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

The world of semiconductor and software intellectual property (IP) is going through some fundamental changes. No longer are the exchanges such as VIX 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 PExtrime, 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.”

PExtrime takes the IP from inside the companies such as Infineon Technologies, packages it and provides design in 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.

This is still more high end, but right now we are taking advantage of the fact that by Nick Flaherty

Digging out the gold

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. Ipiras 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 Ipiras. “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 KDA 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 PExtrime 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 →
VX is a noble attempt but every license agreement is individually negotiated, that's the difference. I have never seen the same deal twice.

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

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 $50 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 Etratronics 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-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 9000 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 MicroC."

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

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."