



Case Study: ADLINK* Technology

How Embedded Intel® Architecture Enables ADLINK to Deliver Multiple Solutions From a Single Platform – Speeding Time-to-Market, Cutting Costs

Summary

There is a lot of talk these days about "modular platforms." Separating the facts from the hype is difficult. Some important questions arise:

1. Do modular platforms really save development time? If so, how much time can we save?
2. How can we stay innovative while reducing our platforms to a modular architecture?
3. What sort of success are others having with the modular approach?

Developers will find the answers to these questions in this case study about ADLINK Technology. Having adopted the modular approach in order to address resource issues, ADLINK is now one of its strongest proponents. Their testimony shows how original design manufacturers (ODMs) can save as much as half the usual development time, while OEMs, integrators, TEMs and others can cut time-to-market even more drastically.

In this ADLINK case study, three embedded Intel® Architecture components form the foundation for two entirely different processing platforms: one for a mobile application, the other for a telecom storage application. Read the complete case study to learn how the Intel® Pentium® M processor, Intel® 855GME

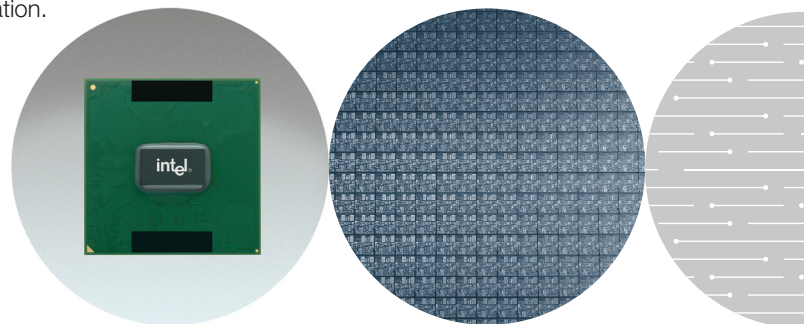
chipset, and Intel® 6300ESB I/O controller hub help ADLINK deliver high-performance, low-power modular platforms for extremely fast time-to-market in two very different solutions.

Background: The Trend to Modularity

Gone are the days when competitive advantage was delivered via highly specialized, proprietary systems. Today vendors must reach volume production in order to profit from the time, effort and cost required to develop the feature-rich solutions demanded by customers.

Thankfully, the volume-related economic benefits to be gained from traditional mass production can be also obtained through design reuse, by which vendors apply core designs to multiple applications. Many design engineers are maximizing scarce resources this way, although reusable design solutions are still mostly proprietary.

Taking the design reuse concept beyond the factory walls, the embedded computing and communications industries are now adopting a modular platform approach to systems design. Engineers integrate a few core components into a "module" that provides a single function – CPU,



for example. One or more modules can then be mixed and matched to deliver a variety of different systems. Which leaves only the application functions to be integrated by the OEM.

By their very nature, modules require standards-based components for complete interoperability. New industry standards are making it easier to modularize in high-performance segments, such as mobile computing and communications. CompactPCI, PCI-X, PCI Express*, AdvancedTCA*, and other specifications offer blueprints for systems design so that components destined for related applications will work together. Such standards-based modules can be built by any ODM and enhanced by any OEM.

Manufacturers adopting the modular platform approach claim that initial product development time can be reduced by half, while design reuse for incremental solutions enables delivery of multiple products with virtually no additional effort. The cost savings can be passed along to the OEM, as well as the end customer.

Design Criteria: Flexibility, Performance, and Low Power

ADLINK has put the modular platform strategy to work in its embedded computing and communications products, speeding development and production without increasing resources.

"Our decision to go modular was based on a need to streamline our design and production resources more efficiently so that we could deliver more products, more quickly," explains Henk van Bremen, product manager for embedded technology at ADLINK.

While modular platforms address the time and cost pressures of the highly competitive embedded computing and communications industries, there is still the challenge of incorporating new technologies, increasing performance, and reducing power consumption. That's why ADLINK uses the Intel® Pentium® M processor with validated chipsets for its high-performance/low-power designs. "There are no other low power processors that deliver greater than one gigahertz in performance; the Intel Pentium M processor is alone in that capability, and will be for a long time to come," claims van Bremen.

Flexibility is also important; modularity must enable greater variety. "We had multiple teams of engineers

working on embedded designs with the Intel Pentium M processor. It makes sense to combine those efforts into modules so that we can maximize design reuse on behalf of our customers," says van Bremen. "Once we have a modular design, ADLINK can build any number of different platforms that deliver a huge variety of applications. By going modular, we'll cut our platform design in half on the original module, and even more so for incremental designs."

The following two scenarios show how ADLINK maximized design reuse and used the modular platform strategy to develop two very different computing solutions from a single platform.

Developing the EM-64: Down to the Basics

ADLINK designed the EM-64 module for a customer needing high performance and low power in a very small footprint for a portable application. For maximum efficiency, ADLINK decided that the solution required only the basics: the CPU, memory and north bridge. The rest of the solution could reside on the carrier board, which also delivered the system application. "We were very precise in selecting our core module components, leaving all functionality to the carrier board," explains van Bremen.

In this solution, ADLINK builds the carrier board on behalf of the OEM customer, incorporating the south bridge and all application components. Van Bremen adds: "ADLINK helps the OEM customer get to market that much faster by designing the carrier board that runs with our core module. All the testing and debugging can be done together, saving months of work."

For this application, ADLINK went with the Intel Pentium M processor for high performance (>1 GHz) at low power. The space-constrained embedded design required highly efficient instruction execution, robust I/O and low thermals. Incorporating the Intel® 855GME chipset at the north bridge reduced the necessary design work – Intel has pre-integrated the chipset for optimum performance "off-the-shelf." At the same time, the "bare bones," two-layer PCB design of the EM-64 reduced the total logic board footprint.

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Product Manager, ADLINK

Removing the south bridge from the core module was part of a calculated plan to make the EM-64 more flexible. Without an embedded south bridge, the ADLINK module can be used with either a 32 or 64-bit carrier board, enabling multiple applications from a single design effort. Carrier boards for the ADLINK EM-64 will use either the Intel® ICH-4 or Intel® 6300ESB ICH in the south bridge, depending on whether the end solution will be 32 or 64-bits respectively.

In the end, the entire EM-64 module was developed in record time: less than three months from the customer requirement to mass production. Now that the core module is complete, ADLINK can develop customized carrier board solutions for other OEMs, delivering new products in less time than it would take to do a full board design. ADLINK plans to reuse the core module for other OEM applications, leveraging the completed design for reduced development costs and faster time-to-market.

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Product Manager, ADLINK

About the Products

ADLINK Technology EM-64 Module:

The EM-64 module is a compact, space-efficient CPU without south bridge. It uses the Intel Pentium M processor with the Intel 855GME chipset in the north bridge. It is designed for use with an ADLINK-built carrier board including either the Intel® ICH-4 or Intel® 6300ESB chipset, depending on whether the customer requires a 32-bit or 64-bit solution. The high performance and low power capabilities make the EM-64 extremely versatile for space-constrained, mobile applications.

ADLINK Technology cPCI-6840 Universal Blade:

The cPCI-6840 features the Intel Pentium M processor and delivers high performance integrated graphics, triple Gigabit Ethernet ports, and PMC optional Ultra-320 SCSI interface to provide the best solution with the most balanced computing and graphics performance available today. As a 32/64-bit, 33/66MHz CompactPCI universal blade, the cPCI-6840 supports PICMG 2.1 Hot Swap Specification, PICMG 2.16 Packet Switching Backplane, PICMG 2.3 PMC on CompactPCI, and PICMG 2.9 System Management Bus for high-end computing servers, multimedia-integration, and telecommunication applications.

Intel® Pentium® M Processor:

The Intel Pentium M processor is designed from the ground up with a new microarchitecture that delivers high performance with low power consumption. Together with validated Intel chipsets, it is an ideal building block for communications blades and space-constrained embedded designs that require highly efficient instruction execution, robust I/O and low thermals, while preserving software compatibility with other Intel architecture processors.

Intel® 855GME Chipset:

The Intel 855GME GMCH and Intel ICH-4 for Embedded Computing are an optimized integrated graphics solution with a 400 MHz system bus and integrated 32-bit 3D core at 133 MHz. It features a low-power design and up to 2 GB of DDR 333-system memory. The Intel 855GME GMCH and ICH-4 are part of Intel's comprehensive validation process that enables fast deployment of next-generation platforms to maximize competitive advantage while minimizing development risks.

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Developing the cPCI-6840: High Throughput, Low Power via "Off-the-Shelf" Solutions

ADLINK developed the cPCI-6840 universal blade to address a different set of issues: introducing new communications standards into an off-the-shelf platform with higher throughput and lower thermal output. For ADLINK telecommunications customers, time-to-market was a critical factor behind the push for an off-the-shelf, universal blade.

The CompactPCI form factor meets the high availability requirements for the telecom industry, while choosing the Intel Pentium M processor and validated chipsets enables the blade to reach 64-bit throughput via the PCI-X and Serial ATA specifications.

The ADLINK cPCI-6840 universal blade is designed for SIs, ISVs, network equipment providers (NEPs), and telecommunication equipment manufacturers (TEMs) that require fast deployment of telecom applications like VoIP, SMS, and media gateways. Since ADLINK has completed all of the core development work to build the universal blade, the off-the-shelf availability of the cPCI-6840 can help ADLINK's customers reduce time-to-market by at least half.

"For the cPCI-6840, the Intel Pentium M processor and the Intel 855GME chipset is a perfect combination. It not only provides high performance

at 1.6 GHz CPU with a fast PCI-X interface, but it also delivers an ultra low voltage solution for great heat dissipation. What's more, the south bridge Intel 6300ESB ICH gives designers more choices for I/O solutions," says van Bremen.

Conclusion

As seen by the two ADLINK examples, the Intel Pentium M processor, along with validated chipsets, can provide an optimal combination of strong computing performance and low power consumption for a variety of applications requiring dense form factors. It's testimony to the versatility of both embedded Intel Architecture and the modular platform approach to systems design.

But ADLINK isn't done yet. This innovative company is working on several other modular designs incorporating the Intel Pentium M processor and other Intel building blocks. With that much effort going into modular system development, it's clear that the strategy works. That's fact, not hype.



A community of communications and embedded developers and solution providers

For More Information:

<http://developer.intel.com/design/intarch/index.htm>

<http://developer.intel.com/design/intarch/pentiumm/pentiumm.htm>

<http://developer.intel.com/design/chipsets/embedded/855gme.htm>

<http://developer.intel.com/design/chipsets/embedded/6300esb.htm>

<http://developer.intel.com/design/intarch/pentiumm/brochure/index.htm>

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