CMP
United Business Media

ELECTRONIC ENGINEERING
EETIMES
The industry newspaper for engineers and technical management
MARCH 8, 2004

In Focus
Single-Board Computers

Fine-grained fabric emerges for telecom

By Michael Franco

For almost two decades, the holy grail for suppliers of telecommunications components has been an open-architecture platform that would entice telecom OEMs to use off-the-shelf solutions. At long last, close collaboration between component houses and the OEMs has produced such a platform.

Advanced Telecommunications Computing Architecture carriers equipped with application-specific advanced mezzanine card (AMC) modules provide a solid foundation for building the scalable, affordable, high-availability telecom systems needed to power next-generation packet networks. Ultimately, AdvancedTCA and AMC will lower the lifetime cost of ownership by leveraging efficiency and reducing time-to-market, allowing OEMs to outsource enabling technology and thus lower maintenance costs.

An AdvancedTCA card equipped with advanced mezzanine card (AMC) modules could be used to implement a single-board media gateway.

AdvancedTCA's high throughput, multiprotocol support, high power capability, hot-swappability and integrated system management provide the baseline telecom fabric. AMC enhances that fabric by enabling designers to customize, scale, upgrade and service their systems with a finer degree of granularity. The resulting fabric offers greater flexibility than ever before possible, reducing the time and cost associated with developing, up-grading and servicing high-performance, high-availability telecom systems.

The key to this flexibility is AMC's ability to extend the performance and serviceability of the baseline fabric to the module level. For example, AMC's high-speed, packet-based serial interface extends Ad-vancedTCA's 10-Gbit/second fabric by providing 21 high-speed I/O channels (up to 12.5 Gbits/s each) and supporting multiple protocols (Ethernet PCI Express, RapidIO and Infiniband). Equally important, AMC modules are hot-swappable and provide an Intelligent Platform Management Interface-based system-management interface. They can be remotely monitored and serviced in the field without taking the AdvancedTCA carrier offline. AMC also lets designers take advantage of AdvancedTCA's high-power capability (up to 200 watts/blade), supporting up to 60 W/module.

One of the biggest contributors to overall flexibility is the support for multiple mechanical form factors and configurations. This mechanical flexibility enables designers to partition their blades in a way that is optimized to meet the requirements that they can be scaled, upgraded and field-serviced.

AMC supports four module sizes: half-height single width, half-height double width and a full-height version of both. The AMC spec also provides detailed guidelines for building three types of AdvancedTCA carrier boards: short, long and hybrid. The short carrier has bays for up to eight AMC modules with no component height restrictions. The long carriers provide bays for up to four AMC modules, with two-thirds of the board reserved for other components, which do have height restrictions. The hybrid carrier provides for portions of either long or short module bays.

Architecturally, long carriers are generally perceived as baseboards that provide primary functionality, with AMCs acting as a functional extension of the on-board circuitry. This is the conven-

Michael Franco is hardware engineering manager at Artesyn Technologies Inc.'s Communication Products Division (Madison, Wis.).

tional role of mezzanine cards. However, the short carrier is more aptly viewed as a modularly constructed blade or extension of the AdvancedTCA fabric. Here the carrier performs generic functions such as distributing power, system management infrastructure and fabric interconnectivity, while field-replaceable AMC modules provide the primary functionality.

By mixing and matching short, long and hybrid carriers with various modules, designers can readily configure a system with the desired degree of granularity. For example, an AdvancedTCA shelf populated with short carriers can hold up to 128 AMC modules, enabling designers to upgrade, scale and service their systems at a very fine-grained level.

This modularity gives designers flexibility in the way they partition their system. They are free to create scalable high-density modules dedicated to a specific function, such as control, SIGTRAN signaling, transcoding, interfacing or packet processing. They can combine multiple functions on a single blade and alter the mix as applications or system partitioning or both change. Either way, they can spread critical functions across multiple field-replaceable AMC modules.

An AdvancedTCA card equipped with AMC modules could be used to implement a single-board media gateway. TDM voice traffic comes onto the board via either optical-carrier Sonet interfaces or T1-E1 ports. By TDM emulation, the board moves the voice channels to DSP farm modules for transcoding and packetization. The packetized voice is then transported off the board via the high-speed Internet Protocol switch fabric interface. Alternative solutions could be designed using a multiblade approach, where one blade is dedicated to the DSP transcoding and packetization function and another is dedicated to the TDM interfaces.

Test and development

As standardized functional modules emerge, so too will standardized online functional testing, paving the way for a new generation of continuous background testing that consumes a small portion of channel capacity and provides far more extensive coverage. The ability to keep refining this test strategy relies on the limited number of standardized modules required to implement any system, a by-product of the Lego-like block approach. The consistent functionality of these modules will also make these tests easier to propagate to other modules.

As OEMs move to outsource their AdvancedTCA-AMC hardware, they may also want to consider outsourcing the high-availability middleware that connects the hardware to their applications. The APIs that define the application and hardware interfaces are well-defined by the Service Availability Forum. However, high-availability middleware is available off the shelf from a number of reliable suppliers. And outsourcing the middleware offers the same advantages as outsourcing the hardware: faster time-to-market and more resources to focus on value-added application development. Telecom OEMs that are considering a move to the ATCA-AMC hardware architecture will want to reexamine their application framework to ensure an optimal fit. For example, to take full advantage of ATCA-AMC's modularity, the OEMs may want to consider modularizing their software in a similar fashion.

Contact Information:
Artesyn Techonologies
Communication Products Division
8310 Excelsior Drive
Madison, Wisconsin 53717
Toll Free: 1-800-356-9602
Phone: 608-831-5500
Fax: 608-831-4249
info@artesyncp.com
www.artesyncp.com