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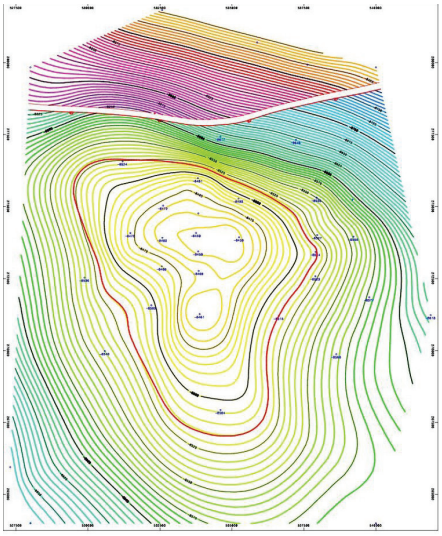
Solution Brief

Making the Case for MicroTCA in Energy Market Applications



Embedded computing systems play an increasing key role in managing the electrical/power distribution systems, communications systems, and exploration/mapping in Energy applications. Whether it's optimizing performance of a wind farm or managing resources on the electrical grid, or a control system on an oil platform, there are key requirements for these types of systems. They include:

Real-time Power Distribution & Control	Communications Systems	Energy Exploration
• Low latency • Precision real-time processing • Programmable (FPGA) processing • Ethernet communications (GbE/10GbE)	• Multi-core processing • Network interface/ connectivity • Ethernet communications (GbE/10GbE)	• Multi-core processing • Matrix math acceleration (GPGPU, etc.) • Storage, RAID • Programmable (FPGA) processing

It would be ideal to have one architecture to handle these all of these applications in the Energy sector. Is that possible? Yes. MicroTCA is a compelling architecture for Energy applications with its significant versatility to meet the needs of a wide range of designs/applications. It features inherent system management and failover capabilities, with the ability to ensure up to 99.9999% uptime. The Telco alarm, carrier locator, and remote management options are key features for seamless servicing/maintenance without any downtime. With multiple high-speed fabric options and a versatile ecosystem, MicroTCA' s bandwidth and reliability are ideal for lightning-fast allocation and management of resources throughout complex arrays.

For real-time control systems, precision real-time processing with low latency is often needed. One design example includes a 40GbE MicroTCA Carrier Hub (MCH) that provides precision timing including SyncE/GPS/IEEE 1588 and a PLL for clean signals. A Kintex-7 or similar FPGAs provide versatile processing, along with GbE/10GbE ports out the front panel. Power distribution control systems are often space-constrained (for instance in off-shore wind farms) so compact solutions are required. See Figure 1 for a VT950 1U rugged chassis. Designed to meet MIL grade shock and vibration, the chassis hold 6 AMCs and has the MCH functionality integrated into the system.

Figure 1: VT950 1U Rugged Chassis Platform

In Communications systems, a common configuration is a 6 to 12 slot 1U commercial-grade chassis with x86 Intel or multi-core Cavium processors, with various network interface cards with GbE and 10GbE ports out the front panel. PCIe is sometimes required, which is a standard option in MicroTCA systems. There are a wide range of options/configurations available in MicroTCA for these types of requirements.

Energy exploration applications can utilize powerful processors such as the AMC740 72-core Tilera or various Cavium 16 to 32 core processors. There are powerful graphics modules that can be utilized such as an AMC343 2560x1600 @ 60Hz resolution ATI E6760 graphics processor. In another application, an AMC104 PCIe Gen3 carrier was utilized allowing commercial high-performance graphics cards to be plugged into the AMC form factor. High-performance storage is often utilized, including RAID options. Figure 2 shows a cube chassis platform with 6 AMC slots including the Tilera processor, PCIe Gen3 carrier with high-end graphics module, and a 2.5" solid state SAS-3 disk at 12 Gbps with RAID 0, 1, 1E and 10.

Figure 2: VT899 7U uTCA Cube Chassis, 6 AMC

For more extreme environments, the VadaTech Rugged COTS products offer outdoor protection against shock/vibration, moisture/dust, humidity, and more. Figure 3 shows a fully enclosed VT872 conduction-cooled chassis platform that also holds 6 slots.

The open, modular approach of MicroTCA allows you to utilize a wide range of vendors and products that comply with the specification. The Modular Open System Architecture (MOSA) approach has many advantages:

- Less Risk – No single source, lower obsolescence risk
- Large Ecosystem – Dozens of vendors and hundreds or products to choose from
- Scalability & Upgrades – Modular design allows easy upgrade path
- Tighter Vendor Competition – Drives innovation, upgrades, and cost reduction
- Leverage whole industry – Leverage knowledge, expertise of dozens of vendors
- Tech Re-Use in Multiple Applications – Utilize many of same modules in multiple programs
- More Options – With an open spec, there is always the option to pivot and do it yourself

VadaTech's modular COTS platforms offers significant performance, scalability, and cost advantages. We offer the largest ecosystem of MicroTCA products, from chassis platforms, MicroTCA Carrier Hubs (MCH), Power Modules, and over 300 Advanced Mezzanine Card (AMC) modules.

We are experts at reviewing your computing requirements and providing creative, innovative solutions for your application. For more information on the specification and architecture, see the Overview Guide at http://www.vadatech.com/media/article_MicroTCA_Overview.pdf.

Figure 3: VT872 1U ½ ATR Short, 6 AMC, Conduction Cooled

vadatech
THE POWER OF VISION

United States
Henderson, NV
702.896.3337

United Kingdom
Southampton, UK
+44 2380 381982

Asia Pacific
Taipei, Taiwan
+886 226 277 655

www.vadatech.com