Market Research Proposal

EMBEDDED PROCESSORS

2010-2014 GLOBAL MARKET DEMAND ANALYSIS

Embedded Hardware & Systems Practice

August 2010
Processor technology for embedded systems has expanded from a niche market 20 years ago to a massive expanse offering myriad options as demand for embedded and networked devices and solutions continues. Development of so many markets, as diverse as PC-based and mini-PACs in healthcare to wireless SCADA in energy to massively parallel signal processing in mil/aero, is generating ever-increasing demand for embedded computing and communications platforms – and the microprocessors that drive them.

The embedded processor market is becoming more important for processor suppliers by the day and many of them are strengthening their efforts to serve the segments that make up the market. For the moment, volumes tend to be smaller, but margins richer; differentiation parameters are varied and commodity pressures generally less acute.

But the most important demand driver and opportunity shaper is the specific application being enabled and its unique processor requirements. And more often than not, the applications are mission-critical.

There are two factors highlighting major differences between the larger consumer and commercial processor market for [desktop and laptop] PCs and servers and the embedded processor market. First, the fragmentation in the devices and solutions translates into highly diverse requirements, and a resulting zoo of off-the-shelf options of embedded processing platforms. Second, while the PC/server market supports innumerable applications critical to the health and wellness in virtually every segment of the global economy, these applications ARE the embedded market.

The point is developers of embedded devices and solutions have the technical requirements and the commercial capabilities to justify support for a highly diverse set of embedded processing platform options, including:

- General-purpose CPUs from the PC/server market only mildly modified for the embedded market;
- FPGAs and DSPs for highly repetitive computing;
- Microcontrollers (MCUs) for highly integrated, low cost, low power, and self-sufficient embedded computing;
- Graphics Processing Units (GPUs) used a general purpose processors and many-core processors for massively parallel high-performance applications;
- Various versions of processor core designs offered by Processor-IP houses such as ARM and MIPS;
- Highly integrated SoCs; and
- A broad range of ASICs.

In these markets, embedded processor suppliers must be responsive to the needs of the development environments within which their processors operate. Many embedded processor suppliers now provide software development tools for their own processors in addition to silicon to facilitate application development. In order to compete, or compete more effectively, complementary software components are regularly packaged with hardware; in some cases, marketed aggressively as critical enabling technologies for the new lines of hardware. In many of the highest-performance, massively parallel segments, the silicon is actually designed around the software tool, not vice-versa.
In an effort to more clearly define the new sets of issues and opportunities created by this market – including new application opportunities, customer requirements and modes of competition – VDC Research Group (VDC) is launching a market intelligence update investigating embedded processors, including CPUs, DSPs, FPGAs, MCUs, and GPUs (GPGPUs).

This research will investigate the latest developments, issues, and trends affecting the embedded processor market, including: the affect of multi-core processing on the embedded world, mobility and low power requirements for all processors from CPUs to FPGAs, how the proliferation of various sensors in many different applications will affect the microcontroller market.

**RESEARCH SUMMARY AND OBJECTIVES**

VDC’s *Embedded Processors: 2010-2014 Global Market Demand Analysis* will focus on the device developer community demand for, and the supplier/ partner community readiness to provide, embedded processor solutions that meet the rapidly changing technical and commercial requirements of ever-expanding developer, OEM and integrator communities.

VDC will begin its work by providing clear definitions for the key technical and commercial segments that make up the current embedded processor market opportunity. Developing sharp definitions and segmentations will enable this research to answer a number of critical questions:

- Which specific processor technologies are most in demand?
- How is demand similar/ unique for the largest, fastest growth and most profitable market segments?
- How are products differentiated in a landscape that is becoming more competitive, and how is the market being trained to understand these different technical approaches?
- How are emerging software trends (e.g. virtualization and Electronic System Level (ESL) design) leveraged?
- What development tools must be integrated with processors to support adoption?

Suppliers of embedded technologies need reliable information – not unsubstantiated claims – in order to make sound business decisions. VDC’s *Embedded Processors: 2010-2014 Global Market Demand Analysis* will answer these questions and more with a comprehensive and granular analysis of the embedded processor product, industry, competitive, and developer landscape.

To provide answers to these questions, the new market program will include:

- In-depth analysis of global market opportunity for embedded processors, with detailed market definitions and segmentations and major regional analysis;
- Conservative, granular market estimates and forecasts for all product, vertical, and technology segments defined;
- Device developer, OEM, and integrator requirements and preferences analysis, including technical and commercial requirements and current and future development project requirements;
- Analysis of the structure of the embedded processor supplier community, including leading and emerging supplier market share, position, direction and profiles; and
- Discussion of key issues, forces and trends driving and restraining market growth and development, including opportunities and requirements for supplier to grow share and profit.
RESEARCH SCOPE AND CONTENTS

The 2010-2014 Embedded Processors report will provide market estimates and forecasts, developer requirements, and competitive share for all embedded processor technologies under study. The following section details the technology and market coverage of the report, as well the analyses executed against that coverage.

RESEARCH SCOPE

Processor Coverage
- Microprocessors (CPUs)
- Digital Signal Processors (DSPs)
- Programmable Logic Devices (PLDs) and Field Programmable Gate Arrays (FPGAs)
- Microcontrollers (MCUs)
- Graphics Processing Units (GPUs) used as general purpose processors (GPGPUs)

Vertical Markets/Applications
- Automotive
- Communications Infrastructure
- Consumer Electronics
- Digital Signage
- Digital Surveillance/Security
- Energy/Power
- Gaming
- Handsets
- Industrial Automation
- Infotainment
- Medical
- Military/Aerospace
- Networking/Infrastructure
- Office/Business Automation
- Retail
- Storage
- Telecom/Datacom
- Transportation

Geographical Coverage
- Americas (North, Central and South America)
- EMEA (Europe, Middle East and Africa)
- Asia-Pacific

RESEARCH CONTENTS

Executive Summary
- Market overview and industry structure
- Strategic issues, trends, and market drivers
- Market estimates and forecasts
- Competitive landscape
- Summary and observation

Scope and Methodology
- Segments and definitions
- Data collection tools
- Analysis models
- Sources

Market Overview and Industry Structure
- Technical value chain
- Sales and support channels
- Developers
- Industry standards
- Industry associations
- Key regulatory issues

Technology Trends and Issues
Including, but not limited to:
- Application support
- Lifecycle management
- Multi-core performance issues
- Power consumption and management
- Pricing pressure
- Silicon technology development
- Supplier product road maps
- Technology displacement
- Time-to-market
Market Segmentation, Estimates and Forecasts
Base year 2009 unit and revenue shipment actuals (where applicable) and forecasts through 2014, for the following segments:

- **Total Market**
  - Processor type
  - Vertical market/applications
  - Core architectures as percentage of total embedded processor cores/unit shipments

- **CPUs**
  - Architectures (e.g. x86, Power, MIPS, etc.)
  - Number of cores
  - Vertical markets/applications
  - Distribution channels
  - Geographic regions

- **DSPs**
  - Multi-core configurations (heterogeneous vs. homogeneous)
  - Number of cores
  - Vertical markets/applications
  - Distribution channels
  - Geographic regions

- **PLDs/FPGAs**
  - Embedded hard/soft CPU cores
  - ASIC total available market
  - Key capability/capacity segments (e.g. power, performance, high/low-end, etc.)
  - Vertical markets/applications
  - Distribution channels
  - Geographic regions

- **MCUs**
  - Architectures (e.g. 8051, proprietary, etc.)
  - Bit count
  - Co-processor integration
  - Vertical markets/applications
  - Distribution channels
  - Geographic regions

- **GPUs**
  - Architectures
  - Vertical markets/applications
  - Distribution channels
  - Geographic regions

Device Developer Requirements and Trends
The following analyses will be provided for each embedded processor technology, unless noted otherwise.

- **Respondent demographics**
  - Primary markets served
  - Processor architectures used
  - Processor suppliers used

- **Processor requirements**
  - Lifecycle requirements
  - Design refresh frequency

- **Design power requirements**

- **Software development tool requirements**
  - Compilers
  - Debuggers
  - Simulators
  - IDEs
  - Emulators
  - Performance tuners
  - Programmers
  - Virtual system simulation tools
  - Thread support libraries
  - Parallelization tool

- **Support services offered by embedded processor suppliers** (including, but not limited to:)
  - Technical support
  - Extended lifecycle
  - Diagnostics and troubleshooting utilities
  - Software development
  - Product support and maintenance
  - Ruggedization
  - Obsolescence/EOL Planning

- **FPGA displacement trends**
  - Current usage considerations
  - Perceived advantages/gains

- **Embedded processor selection criteria** (including, but not limited to:)
  - Software/programming tools provided
  - Performance
  - Extended lifecycle guarantee
  - Power consumption
  - Ease of programming
  - Price
  - Thermals

Competitive Analysis and Position

- Supplier position and share by processor type
- Changes in competition
- Strategic direction
Proposal: Embedded Processors

VDC Research Summary
- Summary observations
- Product development and marketing
- Channel position and direction
- Key success requirements and winning strategy elements across select markets

Vendor Profiles
- Corporate overview
- Primary offerings
- Industries and applications
- Geographic regions served
- Channels and customers
- Key partnerships
- Strategies and direction

RESEARCH SCHEDULE

Monthly status reports .......................................................... Begin September 2010
Interim findings ................................................................. One month prior to publication
Final deliverable...................................................................... November 2010

For More Information Contact:

<table>
<thead>
<tr>
<th>Research Team</th>
<th>Account Representative</th>
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<tbody>
<tr>
<td>Richard Dean</td>
<td><a href="mailto:rdean@vdcresearch.com">rdean@vdcresearch.com</a></td>
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<tr>
<td>Eric Gulliksen</td>
<td><a href="mailto:ericg@vdcresearch.com">ericg@vdcresearch.com</a></td>
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PROCESS AND METHODOLOGY

VDC Research strives to create valid and accurate primary market research using a structured approach, analytic tools and proven analytic methods reinforced by information from secondary sources when appropriate.

METHODOLOGY

The rigor of VDC’s research methodology yields data we translate into information and knowledge to create insights that lead to innovation and business results for our clients. This market research service includes a number of data collection and analytic methods that are designed specifically to enable those results:

Market Segmentation and Definition: Definition of market segments, target customers, and competing solutions critical to building accurate estimates, forecasts, supplier position and customer requirements.
- Market Sizing and Forecasts: Models based on supplier shipments, user budget analysis, recent installations, and future purchasing plans. Other key inputs include supplier forecasts of future growth rates, historical data, and economic outlook data.
- Data Verification: Primary and secondary research on target communities and companies is used to validate our results and includes conducting supplemental interviews at target firms, crosschecking with channel partners, estimates from competing firms and checking historical performance.
- Supplier Share and Position: Derived directly from structured, in-depth interviews of leading and emerging suppliers of embedded processors, with specific emphasis placed on current and projected shipments on combination with VDC’s data repository.
- Customer and Channel Requirements and Preferences: Focused on customer and channel partner priorities driving consideration. Topics include a range of product and supplier selection criteria. We will explore current and future preferences for various technologies, feature sets, suppliers, and sources of supply.
STRUCTURED APPROACH AND TOOLS

- **Segmentation and Models**: Detailed analysis of embedded processors and related market segments, customer class communities, products and technologies and channels that comprise market opportunities.
- **Technical Solution Value Chain**: Definition of the hardware, software, and services that constitute the embedded processor technical value-chain.
- **Commercial Value Chain**: Analysis of the relationships between suppliers, channel partners, and enterprise customers that participate in the embedded processor product markets.
- **Data Collection Tools**: Include, but are not limited to in-depth telephone interviews, on-site interviews, and web-based interviews of manufacturers, channel participants, and customers.
- **Research Databases**: Include VDC proprietary sources, research program sponsors, and industry specific third parties (e.g. trade publications, websites, and conferences).

### PRIMARY RESEARCH

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<th>Target Communities</th>
<th>Approximate Sample Size</th>
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<td>Suppliers: Embedded CPUs</td>
<td>Approx. 15</td>
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<tr>
<td>Suppliers: Embedded MCUs</td>
<td>Approx. 20</td>
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<td>Suppliers: Embedded DSPs</td>
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<td>Suppliers: Embedded PLDs/FPGAs</td>
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<td>Suppliers: Embedded GPUs</td>
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<td>Embedded Developers</td>
<td>&gt;300 respondents</td>
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RESEARCH TEAM

- **J. Eric Gulliksen** – *Senior Analyst, Embedded Hardware & Systems*

  Eric has been a lead analyst in VDC’s Embedded Hardware practice for ten years. Prior to joining the firm, he worked in industry for over thirty years, half in the Engineering field and half in Sales and Marketing. He has held Vice-Presidencies and had P&L responsibilities on both sides. Eric has international experience in twenty-three countries, and has been awarded seventeen US Patents. He has a great deal of in-depth technical knowledge in diverse fields, and is a skilled communicator. He has conducted market research in all aspects of Embedded Hardware including Boards, Systems, Processors and MEMS, and developed several of the analysis tools currently in use in the EHW practice.

  Eric holds a BS in Electrical Engineering and a MS in Management Science and Engineering from WPI, as well as an MBA from Clark University, and has completed several short courses in sales, marketing, mining and patent law.

- **Christopher J. Rezendes** – *Executive Vice President*

  Chris has 19 years experience in industrial technology market research and consulting. He has more than 14 years experience in senior management and leadership positions at a number of IT systems and professional services organizations.

  Chris has advised many of the largest and most respected companies in industrial and information technology industries worldwide. He has also worked with many of the most successful private equity and venture capital firms in the Americas and Europe. His work with the financial services community includes proprietary engagements with most of the leading investment banking firms in the world.

  Chris is a graduate of Harvard University.
New Accounts:  Orders must be pre-paid.
Foreign Orders: Payable in U.S. Dollars drawn on a U.S. bank, wire transfer, or by credit card.

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I want to order *Embedded Processors: 2010-2014 Global Market Demand Analysis*. I have read the Contractual Provisions of this proposal, which can be found [here](#) and agree to its terms.

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Name: _____________________________________________

Title: _____________________________________________

Company: ___________________________________________

Street: ____________________________________________

City: __________________________ State ______________

Zip: __________________________ Country:______________

E-mail: ___________________________________________

Telephone: ______________ Fax:_______________________

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Account Number: _____________________________________

Expiration Date: _________________________________

Name on Card: _____________________________________

Signature: ________________________________________

Authorized Signature: ________________________________________________________________