Technical Note

TN_152

USB 3.0 Compatibility Issues Explained

Version 1.0

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USB 3.0 is the latest superspeed version of the universal serial bus interface. It is designed to allow for higher (super) data rates while being backward compatible with existing devices. However, the roll out of USB 3.0 has created some compatibility issues with FTDI products which this document endeavours to explain.

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1 Introduction

USB 3.0 is the latest superspeed version of the universal serial bus interface. It is designed to allow for higher (super) data rates while being backward compatible with existing devices. However, the roll out of USB 3.0 has created some compatibility issues with FTDI products which this document endeavours to explain.
2 Drivers

All hardware that is used to construct a PC must have software driver support to enable applications to communicate with the hardware. In the case of USB solutions there will be USB host controller drivers with support for different USB classes. This is typically provided with the Operating System. Additional drivers for the peripherals connecting to the USB host are typically provided by the hardware vendor e.g. FTDI provide driver downloads to support their silicon.

The windows variant of this driver should be operational on all windows platforms from Windows 2000 onwards and support all USB host controllers.

2.1 Known Issues (Pre Windows 8)

USB 3.0 did not exist prior to Windows 8 and as such Microsoft did not have driver support for USB 3.0 host controllers.

To allow silicon vendors to add USB 3.0 into pre windows 8 systems the vendors developed their own drivers. This has led to a different registry structure from that observed with USB 1.1 and USB 2.0 host controllers leading to compatibility issues.

In the registry pre Windows 8 there is:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\USB\ROOT_HUB
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\USB\ROOT_HUB20

Following this system, the expectation for USB 3.0 hosts would be:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\USB\ROOT_HUB30 to follow on for 3.0

However, despite this being the case in Windows 8 with the Microsoft driver, it is different pre windows 8, with one example being:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Enum\USB\ROOT_HUB30

2.1.1 Installation

Some users of FTDI silicon have reported that an FTDI device will not install if connected to a USB 3.0 port. This is partly related to some descriptors not being returned correctly or stored in unexpected registry locations. There are a number of workarounds.

I. If the PC has a USB 2.0 port then the device may be installed by connecting to the USB 2.0 port and then moving to the USB 3.0 port after installation.

II. Ensure your device has a serial number.

2.1.2 Location ID Returned As 0

Location IDs are not strictly part of the USB spec in the format provided by FTDI. The feature was added as an additional option to back up identifying and opening ports by index, serial number or product description strings.

When connected to a USB 2.0 port the location is provided on the basis of the USB port that the device is connected to. These values are derived from specific registry keys. As the registry tree for 3rd party USB 3.0 host drivers is different to the Microsoft generic driver the Location ID cannot be calculated.
There is no workaround to this current issue and as such devices should be listed and opened by index, serial number or product description strings.

2.1.3 Device names

It is further noted that existing host ports on a Windows machine are given a name in the format: `\device\usbpdo-#` where # is a number.

One USB 3.0 card tested by FTDI gives the name in the format `\device\device#` where # is a number.

All these discrepancies add up to unpredictable behavior.

2.2 Windows 8

With Windows 8, Microsoft have provided USB 3.0 driver support as part of the OS. This has removed the need for 3rd party host drivers. As a consequence of moving to the default Microsoft driver all the problems so far reported with earlier versions of Windows and USB 3.0 are resolved. There is no need for special modifications in the FTDI driver for this configuration.
3 Conclusion

Although it is theoretically possible to make changes to support every host controller it is highly probable that the next host device discovered on the market (e.g. different manufacturer) will have another variant requiring a different modification.

As such, to create a range of device drivers for all the USB host vendors would not be a sustainable model and goes against the PnP ethos of USB.

On the basis that USB 3.0 issues are largely confined to windows 7 (or earlier) machines and the problems experienced go away with Windows 8 (using a Microsoft host driver) it is FTDI’s view that the problem lies with the USB host vendors and the issue should not be passed to all USB device manufacturers.
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Appendix A – References

Document References

Installation Guides

Acronyms and Abbreviations

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Appendix C – Revision History

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<th>Revision</th>
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