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Making the right ATCA connections

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The Advanced Telecommunications Computing Architecture (ATCA) is a series of industry-standard specifications governing the embedded computing systems used in next generation communications equipment. On the connectors side, ATCA presents system developers with a need for a re-think, as pre-ATCA-era products are often, at best, a compromise in these applications. Erwin Gelderblom of Molex looks at how to address ATCA connector requirements

The ATCA defines a number of new blade (board) and shelf (chassis) form factors. ATCA shelves work with a new family of carrier boards, each of which can accommodate up to eight hot-pluggable advanced mezzanine card (AMC) modules. This arrangement allows system architects to add functionality as needed and to reconfigure existing systems with standard building blocks.

Many applications will, for the time being, continue to use XAUI interfaces with four pairs operating at 3.125Gbit/s. However, the AMCs defined by the specification allow transmission speeds of up to 10Gbit/s on each signal pair. The new connectors allow designers to build in 10Gbit/s compatibility at no extra cost, thereby providing immediate support for 10Gbit/s boards when they become available.

With the ATCA, the circuitry on each carrier card is located in a front-board region while connectors populate the area near the backplane. This latter region is divided into a number of different zones, depending on the type of connector.

The specification calls for zone 3 – the upper section of these cards, housing the signal connectors - to be compatible with a range of different types of interconnect. Connector suppliers like Molex are providing several options. One is to use optical connections. For this purpose,

Molex is offering connectors which can provide 1, 8, 12, 24 or even 72 optical connections in a single housing.

Also for zone 3, Molex is providing three-pair, Very High-Density Metric (VHDM) connectors which can accommodate XAUI and double-XAUI channels. These allow the high-speed channels above 3.125Gbit/s NRZ to be moved to zone 3 which, when VHDM HSD leads are used, enhances signal integrity performance.

Another attractive option for Zone 3 is the use of two-row connectors. With the best of these, 26 channels with serial data rates up to 12.5Gbit/s NRZ can be transported in just 25mm of card space. This design approach minimises the requirement for high-speed backplane layers.

As well as requiring high-bandwidth signal connectors, ATCA carrier boards also require power connectors capable of carrying the high currents needed by modern telecommunications equipment. Located in the so-called Zone 0 of the ATCA rack, the power connectors need to combine blind mating with robust construction and reliability. These needs are addressed by, for example, Molex Power Dock connectors. Configured appropriately, they can serve a wide variety of power applications in conjunction with certain signalling requirements. Individual power contacts are rated at up to 35A, while signal contacts can handle 3A. Also available are 10mm-high power connectors capable of handling up to 50A on a two-circuit housing.

The AMC modules which plug into ATCA carrier cards are currently standardised in full-height (30.45mm) and half-height (15.24mm) versions, each using either a single- or double-width format. These AMC modules are a fundamental building block of the ATCA architecture, and are responsible for much of its versatility.

Most standard I/O connectors are too large to fit on the front panel of an AMC0 (half-height) module. This has slowed their adoption, despite the potential advantages of space savings and versatility that they offer. The situation has now been addressed by the introduction of compact I/O connectors specifically designed for AMC0 applications, as shown in the main image opposite.

A good example of these new connectors is Molex's EMILY range of low-profile products for E1/T1 applications. This is a shielded interconnect system which is compatible with 15mm card pitch, and which offers a compact alternative to the tip-and-ring E1/T1 connectors normally found in access products.

Complementing the EMILY connectors are low-profile RJ-45 jacks for AMC0 modules. These provide convenient shielded connections of the type commonly used for Gigabit Ethernet and 2Mbit/s circuits. These can be front mounted in four-port frames and feature solderless compression contacts for easy assembly.

Even with full-height AMC modules, it can be difficult to accommodate RJ-45 connectors. With conventional connectors of this kind, the cable-retaining clip often partially obstructs the face of the adjacent module. Some suppliers have worked round this problem by reducing the number of RJ-45 connectors on their full-height modules from eight to four, but the latest connector designs mean that this compromise is no longer necessary.

The telecommunications infrastructure is being considerably improved by new architectures like the ATCA. However, it is important to remember that these schemes also make correspondingly greater demands on connectors.