Link

Lava I/O News

What's Coming Down the PCI Pipe: *PCI-X*

PCI has been around for a while, and virtually every motherboard has a PCI slot. But, as readers of the January issue of Link will recall, PCI slots can come in more than one flavor. The conventional PCI slot, and still by far the most common, is the 5.0 volt 32-bit slot found on most PC motherboards. On the other hand, the PCI specification has always included a growth path, with options for both a wider bus and lower signaling voltages. As early as PCI 2.0, the PCI bus specification allowed for a second PCI signaling voltage of 3.3 volts, and a second bus width of 64 bits. These design capabilities, while long available in the specification, were not generally used and for the most part systems developers paid them no heed. More recently however, the forward-looking aspects of the PCI specification have become needed, and newer and higher-end systems are now implementing these more powerful PCI slot/interface designs.

At the same time, older designs are disappearing from the PCI specification, which is moving towards eliminating 5.0 volt PCI signaling altogether. Conventional PCI -- PCI 2.3 at this point -- supports 5.0 volt and 3.3 volt motherboard connectors for adapter cards, and 3.3 volt and universal (3.3 and 5.0 volt) adapter cards. The next version of conventional PCI will remove support for 5.0 volt motherboard connectors, making conventional PCI a 3.3 volt-only technology.

As this happens, newer forms of the PCI specification, such as the Low-Profile PCI, Mini-PCI, and PCI-X are being introduced with support for 3.3 volt signaling, but with no provision for 5.0 volt slots or cards at all.

PCI-X is all about speed

PCI-X, now in version 2.0, is the PCI specification that will most greatly affect resellers and distributors of PCs and PC interface boards. It is the bus specification whose slots are now appearing on the motherboards of servers and high-end PCs. PCI-X makes a number of technical advances over conventional (or maybe we'll one day call it "legacy") PCI. The most significant of these advances contribute to speed. As new high-speed technologies drive the need for greater bus speed, PCI-X becomes more and more important. A single Gigabit Ethernet port on a conventional 5.0 volt 32 bit PCI adapter card already uses all of that slot's bandwidth. Faster technologies such as U160 and U320 SCSI, Fibre Channel, Gigabit Ethernet, and Infiniband™ will only point out conventional PCI as a bottleneck.

The various speeds of PCI-X are designated by numbers in ascending order of speed. PCI-X 1.0 defined the slower versions of PCI-X: PCI-X 66, PCI-X 100, and PCI-X 133. These address the need for increased PCI bus speed by using a signaling voltage of 3.3 volts. PCI-X 2.0 implements the PCI-X 66 and PCI-X 133 speed grades, and adds the higher-speed versions of PCI-X, -- PCI-X 266 and PCI-X 533 -- which use 1.5 volt signaling. The connection between signaling voltage and bus speed is simple: in a nutshell, the lower the signaling voltage, the higher the theoretical bus speed. A signaling voltage of 5.0 volts will allow a PCI slot to operate at up to 33 MHz. Any faster form of PCI is operating at 3.3 volt signaling, or lower.
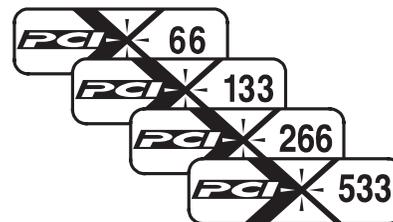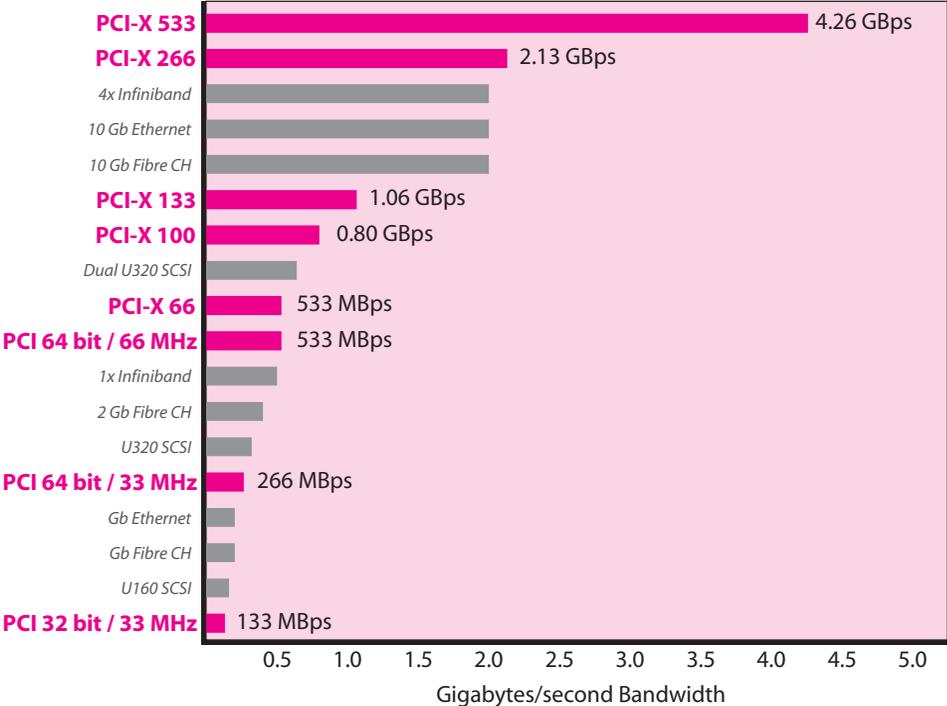
PCI keeps getting faster.

A look at the speeds supported by various versions of PCI makes this clear. A conventional 32-bit PCI slot operating at 33 MHz has a capacity of 133 MBps (megabytes per second). A conventional 64-bit PCI slot operating at 33 MHz has a capacity of 266 MBps. Finally, a conventional 64-bit PCI slot operating at 66 MHz has a capacity of 533 MBps. After this, we are in the PCI-X realm.

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Like a conventional PCI 64-bit slot operating at 66 MHZ, a PCI-X 64-bit slot operating at 66 MHz (called PCI-X 66) has a theoretical capacity of 533 MBps. In fact, however, the PCI-X bus slot will be faster than the conventional PCI slot by between 10 and 30 percent. This added speed results from design improvements that reduce the number of clock cycles devoted to PCI wait states, that improve error checking, and so on. Moving along further, PCI-X 100, PCI-X 133, PCI-X 266, and PCI-X 533 have capacities of 0.80, 1.06, 2.13, and 4.26 GBps (Gigabytes per second) respectively! These are the bus technologies that will be needed to support quad-port Gigabit Ethernet adapters, 10 Gigabit Ethernet interfaces, and the like as they come along. PCI-X 533 is 32 times faster than the original PCI introduced nine years ago. What's next? PCI-X 1066 is in development, and PCI-X 2133 is under consideration.

PXI-X is flexible, also. Hardware engineers can allocate PCI-X bandwidth in various ways: for example, a PCI-X 133 bus segment can have one 133 MHz slot, or two 100 MHz slots, or four 66 MHz slots. Looking at motherboard specifications becomes important to understanding what the PCI slots actually represent. Consideration should be given to how those connectors are used, as well. Like when mixing devices of differing speeds on the same bus on SCSI or USB buses, mixing PCI and PCI-X devices on the same bus will cause the bus and all devices on the bus to operate at the slowest device's speed.

PCI: Capacity for Big Bandwidth Demands

|	Gigabytes/second Bandwidth
PCI-X 533	4.26 GBps
PCI-X 266	2.13 GBps
4x Infiniband	
10 Gb Ethernet	
10 Gb Fibre CH	
PCI-X 133	1.06 GBps
PCI-X 100	0.80 GBps
Dual U320 SCSI	
PCI-X 66	533 MBps
PCI 64 bit / 66 MHz	533 MBps
1x Infiniband	
2 Gb Fibre CH	
U320 SCSI	
PCI 64 bit / 33 MHz	266 MBps
Gb Ethernet	
Gb Fibre CH	
U160 SCSI	
PCI 32 bit / 33 MHz	133 MBps

One of the major strengths of PCI-X is backward compatibility with earlier versions of PCI: the operating systems, connectors, form factors, protocols, and other elements of earlier PCI are all brought forward with minimal changes into PCI-X. Similarly, all speed generations of PCI interoperate, given a common voltage. This makes it possible for Lava and others to quickly move to PCI-X compatibility. The Lava Parallel-PCI, DSerial-PCI, and Quattro-PCI are already PXI-X ready, with more Lava boards soon to follow.
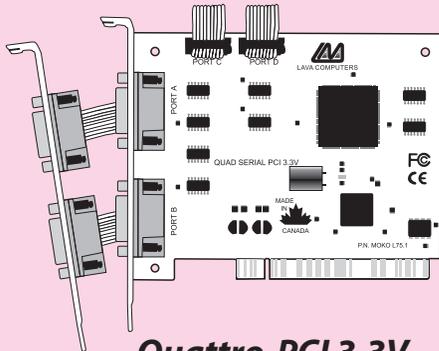
Lava 3.3V PCI Boards
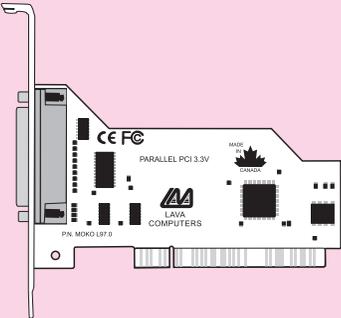
Parallel-PCI 3.3V
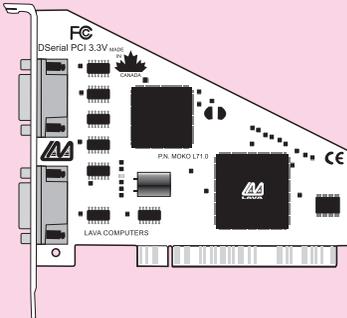
DSerial-PCI 3.3V

Quattro-PCI 3.3V

PCI Logo Spotting Guide

This logo is for use with products built to the PCI v. 2.2 and earlier specification. An earlier version of this logo had the words "LOCAL BUS" where this logo has "CONVENTIONAL."

This logo is for use with products built to the Conventional PCI v. 2.3 specification and higher. It is not for use with other types of PCI.

This logo is exclusively for use with products built to the PCI-X specification. Variants of this logo indicate the particular speed grade of the product, as shown on page 1.

Products built to the PCI Express specification use this logo. Designed for even greater internal system bandwidth than existing PCI, PCI-Express and its products are not yet on the market.

This logo is for use with products built to the Mini PCI specification. Mini PCI is like Conventional PCI, in a smaller form factor, and without the 64-bit extension.

This logo is exclusively for use with products built to the PCI HotPlug.

THE OPPORTUNITY OF CUSTOMER COMPLAINTS

As sales professionals, we all run into situations from time to time when our customer is unhappy (due to late delivery, product malfunction, unpleasantness with the credit department, etc.) It is all too easy as front-line workers for us to go on the defensive. This defensive instinct is precisely what will get us into trouble. By getting defensive, pointing fingers, and generally attempting to deflect blame, we can cause the situation to escalate.

Dealing with customer complaints is a basic selling skill. Resolving the immediate problem and taking the time to understand your customer's problems impact their business is essential.

Six basic steps can turn a customer complaint into an selling opportunity:

1. Listen to your customer. I mean it! Shut your gob and let the customer do the talking. Many customers with a complaint need to vent. While you're at it, stop doing everything else you might be doing (doodling, flipping through a database, etc.) and give your customer your undivided attention. Your customer might need prompting to get more information, so ask confirming questions in the present tense.

2. Repeat key points. Your customer may or may not have a valid complaint. Similarly, their complaint may or may not be easily resolvable. That is not the point. The point is that they have a complaint. They need to know that somebody is listening. Your job is to show them that you are listening by repeating back the key factors of their complaint, in a non-confrontational manner.

3. Show empathy. Whether or not your customer's complaint is truly valid in your eyes doesn't matter. If you've ever bought a product or service that failed to live up to your expectations, you know exactly how your customer feels. Show it.

4. Say "Thank-you." Believe it or not, your customer has done you a huge favour by bringing their problem to your attention. Chances are, you have other customers who don't bother to give you the opportunity to resolve it, they just stop buying. Tell your customer that you appreciate them bringing their concern to your attention.

5. Brainstorm. Ask the customer what their ideal solution would be. Don't be afraid to negotiate. Sometimes, their ideal solution is outside the realm of possibility. By brainstorming, the two of you can come up with an action plan that everyone can live with.

6. Action. You must put the action plan into effect immediately. The customer must perceive that you will resolve his complaint before it becomes a major problem.

7. Follow up. Once the action plan has been initiated, you must give them a quick call just to make sure that everything is A-OK.

Good Luck & Good Selling!
– Lava Sales