

PCI 2.3 - Are you ready for it?

A review of the changes to the conventional PCI interface and the effects on the IT industry.

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1. Background

The PCI interface has for many years provided a consistent and reliable form of PC expansion and is the ubiquitous card slot interface.

The conventional PCI 5 volt interface is now proving slow for some applications and hence a faster 66Mhz option was introduced in the PCI 2.2 specification. This 66Mhz 3.3 volt option has not yet been widely used and hence the higher speed slots are generally not available in PC's, workstations or the lower end servers.

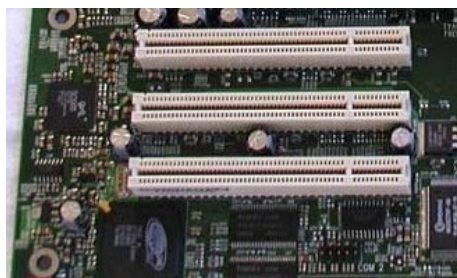
In mid 2002, PCI 2.3 was published and stated that only universal (3.3v or 5v) or 3.3v only card designs were to be used. This removal of the 5v card was to ensure the move to the single design faster card slot. This 3.3v interface will allow these new cards to fit in any motherboard slot from the slowest and provides compatibility with ultra high-speed designs using PCI-X 2.0. The fast PCI-X I/Fs, currently used in servers, are capable of achieving data rates of over 4Gigabytes/sec twice as fast as a 10G Ethernet, 32 times faster than the conventional 5v PCI.

This report investigates the problems associated with this change and the level to which the industry is aware of the potential for problems when specifying new builds and maintaining older installations. The report also provides guidance as to the way to avoid the pitfalls.

2. The PCI issue

PCI slots

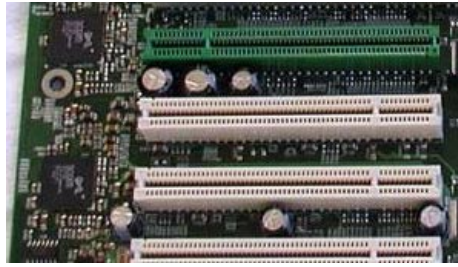
The traditional 5v PCI (33Mhz 32bit) is now used in all expandable PCs, Macs and low-end servers, it is relied upon for the addition of many interfaces and applications. We all recognise the familiar white slot on the motherboard and the connector with the notch at the inner end.



PCI 2.1 5v 33Mhz 32 bit slot

The PCI 2.2 specification provided for the lower voltage (3.3v) data bus, as this will allow the faster speeds required for high data rate applications and compatibility with PCI-X. The newer high performance technologies cannot support 5 volt signalling. As a result, the host bridge needs to migrate to 3.3 volt signalling for speeds over 33Mhz. To allow for this the option of a 3.3v slot was introduced and sensibly this had a different connector to avoid the use of the 5v card in the slot. This slot has the notch towards the

back, nearer the bracket, and is often coloured green. Few systems with this slot are yet produced.



PCI 2.2 3.3v 33/66Mhz 32 bit slot (green)

The cards

Clearly to avoid the complete chaos that a step change in PCI interface would have caused an interim was introduced, the universal card connector. Cleverly this card connector has a notch at both ends and has the ability to work with both the 3.3v and 5v slots. A growing number of universal cards are becoming available particularly for faster applications.



Typical universal card

Faster wider slots

In addition to the 32 bit versions of 5v 33Mhz and 3.3v 33/66Mhz conventional PCI, discussed above, there are the 64 bit wide versions doubling the data rate again. These longer slots take the 32 or 64 bit cards.



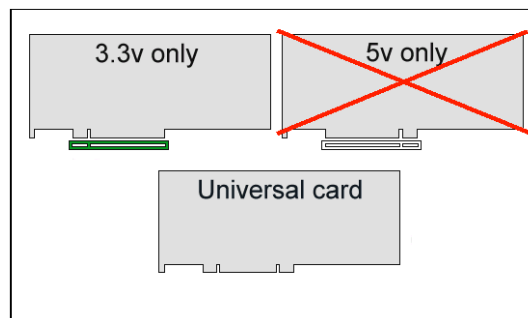
PCI slots 64 bit 5v 33Mhz and 3.3v 66Mhz
(Example from Tyan Thunder motherboard)

For a range of even faster slots PCI-X provides 64 bit data with speeds from 66Mhz up to 533Mhz and allows for the backwards compatibility of the 3.3v cards of all speeds (one pin on the card being used to indicate whether it is a PCI or PCI-X card).

3. So where is the problem?

There are two key problem areas:

1. When purchasing a new PC, Mac, motherboard or server and the manufacturer has moved to PCI 2.3 then you must have Universal or 3.3v cards. This is easy for common cards but much more difficult for the more unusual ones. Legacy interface cards may be available as universal or 3.3v but not always supplied, suppliers of the new cards may be hard to find, see the 'how can you avoid the pitfalls' section.
2. When upgrading an existing installation it is sometimes important to transfer the legacy interfaces. This means installing the previous PCI cards in the new machine. If some or all of the slots have been changed to the new PCI 2.3 version (often green) then the cards will not fit. Replacements will be needed and job costs plus timescales are increased.



PCI 2.3 compatibility

4. Industry awareness

This ought to have been a well publicised change, as it will affect almost everyone who installs computers or maintains current systems. I have researched the issue with installers and maintenance groups and find no evidence of any publicity or newsletters that have warned about the issue. In the research we found less than 30% of IT service companies were aware, and some manufacturers do not make it clear which sockets you will get in the PC when it arrives.

The manufacturers could help by at least warning the customer that the product has the new 3.3v slot, but despite repeated questions HP/Compaq, IBM and Dell helpdesks could not tell me which machines are affected or when they will change over. It is clear though, that some machines are being delivered with the new slots. Card suppliers report that they are receiving requests for 3.3v cards from customers who have found the new slots in Compaq and Dell machines, but they have discovered the hard way by noticing their old cards do not fit.

Imagine the end customer reaction when the project is delayed due to the cards not fitting!

5. How can you avoid the pitfalls

Firstly, it must be said that if you are building machines with added cards for say Raid or Firewire, many, but not all of the cards, are universal and so fit the 3.3v slot.

If however you are **fitting older cards or new cards for legacy interfaces**, then you are more likely to come across the problems, especially if the workstation or low-end server is of major manufacturer origin. If you have to fit the old cards from a previous installation then the only recommendation we can make is to request a system with all PCI 2.1 5v slots, (usually white) and install in this machine. Many custom build machines are currently using the older specification slots. **If you require legacy interface cards then select a supplier who can provide the universal fit cards** and these will be acceptable in all machines.

The **Managing Director of Roalan Ltd, Roger Swabe**, commented 'For sometime we have been aware of the problem and wherever possible we stock the universal cards, even for the legacy interfaces. We ask the customer if they believe they need them. This will ensure our customers have faster repair times and lower cost upgrades'.

So the recommendation is fore warned is fore armed, always obtain universal cards if possible and beware of the new deliveries of systems, check for the new slot.

6. Manufacturer feedback

In an attempt to gain an understanding of the plans the major manufacturers may have for use of the 3.3v interface, I contacted their helpdesks and sales by both emails and telephone but at the time of writing I have no clear feedback.

I have research the manufacturers web sites and find that if you can get to the tech specs or quick specs then they sometimes mention the use of 33 or 66Mhz. In many cases we are left to assume that 33Mhz is 5v, however it could be 3.3v slot, this critical issue is not always mentioned.

7. Conclusion

The new cards will mean future compatibility with a single slot design in the long term, capable of immense speeds. In the interim beware of the problems and buy wisely.

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References

PCI special interest group – PCI 2.3 update
PCI special interest group – PCI-X 2.0 White paper

Thanks

Thanks to all the companies I contacted to research the market awareness and for their willing contributions.

Special request

To help others please keep us informed. If you find that a machine which previously used conventional 5v PCI but has now moved to a 3.3v slot then please keep us informed via the bulletin board giving machine type and model and the number of 5v or 3.3v slots available.

Bulletin board is at <http://www.roalan.com/cgi-bin/ib3/ikonboard.cgi>

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