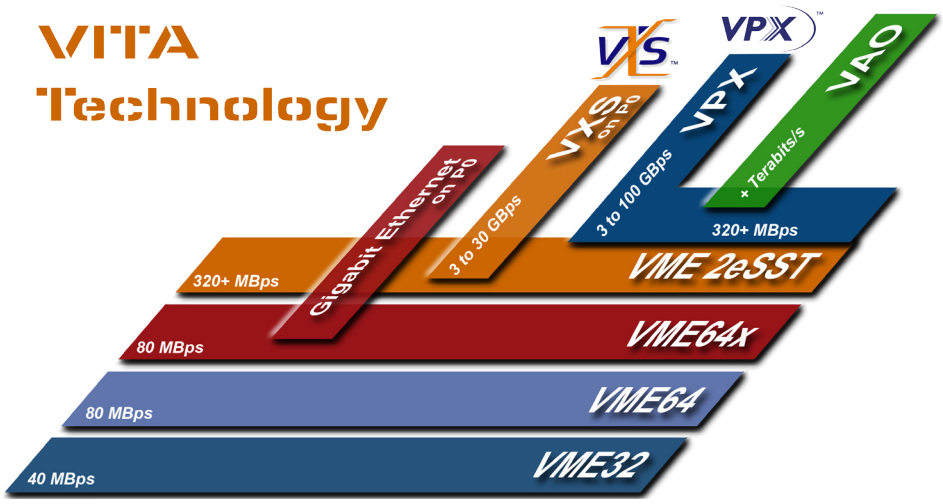
VITA
Open Standards, Open Markets

VITA is an incorporated, non-profit organization of vendors and users having a common market interest in real-time, modular embedded computing systems. Accredited as an American National Standards Institute (ANSI) developer, VITA provides its members with the ability to develop and to promote open technology standards.

VITA Technology



VITA Technologies are a favorite choice in many critical embedded computing architectures. VITA Technologies adhere to the open system architecture definition of real-time, modular critical embedded computing systems. The developers within the VITA community are committed to technology excellence.

With a rich heritage and bright future, VITA Technologies have found an indispensable place in Intelligent and Critical Embedded Systems. These are the systems that must be "able" in many dimensions: dependable, supportable, configurable, reliable, serviceable, . . .

These systems must operate flawlessly to protect life, property, equipment, and the environment – and to do that they rely on the durable products of today and tomorrow using VITA Technologies.

New projects are leveraging advancements in VITA Technology, capturing the benefits of performance and life cycle advantages. Today's VITA Technologies include:

- The original parallel VMEbus with performance of over 300 MB/s using VME 2eSST.
- Serial switch fabric interconnects in XMC, VXS, VPX and new small form factor standards that include Gigabit Ethernet, PCI Express, Serial RapidIO, and InfiniBand.
- Specifications to help standardize environmental criteria, reliability prediction, and other topics important to electronic systems design.

Development of new standards improves the utilization of VITA Technologies in complex systems. The **VITA Standards Organization** (VSO) is continually working to advance common technology, improve interoperability, and create new and exciting possibilities for the future.

VITA Technology Roadmap

The VITA Technology roadmap begins with the original VMEbus foundation. Serial switch fabric and system management specifications, such as VPX, are additional layers that build upon the core specifications.

Each of these standards adds progressively more capability and performance. New products, from VITA members, are emerging that leverage the evolutionary changes in technology.

VITA Technologies

VMEbus 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. 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.

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, voltage pins for 3.3V, a test and maintenance bus, EMI, ESD, and front panel keying per IEEE 1101.10. The 160 pin connectors greatly increase the bandwidth and I/O capability of VMEbus.

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

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. 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.

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.

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

VXS

(VME Switched Serial) combines the event-driven parallel VMEbus with enhancements to support switch fabrics over a 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 switch fabric technologies for multi-point, high-speed data transfers creates choices for embedded computing of all types.

VPX™ standards establish a new direction for the next revolution in embedded computing. 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 switch fabric technology. VPX combines best-in-class technologies to assure a very long technology cycle similar to that of the original VMEbus solutions.

VPX 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.

VPX REDI gives an overview of the associated plug-in units for air-cooling, conduction cooling, and liquid cooling applications. VPX REDI standards define applicable detailed dimensions of key plug-in unit and sub-rack interfaces.

OpenVPX™ systems specification defines an architecture framework that manages and constrains module and backplane designs, including defining pin outs, and sets interoperability points within VPX while maintaining full compliance with VPX.

The OpenVPX framework delineates clear interoperability points necessary for integrating module to module, module to backplane, and chassis. OpenVPX will evolve and incorporate new fabric, connector, and system technologies as new standards are defined.

Mezzanine Cards

Many mezzanine card specifications have emerged out of the work of VITA. These specifications provide increased flexibility and functionality to VITA Technology.

In particular, the working groups have expanded on the PCI Mezzanine Card (PMC) standard in many ways that improve its compatibility with VITA Technology.

PrPMC (ANSI/VITA 32) adds the capability of bus mastership to the PMC specification to enable processor cards to operate as master/host modules. PCI-X bus support is added in ANSI/VITA 39.

XMC (ANSI/VITA 42.x) opens the specification to support various serial buses such as PCI Express, Serial RapidIO, and other high speed serial interfaces while still offering backwards compatibility with PMC.

FMC™ (ANSI/VITA 57) provides a specification describing an I/O mezzanine module with connection to an FPGA or other device with reconfigurable I/O capability. The low profile design allows use on popular industry standard slot card, blade and low profile motherboard form factors. The compact size is highly adaptable to many configuration needs and compliments existing common low profile mezzanine technology.

Reliability

reliability community™
a community of practice, by VITA

The Reliability Prediction Community of Practice is a product of a collaborative effort by a working group in VITA, comprised of representatives from electronics suppliers, system integrator companies, and the Department of Defense (DoD). This working group has developed a community of practice document that provides an electronics failure rate prediction methodology and self-assessment standard.

Failure rate predictions have been utilized by logistics and systems engineers for a myriad of purposes, including reliability analysis, cost trade studies, availability analysis, spares planning, redundancies modeling, scheduled maintenance planning, product warranties and guarantees.

Small Form Factors

VITA has several initiatives focused on addressing the demand for smaller and more robust computing platforms. The working groups are leveraging the work done for VPX to create specifications for very rugged and small compute platforms.

VITA 73, Small Form Factor - Defines a small, conduction cooled or sealed air cooled "microATR" rugged computer architecture and the associated backplane profiles. Also included is a specification for standard I/O using MIL-DTL-38999 connectors to make the standard even more desirable for rugged deployments.

VITA 74, Nano Small Form Factor - Defines a standards-based approach to small form factor conduction-cooled systems for rugged commercial and military field applications.

VITA 75, Rugged Small Form Factor - Defines a small, scalable box and external interfaces to that box. The specification is based heavily on the voice of the customer.

The Future

VITA and its members are always studying future computing requirements of Intelligent and Critical Embedded Systems.

VITA members recognize the need for higher density, higher performing interconnect technologies that will be used in next generations of Intelligent and Critical Embedded Systems. As the transfer rates continue to increase, it is clear that optical technology offers many advantages. Since optical interconnects work best as a point-to-point connection, future systems are going to need much higher I/O density supporting hundreds of connections in a single board or line-replaceable unit (LRU). To that end, VITA launched the VITA Architectures for Optical (VAO) study group to research potential technologies and propose an architecture that could become part of future solutions.

VITA encourages user participation in future specification development.