlipStream\WindowsISO\sources\install.wim
/index:3 /MountDir:E:\Share\SlipStream\Mount
Dism /Image:E:\Share\SlipStream\Mount /Add-Driver
/Driver:E:\Share\SlipStream\Drivers /Recurse
Dism /Unmount-Wim /Mountdir:E:\Share\SlipStream\Mount /Commit

Dism /Mount-Image /ImageFile:E:\Share\SlipStream\WindowsISO\sources\install.wim
/index:4 /MountDir:E:\Share\SlipStream\Mount
Dism /Image:E:\Share\SlipStream\Mount /Add-Driver
/Driver:E:\Share\SlipStream\Drivers /Recurse
Dism /Unmount-Wim /Mountdir:E:\Share\SlipStream\Mount /Commit
```

## Create New ISO

Once the Cisco drivers have been added to each entry in the installation media, you need to recreate a bootable ISO file that can be used for installing Windows Server, either as virtual media within UCS, as input to a virtual machine, or for transfer to a USB device for booting. The size of the installation ISO is greater than will fit on a normal DVD. Because the distribution media contains over 4.5 GB of information, it is necessary to create a file specifying the boot files that need to be placed at the beginning of the ISO file. This file needs to be accessible during the creation of the

ISO file. For purposes of this document, the file was placed in the root of the SlipStream directory tree.

E:\Share\SlipStream\BootOrder.txt

```
boot\bcd
boot\boot.sdi
boot\bootfix.bin
boot\bootsect.exe
boot\etfsboot.com
boot\memtest.exe
boot\en-us\bootsect.exe.mui
boot\fonts\chs_boot.ttf
boot\fonts\cht_boot.ttf
boot\fonts\jpn_boot.ttf
boot\fonts\kor_boot.ttf
boot\fonts\wgl4_boot.ttf
efi\boot\bootx64.efi
efi\microsoft\boot\bcd
efi\microsoft\boot\cdboot.efi
efi\microsoft\boot\cdboot_noprompt.efi
efi\microsoft\boot\efisys.bin
efi\microsoft\boot\efisys_noprompt.bin
efi\microsoft\boot\memtest.efi
efi\microsoft\boot\fonts\chs_boot.ttf
efi\microsoft\boot\fonts\cht_boot.ttf
efi\microsoft\boot\fonts\jpn_boot.ttf
efi\microsoft\boot\fonts\kor_boot.ttf
efi\microsoft\boot\fonts\wgl4_boot.ttf
sources\boot.wim
```

A single ISO file is created that can be used for installing to a BIOS or UEFI service profile. The following command is used to create the ISO file.

```
oscdimg -m -o -u2 -udfver102 -
bootdata:2#p0,e,bE:\Share\SlipStream\WindowsISO\boot\etfsboot.com#pEF,e,bE:\Sha
re\SlipStream\WindowsISO\efi\microsoft\boot\efisys.bin -
yoE:\Share\SlipStream\BootOrder.txt E:\Share\SlipStream\WindowsISO
E:\Share\SlipStream\FinishedISO\Windows2016-UCSdrivers.iso
```

The parameters used in the command are as follows:

- -m – ignore the maximum size of the image
- -o – optimize storage by encoding duplicate files only one time
- -u2 – produce an ISO image that has only the Universal Disk Format (UDF) file system on it
- -udfver102 – specify the UDF version 1.02 format

- -bootdata: – specify a multiboot image. This image uses an x86-based boot sector as the default image. This sector starts the Etfsboot.com boot code. A secondary EFI boot image starts an EFI boot application
  - 2 – specify the number of boot catalog entries
  - # - functions as the separator between root entries to be put into the boot catalog
  - p0 – set the platform ID to 0 for the first, default boot entry for the BIOS
  - e – disables floppy disk emulation in the El Torito catalog
  - bE:\Share\SlipStream\WindowsISO\boot\etfsboot.com – put the specified file (etfsboot.com) in the boot sectors of the disk. File is pulled from the location of the files from the original distribution ISO
  - # – separator between the first and second boot entries
  - pEF – set the platform ID to "EF," as defined by the UEFI specification.
  - E:\Share\SlipStream\WindowsISO\efi\microsoft\boot\efisys.bin – put the specified file (efisys.bin) in the boot sector of the disk. Efisys.bin is the binary floppy disk layout of the EFI boot code. This disk image contains the files that are used to start from the EFI firmware in the Efi\boot\x64boot.efi folder. File is pulled from the location of the files from the original distribution ISO
  - DO NOT USE SPACES in the –bootdata: definition
- -yoE:\Share\SlipStream\BootOrder.txt – specify a text file that has a layout for the files to be put in the image. Do not use spaces. Sample BootOrder.txt file is shown previously.
- E:\Share\SlipStream\WindowsISO – directory containing the extracted and updated files of the original Windows installation ISO
- E:\Share\SlipStream\FinishedISO\Windows2016-UCSdrivers.iso – file name of the ISO file to be created.

## All Commands

The following are all the above commands gathered into an easy to cut and paste block. Using this assumes a typical Windows Server installation media which contains the two entries in the boot.wim and and the four entries in the install.wim.

```
Dism /Get-Wiminfo /Wimfile:E:\Share\SlipStream\WindowsISO\sources\boot.wim

Dism /Mount-Image
/ImageFile:E:\Share\SlipStream\WindowsISO\sources\boot.wim /index:1
/MountDir:E:\Share\SlipStream\Mount

Dism /Image:E:\Share\SlipStream\Mount /Add-Driver
/Driver:E:\Share\SlipStream\Drivers /Recurse

Dism /Unmount-Wim /Mountdir:E:\Share\SlipStream\Mount /Commit
```

```
Dism /Mount-Image
/ImageFile:E:\Share\SlipStream\WindowsISO\sources\boot.wim /index:2
/MountDir:E:\Share\SlipStream\Mount

Dism /Image:E:\Share\SlipStream\Mount /Add-Driver
/Driver:E:\Share\SlipStream\Drivers /Recurse

Dism /Unmount-Wim /Mountdir:E:\Share\SlipStream\Mount /Commit

Dism /Get-Wiminfo
/Wimfile:E:\Share\SlipStream\WindowsISO\sources\install.wim

Dism /Mount-Image
/ImageFile:E:\Share\SlipStream\WindowsISO\sources\install.wim /index:1
/MountDir:E:\Share\SlipStream\Mount

Dism /Image:E:\Share\SlipStream\Mount /Add-Driver
/Driver:E:\Share\SlipStream\Drivers /Recurse

Dism /Unmount-Wim /Mountdir:E:\Share\SlipStream\Mount /Commit

Dism /Mount-Image
/ImageFile:E:\Share\SlipStream\WindowsISO\sources\install.wim /index:2
/MountDir:E:\Share\SlipStream\Mount

Dism /Image:E:\Share\SlipStream\Mount /Add-Driver
/Driver:E:\Share\SlipStream\Drivers /Recurse

Dism /Unmount-Wim /Mountdir:E:\Share\SlipStream\Mount /Commit

Dism /Mount-Image
/ImageFile:E:\Share\SlipStream\WindowsISO\sources\install.wim /index:3
/MountDir:E:\Share\SlipStream\Mount

Dism /Image:E:\Share\SlipStream\Mount /Add-Driver
/Driver:E:\Share\SlipStream\Drivers /Recurse

Dism /Unmount-Wim /Mountdir:E:\Share\SlipStream\Mount /Commit

Dism /Mount-Image
/ImageFile:E:\Share\SlipStream\WindowsISO\sources\install.wim /index:4
/MountDir:E:\Share\SlipStream\Mount

Dism /Image:E:\Share\SlipStream\Mount /Add-Driver
/Driver:E:\Share\SlipStream\Drivers /Recurse

Dism /Unmount-Wim /Mountdir:E:\Share\SlipStream\Mount /Commit

oscdimg -m -o -u2 -udfver102 -
bootdata:2#p0,e,bE:\Share\SlipStream\WindowsISO\boot\etfsboot.com#pEF,e
,bE:\Share\SlipStream\WindowsISO\efi\microsoft\boot\efisys.bin -
yoE:\Share\SlipStream\BootOrder.txt E:\Share\SlipStream\WindowsISO
E:\Share\SlipStream\FinishedISO\Windows2016-UCSdrivers.iso
```