

## HOW TO GUIDE

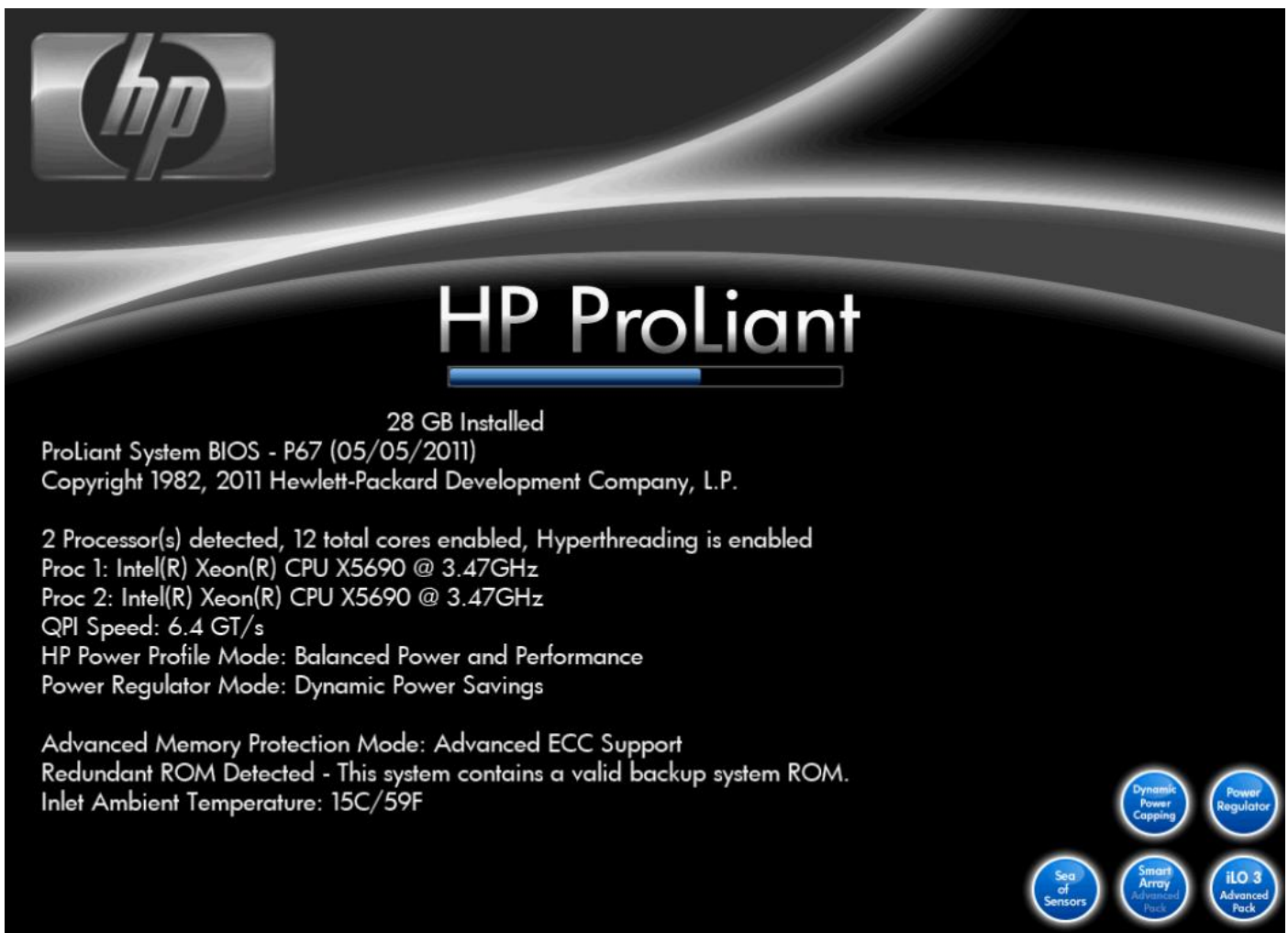
Windows 2008 R2 & ESXi 5.0

Pass-thru Configuration with

Highpoint RocketU 1144A

on

Hewlett Packard DL380 Generation 7



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No warranty is offered that this will work as advertised however this guide has been produced in good faith following this process

## OVERVIEW OF REASON FOR HOW-TO-GUIDE

A need arose for a back-up strategy for both Windows 2008 R2 servers and ESXi standalone servers in a corporate environment where data could be backed up to externally available devices and then for security removed from server location. The amount of data involved was in the TB range and USB2.0 / 1.1 does not offer the speed required for the time window involved. Unfortunately HP servers even in the latest '7<sup>th</sup> Generation' still doesn't offer native onboard Superspeed USB 3.0 chipsets and ports.

The decision was taken to purchase a peripheral card and several dual bay external enclosures. There were 3 requirements that needed to be fulfilled;

1. They must support native 3TB or larger (when available) hard disk drives. This can be both a limitation of the chipset utilized on the peripheral card or can be a limitation of some external hard drive enclosures. Several enclosures were tried until one was found to fully support 3TB drives and had native Superspeed cabling on the back. The dual case found by HornetTek (X2-RACK, HD-3211-URC), which also had an eSata connector, but this is not utilized in this scenario.
2. There must be Windows 2008 / 2008 R2 drivers that supported the card and it work as pass-thru with VMware ESXi 5.0.
3. It should be a minimum 2-port card that has the ability to maximize the throughput per port in the event (once prices come down) of utilizing larger SSD drives to burst the backups and allow growth in the amount of data backed up or a decrease in the backup window required.

Consideration was given due to this 'performance', a card should be found that didn't aggregate the USB 3.0 bandwidth across all ports (ie in a pseudo hub layout) that often supports fast speeds (if operating system cache is available), but are easily saturated if multiple devices are used. This is somewhat negated by utilization within a server environment where often the minimum ram available to the OS for caching is 16GB... However even this is quickly saturated if I/O transfer writes cannot be sustained as a reasonable speed.

Although the Western Digital Green drives WD30EZR support a 6Gb/sec transfer, this is only from buffer to host and not host to/ from drive which is rated on Western Digital's website as a theoretical maximum of 123MB/sec (<http://www.wdc.com/wdproducts/library/SpecSheet/ENG/2879-701229.pdf>).

A 2 or 4 port would be used using 4 or 8 Western Digital's potentially requiring 4 or 8 devices being accessed simultaneously. All things being equal maximum 'advertised' rates don't often occur and an expected 15%-20% loss of bandwidth due to other considerations left the need to find a card that had to support 400-800GB a second sustained transfers.

Whilst 400-800GB seems high, the sustainable throughput of the HP P410i RAID controller on most of the DL380s offers a sustained throughput of 800-1400MB/sec depending on RAID configuration and cache size available, so something 'special' was needed on the USB card to be able to keep up with the reads from the onboard SAS arrays.

After looking at the available cards, only one card stood out that could achieve point (2) and point (3). This card would need to be tested to ensure it met point (1) and so a Highpoint RocketU 1144A was purchased. This card claimed to support a 5Gb/sec throughput per port providing a 20Gb/sec backbone on the card due to multiple controllers, and this provided hope that this would grow to the 300-500MB/sec transfers per device once all connected devices became SSDs hence providing some kind of future proofing.

# **TECHNICAL SPECIFICATION USED IN THIS HOW-TO-GUIDE**

## HIGHPOINT CARD – ROCKETU 1144A

Driver revision used (Windows 2008 R2) – off website ASM104xW1144WHQL.zip from [http://www.highpoint-tech.com/USA\\_new/RU1144A\\_download.htm](http://www.highpoint-tech.com/USA_new/RU1144A_download.htm)

## WINDOWS 2008 R2

Installed using Windows 2008 R2 x64 Standard

Assisted installation using HP SmartStart CD v8.70 (latest SoftPAQ and other specific HP drivers were install as part of the process).

No windows updates were downloaded and installed

The driver for the Highpoint USB3 Superspeed card was installed manually, updating each unknown device individually to ensure correct operation and only driver files were installed

## VMWARE ESXi 5.0

ESXi used was HP Specific with HP CIM features slipstreamed into the ISO

5.0\_Oct\_2011\_ESXi\_HD-USB-SDImgeInstlr\_Z7550-00253.iso

Installed onto internal 4GB Lexar USB Pen drive

## HEWLETT PACKARD DL380 G7

This was the HP DL380 G7 Performance Model (633404-621)

Dual Socket Xeon® CPU X5690 @ 3.47Ghz 6-core Hyperthreading enabled

8 x 146GB SAS 10,000rpm drives configured in a single RAID5 array (no spare)

28GB of ram (6 x 2GBs, 2 x 8GBs) configured as per HP RAM utility guidance for virtualization

Bios was updated from stock P67 (01/30/2011) to P67 (05/05/2011)

ILO3 Bios was updated from stock 1.20 (May 2011) to 1.26 (21<sup>st</sup> August 2011)

## USB DEVICES CONNECTED

Used under Windows 2008 R2 & VMware ESXi 5.0

Port 1 – no device can be detected or used

Port 2 – Dual bay USB3 enclosure, HornetTek X2-RACK using 2 x WD30EZR3 3TB SATA III hard drives

Port 3 – no device can be detected or used

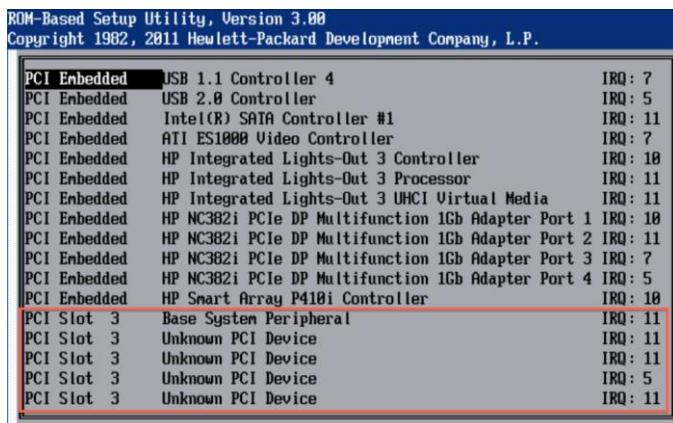
Port 4 – Dual bay USB3 enclosure, HornetTek X2-RACK using 2 x WD30EZR3 3TB SATA III hard drives

## VIRTUAL MACHINE USED

The VM used for testing was a virtual machine built from Windows 7 x64 Ultimate. This was configured with 1 x CPU, 2GB ram and had both devices (PCI) connected to it. The production environment will have individual vms assigned to specific ports using Windows 2008 R2.

## PHYSICAL CARD INSTALLATION IN HP DL380 G7

One thing that should be pointed out is that the Highpoint RocketU 1144A card is **NOT 100% COMPATIBLE** with the HP DL380 G7. Initially when the card was installed it showed a 'Base System Peripheral' and 4x 'Unknown PCI Device' listings in the PCI IRQ settings screen.



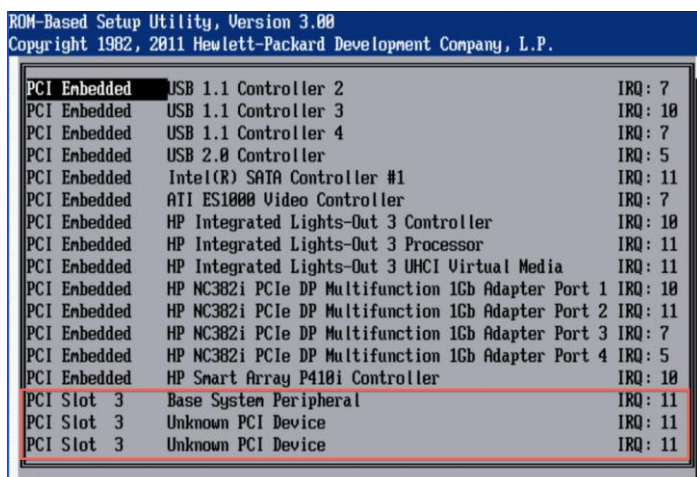
Device	IRQ
PCI Embedded USB 1.1 Controller 4	IRQ: 7
PCI Embedded USB 2.0 Controller	IRQ: 5
PCI Embedded Intel(R) SATA Controller #1	IRQ: 11
PCI Embedded ATI ES1000 Video Controller	IRQ: 7
PCI Embedded HP Integrated Lights-Out 3 Controller	IRQ: 10
PCI Embedded HP Integrated Lights-Out 3 Processor	IRQ: 11
PCI Embedded HP Integrated Lights-Out 3 UHCI Virtual Media	IRQ: 11
PCI Embedded HP NC382i PCIe DP Multifunction 1Gb Adapter Port 1	IRQ: 10
PCI Embedded HP NC382i PCIe DP Multifunction 1Gb Adapter Port 2	IRQ: 11
PCI Embedded HP NC382i PCIe DP Multifunction 1Gb Adapter Port 3	IRQ: 7
PCI Embedded HP NC382i PCIe DP Multifunction 1Gb Adapter Port 4	IRQ: 5
PCI Embedded HP Smart Array P410i Controller	IRQ: 10
PCI Slot 3 Base System Peripheral	IRQ: 11
PCI Slot 3 Unknown PCI Device	IRQ: 11
PCI Slot 3 Unknown PCI Device	IRQ: 11
PCI Slot 3 Unknown PCI Device	IRQ: 5
PCI Slot 3 Unknown PCI Device	IRQ: 11

*Once only configuration, never to be seen again ever!!! no matter what is enabled/disabled*

After the initial reboot once the card was inserted it was no longer listed as above, but had 1, 2 or sometimes 3 'Unknown PCI Device' lines in the Bios. This relates directly to the number of ports functional on the card once the HP server is booted. After spending almost a week attempting to disable Serial, USB, SATA Controller, NICs etc it became clear that no amount of disabling embedded devices to release IRQs allowed the card to fully work.

The DL380 G7 has 3 types of PCI-e riser card (a double full width and a triple full width and a double half width riser card). This means that the card can only be inserted into PCI Slot 1, 2 or 3. Having only the dual full width riser card, the card has only been tried in PCI Slot 2 and 3. The most consistent configuration after power offs / resets / restarts etc appear to be having the card in PCI Slot 3. It is clear however that disabling half of the onboard PCI Embedded devices doesn't enhance the functionality of the card, as it appears the issue is with IRQ Sharing with the ILO3 Devices, 'HP Integrated Lights-Out 3 Processor' and 'HP Integrated Lights-Out 3 UHCI Virtual Media'. This issue cannot be resolved as these two devices insist on using the same IRQ as any PCI card in either Slot 2 or Slot 3 and ILO3 cannot be disabled.

The most consistent configuration has been to perform a full reset and allow all devices to be enabled and have effectively HALF a functional card. This appears to relate to the EVEN ports 2 and 4 (or 1 and 3 if starting from 0 ☺, basically the 2<sup>nd</sup> / 4<sup>th</sup> ports from the motherboard side of the card) and is how the configuration is described throughout the rest of this document.



Device	IRQ
PCI Embedded USB 1.1 Controller 2	IRQ: 7
PCI Embedded USB 1.1 Controller 3	IRQ: 10
PCI Embedded USB 1.1 Controller 4	IRQ: 7
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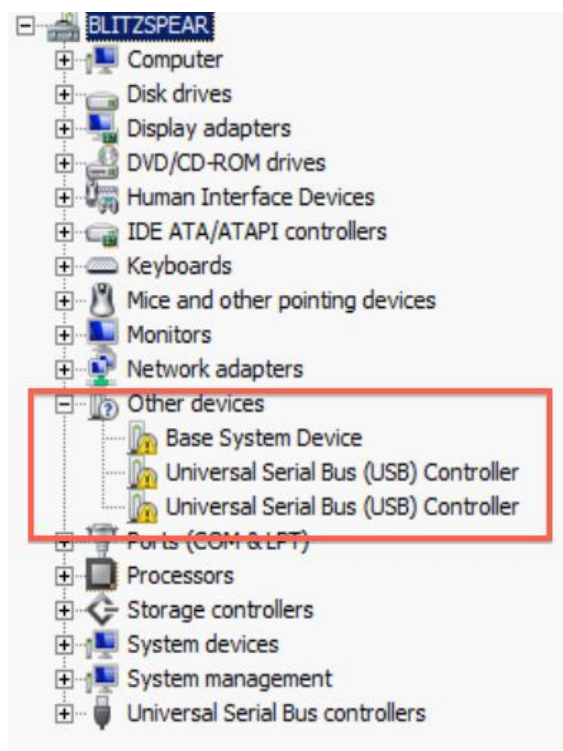
*Most consistent repeatable configuration (2 functional ports only)*

## WINDOWS 2008 R2 INSTALLATION

1. Build Windows 2008 R2 using HP SmartStart (do an assisted installation) and once everything is installed proceed with the next steps.

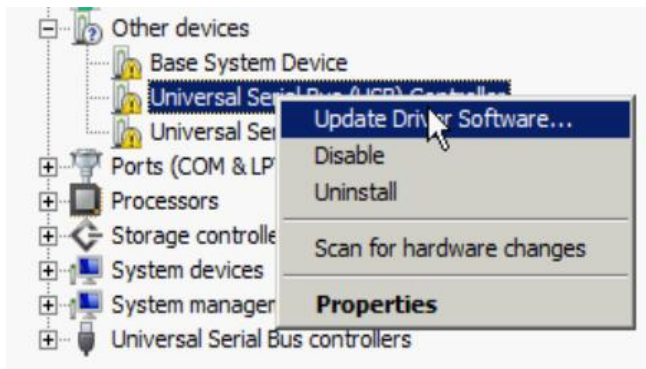


2. Device manager will show the Highpoint card, as a Base System Device and 4 x USB Controllers

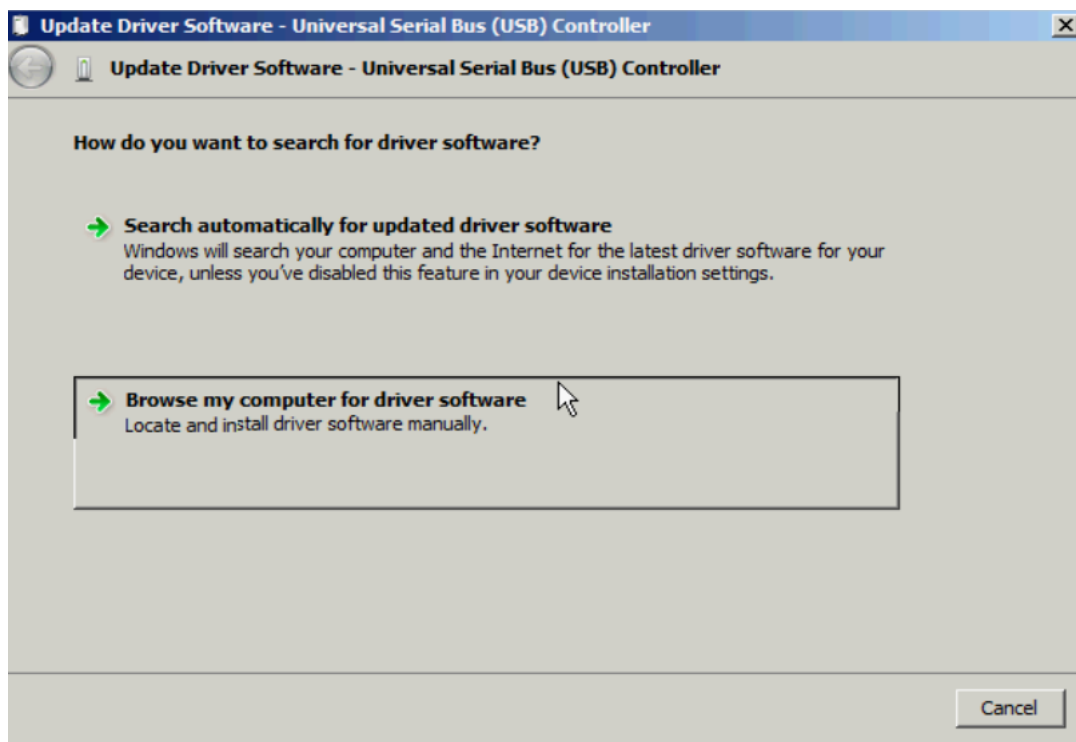


3. Downloaded the Highpoint drivers from their website
4. Extracted driver zip into **C:\ASM104xV1144WHQL**

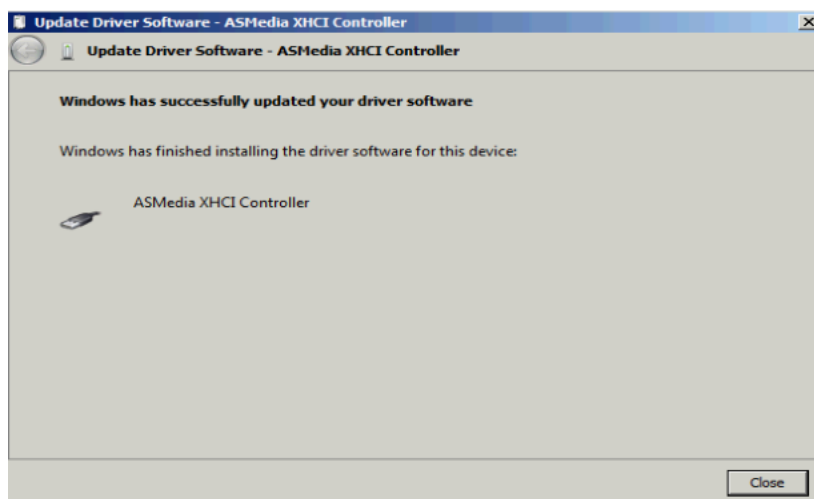
5. Install each device individually, by right-clicking each **'Universal Serial Bus (USB) Controller'** show under **'Other Devices'** and select **'Update Driver Software'**



6. Select **'Browse my computer for driver software'**



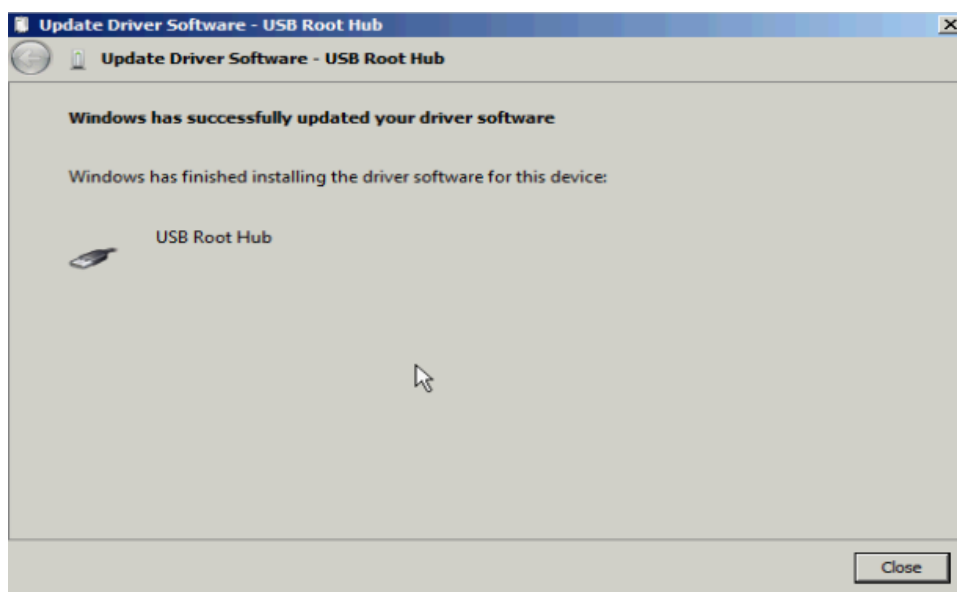
7. Browse to the path required for the driver **'C:\ASM104xV1144WHQL\ASM104xV1144WHQL\Driver'** and click **'Next'**



You will see a '**ASMedia XHCI Controller**' will be installed, but you will also see that a failed device was not able to install a driver. As you enable the '**ASMedia XHCI Controller**' it shows it has a dependent device.



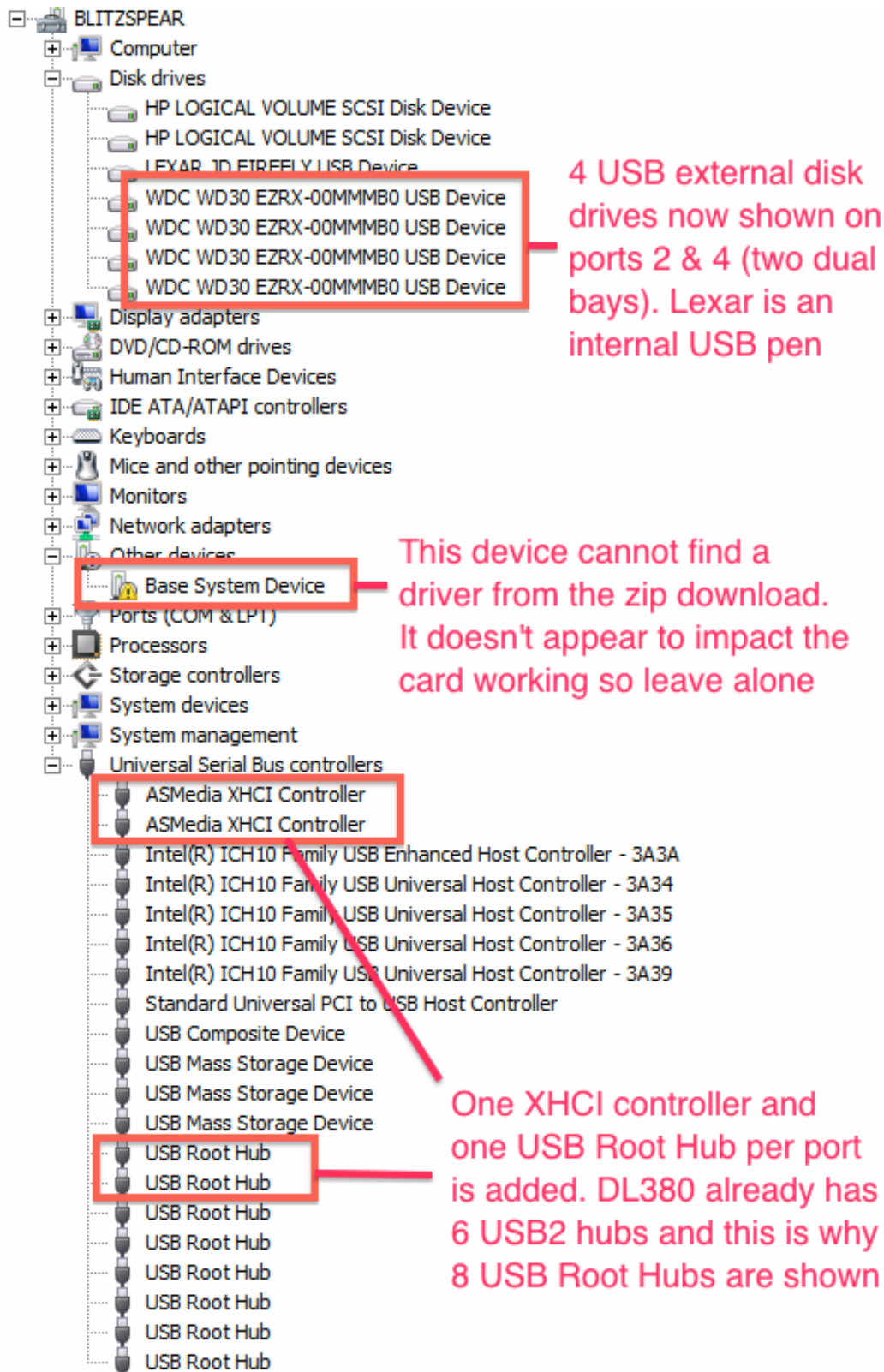
This '**Unknown device**' is the USB Hub device that is associated with each port. Repeat the above prove of right-clicking the '**Unknown device**' and point it back to the same folder location.



You will now have a '**USB Root Hub**' device, simply right-click on the remaining '**Universal Serial Bus (USB) Controller**' and select '**Scan for hardware changes**', the required drivers will be installed. Many drivers will be shown as installing; once the process finishes you will still be left with a '**Base System Device**' in '**Other devices**'. There is no driver available to resolve this, however it should not impact the overall card working.

Whilst there are several ways to install these drivers (you could have clicked on the Setup.exe before installing the hardware), I wanted to show the process fully as a manual installation and to ensure no unneeded files were installed on the server that were not required.

## 8. Finished !

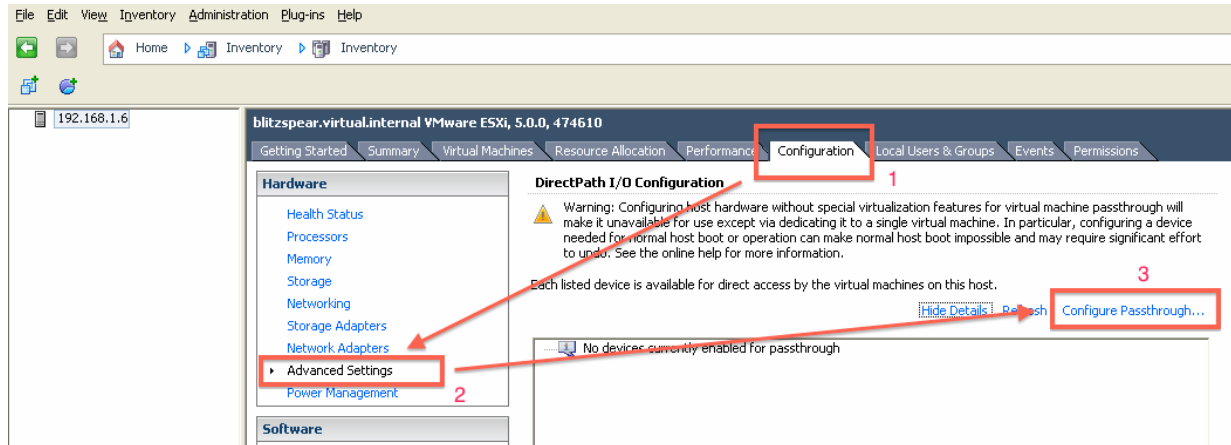


Congratulations the Highpoint RocketU 1144A card is now fully installed and configured

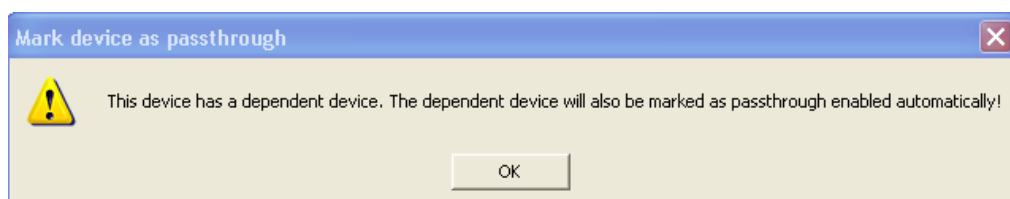
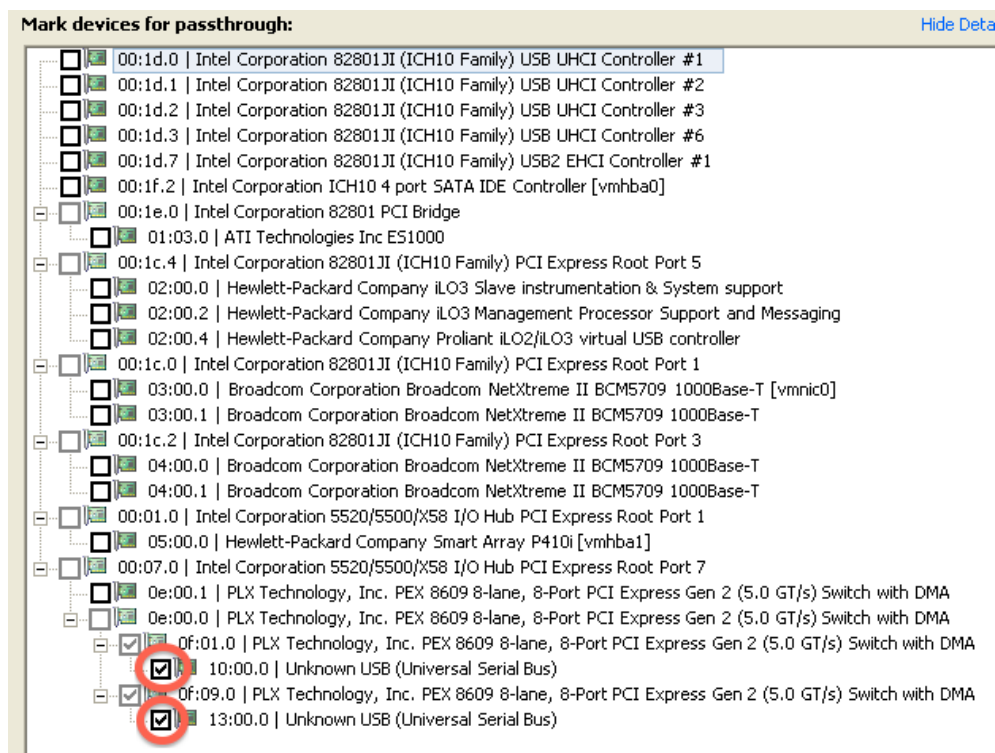


# VMWARE ESXi v5.0 PASS-THRU CONFIGURATION

1. Install VMware ESXi v5.0 using the specific HP version of the ISO. Installing onto the Internal Lexar 4GB USB Pen. Ensure that the boot priority is set to **'Internal DriveKeys First'**
2. Log into VMware ESXi with the client software. Select **'Configuration'** and then **'Advanced Settings'** and then click **'Configure Passthrough...'**




3. Mark only the two devices circled




As each is **'ticked'** the dependent device warning above is shown, in both instances just click **'OK'** to continue

4. You will now be presented with two devices in the Pass Through window but they will not function yet. Reboot the ESXi host

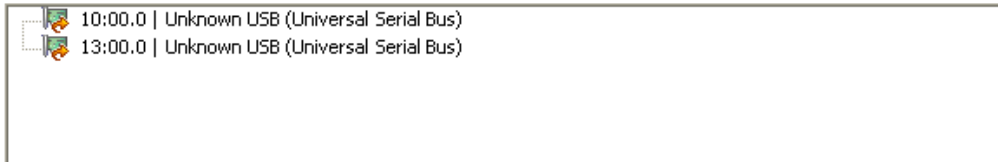
#### DirectPath I/O Configuration

 Warning: Configuring host hardware without special virtualization features for virtual machine passthrough will make it unavailable for use except via dedicating it to a single virtual machine. In particular, configuring a device needed for normal host boot or operation can make normal host boot impossible and may require significant effort to undo. See the online help for more information.

Each listed device is available for direct access by the virtual machines on this host.


 Changes made to some of the devices below will not take effect until the host is restarted.

[Hide Details](#) [Refresh](#) [Edit...](#)



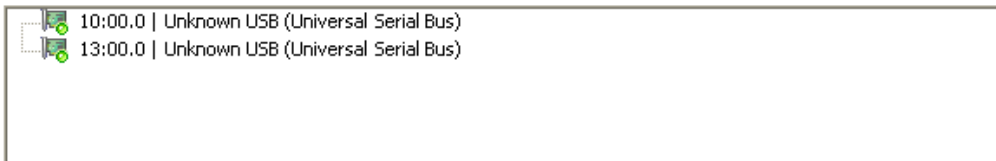
5. You should after the reboot see two 'green' unknown devices 😊

#### DirectPath I/O Configuration

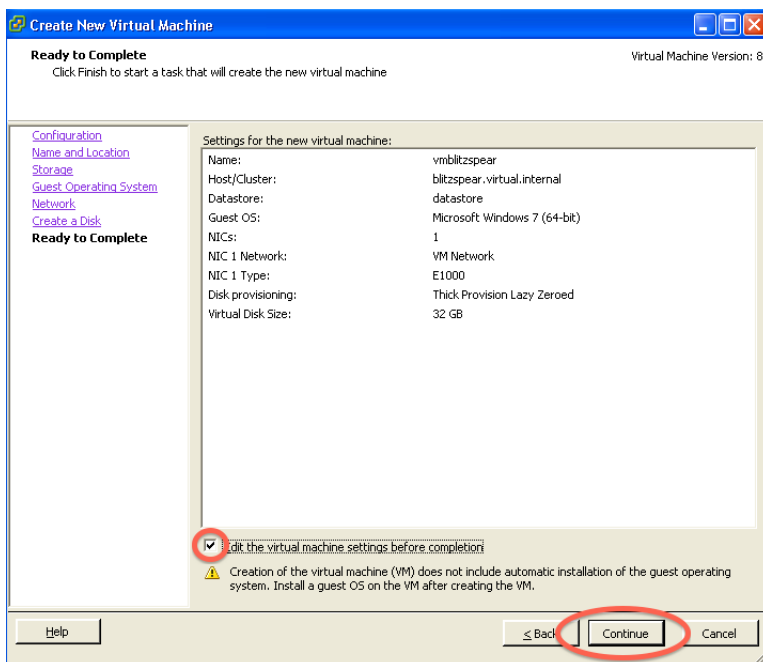
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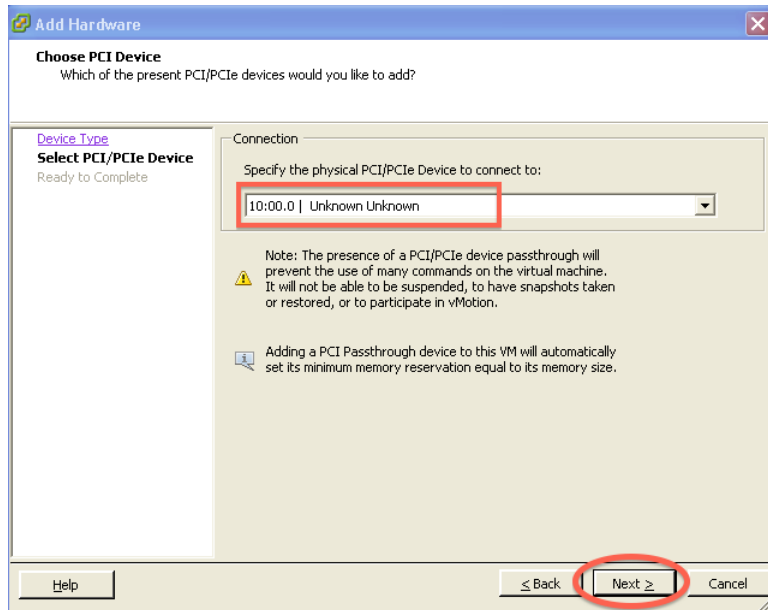
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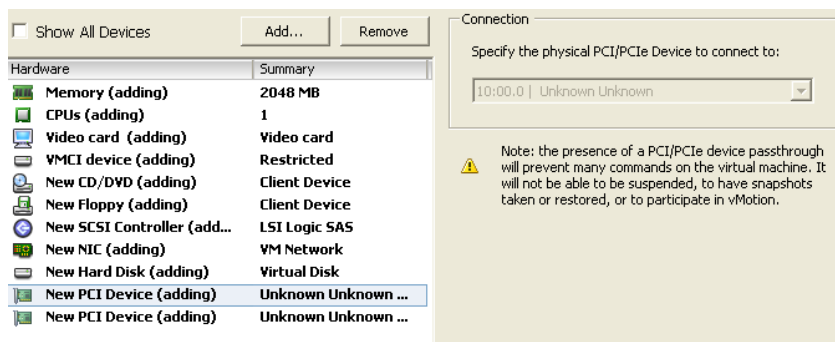
6. Create a new virtual machine and before finishing the creation wizard tick 'Edit the virtual machine settings before completion' and click 'Continue'



7. Add new hardware and select '**PCI Device**' and select one of the '**Unknown Unknown**' devices and click '**Next >**', then repeat the process for the other one



8. You should now have a virtual machine with two new PCI Devices. Continue the installation, start the virtual machine and install Windows 7 x64



Once you have a fully installed Windows 7 machine, log in and follow steps 2, 3, 4, 5, 6 and 7 from the Windows 2008 R2 installation section and you should end up with 2 x dual bay devices showing 4 x 3TB drives connected to your virtual machine

Congratulations you now have a virtual machine passed through hardware USB 3 device !