

Leveraging the AdvancedTCA platform for VoIP media gateways and media servers



By Alan Percy

The hosts of new VoIP carriers coming to market face the uphill challenge of building a new customer base while creating useful enhanced applications that will encourage new customers to stay for the long term. Many of these new carriers are considering open standard hardware platforms as a way to balance the cost of infrastructure versus the time-to-market for new applications. The recently approved AdvancedTCA is rapidly gaining favor with designers as AdvancedTCA offers a significant competitive edge: serving more customers and more new services in less space while improving reliability.

Background

Standard hardware platforms have been the backbone of carrier enhanced applications for the last 10 years. From the founding of the PCI Industrial Computer Manufacturers Group (PICMG) in 1994, through the CompactPCI 1.0 specification in 1998, PICMG has maintained a dedication to continual improvement in hardware platforms. While the PICMG hardware and computing platforms have been targeted for use in a wide range of industrial and commercial applications, no industry has been more affected by the platform evolution than the telecommunications industry. As a result of significant participation and guidance by the telecommunications industry, a new hardware platform specification has been crafted in PICMG 3.0, commonly known as AdvancedTCA. The underlying driver for the development of AdvancedTCA was the hope that a new platform could solve a wide range of physical, mechanical, and electrical limitations found in past PCI and CompactPCI platforms. Figure 1 shows an AdvancedTCA form factor card.

The key advantage of the AdvancedTCA specification is that it helps manufacturers lower equipment development costs by permitting the use of off-the-shelf components, avoiding expensive custom hardware development. The AdvancedTCA form factor also increases flexibility and functionality by providing a large board area – 8U high and 280 mm deep – with a 200 W power budget. AdvancedTCA is designed to meet today's demand for new processor-intensive and high-speed data services that enable expanded carrier IT services.

Increased competition fuels need for advanced applications

As the number of new VoIP carriers continues to grow and the field becomes more crowded, new carriers need to find a differentiator to separate them from the competition. In many cases, these new carriers offer their services for little or no up-front cost, with very affordable monthly charges. Most carriers recognize, however, that over the long run, they need a better solution to keep customers and avoid *churn*. The development of advanced applications (or *sticky* applications) surrounding the service cre-

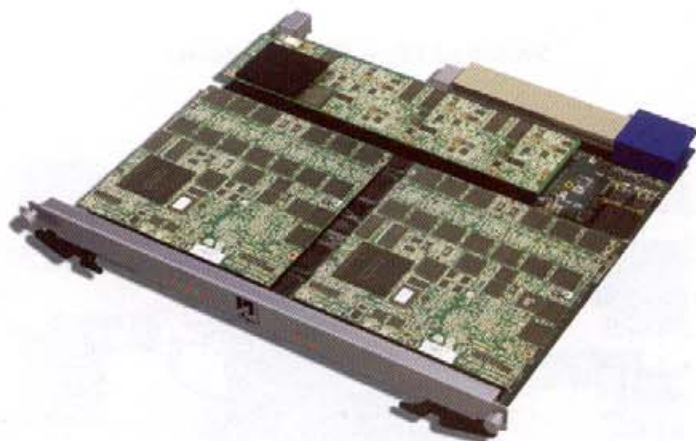


Figure 1

ates customer loyalty and a perception of value that discourages customers from changing carriers.

Most current broadband VoIP carriers are in the early phase of customer acquisition, pulling in new customers through extensive advertising and offers of lower or *all you can use* long distance packages. Over the next few years a shift is likely to occur, with carriers emphasizing applications rather than just monthly cost.

Scaling: Part of the business plan

Building a VoIP carrier business requires a unique balancing act, in that the applications and services must be deployed concurrently with building the subscriber base. If the application or service is successful, more subscribers will be added, and additional hardware will be needed to support the new users. No business savvy carrier wants to buy and install all the equipment they will potentially need before signing up the first customer. Scaling is therefore crucial to the carrier's business plan.

AdvancedTCA equipment addresses the need for scaling exceptionally well by providing a blade-based hardware environment that allows expansion on the fly. AdvancedTCA's packet-based network infrastructure within the chassis permits developers to add new capacity to the platform by installing additional or replacement higher-density blades during operation. This is a vast improvement over older PCI and CompactPCI systems that typically required a system shutdown and restart cycle to recognize the new hardware. Now new capacity can be achieved without disrupting customer service and without the increased cost of upgrades associated with the shutdown.

The flexibility of card insertion also offers carriers the ability to *pay-as-you-grow*. Most new VoIP carriers build their revenue on

subscriber headcount, and the ability to start small and grow as the customer base grows provides a significant asset. AdvancedTCA allows a carrier to start small, bring on the first trial customers, build momentum in the market, and add capacity as customer traffic and revenue build. This sets up two possible scenarios:

Single card solutions

The large physical form factor and modular Advanced Mezzanine Card (AMC) resources available with AdvancedTCA allow complete advanced applications to be built on one card. CPU modules, media processing resources, TDM network interfaces, and VoIP resources can be combined into one blade. Some carriers prefer this all-in-one-card approach as it supports their pay-as-you-grow strategy.

Mix-n-match solutions

In this situation, different blades are used for each function, with a *mix-n-match* combination of various functions. Best-of-breed CPU, media processing, TDM network interfaces, and VoIP resources are combined at the chassis level. This allows N+1 redundancy to be leveraged on high-risk or critical resources without requiring redundancy where it would not add value.

Getting more from less

One significant recurring cost of operation for carriers is the monthly cost of environmentally managed facilities used to house the equipment needed to operate the service. Because the managed facilities are in high demand and costly to operate, every inch of shelf space allocated is quite valuable, creating a need to maximize the number of customers each system can support.

The AdvancedTCA form factor offers greater space efficiency than either PCI or CompactPCI form factors. With AdvancedTCA, each blade is longer and wider, offering up to 140 square inches versus 57 square inches for CompactPCI and 51 square inches for PCI. Figure 2 shows blades in the AdvancedTCA, CompactPCI, and PCI form factors. AdvancedTCA also offers more continuous space per blade, which allows more circuitry on each blade with less room wasted by connectors and mounting brackets. In addition to the larger and denser platform, AdvancedTCA also

specifies a 200 W power budget per blade and improved cooling resources with better airflow over the blade, so faster and hotter processors can be squeezed onto each blade.

Reducing the cost of connecting

In addition to the cost of physical space, carrier applications experience costs associated with connecting equipment to other elements in the network. As the density of the interconnection circuit increases, the cost per individual circuit or user drops. For example, one optical OC-3 circuit with 2,016 voice channels typically will cost less per channel than 84 individual T1 circuits. High-density circuit savings surpass the actual circuit costs and include the cost of equipment to terminate and cable the circuit.

The large AdvancedTCA form factor cards and array of physical interfaces available help carriers leverage high-density circuit savings because they allow high-density OC-3 and even OC-12 circuits to terminate directly on individual cards. Carriers can then build solutions to reduce the cost of each channel and avoid the costs of multiplexing equipment and associated cabling.

Enhanced reliability

With the increasing density of platforms, each component carries a greater number of customers. This increases the risk that a single failure could cause significant outages and negatively impact customer satisfaction and associated revenue. Carrier solution designers carefully review reliability and features like High Availability (HA) with hot standby cards as a way to mitigate this risk and achieve 99.999% uptime.

Reliability enhancements are a hallmark of the AdvancedTCA platform over PCI or CompactPCI platforms. HA builds full redundancy of all the elements in the system into the standard. For example, distributed power conversion on each blade makes the system tolerant to a failure on any board. In addition, the high bandwidth fabric interface in the AdvancedTCA platform can be used in various redundancy schemes. Developers can also use AdvancedTCA's fabric interface to efficiently connect any line card to any processing resource to create pooled resources and

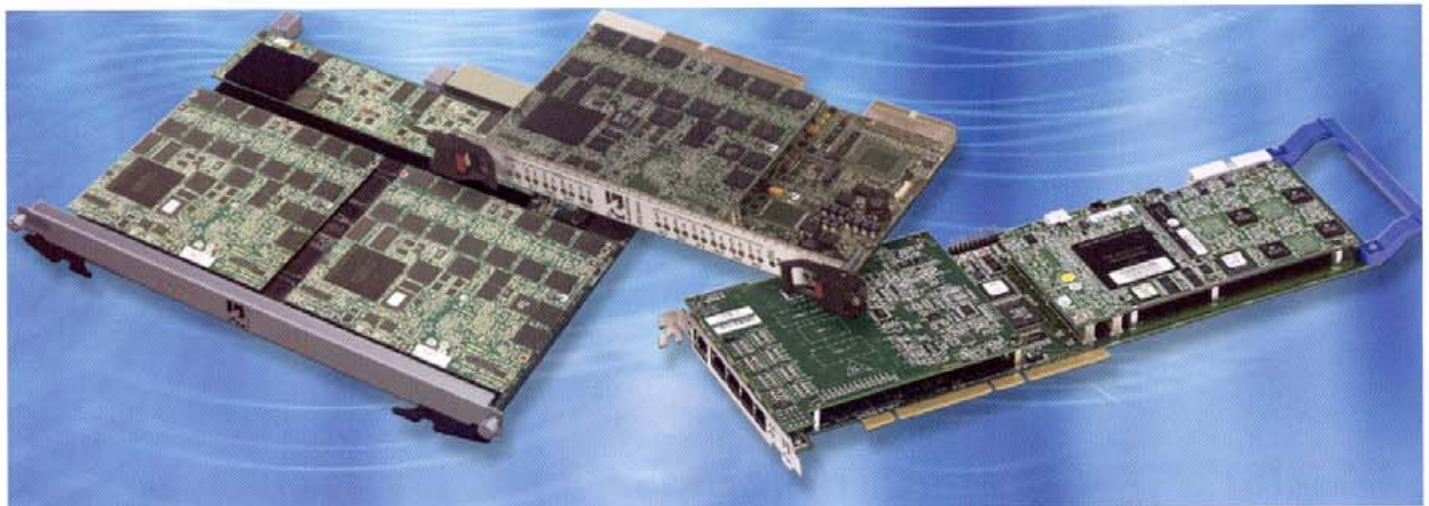


Figure 2

DISTRIBUTED SWITCHING/ MEDIA GATEWAYS


cost-effective N+1 redundancy of expensive media processing resources.

Reducing development costs

The use of a standards-based platform frees telephony equipment manufacturers from the time and expense of designing their own platforms. This allows them to focus on software applications and system integration that maximize their competitive advantages. The AdvancedTCA specification provides exceptional freedom for manufacturers and carriers to expand their resources, offer better services, and maintain control of inventory and maintenance costs.

Summary

It may take some time for all participating vendors to optimize AdvancedTCA offerings, but with several early AdvancedTCA platforms already available on the market and more introduced every month, market momentum appears to be building.

AdvancedTCA will not be the final word on hardware platforms for telecommunications solutions, but for now, the high density, scalable solutions that can be built based on AdvancedTCA platforms fit a wide range of telecommunications needs, especially for solutions that leverage VoIP. The larger packages, improved power and cooling capabilities, greater interface options, and modular approach appear to solve numerous challenges and offer tremendous promise for better customer service and better profitability for the telecommunications industry. 

Further reading

AdvancedTCA Specification: www.picmg.org

Breaking the scaling barrier: How packet-based CompactPCI systems enable large-scale solutions:

www.compactpci-systems.com/articles/id?301

AudioCodes AdvancedTCA Platforms:

www.audiocodes.com/Content.aspx?voip=25

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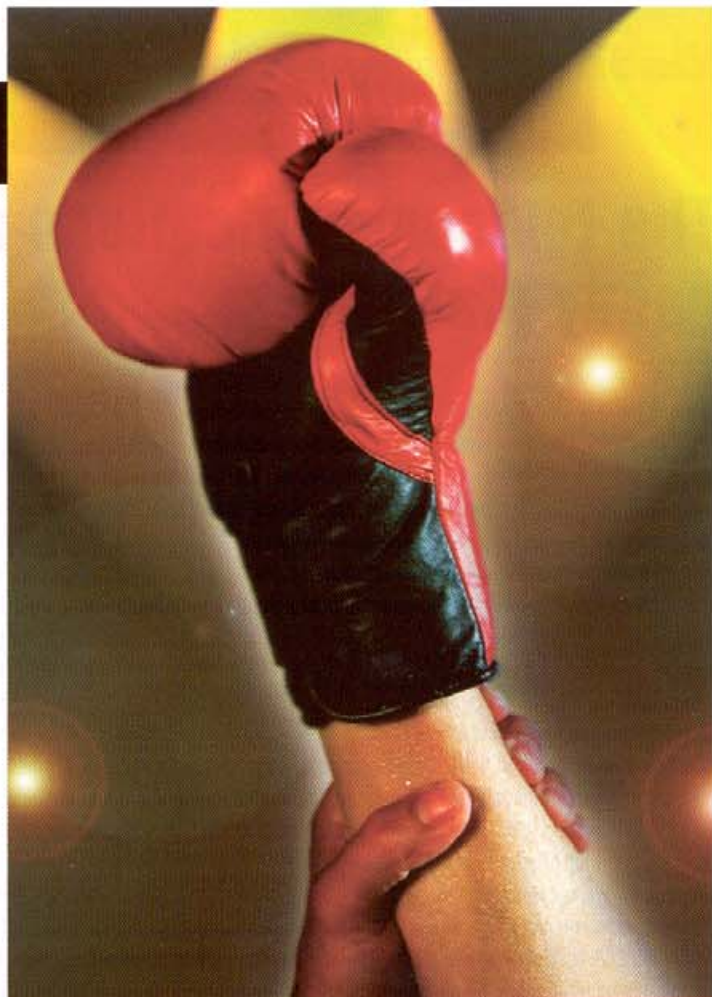
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