

Specialists are extracting software and hardware designs from large electronics companies to provide designers with implementations that have already been road-tested

by Nick Flaherty

The world of semiconductor and software intellectual property (IP) is going through some fundamental changes. No longer are the exchanges such as VCX and Design & Reuse the focus of a lot of the IP development. Instead, new business models are springing up to extract ready-made designs – both hardware and software – from large electronics systems companies and the integrated device manufacturers (IDMs) that have to write software for their chips.

“It’s a lot like 150 years ago, with the gold rush,” said Warren Savage, CEO of IPextreme, a three-year old startup that takes hard IP from companies and packages it up for others to buy. “About three years ago there were a lot of small companies out there trying to make money selling IP. We have now seen most of these go under.”

But, Savage noted: “The need for IP is persistent and shows no sign of slowing down. The question is, where is that IP going to come from? We know where the gold is buried and it’s at the IDMs who desperately need the IP to sustain their semiconductor business.”

IPextreme takes the IP from inside the companies such as Infineon Technologies, packages it and provides design support for it. One of the key areas is in IP to support standard protocol, said Savage. He said companies such as Freescale Semiconductor are trying to create ecosystems around standards. In Freescale’s case, it is the PowerPC and the Power.org community that the chipmaker is helping IBM to create, and FlexRay for automotive control systems.

“We help semiconductor companies participate in these markets by releasing some of their semiconductor IP. IBM also came to us and said they wanted to get into the embedded market through SoC and we are working with Power.org to develop new areas for PowerPC architecture. They have this legacy supplier base of people with chips in everything that we can harvest for IP,” he said.

IPextreme is not alone. A UK start-up, Proven Software Solutions, is looking to do the same thing with embedded software. It is taking the source code of software components such as drivers and networking stacks that have been developed by OEMs and that are shipping in volume in the market. This is the ‘proven’ aspect of the approach, and serves to reduce the possible support issues.

“We take software that is proven to work. It’s been tested and debugged but we wanted to go further,” said Chris

Briggs, managing director of Proven. “We do our own independent analysis of the code and provide a report because that will add value to the software itself. So it was important to perform a static analysis.”

The move to carve IP out of larger companies and sell support for it is also not entirely a new idea. Iprias started its business selling Infineon’s TriCore processor in the late 1990s. Since then, the company has branched out into advising companies on a range of IP issues.

“The IP market in semiconductors has changed significantly in some interesting ways,” said Tony Dent of Iprias. “The view of royalty-bearing licensing that would make everyone pots of money was always flawed and is now restricted to the star IP companies. Support remains the major issue, and that is why the EDA companies have had some success – not because they’re better at support but because they can offer an IP product that is proven in a particular design chain. A third-party IP company has to prove its technology in a whole range of design flows – that’s just an overhead too far.”

However, Dent said he does see growth in the market for software IP – that is, deeply embedded, low-level software that is shown to work in specific applications on specific platforms. “Most of our activity now is around the embedded software space,” he said.

“Most semiconductor companies now realise that, although they probably could write some code that would work, they certainly don’t want to face the investment that would be needed to create product-quality, well-verified software for serious use, rather than just a demonstrator. This is a growth area where the business model may work and the buyers are so nervous of the effect of getting it wrong that they are prepared to pay a proper amount for the expertise.”

Dent added: “The second area I still expect to see take off in a bigger way than it has so far is in verification IP – this is still a big issue but it hasn’t really gone the way it seems it should. However, I’ve been saying this for several years so I suppose it might be the videophone of the IP market – always going to be next year’s big thing, but never actually happening.”

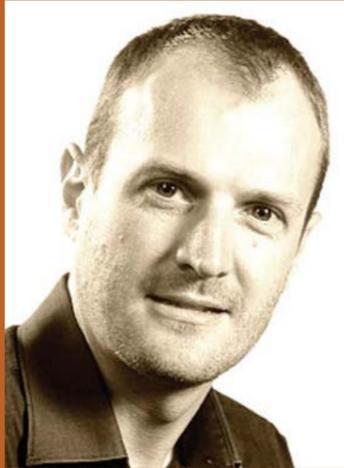
Hal Barbour, president and CEO of Cast, said his company has taken a different approach to providing hardware IP. Rather than looking for large companies with spare IP, Cast concentrates on small suppliers. “Around 30-40% are our own developments, but, increasingly, cores are coming from our partners. Every single core is supported by the original developer. That provides extremely fast technical support.”

Savage said IPextreme is able to use the fact that the IP has been used before as a competitive weapon. “We have a second strategy in the next year of developing for the more high end, but right now we are taking advantage of the fact that →

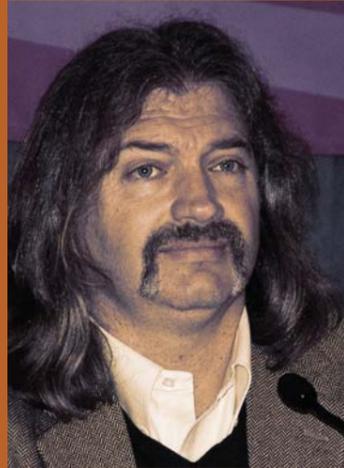
Digging out the gold



Hal Barbour: 30-40% of cores are Cast's own, but more are coming from external sources.



Phil Ling: the model chosen by Proven will let the company handle hundreds of pieces of software IP



Warren Savage: IPextreme's business is "diametrically opposed to conventional wisdom but it's worked for us".

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Proven has 20 products available now running on Toshiba and Renesas processors, said Phil Ling, technical director. “We think we will have over 50 by the end of the year but it could be five or six times that if we are successful with Abacus. We can process 300 to 400 by the end of the year at 60% capacity.”

Support issues are also behind the choice of the particular business model used by Cast, which has racked up 550 licences to around 400 customers. Most licences are for application-specific integrated circuits (ASICs) designs, although more field-programmable gate array (FPGA) designs are emerging, claimed Barbour. The partners include Evatronix in Poland, which developed an 8051 core, multimedia core developer Alma Technologies in the Czech Republic and encryption core specialists Ocean Logic in Australia.

The latest core that Cast is licensing comes from Cortus, a French design house in Montpellier. It has developed a 32bit RISC core that uses 7000 gates, about the same as an 8051 core and considerably smaller than the 32bit ARM Cortex M3 microcontroller with 33,000 gates. The APS is a Harvard-architecture processor with five- to seven-stage execution pipeline and is aimed at integration into ASICs.

There are two versions – one with a full 32bit core and a slightly larger one at 9500 gates that can use both 32bit and 16bit instructions to keep the system memory size and cost down.

“We had been looking around for three years [for a 32bit processor] and then we found Cortus,” said Barbour. The core has been optimised with the C compiler, and tools are emerging from third parties in the Cast network such as MicroCross.

“This core has been developed at the same time as the compiler and tools so these re really tailored to get the best results from C and C++ compilers,” said Chris Kopezyky, vice president of engineering and a former engineer at IPextreme.

Targeting the large semiconductor companies is a key way of tackling the support and confidence issues for IP, and works both ways. “I think semiconductor companies and large IDMs that don't have an IP strategy risk being isolated from the rest of the world,” said Savage.

“It's diametrically opposed to conventional wisdom but it's worked for us. Brick by brick we started to build a credible business. Success is continued growth in partners and customers. Our exit strategy is death.” ■

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many fabless companies are so nervous about the IP they buy. If they buy bad IP they are dead. They are not going to get a second round of funding. So, they are terrified.”

The fear of bad IP is an area that foundry TSMC has seen as an issue, and it has developed a database that includes data from IP suppliers. This means that the IP that TSMC's customers have bought in is included in the manufacturing simulations.

“We run IP on a prototype wafer and see how it stacks up,” said Chuck Byers, vice president of marketing at TSMC. “We are not into selling databases, we are into selling wafers, so the easier we make that process the better off we will be, and we are not going to make this onerous for the IP vendors.”

Savage said there is a difference between companies supporting a portfolio of IP that comes from third-party suppliers and the IP exchanges that were set up at the start of the first wave of IP use to trade cores between creators and users directly, such as the Scotland-based Virtual Component Exchange (VCX).

“VCX is a noble attempt but every license agreement is individually negotiated, that's the difference. I have never seen the same deal twice,” Savage claimed. His company uses the Design and Reuse database to list the cores it has available.

Proven here in the UK has teamed up with Liverpool-based analysis tool vendor LDRA for three seats of its static analysis tool. “We make it clear that we are using the LDRA testbed to analyse the code and the documentation has LDRA on it,” said Briggs. “For LDRA it's exposure and they value it.”

There are three stages to the process. The code is audited and evaluated with the LDRA tool against the rules set by Proven. This determines how much the code should have cost to develop and potentially make it reusable by the in-house development teams. It also provides an asset value for the piece of software, which is useful for due diligence for purchases or the liquidation of a company, said Briggs, and the company charges for this as a consultancy service.

VALUATION

The point of the valuation is to determine the cost of the licence for brokering. Proven takes the code and offers it to the market at a fraction of the development cost. “The price is a percentage of the cost, depending on its proven status, the time in the field without failure and the internal quality standards that are used,” said Briggs. “This is because we want to make sure we are passing on something that works in the field because we can't verify the functionality ourselves.”

The overwhelming issue for IP is support, said the companies. That is why exchanges such as VCX did not garner many users, claimed Savage.

“There is always the threat that the IDMs want to do this themselves or take it back in-house with internal licensing groups,” Savage said. “It's a possibility. But the main reason they are doing it is to make money out of chips rather than IP licensing so why mess with success?”

“Some IDMs need to drive some licensing revenues but its not enough to pay for a global sales and marketing

effort. The other threat would be on the support side of things. We charge 15% of the licence fee to support the engineers at the customer, and its not obvious how hard this is until you actually do it or how long the sales cycles are.”

Briggs said: “Support is case by case. It depends on the licensee. If it is a development house, then it will provide support and work directly with the customer and get a design services contract. If it's an OEM, such as a set-top box maker then it may agree to email support anonymously. Another option is through an non-disclosure agreement with a third-party support company, and then it's between the third party and the customer.”

Proven has signed up MPC Data in Wiltshire to provide the support should a customer need it. The company has also teamed up with distributor Abacus Group to let field application engineers offer the software alongside the hardware the distributor sells. Abacus sees this as a way of adding value to distribution by providing both the hardware processor and the drivers to go with it.

This model assumes the code is fixed and static, which in many cases is the case. But in situations where it is still evolving, Proven provides for a ‘owner maintained’ model, where the code can be supplied along with a consultancy contract for the integration.