

Computer Systems Group Technology Brief December 14, 2001

BEYOND PCI : PCI-X

As a leader in PCI based I/O products, QLogic was first to offer 64-bit PCI and 66MHz PCI Host Bus Adapters (HBAs) and continues leading the way with the next generation, PCI-X! It is important to understand PCI and PCI-X and how QLogic technology dominates in this area, especially as the major server companies supporting PCI-X. While early systems are available now, general launch is expected to ramp up over this next year.

WHAT IS PCI-X?

To understand PCI-X, we need to first understand a few things about PCI (Peripheral Component Interconnect).

The PCI Local Bus is a high-performance bus that provides a processor-independent data path between the CPU and high-speed peripherals. The PCI design incorporated the following attributes in its design:

- Scalability to 64-bit, 66 MHz performance and 528MB/s throughput
- PCI Hot-Plug - Enables removal or replacement of adapter cards without having to shut down the main system. Designed for high-availability servers, PCI Hot-Plug reduces costly downtime for network-dependent enterprises.
- PCI Power Management - Enables the power of PCI devices to be managed by the operating system. PCI Power Management enables energy conservation in PCs, efficient mobile computing, and higher-availability PCs for off-hours tasks such as receiving faxes or Internet transmissions.

So what is PCI-X? PCI-X is a high-performance extension to the PCI Local Bus that is designed to meet the increased I/O demands of technologies such as Fibre Channel and next generation SCSI. PCI-X capabilities include:

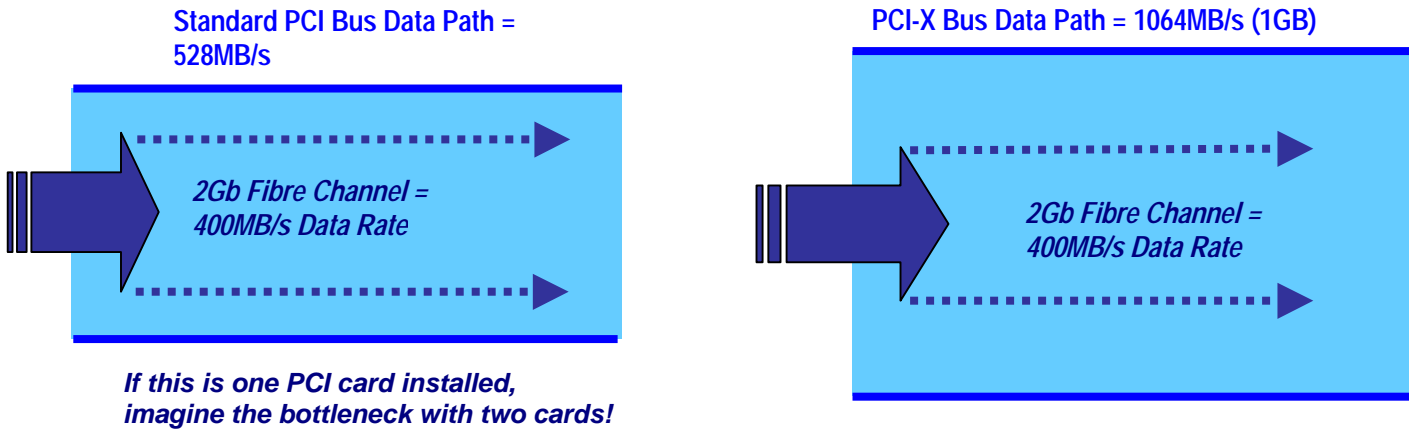
- Scalability to 133 MHz bus speed and 64-bit bandwidth, enabling up to 1 GB/sec (BYTES, not BITS!) throughput
- Backwards compatibility with standard PCI cards which can be used on the PCI-X bus and supports PCI Hot-Plug and PCI Power Management
- Requires no device driver or OS modification

WHAT ARE THE ADVANTAGES OF PCI-X

- Greater I/O performance to support next generation I/O, such as 2Gb Fibre Channel and Ultra320 SCSI
- Virtually eliminates PCI data path bottlenecks
- Increase from 2 to 4 system slots at 66MHz
- Evolutionary I/O upgrade – investment protection (Remember: No S/W modification)

WHAT PROBLEM DOES PCI-X ADDRESS?

- The Standard PCI bus begins to hit Data Path bottlenecks when Fibre Channel Data Rate increases
- With PCI-X, a wider Data Path is provided, which can handle the broader Data Rate of high-performance Fibre Channel, providing scalability.



COMPARISON CHART: SPEED AND SLOT TRADEOFF WITH PCI VERSUS PCI-X

Additional scalability and performance are key advantages of PCI-X. As you can see from the chart below, if performance is the focus, PCI-X supports up to 133MHz. In the event the requirement is the need for more slots, PCI-X can be configured to run at 66MHz which makes up to 4 PCI-X system slots available.

| BUS WIDTH | BUS FREQUENCY | PCI/PCI-X BUS BANDWIDTH | PCI SYSTEM # OF SLOTS AVAILABLE | PCI-X SYSTEM # OF SLOTS AVAILABLE |
|-----------|---------------|-------------------------|---------------------------------|-----------------------------------|
| 32-BIT | 66MHZ | 264MB/s | 4 | N/A |
| 64-BIT | 66MHZ | 528MB/s | 2 | 4 |
| 64-BIT | 100MHZ | 800MB/s | N/A | 2 |
| 64-BIT | 133MHZ | 1064MB/s | N/A | 1 |