CompactTCA unifies platform architecture

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CompactPCI Systems

With the completion of the PICMG 3.0 R1.0 Advanced Telecommunications Computing Architecture (AdvancedTCA), several PICMG member companies are turning their attention to a new effort. AdvancedTCA creates the most complete platform specification for an open architecture platform available today. The Compact Telecommunications Computing Architecture (CompactTCA) working group is creating a proposal for a comparable platform architecture specification that is compatible with existing CompactPCI technology.

The platform market

CompactPCI, with the advent of specification extensions like PICMG 2.16 for Ethernet transport, has been gaining traction in the telecom market. AdvancedTCA is loaded with features for central office equipment including a 2.4 terabit per second fabric and distributed DC power. However, AdvancedTCA may not meet size and cost constraints for access or customer premise equipment. CompactTCA offers a platform alternative with lower power, more granularity in modular components, AC or DC power, and rack sizes that fit 300mm or wiring closet installations (see Table 1 and Figure 1). Note that the two board drawings (with CompactPCI on the left and AdvancedTCA on the right) used to create Figure 1 are not scaled relative to each other. The ratio of board height should be 8 / 6 = 1.33. The ratio of board depth should be 280 / 160 = 1.75.

CompactTCA	AdvancedTCA
6U x 160mm boards	8U x 280mm boards
0.8-inch board pitch	1.2-inch board pitch
367-cm^2 board area	903-cm^2 board area
50W	150W

Table 1

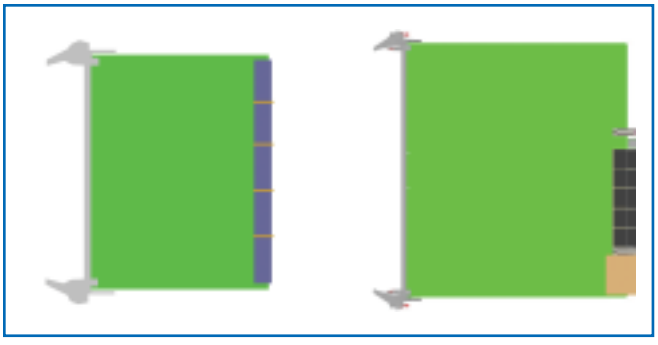

Figure 1

The CompactTCA proposal parallels the AdvancedTCA platform architecture, providing the same complete framework for interoperability. The similarities in the two architectures will allow technology to migrate between the two product families. By leveraging many common elements, major investments like platform software should have a high degree of reuse.

Backward compatibility

A key feature of CompactTCA is its re-use of existing CompactPCI technology. CompactPCI has evolved a series of specifications as optional technologies. This menu approach allows CompactPCI to address diverse markets from industrial automation to telecommunications. The computing and telecom market places, however, need more interoperability.

CompactTCA combines the relevant portions of several CompactPCI specifications to serve as the basis for the platform architecture. By focusing on a specific market, the bar can be raised for the baseline content, consolidating some of the variations in product. While this will affect the compliance of some CompactPCI products, much of what is being sold in the telecom space already includes what CompactTCA defines. The CompactTCA initiative balances compatibility with existing CompactPCI products and still provides a comprehensive model for interoperability.

The baseline for the specification is the mechanical and electrical specifications from the core specification (2.0), features from hot swap (2.1), system management (2.9), and Ethernet transport (2.16). Additionally, system management is augmented using the some of the IPMI framework defined in AdvancedTCA. CompactTCA also provides for system architectures with transports using the H.110 bus (2.5), the high speed serial mesh (2.20), or the StarFabric (2.17).

A common transport architecture

What CompactTCA does not include is the CompactPCI bus itself. The PCI bus has not played a significant role in systems deployed in the telecom market. Rather, the Ethernet transport defined in PICMG 2.16 forms the base transport for CompactTCA. PICMG 2.16 provides for a dual star of 10/100/1000Base-T Ethernet links providing redundancy and reli-ability.

A CompactTCA platform consists of one or two management controllers, one or two Ethernet switch slots, and any number of node slots. The management controllers and switches may be redundant or they may be simplex for smaller systems. The management controllers provide a common element for the IPMI management and centralize the 2.1 hot-swap controller function (see Figure 2).

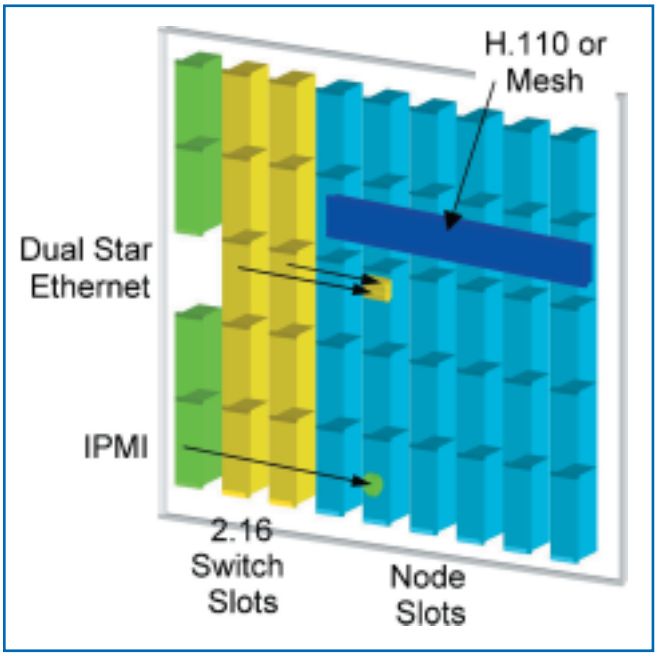

Figure 2

The node slots are all virtually identical. Without the CompactPCI bus, the concept of a special system slot is eliminated. CompactTCA does retain the geographic addressing for each slot that the PICMG 2.0 specification defined.

The basic CompactTCA platform interoperates with any PICMG 2.16 compatible board today. PICMG 2.16 defined a mechanism for detecting the presence of the PCI bus on the backplane. A 2.16 compliant design, even if it has a PCI bus interface, will detect that it is in a CompactTCA system and operate properly. It is possible to design boards that are CompactTCA compliant that will be compatible with some CompactPCI systems.

If Ethernet transport is sufficient for the application, then the base system requires only the Ethernet fabric. Additionally, systems can be built with additional transport overlays. For example, a PICMG 2.5 compatible H.110 bus can be introduced into the node slots on J4. While this reduces the total population of boards that are interoperable, systems of this type are usually targeted to even more specific applications. Generic boards can be built (and are built today) that avoid the use of J4 and are interoperable in systems that overlay transports on J4 like H.110 (or 2.20). All system configurations have the 2.16 Ethernet fabric as a common interface.

The instant standard

CompactTCA is being sponsored by Force Computers, Motorola Computer Group, Performance Technologies, Pigeon Point Systems, StarGen, and ZNYX Networks. These companies represent many years of experience in the CompactPCI market. CompactTCA has a ready supply of compatible products when the specification is completed.

The evolution of the commercial off-the-shelf (COTS) platform continues with AdvancedTCA and now CompactTCA. Both should address the telecom and datacom markets by targeting different strata for cost, size, and performance. Equipment suppliers have more choices. They do not have to face a “one size fits all” situation. The parallels in the two architectures allow customers and vendors alike to get maximum leverage when introducing new technology.

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