WHAT IS VITA 74 A.K.A. VNX?

INTRODUCTION

As computers continue to proliferate in the avionic and military market, size, weight and power, also known as SWaP, are key issues when defining new products and projects. System integrators, project managers and engineers are challenged on which optimal direction to choose to address these new requirements. With the advancement of chip technology, more can be done with less. System-on-a-Chip (SoC) or Everything-on-a-Chip (EoC) make it easier to add more abilities such as video, Ethernet or I/O support on a single chip rather than on separate boards thus saving size and weight. But the biggest challenge has been what form factor should be chosen? PC 104? mTCA? Proprietary? A second important issue is the preference by the military and avionic sectors for standards such as VITA and ANSI. Standards provide better interoperability and drives down costs by allowing more suppliers to meet the demand with commercially-off-the-shelf (COTS) products.

3U VPX - FIRST GENERATION SMALL FORM FACTOR (SFF)

A little over 10 years ago, 3U VPX was introduced to the market as a response of the growing demand for smaller computers without having to give up processing power. Today, 3U VPX has become the de facto standard for new projects where SWaP is an issue and military standards are obligatory. The Open VPX is an ANSI/VITA-65 standard. VITA is an incorporated, non-profit organization that is a "Who's Who" of vendors and users having a common market interest in real-time, modular embedded computing systems. The VITA Standards Organization (VSO), the standards development arm of VITA, is accredited as an American National Standards Institute (ANSI) developer and a submitter of Industry Trade Agreements to the IEC. VITA provides members with the ability to develop and to promote open technology standards.

After VPX, the next goal for VITA was to make a smaller standard form factor by taking the concepts that made VPX successful and apply them while using other successful standards for backplane connectors, intra-system connectivity, and mezzanine card form factors to specifically reduce development risk, cost, and time to market. The outcome was VITA-74 or also known as VNX.

VNX (VITA-74)

VNX is a Commercial off the Shelf (COTS) module standard for Small Form Factor (SFF), conduction-cooled, extremely rugged, Single Board Computers, Signal Processors, and I/O Modules to be used as part of an integrated system. Utilizing Modular Open Systems Architecture (MOSA) principles, VNX provides the first standards based, slotted module approach to conduction-cooled SFF systems. The baseline VNX standard is also known as VITA 74.0 and was developed by members of VITA.

When designing the new standard, the companies that developed the VNX SFF standard decided to apply existing proven technology and "lessons learned" from as many existing standards as possible to the new standard, in an effort to minimize economic, technical and schedule risk:

- The electrical signal interfaces and system topology for VNX is derived directly from VPX (VITA 46) & OpenVPX (VITA 65). The VITA 74.0 electrical signaling and PCIe data bus structure is identical to that specified in VITA 46. Module slot profiles are being developed from the outset in a manner similar to that of VITA 65.
- The VNX connector is a derivative of the FMC (VITA 57) connector; the same connector series, but with a different contact arrangement. This connector has been thoroughly qualified and shown to be operable to PCIe Gen3 speeds and beyond, making it a natural fit for high speed data bus, video, storage and even RF connections.
- Many VNX Single Board Computer (SBC) modules use PCI Industrial Computer Manufacturers Group (PICMG) "COM Express Mini" Type 2 and Type 10 processor mezzanine boards mounted on a VNX carrier inside a VNX mechanical shell, further reducing time to market, risk and cost.
- Many VNX I/O modules utilize another PICMG standard, Mini PCI Express (MiniPCIe). MiniPCIe modules have been integrated onto a VNX carrier, allowing a myriad of existing COTS I/O modules from many different vendors to be used in a VNX inspired system.

For SWaP critical and price sensitive applications, VNX provides the flexibility of the VPX specification in a smaller form factor; resulting in reduced weight and power consumption, at a lower cost.

All VNX modules are approximately the size of a deck of playing cards and available in two standard module widths; 19.0 mm and 12.5 mm.

There are several VITA 74 "dot specifications" that have been identified and in various phases of work. These specs are as follows:

- VITA 74.0: The baseline VITA-74 "VNX" specification describing modules that may be used to build a SFF rugged system. In VPX parlance, this standard is similar to VITA 46.0.
- VITA 74.1: A standard for a complete stand-alone, self-contained, fully function computer module, roughly the size of a deck of cards.
- VITA 74.2: A standard for a VITA 74.0 Rear Transition Module (RTM).
- VITA 74.3: A standard to collect and centralize various VITA 74.0 compatible SBC and I/O Module Slot Profiles. In VPX parlance, this standard will be similar to VITA 65.
- VITA 74.4: A Standard that is being defined to utilize VNX modules in space applications. It is commonly referred to as SpaceVNX and similar in scope to VITA 78's "SpaceVPX Light"
- VITA 74.5: A Standard that is being developed to bring many lanes of Optical data through the VNX backplane. The current approach is to use a multi-lane MT connector adjacent to the copper connector to accomplish this feat.
- VITA 74.6: A standard that is being developed to bring several RF connections on coaxial interfaces adjacent to the copper connector.
- VITA 74.7: A standard that is being developed to allow a compliant VNX module to be used in a higher power, higher performance, chassis with improved cooling characteristics, employing wedge locking devices that are mounted in the chassis, not on the module, thus allowing standard VNX modules to be used in systems with and without wedgelocks. – High Performance Cooling

Brame-Tech and its partners are co-sponsors and developers on the VITA 74 Technical Committee, as well as participants on the VNX Marketing Alliance. Alligator Designs, our key partner, currently holds the chair position for the VITA 74 Technical Committee, a group that meets regularly and consists of multiple suppliers, integrators and customers who are embracing and building hardware and systems which support and utilize the VITA 74 family of standards.

About Brame Technologies

Brame means "intense passion" and here at Brame Technologies (Brame-Tech) we fuse passion and technology. Brame-Tech is a provider of rugged and military grade products and systems in Small Form Factor (SFF) for the avionic, military and heavy industrial market. Brame-Tech has consolidated and integrated several best-of-breed manufactures of embedded computing boards and systems to create standards based solutions in small and rugged formats. Brame-Tech's SFF products utilize standards based on VITA 46/65 (3U VPX), VITA-74 (VNX) and PICMG's COM Express. Products and solutions include multiple CPUs manufactured by Intel® (Xeon, i7, i5, Atom), NXP/Freescale (PPC® and ARM), AMD (G and R Series), storage, Ethernet switching, video graphics (with OpenGL), discrete and analog I/O and avionic interfaces (MIL-STD-1553, ARINC 429 and AS-5643 MIL-1394B) operating over MS-Windows, Linux, VxWorks and Integrity.

About the author - Bill Ripley

Brame-Tech was founded by Bill Ripley, a seasoned Electrical Engineer with over 35 years of experience in the avionic / military embedded computer market, and has worked half the time in a major helicopter / tiltrotor manufacturer's system integration organization, and the rest of the time for a COTS board and M-COTS system provider. Throughout the years, he has been a mentor and guru for the supporting technologies that have driven this sector, as well as a visionary of where the rugged embedded market should go. Bill has been active participant in the VITA Standards Organization, Vehicle Integration for C4ISR/EW Interoperability (VICTORY) standards committee, the Future Airborne Capability Environment (FACE™) community, as well as the European analog of VICTORY, the MILVA & NGVA groups.