

The Bytes of Las Vegas

Las Vegas PC Users Group

February 2008

What is PCI Express?

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Let's start this off with an explanation of PCI (Peripheral Component Interconnect). These are the slots in the motherboard of your computer used for connecting peripheral devices directly to computer bus. Now you're asking what is the computer bus? Essentially, the bus is the electrical means for a peripheral device to connect to the computers chipset. The chipset is the interconnection between the peripherals, the main processor and system memory. (Got all that?)

The original PCI bus released in 1992 had a maximum communication rate of 33 MHz. This allows data transmission at a maximum rate of 133 megabytes per second (MB/ sec.). The bus is used by such things as the sound system, video card, network adapters, parallel and serial ports.

In the PCI system all data are transmitted in parallel. In parallel transmission many "wires" or connections are required for each PCI slot or integrated device. For example, if you have a 32 bit data transmission path from the PCI slot to the chipset, this requires 32 connecting wires just for data. Additional wires are required for control signals. With six PCI slots you can have more than 1,000 wires required for the connections. Each wire should be exactly the same length so that all the data arrive simultaneously. However, in a computer it is impossible for each wire to be exactly the same length. So as the speed of devices increased, data started arriving out of order. Therefore, the receiver had to delay until all the data were available before it could be processed. Another aspect of PCI is that all the devices share the bus at the same time so the actual data rate per device will be significantly less than the maximum rate. It's like having a speed limit of 65 miles per hour on a multi-lane highway. When all the traffic lanes are full, everything slows down. Think Chicago or Atlanta in rush hour!

Shortly after PCI was introduced, the arrival of 3-D video cards made PCI obsolete for graphics purposes. That resulted in the development of the AGP slot in the motherboard for AGP video cards. AGP uses a separate bus and this freed up bandwidth on the PCI bus for other peripherals. The AGP-8X system can transmit data at the rate of 2.134 gigabytes per second (GB/sec.). In spite of the removal of the data intensive video card transmissions, the number of high-speed peripherals being added to computers quickly saturated the PCI bus and it remained a data transport bottleneck. Additional problems arise as communication can only be made in one direction at a time. Today, many communications networks utilize bidirectional traffic.

In 2004 the PCI Express (PCIe) bus started showing up on computer motherboards. This is quite different from the original PCI bus and in the strictest definition is not a true bus. It is described as a high performance, scalable, point to point serial bus. Now, that statement requires some further explanation as I'm sure it is not immediately clear to all of you. It certainly wasn't to me the first time I read it.

First, consider the "serial" relationship. In a serial device the data is transmitted in a single stream rather than in several parallel streams. This is like reducing a multi-lane highway to one lane in each direction. That should slow things down instead of speeding it up! But in PCIe the clue is that you now have a point to point relationship. That means the device is connected directly to the chipset and does not have to share bandwidth with other devices. It is like having a high speed commuter corridor that bypasses all the slow traffic on the rest of the multi-lane highway. You may have multiple PCIe connections to the chipset. To prevent problems the connections occur through a system similar to a router. This router passes the data packets from each device in an ordered manner with a minimum of delay and contributes to the speed and accuracy of the transmission. Because this is a point to point connection with each device having its own pathway, this is not a bus under the strict definition of a computer bus. It is also important to note that PCIe transmission occurs in data packets.

The connections are in dual pairs so there is a possibility of a simultaneous bidirectional transmission. One pair is used for transmission and the other for receiving. As mentioned above, data is transmitted in packets, rather than in a continuous stream. Each packet contains an identifier so the data can be reassembled at the receiving end. This allows the receiver to work with multiple inputs. The data is encoded in what is called 8b/10b. This means that eight data bits are packaged with two information bits in a ten-bit package. (See how much simpler it is to call this 8b/10b?) Also consider that this is the method used for data and voice transmission on the Internet. Hard drives have moved to an SATA interface that is a serial connection instead of the parallel IDE connection. Gigabit ethernet cards are also designed with a serial connection. More devices are moving to serial connectivity to gain additional speed and reliability.

The scalable part of the PCIe bus is in its ability to work with more than one pair of connections. These are called x1 (or times 1), x4, x8 or x16. The x1 version (two data pairs) can transmit the encoded data at a bidirectional rate of 500 MB/s or 250 MB/s in each direction. The x16 version (32 data pairs) can transmit at a rate of 8 GB/s. This is the combined bidirectional rate. The rate in one direction is half this figure. There is a second version of PCIe in the works, PCIe 2.0. This is expected to double the current transmission speeds and provide other benefits.

PCIe slots in the motherboard come in various sizes depending on the number of lanes they use for connection. These vary from the smallest connector for the x1 version to the largest for x16. It is the 16x version that is currently found on new motherboards which supports the latest graphics (video) cards. Unlike the AGP slots, the x16 slot can be used for peripherals other than the video card.

Another interesting aspect of PCIe is one means by which it achieves its high data rates. It is called “low-voltage differential signaling”. Another phrase that I had better explain a little more. As I mentioned earlier, connections occur in a pair of “lanes” in each direction. One of the lanes carries a “positive” image of the data and the other carries a “negative” or “inverted” image. The transmission of the data follows strict rules such that any noise that occurs will affect both lines. When the data is reassembled at the destination, the receiver collects both signals, inverts the negative back to positive and sums both signals. This effectively removes the noise from the signal.

PCIe is also backward compatible with PCI devices and software that uses PCI devices. The configuration space and programmability of PCI Express devices are unchanged from traditional PCI. In fact, all operating systems can boot without modification on a PCI Express architecture. Programs originally written for PCI devices can run unchanged on PCI Express devices because the PCIe layer is transparent to the application software. This provides benefits to users who don't have to upgrade software applications to work with newer hardware.

PCIe has another characteristic that greatly improves on PCI. It has an active power management (APM) system. When a PCIe link is not in use it does require that the link remain active so that the transmitter and receiver remain synchronized. It is the role of the APM to reduce the power level whenever the link is inactive. The catch is that when data needs to be transmitted there is a recovery time to allow full activation of the transmitter/receiver. The longer the recovery time, the lower the power usage. Overall, the systems are designed for the lowest power usage with the shortest recovery time.

There is a gradual transition from the motherboard with combined PCIe/PCI slots to those that will have only PCIe slots as more PCIe plug-in cards become available. This will also affect the size of the motherboard and the ultimate size of the computer.

The specification for the PCIe mini-card allows for a card half the size of a standard PCI mini-card. Most of these mini-cards may be destined for laptop computers. However, some desktop designs that take advantage of all PCIe input are far smaller than the standard desktop computer. Some of the new small box computers utilize these smaller motherboards.

So when you get your next computer you should now have a better understanding of the role of the PCIe slots it contains. Dr. Lewis is a former university & medical school professor. He has been working with personal computers for more than thirty years. _

Product Review

Random House Webster's Unabridged Dictionary - WordGenius

by Don Sabatine, LVPCUG

This product is a software program designed to give you access to Webster's Unabridged Dictionary from any screen you are viewing. When you are working with a word processor, you can highlight a word and drag it to the program icon. The icon is a small square with the words Random House Webster's Unabridged Dictionary inside the square. This icon, called the WordGenius Drag-on icon, is present on the desktop and all programs you use on your computer. It can be positioned to be on any part of the screen with the pointer so that none of your view is blocked permanently. When you are on an Internet site, you might not be able to drag and drop a word onto the icon, but you can left click once to open a window where you can enter the word or words of interest.

When you want to look up a phrase such as “vice verse”, do not use a hyphen or anything else except a space between the words (in contrast to what you might see somewhere else). Phonetic pronunciations of words are spoken and spelt out using common words with the WordGenius ‘mouse over’ pronunciation assistant.

The WordGenius icon can be replaced with your favorite picture or graphic. You can also search for words you cannot spell by using question marks for letters you cannot remember.

Product Rating (scale 1 to 100 - 100 is best)

Presentation 100 | Features 100 | Controls 100 | Ease of Use 100 | Durability 100 | Overall 100 |

Special Interest Groups (SIGs)

Digital Imaging Techniques

Leader: Howard Mark hmark@embarqmail.com 256-3662

2nd Sunday 12 Noon at Nevada Power–Wengert Rm, 6226 W Sahara Ave (near Jones Blvd)

If you take photographs using a film or digital camera, this SIG will look for ways to use software such as Adobe Photoshop, Adobe Elements, and others, to learn how to scan, edit, correct or otherwise manipulate images. You are welcome to bring your image(s) to the sessions. Just copy it to a floppy disk or CD and bring it to a session for discussion.

Genealogy

Co-leaders: Val Sharp vdsrrs@juno.com 453-4037

2nd Saturday 9:30AM

Ms S J "Sam" Espino-Giordano samespin1@cox.net 914-4408

at Family History Center, 9th & 10th St. and Clark

This SIG covers searching the internet for family members, overcoming brick walls, genealogy publications, and genealogy software evaluation.

How-To-Workshop

Leader: Dennis Kemper denman3@cox.net 458-0654

4th Saturday 9:30AM at Paseo Verde Library (Near I-215 and Green Valley Pkwy, 280 S. Green Valley Pkwy

Hands-on computer workshop. This SIG covers a variety of software programs and hardware questions. You are encouraged to bring your computer, or at least a disk with the problem or demo to share. If you have a specific program or problem, please call in advance to make sure we will have someone available to assist you with your particular problem.

Internet

Leader: Ceazar Dennis ceazar@viawestdu.net 283-8029

3rd Monday 7PM at Nevada Power-Wengert Rm, 6226 W Sahara Ave (near Jones Blvd)

Covers the Internet: how to access the service, Internet access providers, hooking up, surfing the Internet, how to find information, the use of Internet utilities to find information, and software packages supporting the Internet. Discussions include commercial communications services such as Prodigy, America Online (AOL), and CompuServe - what they are and how they are accessed and used.

Linux/Open Source

Leader: Joseph Mottola mottola_j@yahoo.com 412-5399

3rd Sunday 1PM at Nevada Power-Wengert Room, 6226 W Sahara Ave, (near Jones Blvd)

A free operating system that is an alternative to Microsoft Windows. The many flavors of this operating system and applications will be covered and explored.

Novice (New Users)

Leader: Charles Frederick novicesiglv@yahoo.com 452-9440

3rd Sunday 4PM at Nevada Power-Wengert Room, 6226 W Sahara Ave, (near Jones Blvd)

Topics of interest to the beginning computer user, explained in simple easy-to-understand terms. Each session is complete and beginners are welcome to start coming to the meetings at any time.

Systems Applications Review

Ldr: Linda DiGiovanni systemapplicationreview@yahoo.com 395-6676

1st Saturday 11AM and 2nd Saturday 3:30PM at Nevada Power-Wengert Room, 6226 W Sahara Ave

A meeting focusing on the windows environment. Members helping members in the exchange and sharing of knowledge and information.

Using Office Suites

Leader: Wendy Jaroslowski wjjaros@cox.net 339-3812

2nd Saturday 1PM at Nevada Power-Wengert Room, 6226 W Sahara Ave, (near Jones Blvd)

Office SIG centers around discussion of Office, Excel, Power Point, Outlook Express, and Publisher. This is an open forum, so if you run across a problem that you need help with, bring in a CD or diskette, and the entire group will assist in finding a solution to the problem. Each meeting will center around a

specific feature of a particular program of the Office Suite. Any related programs or add-ins will also be explored. Tools and texts that are available will also be introduced.

Windows Developers

Leader: Richard Rosenheim windev@lvpcug.org 897-1117

2nd Thursday 6:30PM at Sahara West Library, 9600 West Sahara Ave (near Fort Apache)

The Windows Developers SIG is a forum for those who develop programs and applications targeted to run in a Windows environment (desktop and/or PocketPC). The SIG addresses topics relating to Windows development issues and languages. While the primary focus is on Visual Basic, attention is also given to database design and programming, web programming, and program algorithms. In addition, any other area of interest to the members (such as Windos API, Visual Basic, C++, Delphi, Java, and Active X programming, etc. can be addressed.

WI-FI

Leader: Harold Rozinski director@lvpcug.org 870-8946

4th Saturday 3PM Paseo Verde Library (Near I-215 and Green Valley Pkwy), 280 S. Green Valley Pkwy

Covers the basics, benefits and pitfalls of wireless networks and technologies for home and business, and while traveling to hotspots, plus rules, regulations, and techniques for site survey.

February 2008

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27 Jan	28	29	30	31	1 Feb	2
						Groundhog Day 10:00a -3:00p Systems / Applications Review.
3	4	5	6	7	8	9
			6:15p -8:30p General Meeting at West Charleston Library with Ryan Didur			1:00p -3:00p Office Suites Wengert Room at Nevada Power 3:30p -5:30p Systems/Applications Review Wengert Room Nevada Power
10	11	12	13	14	15	16
12:00p -2:00p Digital Imaging Techniques Wengert Room Nevada Power		Lincoln's Birthday		Valentine's Day 6:30p -8:30p Windows Developers Sahara West Library Canceled for this Month		
17	18	19	20	21	22	23
1:00p -3:00p Linux/open Source OSes Wengert Room Nevada Power 4:00p -6:00p Novice (new Users) Wengert Room Nevada Power	Presidents Day (Fed) 7:00p -9:00p Internet Sig	3:30p -5:30p Board of Directors (Contact Board Member for location)			Washington's Birthday	9:15a -2:30p HOW-To-Workshop Paseo Verde Library Henderson 2:30p -4:30p Wi-Fi Paseo Verde Library Henderson
24	25	26	27	28	29	1 Mar
						10:00a -3:00p Systems / Applications Review.

LAS VEGAS PC USERS GROUP

Membership Application

(PLEASE PRINT)

Date _____ Renewal?

New? Been a Member Before?

Name _____

Address _____

City _____ State _____ ZIP _____

Preferred Phone _____ Alternate Phone _____ Fax _____

Email _____

It is LVPCUG policy to keep your information confidential. However, for contact regarding Special Interest Groups and meetings, can we release your information to other members?

Primary Phone Number? Yes No

Alternate Phone Number? Yes No

Email Address? Yes No

Bring this form to our General Meeting, or send along with your check for \$30 to:

LVPCUG
Membership Chairperson
1350 E. Flamingo Road #188
Las Vegas, NV 89119



General Meeting Location

