



The Ongoing Revival of VME Bus Computing; Fastwel shows how to design VME, Advanced. Embedded CPU Products Incorporating Intel Pentium M CPUs and 2eSST Signaling Protocol for High Bandwidth Transfers.



According to VITA and Venture Development Corporation (www.vita.com), total sales of VME boards are estimated as \$450MM in 2008. Experts and analytical agencies give various forecasts for this market development in the next 5 years - from "flat" to 8% growth.

However, at the same time everybody is anticipating serial VME products sales growth at a rate of greater than 10% per year, whereas parallel VME bus products sales are expected to scale down.

This trend is not surprising, because all processor and chipset manufacturers are methodically migrating (or, probably, have already migrated) from parallel protocols to their serial adaptations.

This trend is well illustrated by a great number of publications dedicated to new VPX and VXS computer systems developed by many leading companies, and even to new systems based on such products. Electronic and printed media are full of "tips" and recommendations on what to select and how to build new systems using serial protocols.

However, one should not forget that the lion's share of sold VME boards belong to VME64 bus cards. Many VME64-based systems were developed quite a long time ago and reliably perform their tasks, however have to be redesigned due to various issues. Among them: phase out of CPUs; gradual system expansion with necessity to add extra peripheral boards, and,

therefore, need to solve bandwidth issues; necessity to add functionality; incompatibility with renewed system communication components and other issues.

To develop entirely new system based on VPX or VXS is not always technically and economically justified. What should developers do in these circumstances?

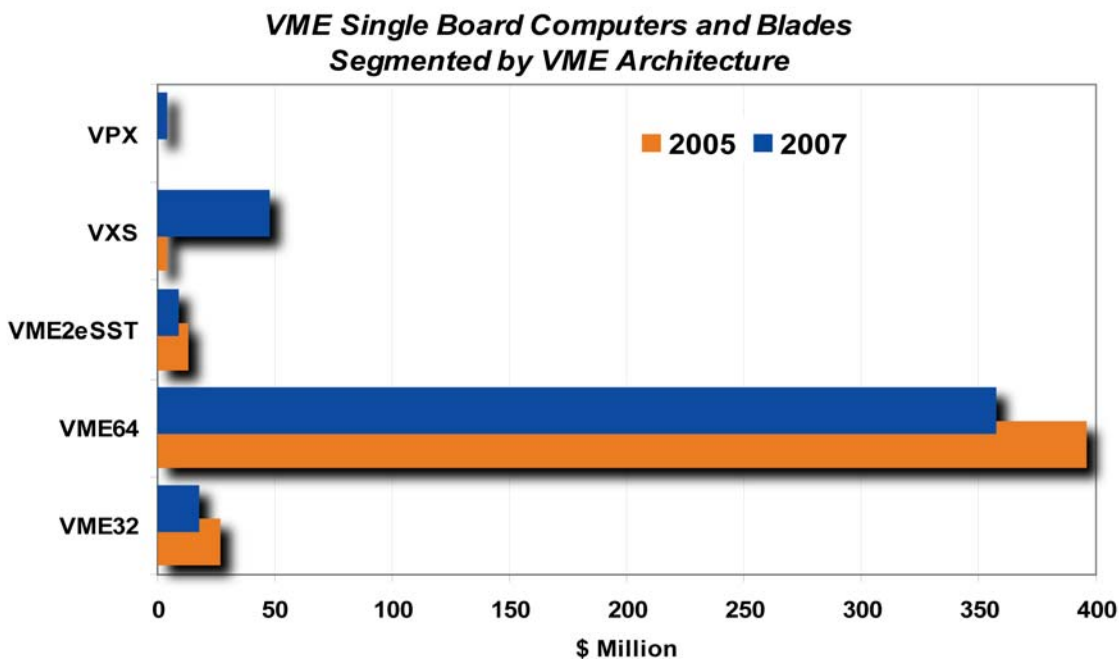
The answer seems to be obvious – they should select a board built on modern CPUs from long-term availability programs with sufficient communication capabilities to replace outdated product. There are many of such boards on the market both with Pentium M and PowerPC processors, but nearly all of them have a 64-bit VME bus (VME64x) with bandwidth ability being a bottleneck of the whole system.

In 2002 at the Bus & Boards conference, Motorola (MCG) predicted parallel VME bus market renaissance resulting from deployment of new technology giving bus data throughput rate of 320 MB/s. This technology was developed by VITA as long ago as in 1997 and is called Double-Edged Source Synchronous Transfer (2eSST). In addition to high transmission capacity, this technology is backward compatible with VME64 and VME64x protocols, thus giving an opportunity for system upgrade without a significant redesign.

Optimism of Motorola was caused by completion of development of a single chip bridge - PCI-X to VME 2eSST, which should simplify VME board design. Unfortunately, this technology was not accorded wide recognition, even after Motorola conveyed this chip to an independent company, Tundra Semiconductor, where it was called Tsi148.

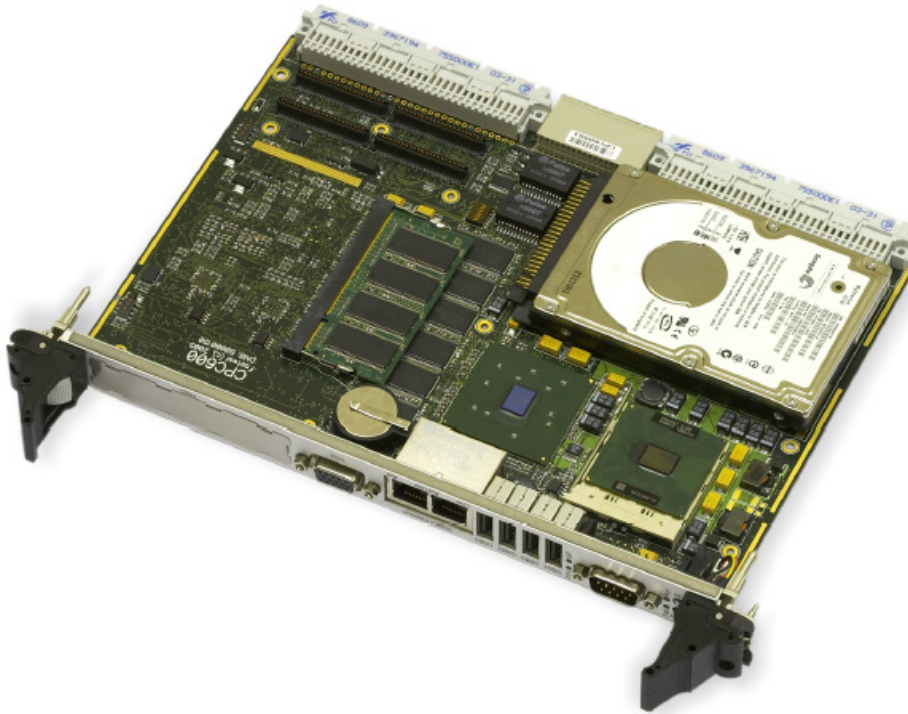
There are several reasons why it has happened; perhaps one of them is that until recently boards with 2eSST bus were based only on PowerPC processors. This limitation in available board architecture and related limitation in software components use negatively influenced popularity of this product.

PowerPC and x86 compatible processors have different data processing sequences operating in Big Endian and Little Endian modes respectively. Tsi148 was initially developed for PowerPC systems. Probably the complexity of work needed to ensure compatibility of Tsi148 with Intel processors was one of the reasons of 2eSST protocol gained little popularity within Intel based embedded computer manufacturers community.



Picture 1

However, this trendy has recently broken down with the advent of boards bearing modern Intel processors together with 2eSST support. One of the leading examples is the Fastwel CPC600; its architecture is based on the Intel Pentium M CPU from the long-term availability program in combination with 2eSST protocol support via VME bus, embedded graphics controller and conformance to VITA 31.1 standard stipulating two Gigabit Ethernet channels available via backplane.



Picture 2. CPC 600

High I/O bus bandwidth allows using CPC600 in high-performance computer systems with numerous peripherals or to replace obsolete processor boards in off-the-shelf systems in order to improve reliability and VME bus data exchange rate.

Intel's long-term availability product line includes processors from ULV Celeron M at 1 GHz with thermal budget of as low as 5.5 W allowing its use in systems with free convection cooling, and Pentium M at up to 1.8 GHz with 2 MB cache memory and 21 W TDP.

CPC600 employs DDR SDRAM memory with Error-Correction Code. This function corrects 1-bit errors in 64-bit memory blocks, thus increasing system reliability in environments with unstable power supply, static discharges, high RFI levels, and radiation interference. Maximum memory capacity is 2 GB, including up to 1GB soldered and 1GB installed into an SODIMM socket.

Fastwel CPC600 has an attractive set of communication capabilities: four independent Gigabit Ethernet channels, two of which are available at the front panel and the two which are routed to P0 backplane connector according to VITA31.1 standard. This allows using CPC600 in cluster systems with packet switching via backplane. Additionally, Fastwel CPC600 has two SATA and one EIDE interface accessible via rear I/O board for connection of external hard drives.

CPC600 uses onboard graphics controller for video signal output via two independent interfaces, VGA and LVDS. VGA interface is available through the front panel connector; supporting resolutions up to 2048x1536 at 75 Hz. LVDS signals are routed to P0 backplane connector and are available via rear I/O board.

Fastwel CPC600 has a unique data and software component storage subsystem architecture. Besides using a standard CompactFlash socket and soldered onboard 32 MB solid-state disk, the user can install two IDE 1.8" or 2.5" HDDs, either both or separately, while still being within the boundaries of one 4HP slot.

To increase applications reliability, Fastwel CPC600 is equipped with a number of hardware and software features, lowering risk of system hang-ups and providing opportunity to monitor system state remotely. Among them are power supply voltage and temperature monitoring, watchdog timer, and baseboard management controller (IPMI).

All key components of Fastwel CPC600, including CPU and memory, are soldered onboard, thus allowing the board to withstand vibration loads up to 5G and shocks up to 50G. Additionally, a conformal coating protects the board from surface short circuits caused by salt or other misting environments. .

For customers developing systems with conduction cooling Fastwel offers a cost-effective adaptation of CPC600. This 8HP modification of CPC600 – together with rear I/O board – has wide choice of interfaces at the front panel – two Gigabit Ethernet channels, two USB 2.0, two COM ports, SVGA, PS/2, and audio – along with onboard connectors for SATA, IDE, and floppy disk drives.

CPC600 supports different operating systems from real-time to Windows/Linux based ones.

Operating temperature range for industrial version of CPC600 is -40°C to +85°C, while commercial is from 0°C to +70°C.

Fastwel CPC600 provides developers with highly integrated multipurpose configurable embedded computing platform for use with application-specific boards through both VME bus and Gigabit Ethernet channels.

Versatility of design models and low re-design cost makes CPC600 a multipurpose tool in hands of VME systems developers. It helps to generate solutions for wide range of applications from data acquisition and processing systems in industrial automation, to reliable high-performance systems consisting of up to 23 CPC600 boards interconnected via three data-exchange networks.

Details-at <http://www.fastwel.com/products/356046/vme/240095.html>

Author:

Alexander Buravlev

Sales Director

Fastwel Ltd

For inquires contact business development manager

David Sanchez

DSanchez@fastwel.com

See the Fastwel CPC600 at the Embedded Systems Conference in Boston at booth 1021 in October, 2008!!