



Future Technology Devices International Ltd.

Application Note AN_107

Advanced Driver Options

Document Reference No.: FT_000073

Version 2.51

Issue Date: 2010-10-06

This application note describes advanced driver settings and operations for FTDI's CDM Windows driver. This is intended to be a reference for experienced engineers developing products incorporating FTDI devices and drivers who are experts with FTDI devices.

Future Technology Devices International Limited (FTDI)

Unit 1, 2 Seaward Place Centurion Business Park, Glasgow G41 1HH United Kingdom

Tel.: +44 (0) 141 429 2777 Fax: + 44 (0) 141 429 2758

E-Mail (Support): vinculum.support@ftdichip.com Web: <http://www.ftdichip.com>

Copyright © 2008-2010 Future Technology Devices International Limited

Table of Contents

1	Introduction.....	3
2	CDM USB Serial Converter Properties Page	4
3	CDM COM Port Advanced Properties Page	5
4	Modification of INF for Non-Default VID and PID Values	7
4.1	FTDIBUS.INF	7
4.2	FTDIPORT.INF	7
5	FTDIBUS.INF Options.....	9
5.1	Adjusting the Reset Pipe Retry Count.....	9
5.2	Using Location IDs	9
5.3	Limiting the Number of COM Ports That Can Be Installed.....	10
5.4	Override EEPROM Driver Setting.....	11
5.5	USB Timeout	12
5.6	Disable EEPROM Writes	13
6	FTDIPORT.INF Options	14
6.1	Aliasing Baud Rates.....	14
6.2	Changing the Default USB Transfer Size	14
6.3	Setting a Custom Default Latency Timer Value	15
6.4	Enabling Modem Emulation Mode	15
6.5	Buffered Writes.....	15
6.6	Miscellaneous Options	16
6.6.1	Timeouts	16
6.6.2	Serial Enumerator.....	17
6.6.3	Serial Printer	17
6.6.4	Cancel If Power Off	17
6.6.5	Event On Surprise Removal	17
6.6.6	Set RTS On Close	18
6.6.7	Disable Modem Ctrl At Startup.....	18
6.7	Changing the Driver Priority.....	19
6.8	Specifying the COM Port Allocation Start Value.....	19
7	System Options	21
7.1	Ignore Hardware Serial Number	21
7.2	Phantom Devices.....	21
8	Foreign Language Support.....	23
9	Co-Installer.....	24

10 Renaming Driver Files	25
11 Driver Pre-Installation	26
11.1 DPInst Packages.....	26
12 Uninstalling Drivers	28
13 Contact Information	29
Appendix A – Appendix	31
A.1 FTDIBUS.INF	31
A.2 FTDIPOINT.INF	34
Appendix B - Revision History	38

1 Introduction

This application note describes advanced driver settings and operations for FTDI's CDM Windows driver. This is intended to be a reference for experienced engineers developing products incorporating FTDI devices and drivers who are experts with FTDI devices.

If you are unsure about any of the features described in this document, please do not change any of your driver files or registry settings and seek assistance from [FTDI Support](#).

2 CDM USB Serial Converter Properties Page

With the CDM driver, a property page is now available for the USB Serial Converter driver. This is at the same level as the original D2XX driver.

In the case of FT232R, FT245R and FT2232 devices, the driver type is determined by a setting in the device EEPROM. The Advanced tab allows the user to override any EEPROM settings to select the driver type. The EEPROM settings can be overridden using the check box shown below:

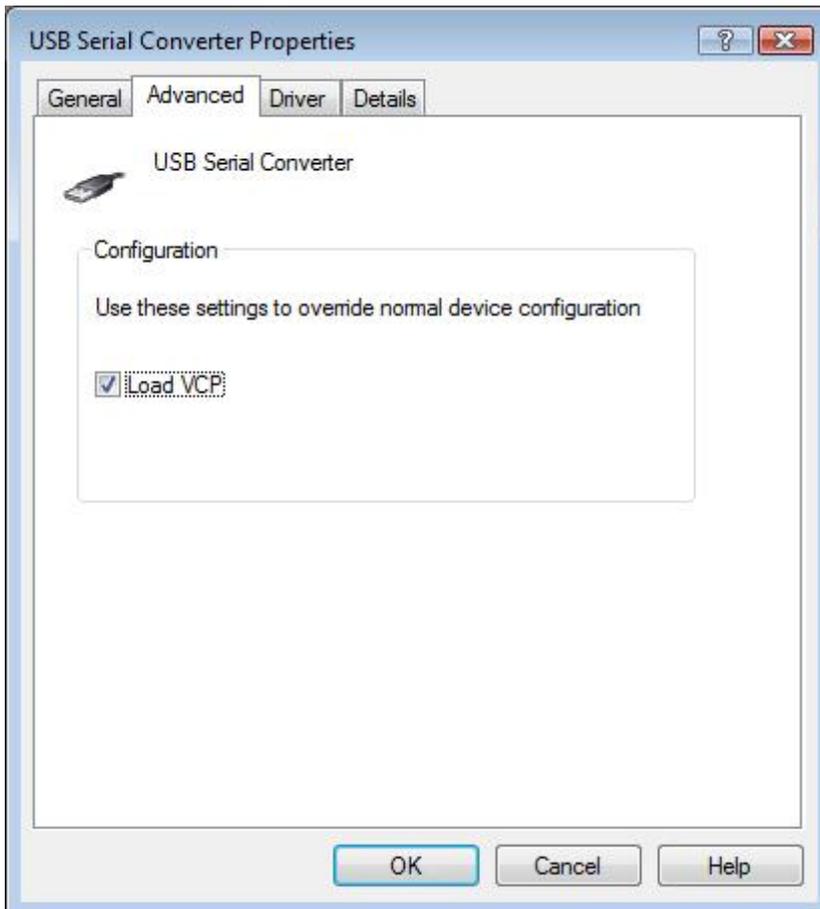


Figure 2.1 USB Serial Converter Properties

This option can also be configured as a default value via the FTDIBUS.INF file before installation as indicated in [FTDIBUS.INF Options](#). If this is set, the EEPROM driver setting will be ignored.

3 CDM COM Port Advanced Properties Page

An advanced properties page is available for devices using VCP drivers. To access the advanced properties page in Windows 2000 or Windows XP, go to "Control Panel > System" then select the "Hardware" tab and click "Device Manager...", or "Control Panel > Device Manager" in Vista. Find the USB serial port you want to change the properties of and right-click on it. Select "Properties" from the menu then select the "Port Settings" tab to get the window below.

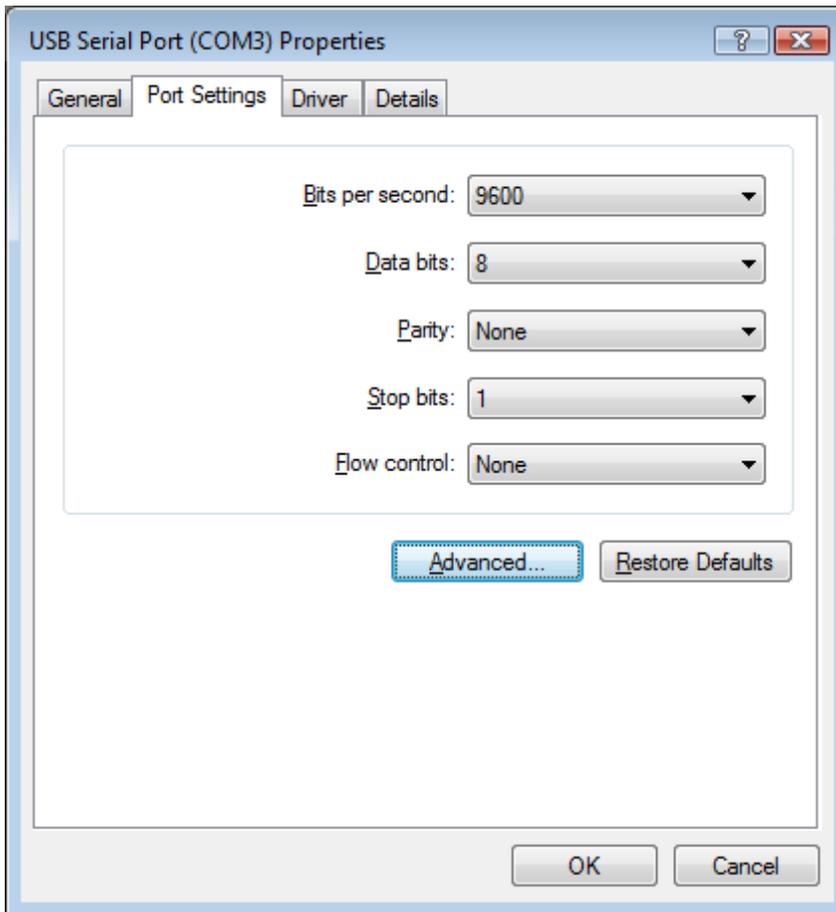
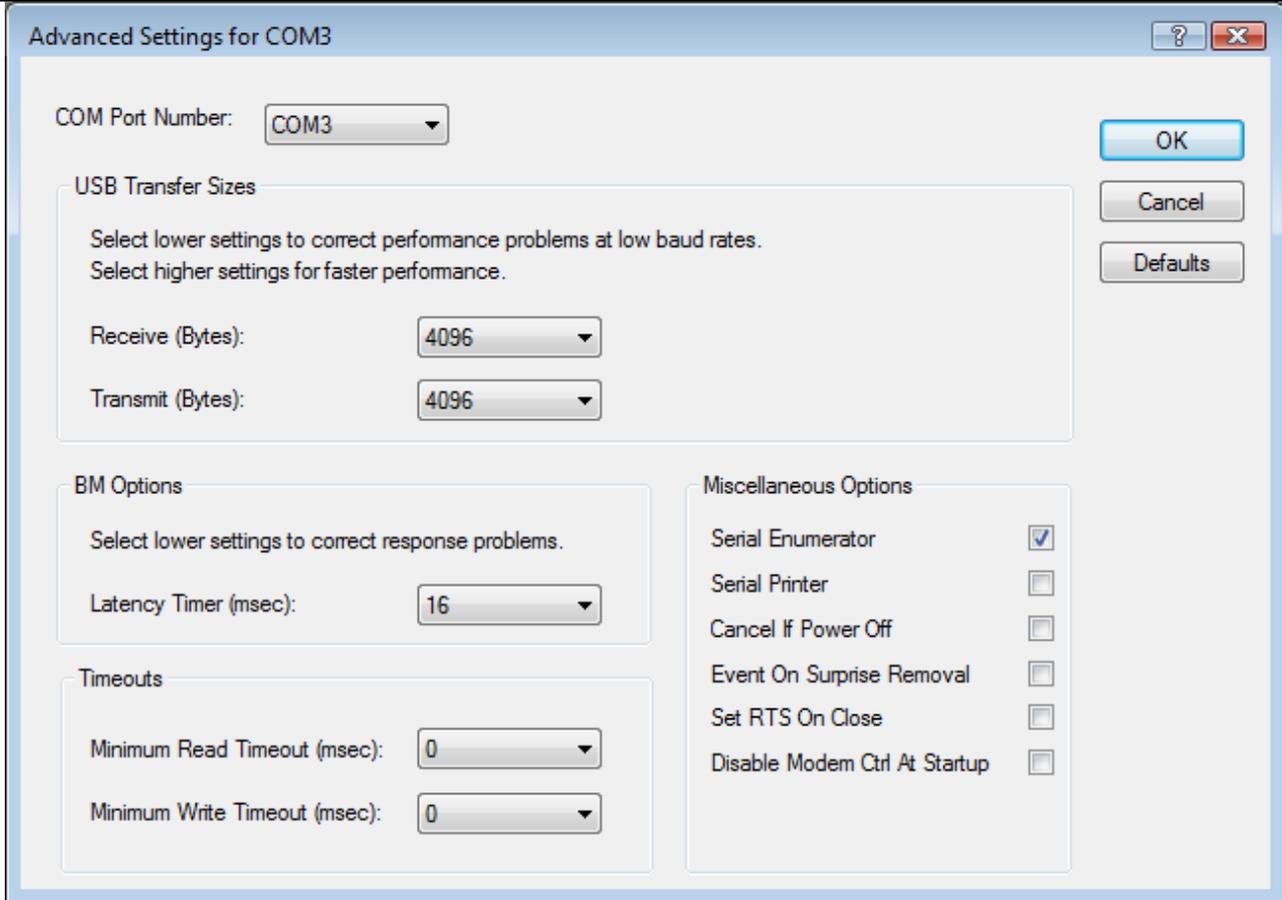


Figure 3.1 USB Serial (COM3) Properties

This page allows configuration of the basic device parameters (i.e. Baud rate, data bits, parity, stop bits and flow control). To access more advanced settings, click on the "Advanced..." button to display the advanced properties page (shown below).



This page will allow the following parameters to be altered:

- COM port number
- USB buffer sizes
- Latency timer value
- Read and write timeout values
- Miscellaneous options

These options can also be configured as default values via the FTDIPORT.INF file before installation as indicated in [FTDIPORT.INF Options](#). The miscellaneous options are covered in [Miscellaneous Options](#).

4 Modification of INF for Non-Default VID and PID Values

In order to use FTDI drivers with devices that are identified by a VID and PID combination other than FTDI's VID and the device default PID, the driver INF files must be modified to match the desired VID and PID combination. The following sections indicate which references must be modified for the drivers to function correctly with alternative VIDs and PIDs.

There is also some useful information on the modification of INF files for custom VID and PID values in the MPro user manual which is available from the [FTDI Knowledgebase](#).

4.1 FTDIBUS.INF

In order that Windows successfully match a device with the driver, the VID and PID programmed into the device must be listed in the driver INF file. The following sections of FTDIBUS.INF show text in **bold** that must be amended to match the desired VID and PID combination:

```
[FtdiHw]
%USB\VID_0403&PID_6001.DeviceDesc%=FtdiBus,USB\VID_0403&PID_6001
[FtdiHw.NTamd64]
%USB\VID_0403&PID_6001.DeviceDesc%=FtdiBus.NTamd64,USB\VID_0403&PID_6001
```

Also, in the case of the FTDIBUS.INF file FT2232 devices must have each interface listed as follows:

```
[FtdiHw]
%USB\VID_0403&PID_6010&MI_00.DeviceDesc%=FtdiBus,USB\VID_0403&PID_6010&MI_00
%USB\VID_0403&PID_6010&MI_01.DeviceDesc%=FtdiBus,USB\VID_0403&PID_6010&MI_01
[FtdiHw.NTamd64]
%USB\VID_0403&PID_6010&MI_00.DeviceDesc%=FtdiBus.NTamd64,USB\VID_0403&PID_6010&MI_00
%USB\VID_0403&PID_6010&MI_01.DeviceDesc%=FtdiBus.NTamd64,USB\VID_0403&PID_6010&MI_01
```

The device description string may be modified to display a custom device port name in the device manager if so desired in the section listed below:

```
[Strings]
Ftdi="FTDI"
USB\VID_0403&PID_6001.DeviceDesc="USB Serial Converter"
```

and for FT2232 devices:

```
[Strings]
Ftdi="FTDI"
USB\VID_0403&PID_6010&MI_00.DeviceDesc="USB Serial Converter A"
USB\VID_0403&PID_6010&MI_01.DeviceDesc="USB Serial Converter B"
```

Note: The values shown here are the default values already certified by FTDI. When changing FTDIBUS.INF to match a new VID and PID combination, all references to these default values must be removed from the file. See Technical Note [OEM Technical Support Requirements for FTDI Products and Application Note Using Microsoft's WHQL Process for Certifying Customer Modified FTDI Driver Files](#) for more details

A sample FTDIBUS.INF file is included in the [appendix](#).

4.2 FTDIPOINT.INF

In addition to the modifications made to the FTDIBUS.INF file to accommodate driver matching, the following entries in the FTDIPOINT.INF file show text in **bold** that must be changed to match the VID and PID combination:

```
[FtdiHw]
%VID_0403&PID_6001.DeviceDesc%=FtdiPort,FTDIBUS\COMPORT&VID_0403&PID_6001
[FtdiHw.NTamd64]
%VID_0403&PID_6001.DeviceDesc%=FtdiPort,FTDIBUS\COMPORT&VID_0403&PID_6001
```

In the case of the FTDIPORT.INF file, separate entries are not needed for each interface of FT2232 and FT4232 devices as each port of these is supported by the same entry:

```
[FtdiHw]
%VID_0403&PID_6010.DeviceDesc%=FtdiPort,FTDIBUS\COMPORT&VID_0403&PID_6010
[FtdiHw.NTamd64]
%VID_0403&PID_6010.DeviceDesc%=FtdiPort,FTDIBUS\COMPORT&VID_0403&PID_6010
```

The device description string may be modified to display a custom device port name in the device manager if so desired in the section listed below:

```
[Strings]
Ftdi="FTDI"
VID_0403&PID_6001.DeviceDesc="USB Serial Port"
```

Note: The values shown here are the default values already certified by FTDI. When changing FTDIBUS.INF to match a new VID and PID combination, all references to these default values must be removed from the file. See Technical Note [OEM Technical Support Requirements for FTDI Products](#) and Application Note [Using Microsoft's WHQL Process for Certifying Customer Modified FTDI Driver Files](#) for more details

A sample FTDIPORT.INF file is included in the [appendix](#).

5 FTDIBUS.INF Options

Some default configuration options are configurable through FTDIBUS.INF. This section describes the options available and how to implement them.

5.1 Adjusting the Reset Pipe Retry Count

In some rare cases, it may be necessary to increase the number of times the driver tries to reset a USB pipe on which an error has occurred, for example in noisy environments where a lot of USB errors occur.

The default value for the reset pipe request retry count is 50. This default value may be changed in the FTDIBUS.INF file by editing or including the following fragment.

```
[FtdiBus.NT.AddService]
AddReg = FtdiBus.NT.AddService.AddReg
[FtdiBus.NT.AddService.AddReg]
HKR,Parameters,"RetryResetCount",0x00010001,100
```

In this example fragment, the reset pipe request is set to 100.

This value is held in the registry key located at

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\FTDIBUS\Parameters\RetryResetCount
```

5.2 Using Location IDs

In some application areas it may be desirable to install devices by physical location rather than serial number. In these instances, this may be accomplished by using the LocIds entry in the driver INF file.

The driver uses LocIds to define the set of USB ports supported. It can be used in systems that require only certain USB ports to be available, perhaps in conjunction with [MaxDevs](#). The default behaviour is that all USB ports are supported. The default can be overridden by including LocIds in the FTDIBUS.INF service key section.

```
[FtdiBus.NT.AddService]
AddReg = FtdiBus.NT.AddService.AddReg
[FtdiBus.NT.AddService.AddReg]
HKR,Parameters,"LocIds",1,21,00,00,00,32,00,00,00,11,00,00,00,00
```

In this example INF file fragment, three USB ports are supported. Location ID 0x00000021 represents host controller 1 port 1. Location ID 0x00000032 represents host controller 2 port 2.

Location ID 0x00000011 represents host controller 0 port 1.

This value is held in the registry key located at

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\FTDIBUS\Parameters\LocIds
```

Note that setting LocIds will radically alter the behaviour of the driver; please contact FTDI if you think you have to change LocIds.

Location IDs can be obtained using the latest version of the USBView utility available from the [Utilities](#) section of the [FTDI website](#). An application note on location IDs [AN232B-07 Configuring FTDI's VCP Drivers to use Location ID's](#) is also available.

USBView can be configured to show location IDs by selecting Options > Location IDs. The screen shot below shows a PC with a hub connected to location 0x0000002A and devices connected at locations 0x00000019 and 0x00002A3.

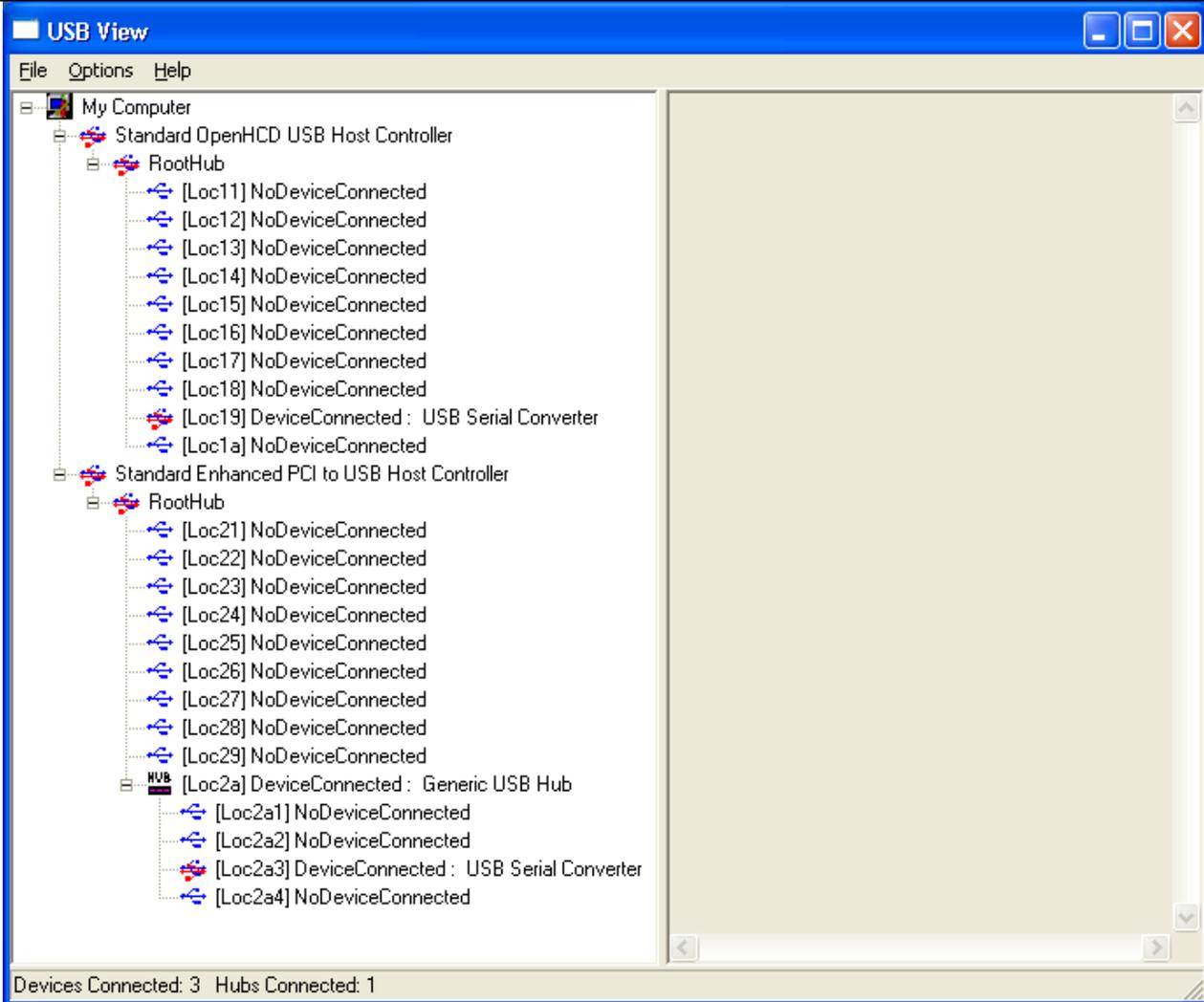


Figure 5.1 USB View

The INF entries for the devices connected to these ports would be

```
[FtdiBus.NT.AddService.AddReg]
HKR, Parameters, "LocIds", 1, 19, 00, 00, 00, 03, 2A, 00, 00, 00
```

Please note that the INF entry must end with an additional 00 entry to terminate the location ID list.

If an attempt is made to install a device at a location that is not supported, a Code 10 error ("This device cannot start") is generated for the new device.

Note that Location IDs are represented in the LocIds field as 4 hexadecimal bytes and in byte reversed order.

Note also that although on USB host controllers are indexed from 0 and ports from 1, Location IDs are calculated by adjusting the host controller number so that it is indexed from 1

5.3 Limiting the Number of COM Ports That Can Be Installed

The number of FTDI virtual COM ports that may be installed in a system can be limited by setting the MaxDevs parameter. MaxDevs defaults to 0, meaning that the feature is disabled and the driver will always attempt to create a COM port. The default can be overridden by including a nonzero MaxDevs value in the FTDIBUS.INF service key section.

```
[FtdiBus.NT.AddService]
AddReg = FtdiBus.NT.AddService.AddReg
```

```
[FtdiBus.NT.AddService.AddReg]
HKR, Parameters, "MaxDevs", 0x00010001, 3
```

In this example INF file fragment, the maximum number of devices is set to 3.

This value is held in the registry key located at

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\FTDIBUS\Parameters\MaxDevs
```

If an attempt is made to install more than MaxDevs devices, a Code 10 error ("This device cannot start") is generated for the new device.

Note that setting MaxDevs to a value other than zero will radically alter the behaviour of the driver; please contact FTDI if you think you have to change MaxDevs.

5.4 Override EEPROM Driver Setting

In the case of FT232R, FT245R and FT2232 devices, the driver will read the device EEPROM to determine whether to expose a COM port or not. The earlier B and AM series devices do not have an EEPROM setting for driver type, so will default to installing a COM port. This feature can be turned off and the choice of driver to load can be made through a setting in the installation file.

For a standard installation, the following sections can be added to FTDIBUS.INF to override the EEPROM configuration and load the VCP driver:

```
[FtdiBus.NT.HW]
AddReg=FtdiBus.NT.HW.AddReg
[FtdiBus.NTamd64.HW]
AddReg=FtdiBus.NT.HW.AddReg
[FtdiBus.NT.HW.AddReg]
HKR, "ConfigData", 0x00010001, 4
```

Bit 2 of the ConfigData parameter determines the driver to be loaded: if it is set to 1, the VCP driver is loaded (as in the above example); otherwise, only the D2XX driver is loaded. Therefore, adding the above sections to the installation file, and in particular setting the value of ConfigData to 4, will cause the VCP driver to be loaded regardless of the EEPROM settings.

This method can be extended for the dual channel FT2232 device. In this case, new sections have to be created for each channel to allow the channels to be configured and installed separately. The following fragments show the additional changes that are necessary to configure channel A to load the D2XX driver only, and channel B to load the VCP driver.

```
[FtdiHw]
%USB\VID_0403&PID_6010&MI_00.DeviceDesc%=FtdiBusA,USB\VID_0403&PID_6010&MI_00
%USB\VID_0403&PID_6010&MI_01.DeviceDesc%=FtdiBusB,USB\VID_0403&PID_6010&MI_01
[FtdiHw.NTamd64]
%USB\VID_0403&PID_6010&MI_00.DeviceDesc%=FtdiBusA.NTamd64,USB\VID_0403&PID_6010&MI_00
%USB\VID_0403&PID_6010&MI_01.DeviceDesc%=FtdiBusB.NTamd64,USB\VID_0403&PID_6010&MI_01
[FtdiBusA.NT]
CopyFiles=FtdiBus.NT.Copy,FtdiBus.NT.Copy2
AddReg=FtdiBusA.NT.AddReg
[FtdiBusA.NTamd64]
CopyFiles=FtdiBus.NTamd64.Copy,FtdiBus.NTamd64.Copy2,FtdiBus.NTamd64.Copy3
AddReg=FtdiBusA.NT.AddReg
[FtdiBusA.NT.HW]
AddReg=FtdiBusA.NT.HW.AddReg
[FtdiBusA.NTamd64.HW]
AddReg=FtdiBusA.NT.HW.AddReg
[FtdiBusA.NT.HW.AddReg]
HKR, "ConfigData", 0x00010001, 0
```

```
[FtdiBusA.NT.Services]
AddService = FTDIBUS, 0x00000002, FtdiBus.NT.AddService
[FtdiBusA.NTamd64.Services]

AddService = FTDIBUS, 0x00000002, FtdiBus.NT.AddService
[FtdiBusB.NT]
CopyFiles=FtdiBus.NT.Copy,FtdiBus.NT.Copy2
AddReg=FtdiBusB.NT.AddReg
[FtdiBusB.NTamd64]
CopyFiles=FtdiBus.NTamd64.Copy,FtdiBus.NTamd64.Copy2,FtdiBus.NTamd64.Copy3
AddReg=FtdiBusB.NT.AddReg
[FtdiBusB.NT.HW]
AddReg=FtdiBusA.NT.HW.AddReg
[FtdiBusB.NTamd64.HW]
AddReg=FtdiBusA.NT.HW.AddReg
[FtdiBusB.NT.HW.AddReg]
HKR,,"ConfigData",0x00010001,4
[FtdiBusB.NT.Services]
AddService = FTDIBUS, 0x00000002, FtdiBus.NT.AddService
[FtdiBusB.NTamd64.Services]
AddService = FTDIBUS, 0x00000002, FtdiBus.NT.AddService
```

Note that the value of ConfigData is set to 0 for channel A (D2XX) and the value of ConfigData is set to 4 for channel B (VCP) to achieve the required configuration. Of course, if ConfigData is not included in the installation file, the EEPROM settings will determine which driver is loaded.

The ConfigData parameter is held in the registry under the key

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\USB\{Device VID, PID and interface}\{Serial number}\DeviceParameters\ConfigData
```

The COM port can also be suppressed after installation through the Advanced tab of the [USB Serial Converter properties page](#) which is available through the device manager.

5.5 USB Timeout

The USB timeout is the maximum time in milliseconds that a USB request can remain outstanding.

It is unlikely that this will ever need to be changed from the 5000ms default value.

This USB timeout (in milliseconds) is configurable through the FTDIBUS INF file in the INF fragments shown below:

```
[FtdiBus.NT.HW]
AddReg=FtdiBus.NT.HW.AddReg
[FtdiBus.NTamd64.HW]
AddReg=FtdiBus.NT.HW.AddReg
[FtdiBus.NT.HW.AddReg]
HKR,,"USBTimeout",0x00010001,5000
```

which corresponds to the registry entry

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\USB\{Device VID, PID and interface}\{Serial number}\DeviceParameters\USBTimeout
```

The default value for the USB Timeout is 5 seconds (5000ms).

5.6 Disable EEPROM Writes

In some cases, it may be desirable to disable the ability to write to the device EEPROM. This can be accomplished through a ConfigData bit in the FTDIBUS INF file.

The driver can be made to ignore any EEPROM write requests by setting bit 0 of the ConfigData field as shown in the INF fragment below:

```
[FtdiBus.NT.HW]
AddReg=FtdiBus.NT.HW.AddReg
[FtdiBus.NTamd64.HW]
AddReg=FtdiBus.NT.HW.AddReg
[FtdiBus.NT.HW.AddReg]
HKR,, "ConfigData", 0x00010001, 1
```

which corresponds to the registry key

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\USB\{Device VID, PID and interface}\{Serial number}\DeviceParameters\ConfigData
```

6 FTDIPOINT.INF Options

There are many configuration options available through FTDIPOINT.INF. This section describes these options and how to configure them.

6.1 Aliasing Baud Rates

FTDI devices can support non-standard Baud rates. It is not necessary to alias Baud rates to achieve this, but in cases where the application software tries to set a standard Baud rate and a non-standard Baud rate is desired, this can be achieved by aliasing non-standard baud rates.

Baud rates are calculated using a Baud rate divisor. The file FTDIPOINT.INF contains entries that are used as the divisors for standard baud rates. By changing these values it is possible to alias standard baud rates with non-standard values - for instance replacing 115k Baud with 512k Baud. Users would then set up the device to operate at 512k Baud by selecting 115k Baud for the USB serial port.

The procedure for calculating Baud rate divisors is described fully in application note [AN232B-05 Configuring FT232R, FT2232 and FT232B Baud Rates](#).

The FT8U232AM device supports sub-integer divisors of 0, 0.5, 0.25 and 0.125 only. These values can be configured through a Baud rate divisor table with two elements to define a Baud rate.

The extract below from FTDIPOINT.INF gives an example of the Baud rate table for standard Baud rates for the FT8U232AM device. Note that the Baud rate table is one line in the INF.

```
[FtdiPort.NT.HW.AddReg]
HKR,, "ConfigData", 1, 01, 00, 3F, 3F, 10, 27, 88, 13, C4, 09, E2, 04, 71, 02, 38, 41, 9C, 80, 4E, C0, 34, 00, 1A, 00,
0D, 00, 06, 40, 03, 80, 00, 00, D0, 80
```

In the case of the FT232R, FT2232 and FT232B devices, sub-integer divisors of 0, 0.5, 0.25, 0.125, 0.375, 0.625, 0.75 and 0.875 are supported. This requires that the Baud rate table be extended to four elements per Baud rate as indicated below. This example extract shows the four-element Baud rate table for standard Baud rates. As with the original divisors, note that the Baud rate table is one line in the INF.

```
[FtdiPort.NT.HW.AddReg]
HKR,, "ConfigData", 1, 11, 00, 3F, 3F, 10, 27, 00, 00, 88, 13, 00, 00, C4, 09, 00, 00, E2, 04, 00, 00, 71, 02, 00, 00,
38, 41, 00, 00, 9C, 80, 00, 00, 4E, C0, 00, 00, 34, 00, 00, 00, 1A, 00, 00, 00, 0D, 00, 00, 00, 06, 40, 00, 00, 03, 80, 00,
00, 00, 00, 00, 00, 00, D0, 80, 00, 00
```

The Baud rate table used by each device is located in the registry under

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\FTDIBUS\{Device VID, PID and serial
number}\0000\Device Parameters\ConfigData
```

Please note that the four-element table will not allow the use of the additional sub-integer divisors with FT8U232AM devices. The two-element table will work with all devices.

For a full explanation of calculating non-standard Baud rate divisors and how to arrange them in the Baud rate table, see application note [AN232B-05 Configuring FT232R, FT2232 and FT232B Baud Rates](#).

6.2 Changing the Default USB Transfer Size

The default USB transfer size may be set up at installation through the ConfigData entry in the FTDIPOINT.INF file. This is the same entry that contains the Baud rate table.

The options can be set through the first DWORD of the table (shown in bold below)

```
[FtdiPort.NT.HW.AddReg]
HKR,, "ConfigData", 1, 01, 00, 3F, 3F, 10, 27, 88, 13, C4, 09, E2, 04, 71, 02, 38, 41, 9C, 80, 4E, C0, 34, 00, 1A, 00,
0D, 00, 06, 40, 03, 80, 00, 00, D0, 80
```

This entry is byte-reversed, so MSB the DWORD reads 3F 3F 00 01 and the least significant bit is Bit 0. The values are given as follows:

Bits 16 - 23: Receive transfer size

Bits 24 - 31: Transmit transfer size

The maximum value permitted in each case is 3F this is the standard default value.

The transfer size in bytes may be calculated as

$$\text{Transfer size in bytes} = (\text{Transfer size entry} + 1) * 0x40$$

The USB transfer sizes used by a device are located in the registry under

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\FTDIBUS\{Device VID, PID and serial number}\0000\Device Parameters\ConfigData
```

6.3 Setting a Custom Default Latency Timer Value

The latency timer is a form of time-out mechanism for the read buffer of FTDI devices. When a FT_Read instruction is sent to the device, data will not be sent back to the host PC until the requested number of bytes has been read. If the requested number of bytes never comes, the device would not send data back.

The latency timer counts from the last time data was sent back to the PC. If the latency timer expires, the device will send what data it has available to the PC regardless of how many bytes it is waiting on. The latency timer will then reset and begin counting again.

The default value for the latency timer is 16ms. This value may be customised by adding or changing the following entries in the FTDIPTORT.INF file of the driver before installation.

```
[FtdiPort.NT.HW.AddReg]
HKR,,"LatencyTimer",0x00010001,50
```

This example will set the default latency timer value to 50ms. The valid range for the latency timer is 1ms - 255ms, although 1ms is not recommended as this is the same as the USB frame length.

The latency timer value is held in the registry under

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\FTDIBUS\{Device VID, PID and serial number}\0000\Device Parameters\LatencyTimer
```

Please see [AN232B-04 Data Throughput, Latency and Handshaking](#) for additional information on the latency timer.

6.4 Enabling Modem Emulation Mode

Modem emulation mode allows binary data to be transmitted over a two (or more) wire interface with full handshaking and modem control signalling, thus allowing PPP connections to be made.

Possible applications include mobile phone data cables, and radio links.

Including the following entries in the FTDIPTORT.INF file for the VCP driver before installation enables modem emulation mode:

```
[FtdiPort.NT.HW.AddReg]
HKR,,"EmulationMode",0x00010001,0x0000nnnn
```

This creates a registry entry under

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\FTDIBUS\{Device VID, PID and serial number}\0000\Device Parameters\EmulationMode
```

Please see [AN232B-09 Using the Modem Emulation Mode in FTDI's VCP Driver](#) for additional information on modem emulation mode.

6.5 Buffered Writes

In some cases, it is possible that the hardware developer does not have control over the application software. This can cause problems when migrating from RS232 to USB, as applications written for RS232 typically write bytes to the port one at a time and this will have a detrimental effect on the USB performance. Due to the packetised nature of USB, it is far more efficient to transfer data in large chunks. This can be achieved by buffering the data within the application.

If the developer does not have control over the application software to allow for buffering the data there, the FTDI driver provides an option to buffer the data from the application in the driver before sending the data out over USB to the device.

The Buffered Writes option is enabled through bit 10 of the first DWORD of the ConfigData entry in the FTDI\PORT.INF file. This is the same entry that contains the Baud rate table.

The first DWORD is shown in bold in the INF fragment below.

```
[FtdiPort.NT.HW.AddReg]
HKR, "ConfigData", 1, 01, 00, 3F, 3F, 10, 27, 88, 13, C4, 09, E2, 04, 71, 02, 38, 41, 9C, 80, 4E, C0, 34, 00, 1A, 00,
0D, 00, 06, 40, 03, 80, 00, 00, D0, 80
```

Please note that the ConfigData entry is byte-reversed, so MSB the DWORD reads **3F 3F 00 01** and the least significant bit is Bit 0. With Buffered Writes disabled, the DWORD would read **3F 3F 00 01**. With Buffered Writes enabled, the DWORD would read **3F 3F 04 01**.

In addition to enabling buffered writes in the Config Data entry, some parameters must be set up to control the behaviour. These parameters can also be set up in FTDI\PORT.INF as follows:

```
[FtdiPort.NT.HW.AddReg]
HKR, "WriteBufferSize", 0x00010001, 4096
HKR, "WriteBufferThreshold", 0x00010001, 20
HKR, "WriteLatency", 0x00010001, 6
```

These values are held in the registry under this key:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\FTDIBUS\{Device VID, PID and serial
number}\0000\Device Parameters
```

These parameters are specific to the application. As such, they will require to be "tuned" to provide best performance.

6.6 Miscellaneous Options

Miscellaneous options available on the [COM port advanced properties page](#) may be set up at installation through the INF sections covered in this section.

- [Timeouts](#)
- [Serial Enumerator](#)
- [Serial Printer](#)
- [Cancel If Power Off](#)
- [Event On Surprise Removal](#)
- [Set RTS On Close](#)
- [Disable Modem Ctrl At Startup](#)

6.6.1 Timeouts

The read and write timeout values may be set through the FTDI\PORT.INF file.

```
[FtdiPort.NT.HW.AddReg]
HKR, "MinReadTimeout", 0x00010001, 0
HKR, "MinWriteTimeout", 0x00010001, 0
```

This INF file fragment shows the minimum read and minimum write timeout values set to 0ms.

These values are held in the registry under this key:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\FTDIBUS\{Device VID, PID and serial
number}\0000\Device Parameters
```

6.6.2 Serial Enumerator

The function of the serial enumerator is to detect a Plug-and-Play enabled device (such as a serial mouse or serial modem) that is attached to the USB serial port.

The Serial Enumerator option is controlled through the following entries in FTDIPORT.INF:

```
[FtdiPort.NT.HW.AddReg]
HKR,, "UpperFilters", 0x00010000, "serenum"
```

6.6.3 Serial Printer

If enabled, serial printer will disable timeouts to allow for long delays associated with paper loading. The Serial Printer option is controlled through bit 7 of byte 0 of the first DWORD of the ConfigData entry in the FTDIPORT.INF file. This is the same entry that contains the Baud rate table.

The first DWORD is shown in bold in the INF fragment below.

```
[FtdiPort.NT.HW.AddReg]
HKR, "ConfigData", 1, 01, 00, 3F, 3F, 10, 27, 88, 13, C4, 09, E2, 04, 71, 02, 38, 41, 9C, 80, 4E, C0, 34, 00, 1A, 00,
0D, 00, 06, 40, 03, 80, 00, 00, D0, 80
```

Please note that this entry is byte-reversed, so MSB the DWORD reads **3F 3F 00 01** and the least significant bit is Bit 0. When disabled (serial printer disabled), the DWORD would read **3F 3F 00 01**. When enabled (serial printer enabled), the DWORD would read **3F 3F 00 81**.

These values are held in the registry under this key:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\FTDIBUS\{Device VID, PID and serial
number}\0000\Device Parameters\ConfigData
```

6.6.4 Cancel If Power Off

The Cancel If Power Off option can be used to assist with problems encountered when going into a hibernate or suspend condition. This will cancel any requests received by the driver when going into hibernate or suspend.

The Cancel If Power Off option is controlled through bit 6 of byte 0 of the first DWORD of the ConfigData entry in the FTDIPORT.INF file. This is the same entry that contains the Baud rate table.

The first DWORD is shown in bold in the INF fragment below.

```
[FtdiPort.NT.HW.AddReg]
HKR, "ConfigData", 1, 01, 00, 3F, 3F, 10, 27, 88, 13, C4, 09, E2, 04, 71, 02, 38, 41, 9C, 80, 4E, C0, 34, 00, 1A, 00,
0D, 00, 06, 40, 03, 80, 00, 00, D0, 80
```

Please note that this entry is byte-reversed, so MSB the DWORD reads **3F 3F 00 01** and the least significant bit is Bit 0. When disabled (no cancel on power off), the DWORD would read **3F 3F 00**

01. When enabled (cancel on power off), the DWORD would read **3F 3F 00 41**.

These values are held in the registry under this key:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\FTDIBUS\{Device VID, PID and serial
number}\0000\Device Parameters\ConfigData
```

6.6.5 Event On Surprise Removal

The Event On Surprise Removal option is generally left unselected. If an application sets SERIAL_EV_EVENT2 (see NTDDSER.H) in its event bitmask and this feature is enabled, the driver will signal this event on surprise removal.

The Event On Surprise Removal option is controlled through bit 5 of byte 0 of the first DWORD of the ConfigData entry in the FTDIPORT.INF file. This is the same entry that contains the Baud rate table.

The first DWORD is shown in bold in the INF fragment below.

```
[FtdiPort.NT.HW.AddReg]
HKR,, "ConfigData", 1, 01, 00, 3F, 3F, 10, 27, 88, 13, C4, 09, E2, 04, 71, 02, 38, 41, 9C, 80, 4E, C0, 34, 00, 1A, 00,
0D, 00, 06, 40, 03, 80, 00, 00, D0, 80
```

Please note that this entry is byte-reversed, so MSB the DWORD reads **3F 3F 00 01** and the least significant bit is Bit 0. When disabled (no event on surprise removal), the DWORD would read **3F 3F 00 01**. When enabled (event on surprise removal), the DWORD would read **3F 3F 00 21**.

These values are held in the registry under this key:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\FTDIBUS\{Device VID, PID and serial
number}\0000\Device Parameters\ConfigData
```

6.6.6 Set RTS On Close

Selecting the Set RTS On Close option will set the RTS signal on closing the port. The Set RTS On Close option is controlled through bit 3 of byte 0 of the first DWORD of the ConfigData entry in the FTDIPORT.INF file. This is the same entry that contains the Baud rate table.

The first DWORD is shown in bold in the INF fragment below.

```
[FtdiPort.NT.HW.AddReg]
HKR,, "ConfigData", 1, 01, 00, 3F, 3F, 10, 27, 88, 13, C4, 09, E2, 04, 71, 02, 38, 41, 9C, 80, 4E, C0, 34, 00, 1A, 00,
0D, 00, 06, 40, 03, 80, 00, 00, D0, 80
```

Please note that this entry is byte-reversed, so MSB the DWORD reads **3F 3F 00 01** and the least significant bit is Bit 0. When disabled (RTS not set on close), the DWORD would read **3F 3F 00 01**. When enabled (RTS set on close), the DWORD would read **3F 3F 00 09**.

These values are held in the registry under this key:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\FTDIBUS\{Device VID, PID and serial
number}\0000\Device Parameters\ConfigData
```

6.6.7 Disable Modem Ctrl At Startup

This option is used to control the modem control signals DTR and RTS at startup. In normal operation, the modem control signals at startup follow the behaviour of the legacy port. However, due to timing differences between a legacy COM port and a virtual COM port, a "spike" on one of these signals in the legacy port can appear as an assertion of the signal in the virtual COM port.

Devices that monitor these signals can enter the wrong state after an unplug-replug cycle on USB.

Note that if the "Serial Enumerator" option in the property page is selected, then the enumeration sequence causes the modem control signals to change at startup. So if it is necessary to select "Disable Modem Ctrl At Startup", then it is likely that "Serial Enumerator" should be unchecked in the property page.

The Disable Modem Ctrl At Startup option is controlled through bit 1 of byte 1 of the first DWORD of the ConfigData entry in the FTDIPORT.INF file. This is the same entry that contains the Baud rate table.

The first DWORD is shown in bold in the INF fragment below.

```
[FtdiPort.NT.HW.AddReg]
HKR,, "ConfigData", 1, 01, 00, 3F, 3F, 10, 27, 88, 13, C4, 09, E2, 04, 71, 02, 38, 41, 9C, 80, 4E, C0, 34, 00, 1A, 00,
0D, 00, 06, 40, 03, 80, 00, 00, D0, 80
```

Please note that this entry is byte-reversed, so MSB the DWORD reads **3F 3F 00 01** and the least significant bit is Bit 0. When disabled(modem control at startup enabled), the DWORD would read **3F 3F 00 01**. When enabled (modem control at startup disabled), the DWORD would read **3F 3F 02 01**.

Alternatively, the default can be overridden by directly editing the ConfigData parameter in the virtual COM port's registry entry.

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\FTDIBUS\VID_0403+PID_6001+12345678\0000\Dev
iceParameters\ConfigData
```

Note that if DisableModemControlSignalsAtStartup is set TRUE by editing the installation file or the registry, the same considerations as above apply to "[Serial Enumerator](#)". So it may be necessary to remove references to "serenum" in "UpperFilters" in the AddReg sections of the installation file, and in the UpperFilters key in the virtual COM port's registry entry.

6.7 Changing the Driver Priority

For some applications (e.g. audio data transmission), it is possible to change the priority level of the driver to provide better performance. The InPriorityLevel and OutPriorityLevel values can be set to a value between 1 and 31. The default value for both of these parameters is 16.

The custom driver priority option is enabled through bit 11 of the first DWORD of the ConfigData entry in the FTDIPORT.INF file. This is the same entry that contains the Baud rate table.

The first DWORD is shown in bold in the INF fragment below.

```
[FtdiPort.NT.HW.AddReg]
HKR,, "ConfigData", 1, 01, 00, 3F, 3F, 10, 27, 88, 13, C4, 09, E2, 04, 71, 02, 38, 41, 9C, 80, 4E, C0, 34, 00, 1A, 00,
0D, 00, 06, 40, 03, 80, 00, 00, D0, 80

[FtdiPort.NTamd64.HW.AddReg]
HKR,, "ConfigData", 1, 01, 00, 3F, 3F, 10, 27, 88, 13, C4, 09, E2, 04, 71, 02, 38, 41, 9C, 80, 4E, C0, 34, 00, 1A, 00,
0D, 00, 06, 40, 03, 80, 00, 00, D0, 80
```

Please note that the ConfigData entry is byte-reversed, so MSB the DWORD reads 3F 3F 00 01 and the least significant bit is Bit 0. With the driver default priority, the DWORD would read 3F 3F 00 01. With custom driver priority enabled, the DWORD would read 3F 3F 08 01.

In addition to enabling custom driver priority in the Config Data entry, some parameters must be set up to control the behaviour. These parameters can also be set up in FTDIPORT.INF as follows:

```
[FtdiPort.NT.HW.AddReg]
HKR,, "InPriorityLevel", 0x00010001, 16
HKR,, "OutPriorityLevel", 0x00010001, 16

[FtdiPort.NTamd64.HW.AddReg]
HKR,, "InPriorityLevel", 0x00010001, 16
HKR,, "OutPriorityLevel", 0x00010001, 16
```

These values are held in the registry under this key:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\FTDIBUS\{Device VID, PID and serial
number}\0000\Device Parameters
```

Note that custom driver priority is rarely required and setting driver priority to an excessive level may result in machine lock-up. Use custom driver priority with care and consult FTDI support if in doubt.

6.8 Specifying the COM Port Allocation Start Value

As of CDM 2.08.02, the co-installer applies to all FTDI devices and can accept an optional parameter to specify the initial index for COM port allocation. The default behaviour for the CDM driver is to start the allocation at COM3. If a COM port is in use, the next available COM port number will be used. The initial index is specified for a specific VID and PID combination and can be included in the FTDIPORT INF file with the following entry:

```
[FtdiPort.NT.AddService.AddReg]
```

```
HKR,"Parameters\VID_0403&PID_6001", "InitialIndex", 0x00010001, 14
```

and the following line should be added to the [FtdiPort.NT.AddService] section:

```
AddReg=FtdiPort.NT.AddService.AddReg
```

This example will cause devices with a VID of 0x0403 and PID of 0x6001 to have their COM ports allocated from COM14 onwards. Note that the VID and PID identifiers in bold in the above example should be customised for the particular device required.

This values are held in the registry under this key:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\services\FTSER2K\VID_{vendorID}&PID_{productID}
```

7 System Options

7.1 Ignore Hardware Serial Number

If devices have the same vendor ID and product ID but different serial numbers, the system will normally treat them as different devices. This causes the drivers to be installed for each device and create registry entries for each device.

It is possible to override this behaviour to make the system ignore a device's serial number and treat all devices with matching VID and PID connected to the same USB port as if they were the same device. This is achieved by adding a REG_BINARY value called *IgnoreHWSerNum* to the registry and setting it to 01.

This value is held in the registry key located at:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\UsbFlags\IgnoreHWSerNum{Device VID, PID and interface}
```

For a default FTDI device ID (VID 0x0403, PID 0x6001), add the following registry REG_BINARY value set to 01:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\UsbFlags\IgnoreHWSerNum04036001
```

For port A of an FT2232 device with default VID and PID, the IgnoreHWSerNum string would be:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\UsbFlags\IgnoreHWSerNum0403601000
```

and for port B of an FT2232 device the IgnoreHWSerNum string would be:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\UsbFlags\IgnoreHWSerNum0403601001
```

As the FT2232 device also uses the Windows composite device driver, an additional IgnoreHWSerNum entry is required to prevent Windows from creating additional composite driver registry entries:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\UsbFlags\IgnoreHWSerNum04036010
```

Now the system can treat devices with the same vendor ID and product ID but different serial numbers as the same device and drivers are installed for the first device only. As such, only one entry is created in the registry. If the device is connected to another USB port, the driver will have to be reinstalled for that port.

Note that IgnoreHWSerNum cannot be setup in FTDIBUS.INF or FTDIPORT.INF, it must be setup by editing the registry manually or by an installation utility BEFORE installing the driver.

7.2 Phantom Devices

Devices that have been installed on a system but are not currently available are referred to as "phantom devices". These devices are not usually displayed in the device manager, but can be made to be displayed as though they are attached. This allows device properties to be changed or devices to be uninstalled via Device Manager even though the device is not physically connected to the PC.

To display phantom devices in Device Manager, a new system variable is required. Open "Control Panel > System" then select the "Advanced" tab and click "Environment Variables". In the System Variables section (**NOT THE USER VARIABLES SECTION**), click "New..." to display the following window:

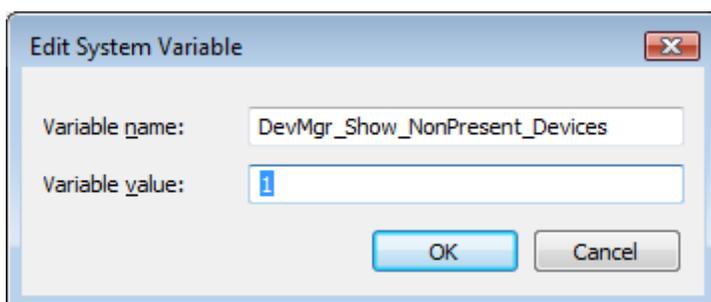


Figure 7.1 Edit System Variable

Create a new System Variable called "DevMgr_Show_NonPresent_Devices" and set the value to 1, then click OK.

Open the Device Manager ("Control Panel > System" then select the "Hardware" tab and click "Device Manager...", or "Control Panel > Device Manger" in Vista) and select "View > Show Hidden Devices". Device Manager will then show all hidden and phantom devices available on that PC as shaded.

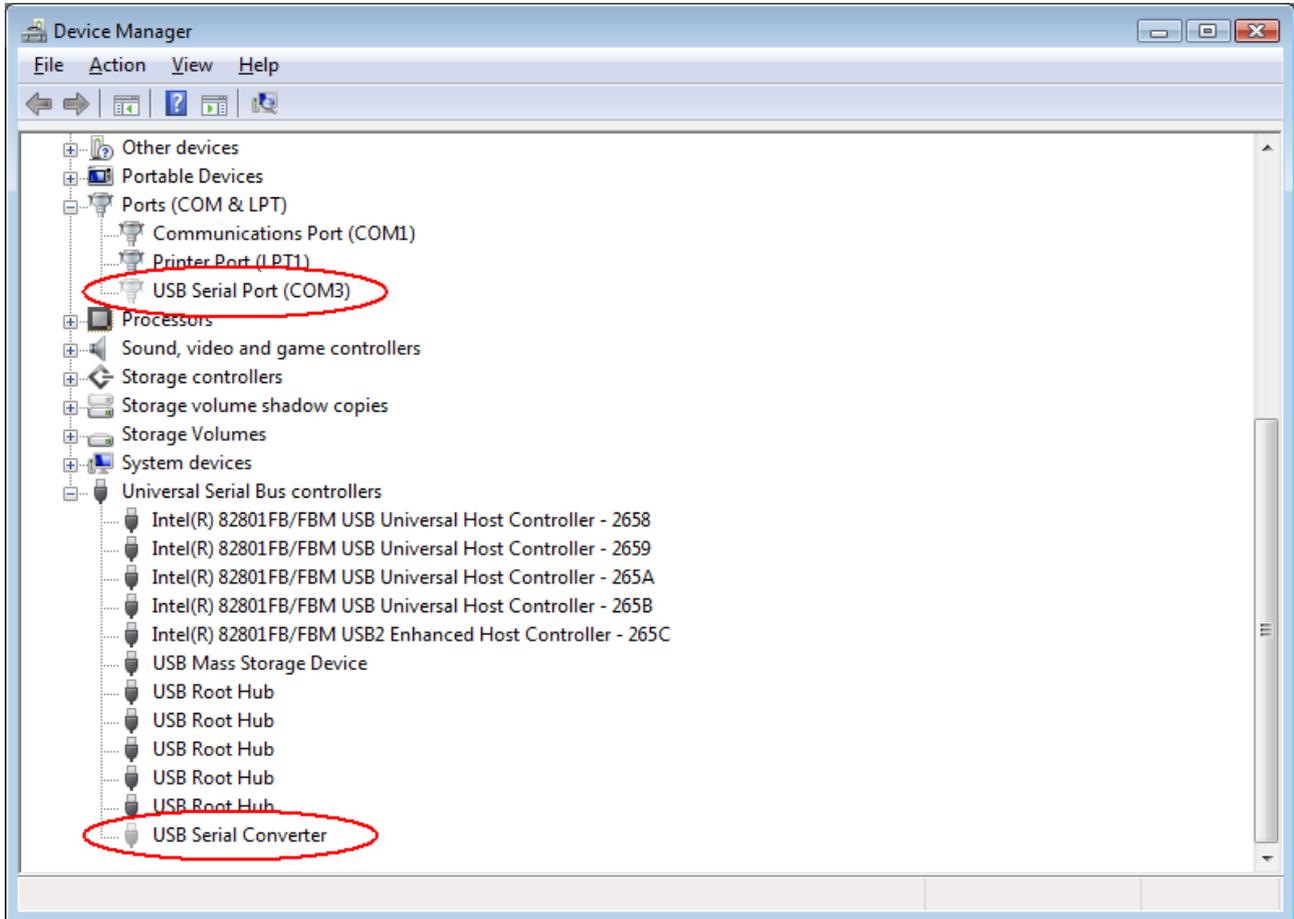


Figure 7.2 Device Manager

8 Foreign Language Support

There is a DLL available to display the VCP COM port properties page in languages other than English. To request a new language be made available in the DLL, please contact [FTDI Support](#) who will provide the text from the properties page to be translated into the desired language. Once the translated text is returned to FTDI the new language can be implemented in the DLL.

9 Co-Installer

The FT2232 and FT4232 devices are composite USB devices which are capable of providing two or more COM ports to a system. To ensure that the ports of these devices are allocated COM port numbers in the correct order (i.e. port A is allocated before port B) under Windows, a co-installer is used. The co-installer is specified in the following sections of the FTDIPOINT.INF file:

```
[FtdiPort.NT.CoInstallers]
AddReg=FtdiPort.NT.CoInstallers.AddReg
CopyFiles=FtdiPort.NT.CopyCoInst
[FtdiPort.NT.CoInstallers.AddReg]
HKR,,CoInstallers32,0x00010000,"ftcserco.Dll,FTCSERCoInstaller"
[FtdiPort.NT.CopyCoInst]
ftcserco.dll
```

In addition, as of version CDM 2.08.02 the co-installer can specify the initial COM port allocation index for all FTDI devices. This is detailed in section [6.8 Specifying the COM Port Allocation Start Value](#).

10 Renaming Driver Files

It is possible to rename the driver files to create a unique driver package, but this is not recommended. In order for the renamed driver package to work correctly, all references to file names in the INF files must be updated to use the new file names. FTDI does not currently support users who attempt to rename driver packages.

Any changes to an existing WHQL certified driver package, including modified file names, will invalidate the certification.

11 Driver Pre-Installation

Traditionally, the Found New Hardware Wizard has been the regular method for installing new hardware on a Windows machine. Microsoft has recognised that this requires some input from the end-user who may know very little about driver installation. Additionally, many manufacturers would prefer to install the device drivers before the end-user connects the hardware to the PC.

Microsoft has addressed this problem by producing a set of driver installation tools called Driver Install Frameworks (DIFx). The simplest tool provided for driver installation is called the Driver Package Installer (DPIInst). FTDI's driver packages from VCP 1.00.2176 onwards are compatible with DPIInst.

11.1 DPIInst Packages

In order to be compatible with [DPIInst](#), a driver package **must** be Microsoft WHQL certified and meet certain requirements as outlined in [Microsoft Documentation](#). The standard FTDI CDM driver package meets these requirements if certified, such as CDM 2.02.04. When bundled with DPIInst, the driver package typically contains the files shown below:

Name	Date modified	Type	Size
amd64	03/07/2007 16:51	File Folder	
i386	03/07/2007 16:51	File Folder	
dpinst.xml	29/06/2007 14:42	XML Document	1 KB
DPIInstx64.exe	17/11/2005 16:46	Application	826 KB
DPIInstx86.exe	17/11/2005 16:46	Application	509 KB
ftd2xx.h	02/02/2007 14:50	C/C++ Header	20 KB
ftdibus.cat	02/07/2007 12:37	Security Catalog	14 KB
ftdibus.inf	27/06/2007 14:12	Setup Information	3 KB
ftdiport.cat	02/07/2007 12:37	Security Catalog	14 KB
ftdiport.inf	27/06/2007 14:12	Setup Information	5 KB

where the i386 subdirectory contains the 32-bit driver files:

Name	Date modified	Type	Size
ftbusui.dll	27/06/2007 14:10	Application Extens...	110 KB
ftcserco.dll	27/06/2007 14:06	Application Extens...	50 KB
ftd2xx.dll	27/06/2007 14:10	Application Extens...	198 KB
ftd2xx.lib	27/06/2007 14:10	Object File Library	19 KB
ftdibus.sys	27/06/2007 14:05	System File	52 KB
ftlang.dll	27/06/2007 14:10	Application Extens...	106 KB
ftser2k.sys	27/06/2007 14:04	System File	70 KB
ftserui2.dll	27/06/2007 14:06	Application Extens...	47 KB

and the amd64 subdirectory contains the 64-bit driver files:

Name	Date modified	Type	Size
 ftbusui.dll	27/06/2007 14:10	Application Extens...	144 KB
 ftcserco.dll	27/06/2007 14:05	Application Extens...	48 KB
 ftd2xx.lib	27/06/2007 14:10	Object File Library	17 KB
 ftd2xx64.dll	27/06/2007 14:10	Application Extens...	326 KB
 ftdibus.sys	27/06/2007 14:05	System File	63 KB
 ftlang.dll	27/06/2007 14:10	Application Extens...	133 KB
 ftser2k.sys	27/06/2007 14:03	System File	82 KB
 ftserui2.dll	27/06/2007 14:06	Application Extens...	49 KB

In order to use DPInst to install the driver, DPInst.exe must be run. There are two versions of DPInst, a 32-bit version to install the 32-bit driver package (DPInstx86.exe in above screen shot) and a 64-bit version to install the 64-bit driver package (DPInstx64.exe in above screen shot). An automated installer must detect which version of DPInst is required to successfully install the driver package using DPInst.

If a custom VID and PID combination is required, FTDI can grant reseller rights to customers with a WinQual account. Details on obtaining reseller right / driver update WHQL certification can be found in application note [Using Microsoft's WHQL Process for Certifying Customer Modified FTDI Driver Files](#). Microsoft charges a small fee for this service. To learn more about using DPInst with FTDI drivers, please see application note [AN232R-03 FTDI Windows Driver Pre-installation](#).

12 Uninstalling Drivers

With the release of Microsoft Windows Vista, the FTDI uninstaller has been rendered unusable due to Windows Resource Protection preventing the executable from deleting driver files and associated registry values. Vista will only allow the system itself to modify files and registry values in these locations.

Consequently, a new method for uninstalling has to be used. Devices can be removed using the Device Manager by simply right-clicking and selecting "Uninstall". This will delete the associated registry entries for that device only. Vista provides an automatic method to delete driver files via a check box to "Delete the driver software for this device" on the uninstall dialog box.



Figure 12.1 Confirm Device Ininstall

Some points to note about the new uninstallation method:

- In the case of FT2232 devices, a composite device is also installed. This can also be removed by right-clicking and selecting "Uninstall". There is no option the delete the driver files when doing this as the driver for the composite device is a native Windows driver.
- If the VCP driver has been installed, the COM port driver should be removed before the bus driver. If the bus is removed first, the COM port will no longer appear in the Device Manager.
- If the files are deleted while other installed devices still require them those devices will not work correctly. This can be fixed by right clicking the device and selecting "Reinstall Driver" which will replace the missing files.
- If a device to be uninstalled is not connected to the PC, the device can still be removed by [setting the device manager to show phantom devices](#). This can also allow a virtual COM port to be uninstalled if the bus layer has been removed first.

Windows 2000, XP and Server 2003 do not have this check box, so driver files and OEM INF and PNF files must be removed manually or by using a custom application. The FTDI Uninstall Utility, [FTClean](#) may still be used on these operating systems.

13 Contact Information

Head Office – Glasgow, UK

Future Technology Devices International Limited
Unit 1, 2 Seaward Place, Centurion Business Park
Glasgow G41 1HH
United Kingdom
Tel: +44 (0) 141 429 2777
Fax: +44 (0) 141 429 2758

E-mail (Sales) sales1@ftdichip.com
E-mail (Support) support1@ftdichip.com
E-mail (General Enquiries) admin1@ftdichip.com
Web Site URL <http://www.ftdichip.com>
Web Shop URL <http://www.ftdichip.com>

Branch Office – Taipei, Taiwan

Future Technology Devices International Limited (Taiwan)
2F, No. 516, Sec. 1, NeiHu Road
Taipei 114
Taiwan, R.O.C.
Tel: +886 (0) 2 8791 3570
Fax: +886 (0) 2 8791 3576

E-mail (Sales) tw.sales1@ftdichip.com
E-mail (Support) tw.support1@ftdichip.com
E-mail (General Enquiries) tw.admin1@ftdichip.com
Web Site URL <http://www.ftdichip.com>

Branch Office – Hillsboro, Oregon, USA

Future Technology Devices International Limited (USA)
7235 NW Evergreen Parkway, Suite 600
Hillsboro, OR 97123-5803
USA
Tel: +1 (503) 547 0988
Fax: +1 (503) 547 0987

E-Mail (Sales) us.sales@ftdichip.com
E-Mail (Support) us.support@ftdichip.com
E-Mail (General Enquiries) us.admin@ftdichip.com
Web Site URL <http://www.ftdichip.com>

Branch Office – Shanghai, China

Future Technology Devices International Limited (China)
Room 408, 317 Xianxia Road,
Shanghai, 200051
China
Tel: +86 21 62351596
Fax: +86 21 62351595

E-mail (Sales) cn.sales@ftdichip.com
E-mail (Support) cn.support@ftdichip.com
E-mail (General Enquiries) cn.admin@ftdichip.com
Web Site URL <http://www.ftdichip.com>

Distributor and Sales Representatives

Please visit the Sales Network page of the FTDI Web site for the contact details of our distributor(s) and sales representative(s) in your country.

Vinculum is part of Future Technology Devices International Ltd. Neither the whole nor any part of the information contained in, or the product described in this manual, may be adapted or reproduced in any material or electronic form without the prior written consent of the copyright holder. This product and its documentation are supplied on an as-is basis and no warranty as to their suitability for any particular purpose is either made or implied. Future Technology Devices International Ltd will not accept any claim for damages howsoever arising as a result of use or failure of this product. Your statutory rights are not affected. This product or any variant of it is not intended for use in any medical appliance, device or system in which the failure of the product might reasonably be expected to result in personal injury. This document provides preliminary information that may be subject to change without notice. No freedom to use patents or other intellectual property rights is implied by the publication of this document. Future Technology Devices International Ltd, Unit 1, 2 Seaward Place, Centurion Business Park, Glasgow G41 1HH, United Kingdom. Scotland Registered Number: SC136640

Appendix A – Appendix

A.1 FTDIBUS.INF

```
; FTDIBUS.INF
;
; Copyright © 2000-2010 Future Technology Devices International Limited
;
; USB serial converter driver installation file for Windows 2000, XP, Server 2003, Vista,
Server 2008,
; Windows 7 and Server 2008 R2 (x86 and x64).
;
;
; THIS SOFTWARE IS PROVIDED BY FUTURE TECHNOLOGY DEVICES INTERNATIONAL LIMITED ``AS IS'' AND
ANY EXPRESS
; OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
MERCHANTABILITY AND FITNESS
; FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL FUTURE TECHNOLOGY DEVICES
INTERNATIONAL LIMITED
; BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL
DAMAGES (INCLUDING,
; BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR
PROFITS; OR BUSINESS
; INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT
LIABILITY, OR TORT
; (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE,
EVEN IF ADVISED OF
; THE POSSIBILITY OF SUCH DAMAGE.

; FTDI DRIVERS MAY BE USED ONLY IN CONJUNCTION WITH PRODUCTS BASED ON FTDI PARTS.

; FTDI DRIVERS MAY BE DISTRIBUTED IN ANY FORM AS LONG AS LICENSE INFORMATION IS NOT
MODIFIED.

; IF A CUSTOM VENDOR ID AND/OR PRODUCT ID OR DESCRIPTION STRING ARE USED, IT IS THE
RESPONSIBILITY OF
; THE PRODUCT MANUFACTURER TO MAINTAIN ANY CHANGES AND SUBSEQUENT WHQL RE-CERTIFICATION AS A
RESULT OF
; MAKING THESE CHANGES.
;

[Version]
Signature="$Windows NT$"
DriverPackageType=PlugAndPlay
DriverPackageDisplayName=%DESC%
Class=USB
ClassGUID={36fc9e60-c465-11cf-8056-444553540000}
Provider=%FTDI%
CatalogFile=ftdibus.cat
DriverVer=07/12/2010,2.08.02
```



[SourceDisksNames]

1=%DriversDisk%,,,

[SourceDisksFiles]

ftdibus.sys = 1,i386

ftbusui.dll = 1,i386

ftd2xx.dll = 1,i386

FTLang.Dll = 1,i386

[SourceDisksFiles.amd64]

ftdibus.sys = 1,amd64

ftbusui.dll = 1,amd64

ftd2xx64.dll = 1,amd64

ftd2xx.dll = 1,i386

FTLang.Dll = 1,amd64

[DestinationDirs]

FtdiBus.NT.Copy = 10,system32\drivers

FtdiBus.NT.Copy2 = 10,system32

FtdiBus.NTamd64.Copy = 10,system32\drivers

FtdiBus.NTamd64.Copy2 = 10,system32

FtdiBus.NTamd64.Copy3 = 10,syswow64

[Manufacturer]

%Ftdi%=FtdiHw,NTamd64

[FtdiHw]

%USB\VID_0403&PID_6001.DeviceDesc%=FtdiBus.NT,USB\VID_0403&PID_6001

%USB\VID_0403&PID_6010&MI_00.DeviceDesc%=FtdiBus.NT,USB\VID_0403&PID_6010&MI_00

%USB\VID_0403&PID_6010&MI_01.DeviceDesc%=FtdiBus.NT,USB\VID_0403&PID_6010&MI_01

%USB\VID_0403&PID_6011&MI_00.DeviceDesc%=FtdiBus.NT,USB\VID_0403&PID_6011&MI_00

%USB\VID_0403&PID_6011&MI_01.DeviceDesc%=FtdiBus.NT,USB\VID_0403&PID_6011&MI_01

%USB\VID_0403&PID_6011&MI_02.DeviceDesc%=FtdiBus.NT,USB\VID_0403&PID_6011&MI_02

%USB\VID_0403&PID_6011&MI_03.DeviceDesc%=FtdiBus.NT,USB\VID_0403&PID_6011&MI_03

[FtdiHw.NTamd64]

%USB\VID_0403&PID_6001.DeviceDesc%=FtdiBus.NTamd64,USB\VID_0403&PID_6001

%USB\VID_0403&PID_6010&MI_00.DeviceDesc%=FtdiBus.NTamd64,USB\VID_0403&PID_6010&MI_00

%USB\VID_0403&PID_6010&MI_01.DeviceDesc%=FtdiBus.NTamd64,USB\VID_0403&PID_6010&MI_01

%USB\VID_0403&PID_6011&MI_00.DeviceDesc%=FtdiBus.NTamd64,USB\VID_0403&PID_6011&MI_00

%USB\VID_0403&PID_6011&MI_01.DeviceDesc%=FtdiBus.NTamd64,USB\VID_0403&PID_6011&MI_01

%USB\VID_0403&PID_6011&MI_02.DeviceDesc%=FtdiBus.NTamd64,USB\VID_0403&PID_6011&MI_02

%USB\VID_0403&PID_6011&MI_03.DeviceDesc%=FtdiBus.NTamd64,USB\VID_0403&PID_6011&MI_03

[ControlFlags]

ExcludeFromSelect=*

```
[FtdiBus.NT]
CopyFiles=FtdiBus.NT.Copy,FtdiBus.NT.Copy2
AddReg=FtdiBus.NT.AddReg

[FtdiBus.NTamd64]
CopyFiles=FtdiBus.NTamd64.Copy,FtdiBus.NTamd64.Copy2,FtdiBus.NTamd64.Copy3
AddReg=FtdiBus.NT.AddReg

[FtdiBus.NT.Services]
AddService = FTDIBUS, 0x00000002, FtdiBus.NT.AddService

[FtdiBus.NTamd64.Services]
AddService = FTDIBUS, 0x00000002, FtdiBus.NT.AddService

[FtdiBus.NT.AddService]
DisplayName = %SvcDesc%
ServiceType = 1 ; SERVICE_KERNEL_DRIVER
StartType = 3 ; SERVICE_DEMAND_START
ErrorControl = 1 ; SERVICE_ERROR_NORMAL
ServiceBinary = %10%\system32\drivers\ftdibus.sys
LoadOrderGroup = Base
AddReg = FtdiBus.NT.AddService.AddReg

[FtdiBus.NT.AddReg]
HKR,,DevLoader,,*ntkern
HKR,,NTMPDriver,,ftdibus.sys
HKR,,EnumPropPages32,, "ftbusui.dll,FTBUSUIPropPageProvider"

[FtdiBus.NT.AddService.AddReg]
;HKR,Parameters,"LocIds",1,31,00,00,00,32,00,00,00,00
;HKR,Parameters,"RetryResetCount",0x10001,50

[FtdiBus.NT.Copy]
ftdibus.sys

[FtdiBus.NT.Copy2]
ftbusui.dll
ftd2xx.dll
FTLang.dll

[FtdiBus.NTamd64.Copy]
ftdibus.sys

[FtdiBus.NTamd64.Copy2]
ftbusui.dll
```

ftd2xx.dll, ftd2xx64.dll

FTLang.dll

[FtdiBus.NTamd64.Copy3]

ftd2xx.dll

[Strings]

Ftdi="FTDI"

DESC="CDM Driver Package"

DriversDisk="FTDI USB Drivers Disk"

USB\VID_0403&PID_6001.DeviceDesc="USB Serial Converter"

USB\VID_0403&PID_6010&MI_00.DeviceDesc="USB Serial Converter A"

USB\VID_0403&PID_6010&MI_01.DeviceDesc="USB Serial Converter B"

USB\VID_0403&PID_6011&MI_00.DeviceDesc="USB Serial Converter A"

USB\VID_0403&PID_6011&MI_01.DeviceDesc="USB Serial Converter B"

USB\VID_0403&PID_6011&MI_02.DeviceDesc="USB Serial Converter C"

USB\VID_0403&PID_6011&MI_03.DeviceDesc="USB Serial Converter D"

SvcDesc="USB Serial Converter Driver"

ClassName="USB"

A.2 FTDIPT.INF

; FTDIPT.INF

;

; Copyright © 2000-2010 Future Technology Devices International Limited

;

; USB serial port driver installation file for Windows 2000, XP, Server 2003, Vista, Server 2008,

; Windows 7 and Server 2008 R2 (x86 and x64).

;

;

; THIS SOFTWARE IS PROVIDED BY FUTURE TECHNOLOGY DEVICES INTERNATIONAL LIMITED ``AS IS'' AND ANY EXPRESS

; OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS

; FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL FUTURE TECHNOLOGY DEVICES INTERNATIONAL LIMITED

; BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING,

; BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS

; INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT

; (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF

; THE POSSIBILITY OF SUCH DAMAGE.

; FTDI DRIVERS MAY BE USED ONLY IN CONJUNCTION WITH PRODUCTS BASED ON FTDI PARTS.

; FTDI DRIVERS MAY BE DISTRIBUTED IN ANY FORM AS LONG AS LICENSE INFORMATION IS NOT MODIFIED.

```
; IF A CUSTOM VENDOR ID AND/OR PRODUCT ID OR DESCRIPTION STRING ARE USED, IT IS THE  
RESPONSIBILITY OF  
  
; THE PRODUCT MANUFACTURER TO MAINTAIN ANY CHANGES AND SUBSEQUENT WHQL RE-CERTIFICATION AS A  
RESULT OF  
  
; MAKING THESE CHANGES.  
;
```

```
[Version]  
Signature="$Windows NT$"  
DriverPackageType=PlugAndPlay  
DriverPackageDisplayName=%DESC%  
Class=Ports  
ClassGUID={4d36e978-e325-11ce-bfc1-08002be10318}  
Provider=%FTDI%  
CatalogFile=ftdiport.cat  
DriverVer=07/12/2010,2.08.02
```

```
[SourceDisksNames]  
1=%DriversDisk%,,,
```

```
[SourceDisksFiles]  
ftser2k.sys=1,i386  
ftserui2.dll=1,i386  
ftcserco.dll = 1,i386
```

```
[SourceDisksFiles.amd64]  
ftser2k.sys=1,amd64  
ftserui2.dll=1,amd64  
ftcserco.dll = 1,amd64
```

```
[DestinationDirs]  
FtdiPort.NT.Copy=10,system32\drivers  
FtdiPort.NT.CopyUI=10,system32  
FtdiPort.NT.CopyCoInst=10,system32
```

```
[ControlFlags]  
ExcludeFromSelect=*
```

```
[Manufacturer]  
%FTDI%=FtdiHw,NTamd64
```

```
[FtdiHw]  
%VID_0403&PID_6001.DeviceDesc%=FtdiPort.NT,FTDIBUS\COMPORT&VID_0403&PID_6001  
%VID_0403&PID_6010.DeviceDesc%=FtdiPort.NT,FTDIBUS\COMPORT&VID_0403&PID_6010  
%VID_0403&PID_6011.DeviceDesc%=FtdiPort.NT,FTDIBUS\COMPORT&VID_0403&PID_6011
```

```
[FtdiHw.NTamd64]
%VID_0403&PID_6001.DeviceDesc%=FtdiPort.NTamd64,FTDIBUS\COMPORT&VID_0403&PID_6001
%VID_0403&PID_6010.DeviceDesc%=FtdiPort.NTamd64,FTDIBUS\COMPORT&VID_0403&PID_6010
%VID_0403&PID_6011.DeviceDesc%=FtdiPort.NTamd64,FTDIBUS\COMPORT&VID_0403&PID_6011

[FtdiPort.NT.AddService]
DisplayName      = %SvcDesc%
ServiceType     = 1 ; SERVICE_KERNEL_DRIVER
StartType       = 3 ; SERVICE_DEMAND_START
ErrorControl     = 1 ; SERVICE_ERROR_NORMAL
ServiceBinary   = %10%\system32\drivers\ftser2k.sys
LoadOrderGroup = Base

; ----- Serenum Driver install section
[SerEnum_AddService]
DisplayName      = %SerEnum.SvcDesc%
ServiceType     = 1 ; SERVICE_KERNEL_DRIVER
StartType       = 3 ; SERVICE_DEMAND_START
ErrorControl     = 1 ; SERVICE_ERROR_NORMAL
ServiceBinary   = %12%\serenum.sys
LoadOrderGroup = PNP Filter

[FtdiPort.NT.AddReg]
HKR,,EnumPropPages32,, "ftserui2.dll,SerialPortPropPageProvider"

[FtdiPort.NT.Copy]
ftser2k.sys

[FtdiPort.NT.CopyUI]
ftserui2.dll

[FtdiPort.NT.CopyCoInst]
ftcserco.dll

[FtdiPort.NT]
CopyFiles=FtdiPort.NT.Copy,FtdiPort.NT.CopyUI
AddReg=FtdiPort.NT.AddReg

[FtdiPort.NTamd64]
CopyFiles=FtdiPort.NT.Copy,FtdiPort.NT.CopyUI
AddReg=FtdiPort.NT.AddReg

[FtdiPort.NT.HW]
AddReg=FtdiPort.NT.HW.AddReg

[FtdiPort.NTamd64.HW]
```

AddReg=FtdiPort.NT.HW.AddReg

[FtdiPort.NT.Services]

AddService = FTSER2K, 0x00000002, FtdiPort.NT.AddService

AddService = Serenum,,SerEnum_AddService

DelService = FTSERIAL

[FtdiPort.NTamd64.Services]

AddService = FTSER2K, 0x00000002, FtdiPort.NT.AddService

AddService = Serenum,,SerEnum_AddService

DelService = FTSERIAL

[FtdiPort.NT.HW.AddReg]

HKR,, "UpperFilters",0x00010000, "serenum"

HKR,, "ConfigData",1,11,00,3F,3F,10,27,00,00,88,13,00,00,C4,09,00,00,E2,04,00,00,71,02,00,00,38,41,00,00,9C,80,00,00,4E,C0,00,00,34,00,00,00,1A,00,00,00,0D,00,00,00,06,40,00,00,03,80,00,00,00,00,00,00,D0,80,00,00

HKR,, "MinReadTimeout",0x00010001,0

HKR,, "MinWriteTimeout",0x00010001,0

HKR,, "LatencyTimer",0x00010001,16

[FtdiPort.NT.CoInstallers]

AddReg=FtdiPort.NT.CoInstallers.AddReg

CopyFiles=FtdiPort.NT.CopyCoInst

[FtdiPort.NTamd64.CoInstallers]

AddReg=FtdiPort.NT.CoInstallers.AddReg

CopyFiles=FtdiPort.NT.CopyCoInst

[FtdiPort.NT.CoInstallers.AddReg]

HKR,,CoInstallers32,0x00010000, "ftcserco.Dll,FTCSERCoInstaller"

;-----;

[Strings]

FTDI="FTDI"

DESC="CDM Driver Package"

DriversDisk="FTDI USB Drivers Disk"

PortsClassName = "Ports (COM & LPT)"

VID_0403&PID_6001.DeviceDesc="USB Serial Port"

VID_0403&PID_6010.DeviceDesc="USB Serial Port"

VID_0403&PID_6011.DeviceDesc="USB Serial Port"

SvcDesc="USB Serial Port Driver"

SerEnum.SvcDesc="Serenum Filter Driver"

Appendix B - Revision History

Revision History

Version 1.00	Initial Release	January, 2005
Version 2.00	Modified to reflect new driver model Screen shots updated for XP themes; DPlnst references included	June 2006
Version 2.10	Amended Location IDs to include terminating 00 entry	August 2006
Version 2.20	Added Phantom Devices Section Modified appendix entries for INF and INI files to reflect new driver package for Vista (combined x86 and x64 package, no uninstaller executable); Removed references to uninstaller and FTClean (which uses the uninstaller) as no longer valid for Vista; Removed references to power management tab and INF options - handled automatically as of CDM 2.02.04.; Added a section on uninstalling via Device Manager as is required by Vista; Updated USA office address	July 2007
Version 2.3	Referenced new application notes Updated Vendor / Product ID sections to indicate removal of FTDI default values Added Changing Driver Priority section Changed Name	August 2008
Version 2.4	Moved section "changing the driver priority" to a more appropriate area. Changed document to AN_107. Updated company address	Nov 2008
Version 2.5	Updated INF entries to reflect the new FTDIPOINT file format Added documentation of new feature to specify initial index for co-installer (section 6.8). Updated contact info.	Aug 2010
Version 2.51	Corrected section 3, page 21. Edited section 5.2 LocIds description	October 2010