Transitioning to VoIP: All-in-One Blades or Modular ATCA Solutions?

The combination of the ATCA form-factor along with the debut of the AMC modular card offers developers a wide choice of options for implementing network and communication equipment—to integrate many functions on one board or to customize a larger carrier board with a selection of modules?

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One hundred years of technology investment has created one of the most reliable voice networks the world has seen. But the writing is on the wall: the legacy infrastructure is soon to be replaced by more agile Voice-over-IP technologies, carrying voice as packets over a robust real-time data network. From the tried and true ILECs to the latest "download me now to make free phone call" challengers, the race is on to upgrade or replace legacy equipment.

This creates an enormous opportunity for developers who understand the needs, priorities and solutions available to create Voice-over-IP equipment to replace the legacy infrastructure. The developer's challenge is figuring out which of the competing form-factors provides the right platform to serve as a foundation for the next-generation network.

Shifts in Technology

A number of changes in technology have fueled a shift in the way network equipment is developed. The evolution of the newly defined AdvancedTCA form-factor and its offspring AMC modules along with MicroTCA form-factors has provided a framework that enables multiple vendors' blades to interoperate in a highly reliable and mechanically sound package. Along with these standard form factors a set of standard protocols has arisen. Now, instead of closed protocols required for command and control of network components, standard protocols, including SIP, H.323 and MGCP, allow different vendors to interoperate their equipment without expensive custom development.

On all fronts, advances in processor technology have brought intelligence down to the module level. Increased computing capabilities in smaller packages and improved embedded operating system technologies have created a shift to AMC module-level intelligent devices. Complete media gateway and media server technologies are now available as modular one-blade resource cards. With these changes in technology, a whole new paradigm has evolved that allows integrators to build not just at the blade level but also at the module level.

The ATCA specification was designed to help manufacturers lower equipment cost by permitting the use of off-the-shelf components. The ATCA also increases flexibility and functionality by providing a large board area—8U by 280 mm deep—and a 200-watt power draw (Figure 1). This accommodates dense, processor-intense designs that meet the demand for new high-speed data services and expanded carrier IT services. The combination of functionality, flexibility and redundancy of the ATCA specification produces a platform that carriers can use to optimize services and improve profitability.

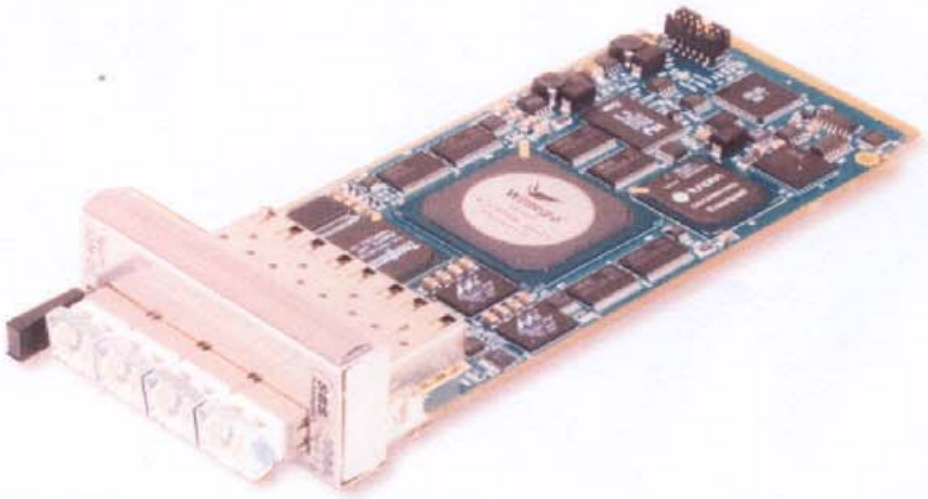

Figure 2 A network processor-based full-height Telum 1204-03 AMC module from SBS designed for high-availability telecom edge access applications.

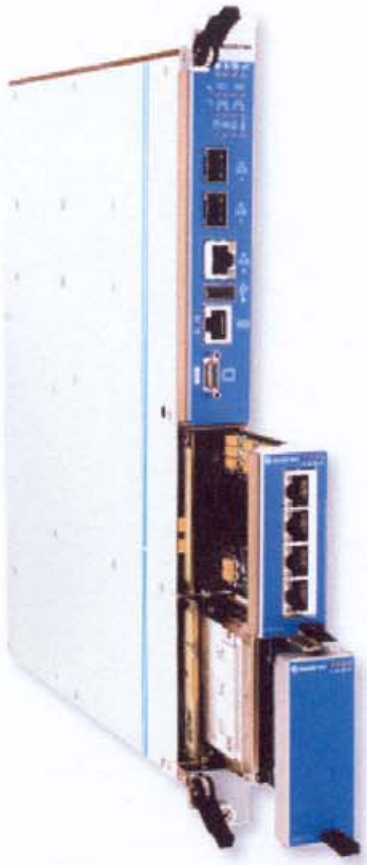

Figure 3 Kontron ATCA CPU blade with optional AMC modules.

In other cases, a designer may find all or many of the needed resources on one or more AMC modules and would like to integrate these resources together into one ATCA slot. When this is the case, an AMC carrier blade would allow the various modules to be combined into a custom ATCA blade slot. AMC carrier blades have no native functionality; they simply provide connectivity, power and cooling to the associated AMC modules.

Making a Decision

With so many choices between full-size ATCA blades, leveraging AMC module add-ons or complete AMC-based solutions, what are the advantages of using one approach vs. another?

Full ATCA Blade-level integrations offer a number of advantages that designers find appealing. Full-size ATCA blades can access the optional rear transition module (RTM). In highly specialized network interface technologies,

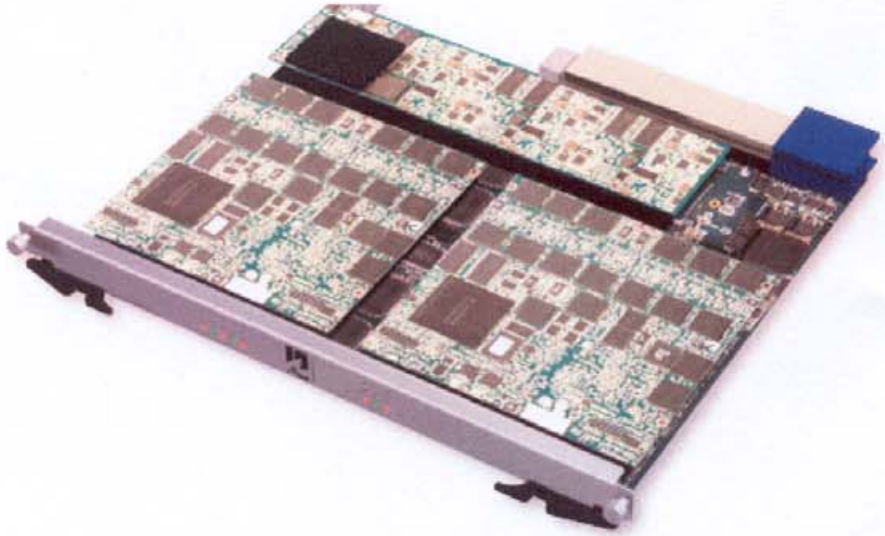

Figure 1 AudioCodes TP12610 ATCA media gateway board.

Leveraging Blade and Module-Level Resources

Designing telecommunications solutions at the blade level typically includes choosing one or more standard form-factor ATCA boards (or blades) that perform some portion of the total solution functionality. These blades are combined into an off-the-shelf chassis to create an integrated application or network element. Examples of complete blade-level components are:

• CPU Blades – containing complete Pentium-class processors, memory and hard disk on a single board able to host complex applications.

• Media Gateways – providing both network connectivity and media conversion needed to interface between the legacy TDM network and VoIP-based networks

• Media Servers – offering complex media processing capabilities that include transcoding, conferencing, tone detection, etc.

• PSTN Interface cards – providing network interfaces and signaling to the legacy TDM network using CAS, ISDN or SS7 signaling

Building solutions at the blade level is not new. In fact, designers have done similar integrations for years. What is new are the standards that make integration easier and less costly. Standard-based protocols and the ATCA base interfaces have replaced custom- developed drivers and APIs that were hard to use and even harder to debug. Intricate dependencies between the host operating systems, device drivers and APIs have all but been eliminated in standards-based solutions. As a result, the ability to build custom solutions at the blade level is now within reach of many more engineers.

One of the unique features of the ATCA form-factor is formalization of the ATCA Mezzanine Card (AMC), a module-level component that can be added or combined with other modules into one ATCA slot (Figure 2). In many cases, a full-size ATCA blade with native base functionality (e.g., a CPU blade) can provide one or more open AMC module slots. In this situation, an AMC slot permits flexibility in adding expansion or additional functionalities into the existing blade. Adding hard disk storage is one example of an ideal application for AMC modules on a CPU blade (Figure 3).

such as T1/E1 interfaces, VoIP gateways and ATM, the design of the blade is generally split to leverage the RTM feature found on ATCA blades. This brings the network interface logic to the rear of the chassis, simplifying wiring and serviceability. By focusing the technology design into one dedicated blade, vendors are also able to optimize the density of the product, utilizing every square inch of the ATCA form-factor.

While ATCA remains a mechanically complex platform, building a one-blade solution reduces the number of connectors and mechanical support needed for a number of AMC modules with positive effects on reliability. ATCA supports sophisticated redundancy and High-Availability (HA) features that allow one blade to take over when another one fails. The complexity of HA often prevents multiple vendors from integrating these features at the AMC module level. In addition, if a single vendor designs the blade, the probability of inter-vendor compatibility issues is reduced.

However, many solutions can leverage a combination of base functionally on an ATCA blade and one or more AMC modules. This approach also offers some unique advantages, one of which is flexibility. Developers can now choose from a wide array of special-purpose AMC modules, enabling new combinations of features in the same shelf. This often lets designers eliminate separate blades or whole chassis from the system design, saving space and money.

And let's face it. No single vendor can do it all. Integrating at the AMC level also opens the opportunity to use multiple AMC vendors in one slot to get the unique mix of performance and functionality that can add value to a design. By stocking module-level AMC components, failures in the field can be quickly repaired or replaced without removing or replacing an entire ATCA blade. Also, stocking only AMC modules reduces the cost of maintaining a spares inventory.

Making the Choice

Given the array of advantages of both blade-level integrations and pre-packaged solutions, how does a developer choose a path forward? Table 1 offers some possible situations in which a company might find itself and offers a suggested development path.

Situation	Suggested Path
Project requires interfaces to existing PSTN or other legacy physical interfaces. Based on requirements, legacy interface and High Availability are top priorities.	In most cases, legacy PSTN interfaces will require a Rear Transition Module (RTM). Only full-size ATCA blades support RTM interfaces and can provide the rear connectivity required in carrier-class applications.
Project has legacy PSTN interface requirements but no single vendor can deliver a complete one-slot solution. High Availability is not needed.	Investigate the potential of an ATCA blade with open AMC slots that can be populated with a set of modules to complete functionality.
Project has no legacy PSTN interface requirements but does require a range of processing and storage needs.	Consider an ATCA processor blade with optional AMC slots to allow expansion that might include DSP processors, disk storage or other complementary technologies.

Table 1

As the legacy carriers and next-generation communication tools begin to leverage VoIP technologies for infrastructure, ATCA and AMC modules will surely play an important role. By choosing the right combination of blades and module technologies, developers have an opportunity to maximize the value proposition for their customers and create a network that will continue to provide reliable services for the next 100 years.

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