INFRASTRUCTURE

The Impact Of ATCA On Telecom Economics

By Bart Stuck and Michael Weingarten

In December 2001, we wrote an article entitled "Chipping Away at Value-Added," (see *BCR*, pp. 50–53; downloadable at www.signallake.com/publications), in which we argued that the advent of high-speed merchant silicon would result in a fundamental reduction in value-added at the systems level (a dynamic that had already happened in the PC world).

Fast-forward four years, and a lot has changed. Due to the telecom depression, high-speed merchant networking chips so far have failed to obtain substantial market traction. Instead, the focus of standardization activity occurred at the system rather than the chip level, with ATCA (Advanced Telecom Computing Architecture) and MicroTCA gaining important support from major players such as Intel, Xilinx, Ericsson, Lucent and Motorola (see "A Primer on ATCA and MicroTCA").

However, despite the shifted focus, the end result is likely to be the same one we predicted four years ago: Commoditization of carrier-grade networking equipment. Since ATCA substitutes modular open standard designs for proprietary

A Primer On ATCA And MicroTCA

Advanced Telecom Computing Architecture (see http://atcanewsletter.com/) is a new industry standard for telecom equipment sponsored by PICMG (http://picmg.com/), a major industry standards body (the Personal Computer Interconnect—PCI—Industrial Computer Manufacturers Group).

For the past 25 years, the PC industry, under the supervision of PICMG, has benefited from standard interfaces and physical packages for motherboards, for add-on cards, and for interfaces to the myriad different hardware and software components used in PCs. This has resulted in high volumes, high quality and low prices. PICMG now has more than 450 members participating in standards activities.

In contrast, the telecom equipment industry has continued to be characterized by largely proprietary designs, resulting in relatively high prices and low unit volumes.

In 2001, PICMG formed the Advanced Telecom Computing Architecture (ATCA) standards group to help develop a PC-style modular approach to telecom equipment. Today, more than 200 companies are active in this standards body. Most major chip, component and system makers support ATCA.

ATCA's approach will permit multiple vendors to build cards and boards for switch/routers and allow these cards and boards to be used in multiple applications and in multiple vendor product lines. This will improve product reliability (e.g., industry-standard hot swappable hardware and software, including power supplies and fans) and will drive down prices—thanks to greater economies of scale in manufacturing and less time spent on details that will be standardized by ATCA (e.g., power, cooling, mechanical spacing and connectors issues).

A separate but related organization, the Service Availability Forum (http://www.saforum.org), concentrates on developing standards for embedded management software; this software is typically high availability (hot swappable), hardware- and operating system-independent. While there is no explicit link between SAF and ATCA, there is significant membership overlap.

ATCA physical design was aimed at the telephone carrier end office or switching center environment, where numerous wire pairs, optical fiber transmission systems and operations support computer systems need to be interconnected to provide telecom services.

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components, in theory it can substantially lower the cost of high-end gear.

(Parenthetically, the onset of open-standard boards means renewed demand for standardized merchant chips, so we continue to believe that the economics discussed in our earlier *BCR* piece will occur.)

Having said this, what is the level of prospective savings for networking customers? For some time, we've been hearing about the potential cost savings from deploying ATCA versus proprietary switching equipment, but we haven't seen quantification. We decided to address this shortcoming by doing our own analysis for two switching configurations (8 × 1-Gbps Ethernet + 1 × 10-Gbps Ethernet lower end; 96 × 1-Gbps Ethernet + 12 × 10-Gbps Ethernet higher end). For each configuration, we compared costs and street prices for the industry leader (i.e., Cisco, with proprietary equipment) versus ATCA/MicroTCA equivalents.

Industry Leader Economics

For the Cisco gear, street prices were obtained by looking at representative eBay prices (which may be lower than actual street prices, since Ebay equipment tends to be surplus goods); costs were based on applying the company's 69 percent corporate gross margin. This yielded estimates shown in Table 1:

ATCA Economics

For ATCA, we configured the lower-end switch using a minimal MicroTCA configuration with a double-wide AMC connected to eight 1-Gbps Ethernet and one 10-Gbps Ethernet CX4 I/Os. We configured the high-end switch in two ways:

- With an ATCA chassis including 12 carrier cards holding 12 AMCs (six with 8 × 1-Gbps I/O cards; 12 with 10 Gbps CX4 I/O cards). The chassis includes two shelf managers and two hub non-blocking switch blades for redundancy.
- With a 150-mm MicroTCA chassis including 12 AMCs (six with 16 × 1-Gbps I/O cards; six with 2 × 10-Gbps CX4 I/O cards) and two VCMs (virtual carrier managers) that provide redundant non-blocking switching.

We assumed that AMCs, carrier cards, VCMs and shelf managers would be using full ASICs and be produced in volume.

Since the ATCA cards would be open standard modular designs, we assumed that gross margin would be closer to the 42 percent margins

TABLE 1 Current Industry Leader Switching Prices And Costs

	8xGE + 1x10GE (Lower End)	96xGE + 12x10GE (High End)
Street Price	$14,320	$141,600
Cost	$4,439	$43,896
Gross Margin	$9,881	$97,704
% GM	69%	69%

Source: Signal Lake analysis, eBay prices

Carriers are very much intrigued with ATCA-compliant hardware designs, because it will permit them to add software to provide unique value-added services, and to have multiple sources of hardware and management software.

In the ATCA architecture, as many as four 2.75" × 7" advanced mezzanine cards (AdvancedMC, or AMCs), each performing different functions, are mounted on a single carrier card (CC), which is then mounted onto a slot in a standard ATCA chassis/backplane. Alternatively, eight half-height AMCs can be mounted on a single carrier card.

MicroTCA

In late 2004, a subgroup within ATCA was established to pursue a variant of ATCA called µTCA or MicroTCA (Micro Telecommunications Computing Architecture). In MicroTCA, ATCA AMCs would connect directly onto a chassis backplane, without the need to be mounted on an intermediary carrier card.

MicroTCA was intended to be a lower-cost version of ATCA, aimed at telecom carrier outside plant environments, such as remote terminals, subscriber loop carrier, wireless base stations, digital subscriber loop access multiplexers and IP video, as well as for CATV multiple system operators deploying CATV modems, VOIP and the like.

ATCA/MicroTCA Market Size And Potential

The market size for ATCA/MicroTCA products is small today, but it has huge growth potential. Most major telecom equipment providers are supporting ATCA/MicroTCA, with major non-participants being Cisco and Juniper (and to some extent, IBM).

One consulting firm (Crystal Cube, www.crystalcubeconsulting.com) has predicted that ATCA will represent a $20 billion market by the end of 2007, with 1.5 million serial backplanes shipped, and $60 billion by 2009. (Others forecast a market smaller than $10 billion.)

Hence, the market potential for ATCA/MicroTCA appears to be significant in the years going forward. Most industry insiders predict that by mid-2006, there will be working prototypes, with volume production beginning in 2007□

Acronym Glossary

10GE	10 Gigabit per Second Ethernet
ATCA	Advanced Telecommunications Computer Architecture
GE	Gigabit per Second Ethernet
IPMI	Intelligent Platform Management Interface
MicroTCA	Micro Telecommunications Computer Architecture

Standardized ATCA compliant gear could cost 80–95 percent less than current prices

TABLE 2: ATCA Configuration Prices And Costs

	Low-MicroTCA	High-MicroTCA	High-ATCA
Street Price	$990	$22,341	$41,172
Cost	$574	$12,958	$23,880
Gross Margin	$416	$9,383	$17,292
% GM	42%	42%	42%

Source: Signal Lake analysis

currently enjoyed by Lucent, Ericsson, Nortel and Alcatel, as compared to the 65–70 percent margins of Cisco, Juniper and Foundry. While 42 percent is higher than Dell's 18.5 percent or Netgear's 28 percent, this is justified by the additional systems, software and support required by telco customers.

The results for the ATCA configurations are shown on Table 2.

ATCA versus industry leader costs and prices are shown on Table 3. The results indicate that ATCA (and in particular, MicroTCA) unit costs with redundant non-blocking switches and 3–5–nines availability are 45–85 percent lower than the industry leader's. Unit prices, based on lower assumed percentage gross margins, are 80–95 percent lower.

TABLE 3: Ratio - ATCA versus Current Industry Leader Per-Unit Economics

	Delta: Low	Delta: High (MicroTCA)	Delta: High (ATCA)
Street Price	-$13,330	-$119,259	-$100,428
Cost	-$3,865	-$30,938	-$20,016
Gross Margin	-$9,465	-$88,321	-$80,412
	Ratio: Low	**Ratio: High (MicroTCA)**	**Ratio: High (ATCA)**
Street Price	6.9%	15.8%	29.1%
Cost	12.9%	29.5%	54.4%
Gross Margin	4.2%	9.6%	17.7%

Source: Signal Lake analysis

Conclusion

Our calculations suggest the huge potential of ATCA/MicroTCA to transform the networking industry. The comparison is not entirely apples-to-apples, in that the intelligent platform management interface (IPMI) software used to manage our ATCA equipment is less capable than Cisco's IOS or Juniper's JUNOS. However, we have no doubt that over time, IPMI as an open standard will be extended to include additional functionality at attractive marginal costs/prices.

As a result, in the long term, the telecom industry is destined to look more and more like the computing industry, albeit with higher service/support/reliability requirements□

Companies Mentioned In This Article

Cisco (www.cisco.com)
Ebay (www. ebay.com)
Ericsson (www.ericsson.com)
Foundry (www.foundrynet.com)
Intel (www.intel.com)
Juniper (www.juniper.net)
Lucent (www.lucent.com)
Motorola (www.motorola.com)
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