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## PCI Express - What is it? Why does it matter?

Your PC is required to do much, much more than it had to do ten years ago. Now, your PC is a digital photo studio, video/movie editing and creation station, video player, TV, personal video recorder, audio mixing and conversion studio and home stereo - as well as your more traditional accounting, word processing, graphics editing system and Internet access device. In fact, the PC is rapidly transforming into the multimedia centerpiece of your home and home business.

But, these new demands are currently being met by systems architectures - PCI and AGP that weren't designed for today's growing multimedia demands. That's where PCI Express comes in, a new architecture designed from the "get go" for high speed, cost-effective system communications that will enable your PC to meet the ever increasing demands of multimedia applications.

But, before we delve into PCI Express, let's do a quick review of existing today's system architectures:

- *PCI* - PCI in brief, is the architecture for interconnecting your system processor and attached devices (like a sound card). It transmits 32 bits at a time over a 124 pin connection or 64 on an expanded 188 pin connection and comes in 2 form factors - a full size, 312 mm card and a short 119-167 mm implementation for "low profile" systems.
- *AGP* - AGP stands for Accelerated Graphics Port. It was developed by Intel so that graphics worked much faster and better - making newer streaming video and video games possible. AGP cards "talk" directly to your system's CPU and memory (in contrast to a PCI implementation where many devices/cards, share access to the CPU). This, along with the fact that the AGP bus is much faster as well, results in better performance and speed. There are 3 AGP specifications:
  - AGP 1.0
  - AGP 2.0 - has 3 operational modes 1x (66MHz, 266MBps), 2x (133MHz, 533MBps), 4x (266MHz 1,066MBps), 8x (2.1Gbps).
  - AGP Pro - AGP Pro has a longer slot than AGP 2.0 providing for cards with even more power and speed.

There are two problems with today's architectures:

- They are application specific (PCI, AGP, USB, etc.) which results in greater implementation complexity (and cost to the end user).

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- They have reached their limits in bandwidth/performance - however, video and other multimedia applications are significantly increasing bandwidth and performance demands!

That's where PCI Express comes in.

The PCI Express architecture works a bit like a switch-based Local Area Network. The CPU is attached via a "switch" (in contrast to a "multi-drop", shared-bandwidth like environment in the PCI world) that enables a number of connectors (cards or other devices) to interact with each other and the CPU and allows the system designer to add bandwidth to specific links where required (like a graphics controller!).

The result is a specification that includes a new connector for devices that need faster connectivity. The specification calls for 1X (2.Gbps), 4x, 8x, and 16x (4 to 5Gbps) connections. When compared with an existing AGP 8x connection (2.1Gbps), PCI Express can deliver more than double the speed at (in the near future) about the same or even less cost.

Desktop systems are already available that have implemented PCI Express from Alienware, Dell, HP, Sony and Voodoo PC (among others) and graphics cards from ATI, nVIDIA and a number of manufacturers who utilize the ATI and nVIDIA chipsets.

So, if you're thinking about a new desktop, consider spending a bit more - but purchasing a machine with not only some longevity, but one that can meet the demands of rapidly expanding multimedia applications - consider a system that has already implemented PCI Express.