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CompactPCI Poised To Meet High Performance Telecom Demands

PC-based applications like computer telephony integration are ideally suited to take advantage of the plug and play benefits of CompactPCI, allowing designers to use the wide range of low-cost, off-the-shelf peripherals and application software that has been developed for the desktop PC market. Moreover, new definitions to the CompactPCI specification and enhancements of complementary sub-buses, such as PMC (PCI Mezzanine Card), H.110, and ATM (asynchronous transfer mode) are playing a critical role in positioning CompactPCI as the leading bus architecture in the telecom market.

INTRODUCTION

Combining the benefits of the PCI desktop architecture with the ruggedness of the Eurocard form factor, CompactPCI continues to penetrate emerging telecom applications at a rapid rate. PC-based applications like computer telephony integration are ideally suited to take advantage of the plug and play benefits of CompactPCI, allowing designers to use the wide range of low-cost, off-the-shelf peripherals and application software that has been developed for the desktop PC market.

Moreover, new definitions to the cPCI specification and enhancements of complementary sub-buses, such as PMC (PCI Mezzanine Card), H.110, and ATM (asynchronous transfer mode) are playing a critical role in positioning CPCI as the leading bus architecture in the telecom market.

PMC ON CPCI

PMC cards continue to be employed in ever-increasing numbers as embedded designers rely more on mezzanine platforms to eliminate the need for customized hardware and reduce the number (and cost) of individual I/O boards. The technical enhancements and design flexibility PMC brings to CompactPCI is significant. First, PMC boards offer a greater range of functionality due to their modularity and ability to take advantage of the wide range of chip-level components available for the PC market. Secondly, using PMC modules instead of separate cPCI boards frees up one or more slots, providing a lower cost solution than a system slot board. Finally, as interface boards, PMC cards give system designers the flexibility to provide a number of interfaces, such as digital and serial I/O interfaces, analog-to digital, digital-to-analog, as well as optically isolated interfaces.

The open PMC standard allows equipment buyers to purchase modules with a variety of different communications interfaces, thereby changing the "personality" of a baseboard depending on what PMC modules are applied to it. For instance, application-specific functionality such as SS7 links, LAN and WAN interfaces, can be added to the "generic" base boards using PMC modules at a much lower cost than a separate cPCI board (Figure 1). Additionally, virtually all new processor board designs support PCI as the local bus, and can therefore easily support designs with PMC expansion.

Sufficient bandwidth is critical to support high-speed telephony applications such as video, Internet access and voice/fax. A derivative of the PCI standard, PMC features a 33 MHz synchronous bus with either a 32 or 64 bit data path and 64 bit data paths approaching 264 Mytes/sec. This gives telecom designers the high-speed bus access they increasingly require for connecting high-bandwidth peripherals and intelligent controllers.

The incorporation of PMC modules as part of a tightly integrated hardware/software subsystem solution is helping telecom OEMs dramatically shorten development cycles and reduce costs. For example, the Portable Protocol Engine (PPE) from Artesyn Communication Products, is a hardware/software subsystem that simplifies development of SS7 and HDLC links. The PPE combines dual PMC modules with a user API (application programming interface) and a choice of protocol options, enabling system designers to employ a single hardware/software platform for multiple network applications, minimizing integration problems, spares issues and application interface concerns. This solution significantly reduces time to market, insulates the customer from changes in hardware due to updates or changes and allows the customer to focus on the application rather than low level porting.

SECONDARY BUS SOLUTIONS

Using standard bus-based technology like CompactPCI and PMC in the design of high-speed telecom systems can bring major cost and time-to-market benefits, but it does have some limitations, particularly in real-time applications. Since PCI is a non-deterministic network, in telecommunications (particularly voice) and multimedia applications, data arriving with unpredictable timing sounds garbled or choppy. Therefore, while CompactPCI is an ideal control bus in these applications, it is less than ideal for delivery of voice data.

A key requirement in processing telephony data such as voice or video is the implementation of a secondary bus for handling the transfer of real-time data, independent from the control data being processed across the system bus. Typically, a subsystem bus like a time division multiplexing (TDM) bus is integrated into the design to handle real-time voice or signal data. While

Figure 1. Artesyn Communication Products recently introduced BajaCom. BajaCom combines an MCP750 CompactPCI baseboard with a choice of Artesyn PMC modules such as the PM/T1, PM/E1 or PM/Link to provide maximum performance and functionality in a single CompactPCI slot.

a number of proprietary methods have been used for this type of signaling on different platforms, they required the use of proprietary cards or employed competing bus architectures.

The H.110 Computer Telephony bus specification helped to further establish CompactPCI as the preeminent bus for system development in the computer telephony field. As a derivative of H.100 which defined a TDM bus in a PC environment, H.110 specifies a single backplane-based signaling specification for telephony applications, (the J4 connector is specified for routing the H.100 CT bus on the cPCI backplane; the J5 is specified for additional telephony I/O) further enhancing the open, standards-based benefits of cPCI. For example, network designers can employ the H.110 bus as a switching fabric to route calls with a base station controller, or use the bus within an STP (signal transfer point) as a switching fabric for SS7 network communications.

H.110 offers the same physical features as H.100, including 64 Kbs data rates, up to 4096 bidirectional time slots, and bit rates up to 8.192 MHz. The full 32-bit bus implementation provides 262 Mbit/sec. of total bandwidth. The primary difference is that H.110 has extensions for CompactPCI and it supports the CompactPCI Hot Swap Specification. By combining the telephony-oriented features of H.100 with the mechanical advantages of cPCI over the standard PC architecture, H.110 becomes the preferred solution for complex, easy to maintain computer telephony systems, such as voice mail and interactive automated phone attendants.

ATM - A BANDWIDTH SOLUTION

New Intelligent Network services such as "follow me" and local number portability, are driving a demand for more bandwidth, particularly on the SS7 network. One likely solution to the SS7 crunch is to increase the bandwidth of SS7 links from 64 Kbit/sec. to 1.544 Mbit/sec. (T1 lines). Most vendors implementing higher speed SS7 links are using ATM protocol at the very low-level of the protocol stack and running the SS7 over ATM over T1. Presently, the SS7 network is essentially a physically separate network from the voice network. However there is a long-term trend to use ATM over fiber or SONET as a long haul medium between telephone switches.

While much of the ATM bandwidth will be used for voice data, a portion of it will be used for signaling information. The SS7 protocol will still be used, but the physical layer will be ATM rather than a DS0. A primary benefit is that designers can designate specific channels to the signal, and the size of the channel based on the size of the message being sent. This concept, known as "bandwidth on demand," makes ATM particularly well-suited for this application.

ATM is also attractive because of its superior scalability. Users can start by implementing ATM at speeds of 25 Mbit/sec, and then increase bandwidth as needed with few changes to the application software. ATM at speeds of 155 Mbits/sec (fiber interface OC3) is available in very compact form factors, including PMC modules, and ultra-high bandwidth rates approaching 620 Mbit/sec (or OC12) will likely be available soon. In short, a high-speed cell structure network like ATM is an excellent choice due to its ability to handle real-time data transfer, designate quality of service, relative ease in which it can be made redundant, and its availability in a variety of media, including copper and fiber.

Combing CompactPCI with a more scalable and deterministic network for subsystem communications like ATM provides designers with an effective method to meet high-end bandwidth requirements. In addition, the cPCI bus and communication interfaces can be used in a complementary manner. For example, cPCI can be employed as the control bus and ATM on a PMC module can also do service as a system bus. This provides telecommunications designers the best of both worlds. By implementing a cPCI bus systems for backplane communications and a cell-based network like ATM for signaling, they can get the cost and flexibility benefits of a standard bus combined with the performance and determinism benefits of today's most advanced communications networks.

The rapidly changing face of the telecom industry and the pressing demand for new services continues to challenge technology and products as designers look to differentiate themselves for increased revenue. While cPCI may have been initially viewed simply as PCI architecture in a rugged formfactor, new technology standards, complementary sub buses and expansion networks are significantly eases the system design task, shortening design cycles, and rapidly establishing the backplane as the leading choice in telecom markets

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Todd Wynia joined Artesyn Communication Products in 1987. Throughout his tenure, he has held several positions within the marketing department, including Marketing Communications Manager, Product Manager and Strategic Marketing Manager. Wynia became Vice President of Marketing - his current position - in 1998. And aside from numerous titles, his 12 + years of industry experience has given Wynia an in-depth understanding of the technology, customer and market trends driving teledatacom applications.