Exciting Times Ahead for MicroTCA

Howard M. Glassman, Director of Business Development, Communications GE Fanuc Intelligent Platforms
The PICMG MicroTCA .0 specification was ratified almost exactly two years ago, and, since then, the MicroTCA platform has captured significant interest. It has often been viewed primarily as a telecommunications platform, but it has also seen success in the military/defense, medical and commercial markets and in industrial automation. All of these markets value the small footprint and inherent modularity that are at the heart of MicroTCA.

MicroTCA is designed ‘from the ground up’ as a network-centric architecture with built-in Ethernet communications to all AdvancedMC (AMC) modules. The AdvancedMC is the key modular building block within MicroTCA, offering designed-in hotswap/serviceability and remote manageability as well as ease of technology upgrade. Flexible chassis/backplane configurations can be tailored to meet specific application environmental needs such as extended temperature, shock and vibration, industrial mounting requirements and so on, allowing MicroTCA to easily adapt to a broad spectrum of application environments.

GE Fanuc Intelligent Platforms is seeing MicroTCA gain traction across a wide range of markets, but convergent telecom is, of course, a natural environment for it. Ethernet has rapidly become the ‘lingua franca’ of IP communications in broadband wireline networks. Gigabit Ethernet has become pervasive and 10 Gigabit Ethernet is rapidly coming to market and moving along the cost/performance curve. The next wave of Ethernet-capable standards-based wireless technologies (802.11x, HART, SP100, WiMax and so on) are on their way and will be integrated with new distributed IT industrial applications. Specifically, WiMax technology (which is basically IP/Ethernet over the airwaves) will become both a disruptive and a dominant force in the global market and new communications systems will need to be designed with an accelerated time-to-market imperative. MicroTCA seems ideal: it’s here now and is architecturally well-suited for designing WiMax NGN platforms.
Tom Cox, Executive Director, RapidIO Trade Association
MicroTCA has become one of the hottest platforms for embedded designers in the past couple years, and recently over the last year an explosive number of designs have started. While the definition of the ATCA platform has the focus of the big telecom providers, the microTCA chassis has vastly expanded into a number of other applications.

Scalability of the solutions is a key factor when looking at MicroTCA, from leveraging the number of boards in a system to the speeds and feeds of processors, DSPs and I/O. Switch fabric backplanes enable seamless upgrades, and multiple application platform solutions from a single design and roster of boards. Whether you need a

single processor and DSP or multiple quad processor boards they can all be added to the switch fabric and solve a wider variety of needs. RapidIO further enabled the switch fabric I/O to scale from X1 to X4 and in speed increments of 1G to 6.25Gbaud, helping to manage problem to solution while keeping an eye on power/cost.

An excellent example of this scalability can be found in a medical ultrasound application. The platform architecture is RapidIO-based switch fabric running on a MicroTCA chassis. The base system uses 2 AMC cards with a single TI DSP. This base system is the lowest cost and basic ‘Dr. office’ class ultrasound equipment. The four classes of equipment build on this platform and scale up in resolution, 3D and performance. The highest level performance system is built on a number of quad DSP boards connected together by 10G RapidIO (X4, 3.125G), all in the same software and system platform. This system services a high-end hospital diagnostic capability and high reliability service requirements.

The extensive Eco-system of AMC cards and supporting software and tools for microTCA and cost-effective size and performance is driving medical, security, military and industrial applications. Growth in these vertical markets dawns a strong future for the MicroTCA architecture.
Tom Wilson, Director Product Marketing, Tundra Semiconductor
There are trends in medical imaging that are driving imaging systems towards low cost as well as high performance and multi-function applications. Specifically, the health industry is focusing on a more “grass-roots” approach to diagnostic imaging. This means lower cost, small, multi-function imaging systems in clinics and local laboratories versus larger single function systems centrally located in hospitals. MicroTCA affords a flexible, low cost means to package high performance distributed processing systems. By flexible and low cost, it means the possibility for a variety of form factors, which MicroTCA supports with a number of Profiles. High performance is a requirement driven by the advent of systems that combine imaging technologies, e.g. Computed Tomography with Positron Emission Tomography. These new hybrid systems are targeted for smaller clinic applications to increase diagnostic function per unit footprint. However, this diagnostic density greatly increases the I/O and processing complexity of the system. MicroTCA supports the integration of a variety of standard I/O and processing functions across a high speed fabric like Serial RapidIO®. The MicroTCA ecosystem has evolved with a number of I/O, processing and switching functions that work together through RapidIO and allow immediate product development in a variety of MicroTCA Profile options.
David Pursley, Applications Engineer, Kontron
MicroTCA is making waves across the embedded industry. While originally developed for telecommunications applications, MicroTCA has also been deployed in a variety of defense applications. With its diverse feature set, MicroTCA is now seeing its first uses in industrial and medical applications, as well.

While the massive amount of compute power and communication bandwidth for MicroTCA systems is well-known, it is MicroTCA’s flexibility and scalability that allows it to be so widely used. For example, a medical imaging device may use a MicroTCA system as a compact supercomputer with up to twelve Advanced

Mezzanine Cards (AMCs), each with a dual core processor. On the other hand, a portable health monitor could have a small cost-optimized system with only one or two boards operating the device.

The use of standard building blocks, AMCs, allows for ease of integration while not tying users to any one vendor. Additionally, many vendors, such as Kontron, offer pre-validated integrated platforms which are ready for use out of the box and helping to keep overall costs down.

In the coming years, many markets will see an upswing in the evaluation and deployment of this new and exciting technology. Companies like Kontron are leading the way in product development and deployment giving end users a wide range of options when it comes to complete systems and components.

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