A Modest Approach to the IP Business — that’s Succeeded for Over Ten Years

Bill Finch, VP Sales, CAST, Inc.
March 2004

The IP Cores Business

Huge Promise
► Growing complexity of SoCs
► Easy reuse: plug in a core
► Build once, sell many times

Disappointing Reality
► Design for reuse expensive
► Reuse hard: big support load
► Customize for every sale

How has CAST thrived for 10 years?
A Needs-Driven Evolution

- New Jersey company founded in 1993 by a group of VHDL simulation experts
  - First VHDL simulation library delivered in 1994
  - First IP core delivered in 1995
  - First CAST production core delivered in 1996
- Bootstrapped funding model
  - No external funding or ownership
  - Lean operations, value-oriented investments
- Financially successful
  - Standard product IP Cores business grew by 50% in both 2002 and 2003
  - Consistently profitable (after the first three years)
  - Expanding resources and customer base
- Product/market approach
  - Create generic HDL IP for both ASIC and FPGA implementation
  - Leverage out from legacy-based solutions to high-interest commonly used functions, e.g., PCI, USB, MAC, FireWire, JPEG, MPEG

CAST Success: Growing Customer Base

- Over 400 core sales
- Satisfying 300 different customers

8051-Compatible Microprocessors
- American Microsystems
- AMI Semiconductor, Inc.
- Anspec Electronics
- Beijing Fu Xing Xiao Cheng
- Electronic Technology Stock Co., Ltd.
- Chipcon AS
- Dacronchip Limited
- The East Development Group
- Fluence Technology, Inc.
- GOAL Semiconductor
- Goyatech Technology, Inc.
- Innomic Technology, Inc.
- InnovASIC, Inc.
- inSilicon Corporation
- Integrated Solutions Technology, Inc.
- Jet Propulsion Laboratory
- Micronet International
- MicroTune, Inc.
- Ours Technology Incorporation
- P&G Electronics (USA), Inc.
- Pijnenburg Custom Chips B.V.
- Pregate Group Corporation
- Tachyon Semiconductor
- Telecommunication Lab
- TMT, Ltd.
- Tokyo Electron Device Ltd.
- Toshiba Fuchu Works
- Ultra Electronics
- United States Naval Service
- Vuelet Corporation
- Westell, Inc.
- Wireless Interface Technologies, Inc.
- Other Popular Processors
- ASIC Bank Co., Ltd.
- Celerent Tech. Services, Corp.
- Cubic Defense Systems
- DAE Electronics, Inc.
- DFKI
- LTX Corp.
- Robert Bosch GmbH
- Thomas Midwest Solar Systems Technologies
- Xilinx Technologies
- Bus and Network Interfaces
- CAN System Interface
- Digichip
- EPC
- Infineon Technologies, Inc.
- Jet Propulsion Laboratory
- Micro Systems, Inc.
- Motorola, Inc.
- Olicon A/S
- Phase One
- Pijnenburg SECUREALINK B.V.
- Quantum
- TMT, Ltd.
- Waytels, Inc.
- Multimedia Functions
- Macronix International Co., Ltd.
- Steltek Semiconductor Co., Ltd.
- Video Communication Research Inc.
- Wireless System Technologies

Encryption Functions
- Broad On Communications
- Contitech EF Data
- Fujitsu Laboratories, LTD
- Japan Radio Co., Ltd.
- KODEN Electronics INC.
- Secure Systems
- Satellite Communications
- Adtrann, Sweden AB
- ASA Technologies, Inc.
- International Layer Industries
- MacTel
- Philco-Standard
- BCI Systems
- BTI Photonics
- CER
- CACI Technologies
- CCL/ITRI
- GEC Electronique, Inc.
- DaimlerChrysler Aerospace AG
- DaimlerChrysler AG
- Elan Electronic Systems LTD
- Embedded Wireless Labs San Bh
c- EMC Corporation
- Ericsson Saab Avionics AB
- Goyatech Technology, Inc.
- Grundig AG

Heidelberger
- Hewlett-Packard
- Gipsley
- Honeywell Defense Systems
- Intesel Corporation
- Japan Radio Co., Ltd.
- Jet Propulsion Laboratory
- Kent Ridge Digital Labs (KDDL)
- Kenwood Corporation
- KLA-Tencor Corporation
- Kollmorgen
- Litton Applied Technology
- Lockheed Martin
- Lucent Technologies
- Marconi Communications
- Matsushita Electric Works, Ltd.
- Micro Systems, Inc.
- Nihon Corporation
- Notel Networks
- Northstar Technologies
- Omron Corporation
- Progate Group Corporation
- Rafael - Missile Division
- Raytheon
- SCI Systems, Inc.
- SCI Systems, Inc.
- Siemens AG Munich
- Snap-on Diagnostics
- Sonosite, Inc.
- Space Dynamics Laboratory
- Sparta, Inc.
The IP Marketplace

- Star IP (e.g. ARM, MIPS, Rambus, etc.)
  - Leading edge technology
  - Very expensive $550K & up
- Large EDA vendors (e.g. Synopsys, Mentor)
  - Broad line HDL IP cores
  - High overhead / cost
- Foundry hard IP libraries (e.g. Artisan, Virage Logic)
  - A different kind of IP
- Focused IP companies (ex. Chipidea, Jennic, PLD Applications)
  - Narrow highly focused product lines
  - Largest number of IP companies

Secrets of IP Success

- No secrets, just hard work
- Focus on standards-based IP: offers greatest opportunity
- Dependency on IP revenue leads to significant lessons:
  - Provide a Broad Range
  - Use Application Experts
  - Offer Competitive Prices and Simple Licensing
  - Deliver Complete, High-Quality Products
  - Provide Quick, Effective Customer Support
Provide a Broad Range of IP

- Build trusted provider relationship with designers
  - “one stop shopping” makes IP choice easier
  - Lower risk, higher success rate for the customer
- Business is not dependent on a single market for success
  - No single technology
  - No single geographic region
  - No single market segment
- Easier to become known in the industry
- CAST offers over 100 different cores for new and replacement applications …

CAST Offers 100 Different Cores

<table>
<thead>
<tr>
<th>Processors</th>
<th>Multimedia</th>
<th>Interfaces</th>
<th>Encryption</th>
<th>Basic Functions</th>
<th>Replacement Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>8051s</td>
<td>JPEG</td>
<td>Ethernet MACs</td>
<td>AES</td>
<td>TTL parts</td>
<td>Processors</td>
</tr>
<tr>
<td>Z80</td>
<td>JPEG 2000</td>
<td>JPEG 2000</td>
<td>DES</td>
<td></td>
<td>Bit Slices</td>
</tr>
<tr>
<td>165x</td>
<td>MPEG-4</td>
<td>FireWire</td>
<td>MD5</td>
<td></td>
<td>Controllers</td>
</tr>
<tr>
<td>6805/11</td>
<td>SPDIF</td>
<td>USB &amp; OTG</td>
<td>SHA-1</td>
<td></td>
<td>Peripherals</td>
</tr>
<tr>
<td>68000</td>
<td>I2S</td>
<td>PCI</td>
<td></td>
<td></td>
<td>Timers</td>
</tr>
<tr>
<td>80186tx</td>
<td>CSC</td>
<td>CAN</td>
<td></td>
<td></td>
<td>UARTs</td>
</tr>
<tr>
<td>DSPs</td>
<td>Toolbox</td>
<td>LIN</td>
<td></td>
<td></td>
<td>Z80 Support</td>
</tr>
</tbody>
</table>

Communications
- UARTS
- SDLC
Examples of Multiple Purchases

- Set top box manufacturer
  - R8051
  - Ethernet MAC
  - USB
  - DES

- Wireless ASSP IC
  - R8051
  - USB

- Government contractor
  - R8051
  - SPI
  - I2C

Use Application Experts

- Impossible to own application expertise across entire broad range
- Simply buying or contracting cores doesn’t work
- CAST cultivates ongoing partnerships with key developers
Offer Competitive Prices …

- Control your costs in all areas
- The real development cost is in verification
  - 60%-70% of total development cost
  - Requires application experts and hardware engineers as well as RTL coders
  - Continuous improvements in this area essential
- Different business models for different customer segments
- Wait till standards are set to begin developing
  - The leading edge is expensive
  - May be tough to recover costs at real market prices

… and Simple Licensing

- Understand why you are taking the positions you take on key issues
- Use industry standard approaches
- Avoid legal language where possible
  - It is understandable
- Be flexible – some negotiation is always involved
- Use a single license to cover everything
- Up-front license usually preferred over royalties
Deliver Quality Products

- For designers to be successful, the cores they purchase must actually work
- Quality depends on:
  - Rigorous development process
  - Uniform standards and coding practices
  - Extensive verification
  - Complete deliverables
- Use standard measurements of quality:
  - Code coverage, VSIA QIP, hardware mode
- Implement cores and promote success
  - Demo systems and reference designs; customer products

Provide Great Customer Support

- “Support” begins with first contacts with customer
  - Offer accurate, extensive core info through web site
  - Back this up with solid, detailed documentation
  - Answer queries quickly and effectively
  - Get it right before the sale
- Quality products and well-packaged deliverables reduce need for support
- Effective customer support must be fast
  - Build a 24 hour culture
  - Make the first response useful
  - Realize that this separates your company from the competition
Design reuse is challenging and the IP business is tough

Success comes from:
- Focusing on the right products
- Developing and packaging quality deliverables
- Offering value and simplicity in licensing
- Backing products with application experts and fantastic support

CAST’s success for 10 years shows that this is possible

The IP marketplace is still evolving ...

---

Summary

EW Survey Oct 2002