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UPDATE

→ MicroTCA

The MicroTCA ecosystem is maturing

By MIKE FRANCO

The MicroTCA ecosystem is maturing at amazing speed. Mike brings us up to date on aspects of the ecosystem and the maturity process.

Let's look at the following dimensions of the MicroTCA ecosystem:

1. Dependability of a multi-sourced MicroTCA solution
2. Comprehensive cost, not just purchase price or operating cost, but space utilization/efficiency
3. Diffusion into lateral markets
4. Diversity of system component resources
5. Range of scalability
6. Technology development of the infrastructure components and application components

Dependability

I mention this first because of the importance established by Geoffrey A. Moore in his book *Crossing the Chasm*, in which he points out that new technologies do not get accepted into the mainstream until the major players

feel that dependability/risk reduction has been adequately addressed. In other words, modules, regardless of vendor, need to interoperate in a consistent reliable way with no surprises! PICMG hosts workshops to address dependable cross-vendor interoperability. Alternatively, numerous companies have formed teams to simplify and expedite the integration process. These collaborations are a practical solution to the interoperability challenge; however, they may result in an implementation that is inconsistent with the broader market. We should all recognize that in the fullness of time, the market will be better served by completely interchangeable modular components.

Cost

Cost is currently the most significant obstacle to full-scale deployment of MicroTCA. Cost is also the most quantifiably understood aspect of the technology maturity development process. Surely, the PICMG MicroTCA Committee in establishing a \$500 cost of infrastructure set a point that was further along in time on the cost maturity curve than the committee realized. Significantly, cost was associated with 50,000 to 100,000 units being produced in 18 months from specification ratification, or January 2008. The market has not yet reached those volumes and so, not surprisingly, it has not achieved the cost target.

MicroTCA has dropped about 1/3 from its introductory cost on average. This has been mostly in the form of new lower cost product introductions rather than reduced pricing for existing products.

When the MicroTCA Committee studied cost several factors came into play:

- CAPEX
- OPEX
- Cost of overhead components
- Percentage volume occupied by overhead elements of the finished system

Remote management and diagnostics are

the most significant portion of OPEX. Overhead components include enclosure with backplane, cooling unit(s), air filter, power module(s), MicroTCA Carrier Hub (MCH) and optionally JTAG Switch Module (JSM). I point these out so that ecosystem members can evaluate their solutions considering these various aspects of cost.

Diffusion into lateral markets

MicroTCA's original market, telecommunications, has been joined by the military, which is surprising because they have hung onto VME longer than any other organization. There has also been rapid progress into the industrial marketplace, especially in Europe. MicroTCA also sees significant development in enterprise applications, network storage and gateways, and other non-server applications. Early stage projects are getting off the ground in the transportation and medical markets.

The original thoughts of the MicroTCA Committee were that MicroTCA would see high-volume applications in telecom well ahead of applications in other markets. In reality, MicroTCA is spreading into other markets far more quickly than expected. This suggests that when MicroTCA does achieve the cost reduction and retirement of risk necessary, the growth curve of volume sales will be much steeper than previously expected.

Diversity of system components resources

As of this writing, the MicroTCA ecosystem is developing nicely.

Infrastructure

There are now four MCH manufacturers in the marketplace. Several MCHs in development have yet to come to market. There is a full spectrum of options including PCI Express fabric switches with spread spectrum clocking.

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XAUI and Serial RapidIO fat pipe fabric switches with telecom clocking are also available. This latter telecom clocking, of course, is one of the more significant gaps in the MicroTCA specification as the AdvancedMC clock structure changed substantially with the R2.0 release of that specification. However, the SCOPE Alliance proposed clock architecture for MicroTCA seems to bridge the gap admirably. Of course, there are a wide assortment of 48 V input power modules in the market with a wider range of power levels and features. AC power modules are beginning to enter the market. A wide range of MicroTCA enclosures exists: Pico, Cube, 19-inch shelves, and 1U shelves, all supporting a wide range of cooling unit alternatives. The last piece of the MicroTCA infrastructure, the JSM, is soon to be available.

Payload

The number of manufacturers of MicroTCA components and AdvancedMC modules has grown at a staggering rate. In fact, there are so many suppliers of AdvancedMC processor modules that it has become a Herculean task to keep track of them all! Available are:

- Network Process Units (NPUs)
- Digital Signal Processors (DSPs)
- Storage modules
- Graphics modules
- Optical and copper line cards
- FPGA arrays

Development tools

Development tools for MicroTCA include extender boards with bus taps for fabric traffic monitoring and analysis and extender boards. Development chassis with integrated power supplies and cooling systems are in the market. Soon to be announced is a MicroTCA hardware platform management software diagnostic tool, which will be of great value.

Range of scalability

The MicroTCA spec includes multi-tiered shelves and back-to-back shelf architecture. As of yet, I don't know of any of these products in the marketplace and I expect we'll see scaling up of these complex products in the later stages of ecosystem development. For the time being, the focus has been on single MCH domains (virtual carriers) with the exception of a single double-tier system. In the near future I would expect to see a much more intense focus on refinements of the Cube and Pico systems, which are very interesting form factors with a lot of market potential.

Technology development of the infrastructure and application components

While new technology is always exciting and fun to talk about, such as 10G single-lane fabric, I think that most of the money made in MicroTCA will be based largely on lower-cost technology that already exists and refinements there of. Technology development

in the areas of platform management and power modules/MCH redundancy is important for many applications. I also suggest that inclusion of the JSM (JTAG Switch Module) is very important.

MicroBlade is investing significant time and money in a sophisticated JSM. (Figure 1) The motivation for this is that I believe the JSM can be of enormous value to the early deployment of MicroTCA systems. It will support not only remote diagnostics, but also support the ability to do remote upgrades of executable software, FPGA files, and the debugging of applications. I believe these features will enable early systems to be supported in field trials with greatly expedited and cost reduced engineering support. It seems that this would be of great value when trying to get new systems and applications to be stable and mature quickly.



Figure 1

Conclusion

I urge our ecosystem partners to accept a slower recovery of MicroTCA investment dollars since system costs are remaining significantly elevated. These elevated prices with heavy R&D burdens could delay the growth and potentially limit the ultimate size of the MicroTCA market. It is becoming clear that a number of companies: see and believe in a very large MicroTCA market; are investing more; and are willing to accept a longer term investment of those dollars in expectation of great potential.



Mike Franco is the President and CEO of MicroBlade, an AMC and MicroTCA products company. He is currently Chairman of the Rugged MicroTCA Subcommittee and former Chairman of the MicroTCA Subcommittee. Other standards work includes serving as draft editor of the AMC spec, authoring the mechanical, power, connector, and thermal sections of the AMC spec, and chairing the AMC Connector Workgroup and VITA 39 Subcommittee.



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