USB DRIVER INSTALLATION UTILITY

1. Description

The driver installer and uninstaller combination is a customizable installation utility for Silicon Laboratories USB drivers. These utilities are completely independent of the actual driver and no referencing is done by the INF file to the installer or uninstaller. This is desirable because certification of the driver is not affected by changes in the installation utility, and the installation utility is not required by the driver if a customer does not want to use it. The utilities currently work under Windows 2000, XP, Server 2003, and Vista.

This also means that as newer versions of the installer are released, they can be dropped into an existing installation package without un-certifying or breaking the installation while still taking advantage of the latest bug fixes or enhancements.

This application note provides a description of utility usage and options. For customization of a driver installation, use the software and read the document associated with AN220.

2. Installation

The following sections explain how installation works.

2.1. Install Package

The driver installer is built as a single executable that references a file called setup.ini. This INI file contains all of the settings used for driver installation and uninstallation. This DriverInstaller.exe and setup.ini combo should exist in a directory alongside the .sys driver files, .inf installation files, and, if the driver is certified, any .cat catalog files. For example, the USBXpress Driver Package structure looks like this:

> \USBXpressInstaller.exe (renamed DriverInstaller.exe)
> \setup.ini (customized setup values)
> \x64\SiUSBXp.sys (USBXpress driver 64 bit)
> \x64\SiLib.sys (support library for USBXpress 64 bit)
> \x86\SiUSBXp.sys (USBXpress driver 32 bit)
> \x86\SiLib.sys (support library for USBXpress 32 bit)
> \SiUSBXp.inf (INF file for the USBXpress driver)
> \SiUSBXp.cat (catalog file for the USB driver)

When the USBXpressInstaller.exe is run, it starts by reading in all the values from the setup.ini file. From this, it can determine if setup should be performed quietly or if the windows and message boxes should be shown. If quiet mode is selected, then the installation routine begins immediately and no status messages are shown to the user. If quiet mode is not selected, the main window is populated with the strings specified in the INI file such as company name, product name, the driver version, etc., and displayed to the user.

2.1.1. Installation Directory Selection

There is an option in the setup.ini file that determines if drivers should be copied to the PC. If driver files are supposed to be copied to the hard drive, then a default installation directory specified in setup.ini is displayed in the DriverInstaller window. This directory can be changed by clicking the "Change Install Location Button". The installation directory is where the driver package is copied and also where the installation originates. This is so the original install media (such as a CD or floppy) is not needed every time a device is installed.

The DriverInstaller can also take a default directory from the command line, which will override the default directory for installation and forces the driver files to be copied regardless of the copy files specification in setup.ini. The following is an example of how to pass in an installation directory:

> USBXpressInstaller.exe "C:\Program Files\Silicon Labs\USBXpress"

If the setup.ini specifies that driver files should not copied to the PC then no installation directory is shown in the window, and nothing will happen if a directory is supplied at command line. Because nothing is copied, the install media (such as a CD, floppy, or the source install directory on the PC) is where the installation originates and will be needed when devices are plugged in. If the installation media is not found when a device is plugged in then the "Add New Hardware Wizard" will prompt you for the disc or floppy. It is recommended to always copy the drivers to the PC under "root:\Program Files\Company Name\Product Name" to avoid this behavior.

2.1.2. Pre-Installation Routine

When the install button is clicked, the installer goes through a process to make sure that the driver is installed successfully and cleanly. The steps are as follows:

- Pre-installation check
  - Checks that a current version of the driver is not already installed.
  - Checks that an older version of the driver is not installed.
  - Checks that a version of this driver is not installed using an older version of Silicon Labs driver installation utilities.
  - Performs a system scan to ensure that other INF files do not exist with the VID and PID of the drivers that are about to be installed.

The first check determines if the driver being installed is already installed or not. If it is installed, it prompts and exits. The next check determines if an older version of this driver was installed previously. If so, it will perform a proper removal before installing the new driver. There is also a check to determine if this type of driver was installed using one of Silicon Labs' older installation utilities by looking up the uninstall keys in the registry. If it finds an old version installed then it prompts the user to uninstall the old installation and runs the old uninstaller utility in quiet mode.

Finally, the INF directory is scanned to find any leftover INF files that contain a matching VID and PID to the one we are installing now. If they are found the user is prompted with the names of the driver sets and can choose to either uninstall them and continue or cancel the installation.

During any of these preinstall checks it is possible that something may occur that requires a reboot. If this is the case, then the user is prompted to reboot at the end of the successful installation.

2.1.3. Driver Installation Routine Description

- Driver Installation (upon successful pre-installation check)
  - Driver files are copied to the installation directory (if specified in setup.ini).
  - The uninstaller is copied into the system directory.
  - INF files are installed from either the installation directory (if copied) or the install media.
  - Registry entries are created for Driver Uninstallation.
  - Registry entries are created containing information on the current installation such as the version, VID, PID, DriverInstaller version, installation directory, and lists of files copied and installed. It also contains the options for uninstallation such as quiet, removing the installed driver files, etc.

The driver installation process is very straightforward. Here, if anything fails in the above routine list then the user is prompted and the application exits. If there are no errors then the installation prompts with success and exits.

2.1.4. Driver Installation Completion

The driver installer records all device installation in the following registry key (this key can be checked by a calling application to determine if an installation has been completed successfully):

HKEY_LOCAL_MACHINE\SOFTWARE\Silicon Laboratories, Inc.\Silicon Laboratories Driver Installations\<Device Type>\<Device Specific Key>

<Device Type>—The devices are split into USBXpress or VCP device types with a corresponding registry key of "USBXpress" and "VCP CP210x Cardinal" respectively.

<Device Specific Key>—USBXpress devices consist of device string "SIUSBXP&VVVV&PPPP" and CP210x devices consist of device string "IIIICOMM&VVVV&PPPP" (where IIII is up to the first 4 characters in the INF file name, VVVV is the VID and PPPP is the PID). These device specific keys are also used in the Windows Uninstaller registry key which causes the driver installation to appear in the Add\Remove Programs listing.

SILICON LABS

The following registry entries are examples of the current USBXpress and VCP installations:

USBXpress:

HKEY_LOCAL_MACHINE\SOFTWARE\Silicon Laboratories, Inc.\Silicon Laboratories Driver Installations\USBXpress\SIUSBXP&10C4&EA61

VCP:

HKEY_LOCAL_MACHINE\SOFTWARE\Silicon Laboratories, Inc.\Silicon Laboratories Driver Installations\VCP CP210x Cardinal\SLABCOMM&10C4&EA60

There may be times when an installation completes and the system needs to be rebooted. The user will be prompted if the driver installer is not running in quiet mode. If the driver installer is being called from another application in quiet mode, it is recommended to reboot the computer at the end of a successful installation.

3. Uninstallation

The following sections explain how uninstallation works.

3.1. Calling the Uninstaller

As stated in the above installation routine, an uninstaller is copied to a Silabs directory inside the Windows system directory (such as C:\Windows\system32\Silabs\). This uninstaller is named DriverUninstaller.exe and is embedded within the DriverInstaller.exe. Because this is a universal installation utility, the same DriverUninstaller.exe is used by any Silicon Labs driver installations. During installation, the installer checks the version of the current uninstaller (if it already exists on the system) and then only replaces it if it is missing or an older version exists.

The uninstaller takes in the <Device Type>\<Device Specific Key> portion of the registry key entered at the completion of an installation via command line. For example, to uninstall the USBXpress device with VID 10C4 and PID EA61, the command would look like this:

> DriverUninstaller.exe "USBXpress\SIUSBXP&10C4&EA61"

The uninstaller is then provided with all of the installation information that was provided in the setup.ini. When the uninstaller is first run, it will look to see if it should run in quiet mode or not. If so, the uninstallation is performed with no windows or messages. If it is not in quiet mode, it will populate the window with all of the strings that were specified in the setup.ini on installation, and if driver files were copied it shows their current existing location.

3.1.1. Driver Uninstallation Routine

First, the uninstaller will remove the copied drivers if they are specified to be removed. If no drivers were copied on installation in the first place, then this check is skipped.

Next, the INF files for the device are uninstalled and this is different depending on the operating system. The basic removal routine is to remove any INF/PNF combinations and then remove any catalog files (catalog files will only be pertinent on Windows XP/Server 2003/Vista).

Finally, the computer is scanned for any device reference to the driver, and those devices are removed from the system. This causes any matching USB devices to be stopped, and they will not be recognized by the system until they are either unplugged and plugged back in or a "Scan for New Hardware" command is issued in the Device Manager.

SILICON LABS

4. Customization of the Driver Installer

To customize a driver installation use the DriverCustomization.exe utility provided in the AN220 software package and documented in the AN220 document. It is not recommended to change anything by hand since this application performs everything for you automatically.

There is an explanation below of the INI format. Any hand editing done here must match up with the INF (such as VID and PID) but is not recommended.

4.1. setup.ini Format

The setup.ini file contains a set of entries denoted by [<option>]. All of the bracketed entries are case sensitive and must be exact or the DriverInstaller.exe will ignore it. The value of the entry is directly below the bracketed entry line. Each entry and selection must be separated by a blank line. (See section "4.1.1. Example setup.ini") Some of these bracketed entries are required, and some are not. Also, some are case sensitive (such as strings, what you type is what you will see) and some are not (such as "on, off, yes, no" options). Each entry is described in detail below:

[Driver Type]—REQUIRED—This is the type of driver that you are trying to install. Currently there is support for two driver types which are both case sensitive:

- USBXpress
- VCP CP210x Cardinal

USBXpress and VCP CP210x Cardinal specify a USBXpress driver installation and CP210x driver installation, respectively.

[Driver Version]—REQUIRED—This is the version of the driver you are trying to install. This is a string and will appear exactly as entered.

[Product Name]—REQUIRED—This is the product name for the device you are installing. This string will also appear in the Add/Remove Programs as "<product string> (Driver Removal)". This is a string and will appear exactly as entered.

[Company Name]—REQUIRED—This is the name of the company that is distributing the driver set. This is a string and will appear exactly as entered.

[VID]—REQUIRED—This is the 4 character hexadecimal VID of the device that matches this driver (example: 10C4). This is not case sensitive.

[PID]—REQUIRED—This is the 4 character hexadecimal PID of the device that matches this driver (example: EA61). This is not case sensitive.

[Relative Install]—OPTIONAL (required if not using a drive relative path in the [Install Directory] and [Copy Driver Files] = Yes)—This allows the driver to be installed relative to either the Windows Drive or the Program Files Directory. This is done by specifying one of the following, which is case sensitive:

- Relative To Program Files
- Relative To Windows Drive

If you specify one of the above, then you can simply specify the Install Directory as "Directory\SubDirectory\SubSubDirectory", and it will be placed directly under the relative path chosen.

[Install Directory]—OPTIONAL (required if [Copy Driver Files] = Yes)—This is the default driver installation directory that appears on the Installer window. This is a string and will appear exactly as entered. This directory does not need to exist, as the installer will create it for you.

[Install Subdirectories]—OPTIONAL (required if [Copy Driver Files = Yes)—If any drivers to be copied contain a .*subdir*\driver.sys all *subdir* names should be listed here.

SILICON LABS

[Install Quiet Mode] and [Uninstall Quiet Mode]—REQUIRED—This has to be one of the following:

- On
- Off

If quiet mode is on, no windows, dialogs or message boxes are shown to the user, which is good for third party installers that integrate the driver installation or do not want to display information or choices on its installation. This is not case sensitive (on and ON will both work).

[Copy Driver Files]—REQUIRED—This has to be one of the following values:

- Yes
- No

This denotes whether the installer should copy the driver files to an installation directory or not. If they are not installed, the install media where the DriverInstaller.exe is run will be the installation location. If the install media is not available when a device is plugged in, you will be prompted to locate it. This is not case sensitive (yes and YES will both work).

[Remove Copied Files On Uninstall]—OPTIONAL (required if [Copy Driver Files] = Yes)—This has to be one of the following values:

- Yes
- No

This denotes whether the copied installation files should be removed on uninstallation. This is not required if files are not copied on installation. This is not case sensitive (yes and YES will both work).

[XP_2K_2K3_VISTA INF Files]—REQUIRED—This will denote the list of INF files that should be copied to the INF directory and installed. There should be one INF on each line with no blank lines in between them. This is not case sensitive.

[XP_2K_2K3_ VISTA Driver Files]—REQUIRED—This will denote the list of driver files that exist in the installation. There should be one file name on each line with no blank lines in between them. This is not case sensitive. If driver files should exist in subdirectories then list them as ".*subdir*\driver.sys. If CopyFiles = Yes, then all subdirectories in any of these files must be listed in [Install Subdirectories] or they will not successfully be copied to the install directory.

[XP_2K_2K3_ VISTA Catalog Files]—OPTIONAL—This will denote the list of catalog files that belong to a certified driver. This is optional because certification is not required. This is not case sensitive.

[Manufacturing Ignore Serial Numbers]—OPTIONAL—This will allow a manufacturing version of the driver to be installed that will ignore the serial numbers and assign a unique serial number to each USB port. The value for this must be as follows:

> Ignore Serial Numbers

If the value does not match specifically the above string, it will not work. This option should not be put on a driver package that is released for end users and should only be used in a manufacturing environment. Because of this it is not supported by the AN220 customization utility and must be put in by hand.

This option is most commonly used in a manufacturing environment for the CP210x devices. If a large number of serialized devices are being tested this will not fill up the registry by assigning a COM port to each individual device.

SILICON LABS

4.1.1. Example setup.ini

Below is an example setup.ini listing, specifically for the USBXpress Driver Package:

```
[Driver Type]
USBXpress

[Driver Version]
3.1

[Product Name]
Silicon Laboratories USBXpress Device

[Company Name]
Silicon Laboratories

[VID]
10C4

[PID]
EA61

[Relative Install]
Relative To Program Files

[Install Directory]
Silabs\MCU\USBXpress\

[Install Subdirectories]
x86
x64

[Install Quiet Mode]
Off

[Uninstall Quiet Mode]
Off

[Copy Driver Files]
Yes

[Remove Copied Files On Uninstall]
Yes

[XP_2K_2K3_VISTA INF Files]
SiUSBXp.inf

[XP_2K_2K3_VISTA Driver Files]
.\x64\SiUSBXp.sys
.\x64\SiLib.sys
.\x86\SiUSBXp.sys
.\x86\SiLib.sys

[XP_2K_2K3_VISTA Catalog Files]
siusbxp.cat
```

DOCUMENT CHANGE LIST

Revision 0.1 to Revision 0.2

■ Relative Install added to sections "4.1. setup.ini Format" and "4.1.1. Example setup.ini".

NOTES:

SILICON LABS

AN335

CONTACT INFORMATION

Silicon Laboratories Inc.
400 West Cesar Chavez
Austin, TX 78701
Email: MCUinfo@silabs.com
Internet: www.silabs.com

Silicon Laboratories, Silicon Labs, and USBXpress are trademarks of Silicon Laboratories Inc.

Other products or brandnames mentioned herein are trademarks or registered trademarks of their respective holders.

SILICON LABS