AdvancedMC modules build powerful applications

By Thanh Nguyen

Created to support the Advanced Telecommunications Computing Architecture (AdvancedTCA), the Advanced Mezzanine Card (AdvancedMC) specification provides designers with a powerful and flexible basis for creating high-performance applications.

When PICMG defined the AdvancedMC in 2005, it opened the door to a wide range of communications and telecom applications. AdvancedMC modules can serve as the basis of systems ranging from home media gateways to metro-level central offices. They feature a flexible combination of size and performance options with additional features that make them versatile building blocks for system design.

AdvancedMC modules come in a variety of sizes. (See Table 1.) A single module measures 73.5 mm x 180.6 mm while a double module measures 148.5 mm x 180.6 mm, with each available in three different heights (Figure 1). Depending on their size, the modules can handle from 20 W to 60 W of power. This combination of size and power capacity means that AdvancedMC modules of considerable complexity and performance can be implemented, providing system developers with great flexibility in partitioning their designs.

The AdvancedMC specification originally targeted telecommunications systems. As a result, modules have been defined to be hot swappable, allowing the repair or upgrade of systems without shutting down. They also include as many as 21 I/O serial packet interface channels, each running at 12 Gbps, and a system management capability based on the Intelligent Platform Management Interface (IPMI). These additional features ensure that the modules support high-reliability designs and can handle demanding, I/O-intensive functions appropriate to their telecommunications origins.

Developers have two ways of combining AdvancedMC modules into system designs. One is the original AdvancedTCA structure. PICMG created AdvancedMC modules to support the AdvancedTCA structure. An AdvancedTCA blade can carry as many as eight AdvancedMC modules, allowing systems based on AdvancedTCA blades to handle large and complex functions.

	Compact-Size (3HP)	Mid-Size (4HP)	Full-Size (6HP)
Single Modules	73.8 x 13.88 x 181.5 mm	73.8 x 18.96 x 181.5 mm	73.8 x 28.95 x 181.5 mm
Double Modules	148.8 x 13.88 x 181.5 mm	148.8 x 18.96 x 181.5 mm	148.8 x 28.95 x 181.5 mm

Table 1

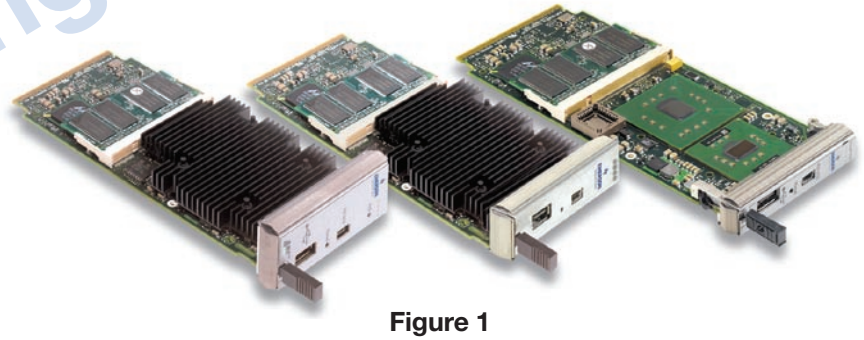

Figure 1

MicroTCA stretches application range

The second structure that utilizes AdvancedMC modules is the recently released MicroTCA architecture. MicroTCA allows developers to create systems by plugging AdvancedMC modules directly into a backplane, as Figure 2 shows. In effect, it uses the mezzanine module as though it were a blade itself. The architecture addresses mid-level performance applications by providing more cost-effective access to AdvancedMC module capabilities than the full AdvancedTCA structure. Designers can create systems as small as one or two modules using MicroTCA.

Between them, AdvancedTCA and MicroTCA allow developers to create

Figure 2

systems spanning a wide performance range. In telecommunications, for example, the AdvancedTCA structure permits creation of large central office server systems. An AdvancedTCA shelf can hold as many as 16 blades, each of which can have from 4 to 8 AdvancedMC modules. The modules can each contain a full processor, including memory and high-speed serial I/O, along with USB, control, and storage interfaces. Emerson's KosaiPM AdvancedMC module, for instance, has a 1.8 GHz Pentium M processor, 256 MB, 2 GB of main memory, and two Gigabit Ethernet interfaces to the MicroTCA backplane or AdvancedTCA blade's switch. This capacity enables developers to implement the functionality of several servers on a single blade.

A MicroTCA chassis can employ AdvancedTCA blade processor modules to provide the same functionality as the AdvancedTCA shelf, but with smaller capacity. For example, system designers can create a mini-server using a 12-slot MicroTCA housing. The MicroTCA version offers the same features, uses the same interfaces, and runs the same software as the larger system, but has fewer channels and comes in a much smaller package.

The range of applications that these structures serve is limited only by the types of AdvancedMC modules that are available. Adoption of the AdvancedMC specification by vendors has only just begun, but a variety of functions have already reached the market. These functions include processor modules like the KosaiPM, DSP modules from companies such as Surf Communications, hard disk drives, and E1/T1 line interfaces. Many more AdvancedMC modules are in the works, continually expanding the possibilities for designers and enabling a plethora of applications for MicroTCA and AdvancedTCA systems.

System design possibilities abound

Today's selection of AdvancedMC modules, while not yet extensive, is already enabling many different system designs. For instance, combining processor modules, DSP modules, and T1/E1 line interfaces allows the creation of a media gateway. The DSP modules handle the compute-intensive image and audio compression and decompression, while the processor modules control channel access to the WAN. Designers can create the system using either AdvancedTCA or MicroTCA structures, depending on the channel capacity the gateway requires.

The same processor and DSP modules, combined with mass storage modules, form the basis of a media server, which could provide streaming video on demand to network users. Its functions would include reading the video data from mass storage and decompressing it for distribution across a LAN. Such a system might find a home in a hotel, allowing it to offer on-demand movies to guests. Built using the MicroTCA structure, this media server would be compact enough and at a low enough cost to be appropriate even for modest establishments.

Because MicroTCA allows the creation of systems with only a few modules, developers can create systems inexpensive enough for small or home office applications. With just a DSP and processor module, developers could create a video conferencing system for the small office market. The Ethernet interfaces on the processor module handle the connection to the company LAN, while the DSP provides the audio and video codec.

Wireless future for AdvancedMC

Additional applications will arise as new AdvancedMC modules come on the market. One area that is currently receiving considerable attention by module developers is wireless networking. With the addition of a WiMAX interface on an AdvancedMC module, systems such as wireless networking base stations become possible. Large AdvancedTCA systems might serve as a metropolitan base station, while small MicroTCA systems can bring that capability down to a mobile platform size. With the right security features in place, a WiMAX MicroTCA system could be installed in a military vehicle such as a Humvee and serve as a mobile network hub for communications, command, and control.

The AdvancedMC specification is the key to the success of such applications. Developers can take advantage of AdvancedMC modularity to create many different systems with only a few basic module types. This simplifies the stocking and supply of components for system developers and users, reducing the costs of development, production, and ownership. The capacity of these modules means that they can play in high-end applications, while the MicroTCA specification allows them to also serve cost-sensitive applications. Addressing both high-end and cost-sensitive markets provides AdvancedMC modules with an opportunity that many analysts put in the multibillion-dollar range and helps ensure their future as the foundation of communications system designs.

Thanh Nguyen *is the manager of the product management group and architect at Emerson Network Power Embedded Computing, where he is responsible for the company's AdvancedTCA, AdvancedMC, and signaling protocol product lines, including long-term strategic vision. Thanh has 20 years of experience in the telecom and embedded industry, with a strong emphasis on telecom infrastructure technologies such as ISDN, ATM, MPLS, VoIP, and NPU. Thanh is a graduate of Penn State University.*

To learn more, contact Thanh at:

Emerson Network Power Embedded Computing
8310 Excelsior Drive
Madison, WI 53717-1935
608-831-5500
thanhn@artesyncp.com
www.artesyncp.com