

Case Study

Computer-on-Modules

The Solution to Technology Evolution

*Computer-on-Modules:
Enabling Longevity and Scalability
for Innovative Embedded Applications*

ETX®

ETX® 3.0

ETXexpress®

ETX® Certified
Partner Program

Computer-On
Modules

Blades &
Mezzanines

CPU
Boards

Systems

Mobile
Rugged

Custom
Solutions



kontron

Executive Summary

Computer-on-Modules (COMs) can be simply defined as a module that contains all the components needed for a bootable host computer, packaged as an off-the-shelf component. System expansion and customization for each solution is implemented on an application-specific carrier board. Together, the COM and carrier board deliver the functionality of a single-board computer.

Volatile demand fluctuations and intense competition are constant challenges in the embedded application market. With the continuing evolution of processors and new and faster buses, embedded system developers are confronted with the problem of how to implement these new capabilities into their designs while also developing unique capabilities to gain a competitive edge. COM methodology has become a well-accepted technique to enable designers to overcome this obstacle.

Many of today's most innovative embedded application segments, such as industrial automation, medical imaging and retail point of sale, utilize COM implementations because they fit mechanically, economically and functionally. This increasingly popular approach offers advantages such as high levels of processing performance and I/O bandwidth in a compact form factor.

More importantly, today's COM solutions can help embedded system designers achieve faster-time-to-market, reduced development cost and minimize design risk, simplified future upgrade paths, scalability, and increased application longevity – all leading to the potential for increased market share.

The Solution to Technology Evolution

By Christine Van De Graaf
Product Marketing Manager, Kontron

Utilizing Computer-on-Module Methodology for Longevity and Scalability

Embedded developers that implement a Computer-on-Module solution soon realize its longevity and scalability benefits. Embedded modules must scale in performance and features so that solutions can be tailored to meet the needs of different applications or segments. Modules that can be exchanged like components are needed to enable future upgrades and extend development work into new uses.

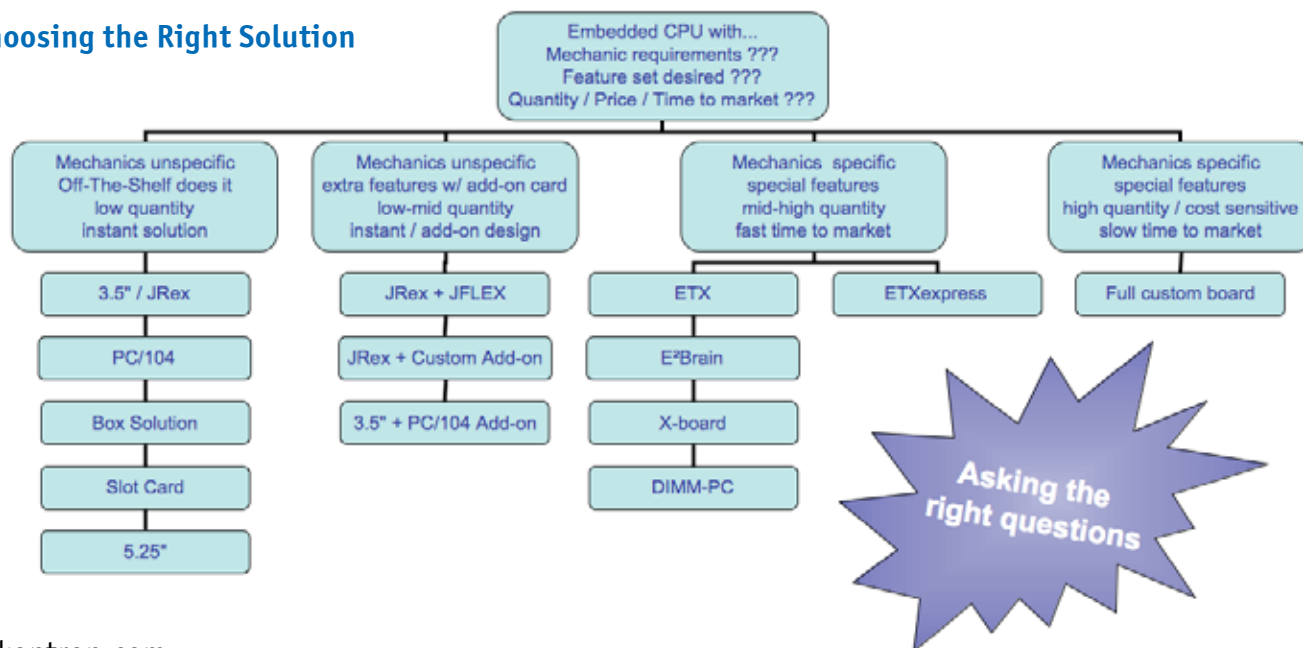
COM methodology enables developers to keep pace with advances in processor architecture and serial interface technology without the need to reengineer their products for each next generation of technology. This alleviates the need for complete system redesigns when embedded processors become obsolete. It also facilitates seamless upgrades to next-generation processors and features, providing much needed scalability for their applications.

Kontron understands that preserving existing designs for future upgrades are also extremely important. Pin definitions need to be consistent within a product family. Interface and technologies need to be standards-based. That is why Kontron supplies a full line of modules based upon the ETX and ETX 3.0 standards. Modules based upon ETX 3.0 guarantee that all the latest interfaces including Serial ATA will always have the same physical location on each board. This consistency of design ensures scalability between ETX product family modules.

ETX and ETX 3.0 modules enable multiple solutions from a single carrier board design. Plus, common development tools make it easy to deliver new solutions. Developers can then choose among various modules to deliver different levels of features and performance within an application. New features, such as higher processing power, next-generation interface I/O, and other performance enhancements may be made by adding new modules down the line to increase the longevity of the application. The objective is to only replace the COM module as an off-the-shelf part, which can be swapped “just-in-time”. This reduces time-to-market to a minimum and enables developers can focus on the application-specific software and carrier board technologies that make their solutions unique, rather than worrying about keeping up with the fast innovation cycles of CPU components and chipsets.

The flexibility afforded by ETX allows OEMs to design differentiated products at various price points or performance levels, giving them a way to future-proof their systems with a built-in upgrade path. In addition, a custom designed carrier board easily works with an ETX module to provide any added functionality that may be required for a specific application. Further simplifying integration and increasing reliability, the carrier board provides the interface to connect the module to peripherals, and connectors can be placed exactly where they are needed to optimize the final package and minimize cabling

Choosing the Right Solution



Modularity

The COM approach puts an entire computer host-complex power on a small form factor module that can be mounted on larger carrier boards containing the application specific IO and power circuitry. All generic PC functions, such as graphics, Ethernet, sound, IDE, FDD, keyboard/mouse, parallel, serial, USB ports and PCI and ISA system buses are readily available on an off-the-shelf compact module. A custom designed carrier board complements the COM with additional functionality that is required for the specific application. The carrier boards provide all the interface connectors to attach the system to peripherals such as hard disk, mouse, and display.

This modularity enables OEMs and system integrators to standardize their system core while offering the ability to customize functions to meet specific application requirements. It also provides flexibility in standard form factor boards that require upgradeable host functionality. For instance, a customer developing a handheld fiber inspection testing application, which is a single device that meets the needs of multiple inspection applications, required the modularity to satisfy changing industry networking standards while still remaining affordable for its customers.

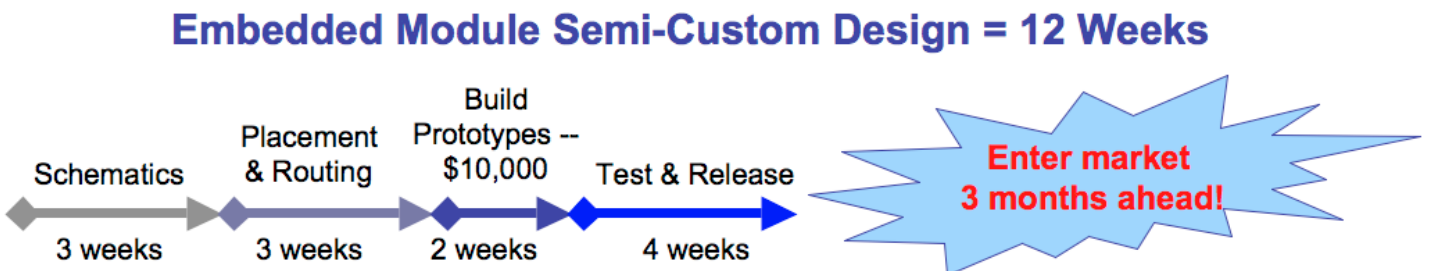
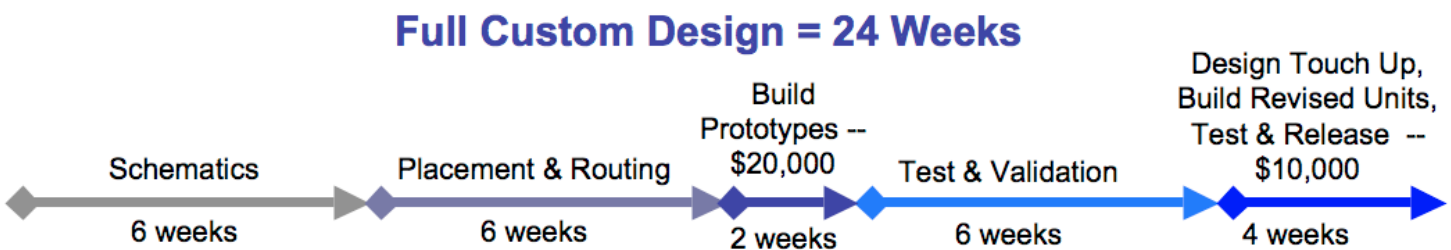
Modularity is also critical for applications, such as the medical equipment industry, that require the flexibility and speed to meet product certifications and approvals.

COMs versus Full Custom Designs

Engineering, debugging and supporting a new single-board computer for each new generation of processor and faster bus can be an extremely expensive and time-consuming undertaking. In fact, a full custom design can average as long as 24 weeks to complete.

However, a pre-developed COM implementation can save design time and reduce costs without sacrificing performance or features. In a proven and stable COM solution, the test and validation phase and need for design revisions are eliminated. In addition, the standard BIOS, drivers and other key components have been pre-tested and qualified, so they are ready to run out of the box. As a result, an embedded module semi-custom design takes on average 12 weeks, a 50 percent improvement when compared to a full custom design. This translates to the ability to enter the market three months ahead by using a COM solution.

For the latest advanced technology, Kontron offers COM solutions such as ETX® and most recently, ETXexpress® (based on COM Express) that are 100 percent compliant with the COM Express standard from PICMG. There are five different CPU performance variations of the ETXexpress-PM computer-on-module that allow embedded systems developers to tailor their designs to meet customer needs.



Packing the highest performance in the smallest 95 x 125mm form factor, ETXexpress modules from Kontron are based on serial differential signaling technology and incorporate interfaces for PCI Express, Serial ATA, USB 2.0, LVDS, Serial DVO and others. The modularity of the design of ETXexpress modules ensures the longevity and scalability of a company's R&D investments thereby giving them a lower total cost of ownership.



Kontron ETX-CD

Adding Value with Certified Design Partner Program

In order to support the development of reliable custom baseboards for the diverse number of possible embedded application solutions based on COMs, Kontron established the ETX Certified Partner Program. ETX Certified Design Partners have been qualified in different levels by Kontron to ensure dependable workflows to create reliable ETX baseboards within the project's specified time frame. Kontron Certified Design Partners offer very quick-to-market and reliable baseboard designs.



Kontron ETXexpress-MC

In response to the rapidly growing demand for custom baseboard designs that support the latest technologies including PCIe and multi-core processors, Kontron expanded the ETX Certified Design Partner Program in November 2006. This expansion and reorganization better supports a wider range of Certified Design Partners and offers more value adding certified services for OEMs that elect to outsource their entire hardware design.



Kontron Universal Graphics Module

Additional information on Kontron COMs is available at www.kontron.com/COM.

For more information on ETX Certified Partner Program, visit www.etx-cdp.com.

AUTHOR'S BIO

Christine Van De Graaf is the Product Marketing Manager of Kontron America's Embedded Modules Division that is located in Northern California's Silicon Valley. She has more than five years experience working in the embedded computing technology industry and holds a Masters of Business Administration, Marketing Management degree from California State University, East Bay (Hayward, CA). Van De Graaf has authored a number of technical articles published in various embedded computing technology trade publications and recently presented at the WindRiver Worldwide Users' Conference on the topic of COM Express and Linux based embedded solutions.

Kontron America
14118 Stowe Drive
Poway, CA 92064-7147
Tel: (888) 294-4558
Fax: (858) 677-0898
info@us.kontron.com
www.kontron.com



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