

Introduction

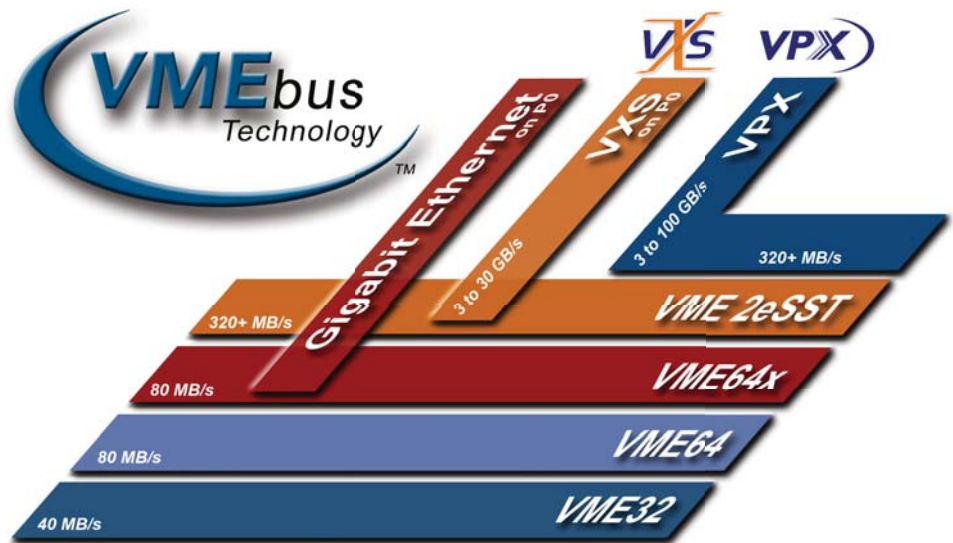
VME Technology is a favorite choice as an embedded systems architecture. Many current users have taken advantage of the long life cycle of VME products and have refreshed their product lines with the vast selection of VME products on the market. New projects are leveraging the advancements in VME technology with an eye on performance and the life cycle advantages of VME.

The VME technology family of specifications has grown significantly since its inception. VMEbus has expanded from the original family of a core VME32 parallel bus specification, a VME Subsystem Bus, and a VME serial interconnect to today's broad family of complementary state-of-the-art specifications.

The core specification has continued to evolve in performance and capability from the original 32-bit bus to a 64-bit bus and from 40MBytes/s maximum to +320MBytes/s with more bandwidth performance on the near horizon. As the serial switch fabric solutions that include Gigabit Ethernet, PCI Express, RapidIO, StarFabric, Infiniband and other alternatives gain popularity and additional usage to form critical mass in the industry, specific purpose parallel and serial subsystem buses will start sharing market space by solving different problems within tomorrow's embedded systems. VME will evolve to incorporate the appropriate alternatives.

Several system management specifications have also been ratified that make the development of VME systems easier with more robust system management. Proposals continue to be submitted and considered for addition to the VME Technology family to improve VME's utilization in complex systems.

The American National Standards Institute (ANSI) accredited VME Standards Organization (VSO) has ratified over thirty VMEbus Technology supporting standards over the past 10



years, with several more in working group status at this time. These standards support the continued evolution of the core VMEbus Technology to ensure a solid foundation for the future.

VME Technology Roadmap

The VME Technology roadmap helps direct users through the various VME related options and encourage user participation in future specification development.

The roadmap consists of major specifications as the base of VME technology, the foundation upon which solutions may be built. New emerging standards build on the legacy of VME Technology compatibility. Switch fabric and system management specifications are additional layers that build upon the core specifications.

Each of these standards adds progressively more capability and performance to the VMEbus Technology core. New products, from many suppliers, are emerging that leverage the evolutionary changes in technology.



VME32 is where everything started in October 1981. The original specification was sponsored

by the VMEbus Manufacturer's Group, now VITA, and eventually standardized as IEEE 1014 and IEC 821. VMEbus established a framework for 8-, 16- and 32-bit parallel-bus computer architectures that could implement single and multiprocessor systems. The VMEbus includes four basic sub-buses: (1) data transfer bus, (2) priority interrupt bus, (3) arbitration bus, and (4) utility bus. Other architectures, with other sub-buses are possible within this VME framework.

In 1994, VME64 was formally approved by ANSI as ANSI/VITA 1-1994, incorporating all the features of VME32 plus adding support for 64-bit transfers.

VME32/VME64 compatible products continue to be deployed in numerous applications throughout the world. The VME Technology roadmap is committed to a legacy of backward compatibility as technology advances.

VME64x (ANSI/VITA 1.1) is an extension of the VME64 standard. It defines a set of features that can be added to VME32 and VME64 boards, backplanes and subracks. These features include a 160 pin P1 and P2 connector, a P0 connector, geographical addressing, voltages pins for 3.3V, a test and maintenance bus, EMI, ESD, and front panel keying per IEEE 1101.10.

The 160 pin connectors greatly increased the bandwidth and I/O capability of VMEbus.

ANSI/VITA 1.7 added support for an increased current DIN connector that doubled the maximum wattage capacity of a VME module.

VME64x is a commonly used in many applications today. It also shares in the backward compatible legacy of VME Technology.

VME 2eSST (ANSI/VITA 1.5) extends performance by adding dual edge, source synchronous data transfer (2eSST) capability that allows sustained data transfers in excess of 300MB/sec. The 2eSST protocol is based on the asynchronous 2eVME protocol. The main exception to this is that during its data phases, 2eSST is a source synchronous protocol. No acknowledgment is expected from the receiver of the data. Hence, the theoretical performance of a 2eSST VMEbus system is limited only by the skew between receiver and transmitter of data.

Concepts exist to enhance 2eSST performance to over 1GB/sec while remaining backward compatible with earlier VMEbus implementations.

Gigabit Ethernet on VME64x (ANSI/VITA 31.1) adds GigE to backplanes via a P0 connector as defined in VME64x. This is the first generation of serial switched fabric solutions implemented in VMEbus backplanes. This implementation works well with VME32, VME64 and 2eSST configurations.

To further enhance compatibility, the specification adopts the PICMG 2.16 P3 connector pinout for use on VME64x boards. The CompactPCI P3 connector and the VME64x P0 connector are identical and have the same placement on the backplane. It also borrows

the definition of the fabric card as described in PICMG 2.16. As a result, PICMG 2.16-compliant systems and ANSI/VITA 31.1 systems can use the same switched fabric boards.



VXS (VME Switched Serial) combines the event-driven parallel VMEbus with enhancements to support switch fabrics over a new P0 connection. VXS maintains backward compatibility with existing backplanes that do not have a conflicting P0 scheme. Several fabric protocols are mapped out for VXS including, 10 Gigabit Ethernet, PCI Express, Serial RapidIO and Infiniband. VME's parallel bus architecture provides bus control and maintenance data, handling everything from single byte transactions to +300MB/s block data transfers. Combining this in various ways with the emerging switch fabric technologies for multi-point, high-speed data transfers creates choices for embedded computing designs of all types.



VPX standards establish a new direction for the next revolution in bus boards. It breaks out from the traditional connector scheme of VMEbus to merge the latest in connector and packaging technology with the latest in bus and serial fabric technology. VPX combines best-in-class technologies to assure a very long technology cycle similar to that of the original VMEbus solutions. Traditional parallel VMEbus will continue to be supported by VPX through bridging schemes that assure a solid migration pathway.

VPX has been designed with the defense/aerospace community in mind, and is notable in that the working group is comprised of a strong set of component vendors, comput-

ing vendors and major defense/aerospace systems integration companies working together on the specification.

REDI REDI defines a general mechanical design implementation for Eurocards such as VMEbus and VPX that enhances thermal performance and structural integrity as well as providing for Two Level Maintenance (2LM) compatibility.

Two types of plug-in units are defined by REDI. Type 1 and Type 2 plug-in units have increased slot pitch, enhanced thermal performance and increased structural durability. Type 1 plug-in units are compatible with 2LM environments. Type 2 plug-in units have one or more covers absent and are not fully compatible with 2LM environments.

REDI gives an overview of the associated plug-in units for air-cooling, conduction cooling, and liquid cooling applications. The REDI family of standards defines applicable detailed dimensions of key plug-in unit and sub-rack interfaces. The implementations in this standard are for 3U and 6U form factor plug-in units with PCB and backplane connectors on 0.80, 0.85 and 1.00 inch centers.

The original VMEbus Technology specifications remains a foundation upon which evolutionary changes are made. The foundation continues to be a valid base that is compatible with new VMEbus technology. Products based on earlier generations of the VMEbus technology family remain valid and continue to be interoperable with the new developments.

VME is a Versatile, Mainstream, Evolutionary solution to your computing needs. Be sure to visit the VITA website at www.vita.com for the latest developments in VME Technology.

Contact Us



VITA
P.O Box 19658
Fountain Hills, AZ 85269
480.837.7486
info@vita.com
www.vita.com