

Business Microscope



Memory Spinning Game ... Infineon has accelerated the spinoff of its beleaguered memory unit, which will begin operations two months ahead of schedule on May 1. To us, this indicates a rush to position the memory unit in a positive financial light while it is enjoying profitable quarters. The German chip giant's memory business has hemorrhaged profits badly during memory overcapacity cycles in the industry. In bad years, such as 2001 and 2002, DRAM losses can be in the billions. Last year, however, the memory unit generated about \$3.4 billion in revenues and a profit of \$148 million, according to information gleaned from press reports. Infineon's DRAM memory technology has benefited from a state-of-the-art 300-mm wafer fabrication facility that enables more efficient production scaling and, claims the company, a 30% lower power advantage.

The spinoff is the latest episode in the German semiconductor industry soap opera, which began when the German semiconductor conglomerate Siemens spun off its chip business in 1999 and called it Infineon (a combination of "infinity" and "eon"). The

memory business spinoff has been christened "Qimonda" (pronounced "key monda"), with "Qi" standing for breathing and flowing energy, and "monda" implying the world. Fancy new names will not save this giant memory maker, in our view.

The DRAM business has historically followed a pattern of boom-to-bust business cycles – something that the conservative Germans and their bankers find troubling. The investments required to stay in the game at each new generation of DRAM technology are huge. Mega-billion investments and casino-like wins and losses do not make German bankers happy.

Unfortunately, Germany is not a good location to locate memory wafer-fabrication facilities, as labor costs are high, unions rule the day, and sometimes-arcane business practices get in the way of productivity. Under the previous, flamboyant leadership of Ulrich Schumaker, the company tried to move in the direction of relocating facilities in lower-cost centers and making the elephant dance in the dynamic chip business. We believe that the brouhaha with the unions led to the ouster of

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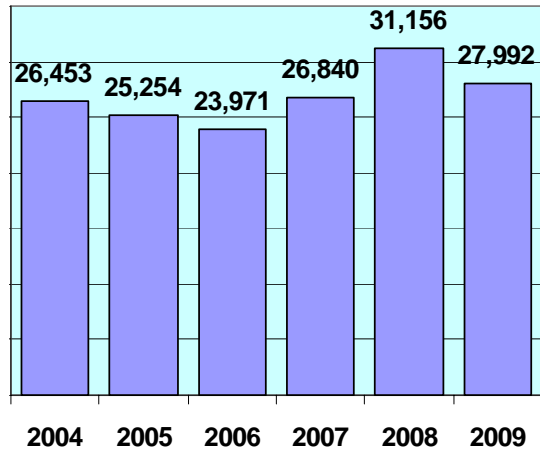
Schumaker in April 2004. In June 2004, The board gave the top Infineon job to Wolfgang Ziebart, a former executive at BMW and tire-manufacturer Continental. Under Ziebart, the Schumaker renegades have been reigned in and the company is progressing along the more traditional German lines of executive behavior.

In our view, a better option would have been to sell the DRAM assets to lower-cost producers and concentrate on its more profitable NAND flash business. Rumors surfaced last year that such a move was under way with plans to sell its U.S. DRAM properties to Micron and its non-U.S. assets, including the Dresden fab, to Taiwan's Nanya Technology. Infineon had an ongoing partnership with Nanya, which gave the Taiwan company access to advanced technology. But the deal either fell through or was just wishful thinking. In any case, any prudent buyer would have thought twice about buying the venture with fabrication facilities located in high-cost German and the U.S. locales. Such a move would also have rattled the government bureaucrats. Keeping Infineon's DRAM empire headquartered in Munich was a more palatable decision from a political viewpoint, but a doomed strategy, in our opinion, from an economic stance. Qimonda will have a tough time competing with likes of Samsung, Micron and a host of second-tier players situated in lower-cost production centers.

Infineon, which has stated that its preferred next step is for Qimonda to launch an IPO, described Qimonda and Infineon as two "forceful players [operating] in their own markets as industry leaders." The German butcher separates the hamburger from the filet mignon. In this case, the filet mignon is Infineon's lucrative automotive business, which is very profitable and growing. The company's business for wired telecom is ailing, while its sales of chips for wireless handsets suffered when cell phone sales at Infineon's key customer, Siemens, dropped precipitously. In the final analysis, Ziebart's strategy seems to be to circle the wagons around its core strength and areas where it can compete effectively (automotive, telecom, power) and jettison its flailing memory business to public investors. The downside for the Infineon troops is a big cut in corporate revenues on the order of 40%. Just as Infineon could not withstand the lack of a mega-billion corporate parent, Siemens, to wage war in the DRAM business, Qimonda without Infineon will be flailing in the wind when the next big downturn comes.

Our message to investors when the Qimonda IPO hits the streets (sooner than later): Steer clear, dangerous rockslide ahead. Qimonda is an unwanted division at Infineon, and dumping it on public investors is a bad idea. Perhaps Infineon's moniker-meisters should have named this carve-out "Quasimodo," the character from Victor Hugo's story "The Hunchback of Notre Dame"; for although he was gentle and kind, Quasimodo had the misfortune of being born hideously deformed.

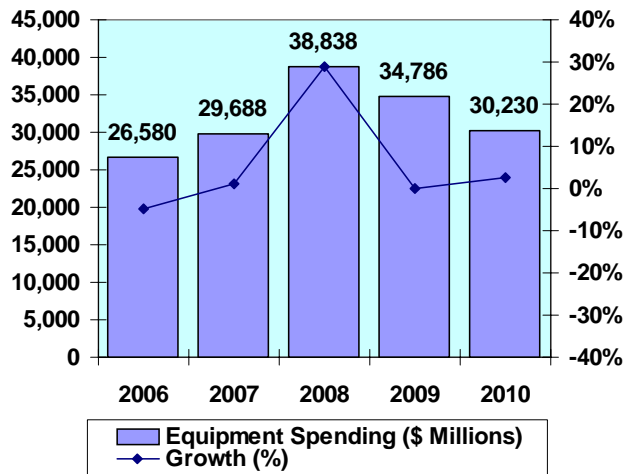
Worldwide DRAM Market (\$ Millions)



Source: iSuppli

Figure 1

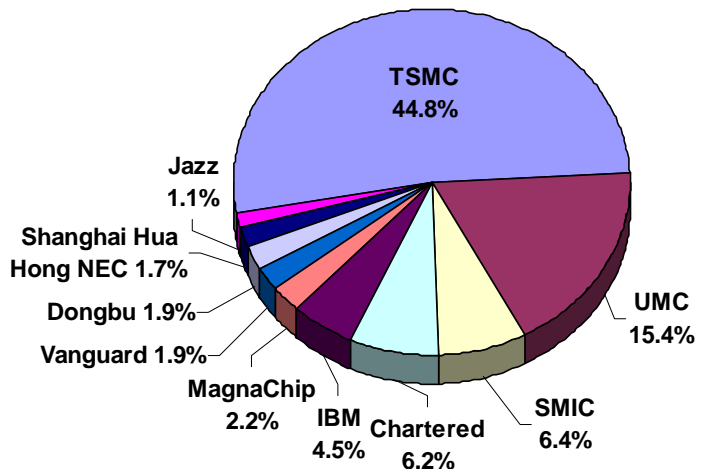
Wafer Fab Equipment Spending



Source: Gartner Dataquest

Figure 2

2005 Foundry Ranking



Source: Gartner Dataquest

Figure 3

IPO Watch

Eagle Test Systems Raises \$100 Million

Eagle Test Systems launched its public offering of 6,500,000 shares of common stock at \$15.50 per share, a price consistent with its previous announcement that its shares would be priced between \$14 and \$16. The Grove, Ill.-based provider of mixed-signal semiconductor automatic test equipment (ATE) raised \$100.8 million in the offering.

Eagle Test's shares will be listed on the NASDAQ National Market under the symbol "EGLT." Nearly one year has passed since the time Eagle Test tried to go public. The company had to postpone its offering due to a cyclical downturn at the end of 2004 that lasted through the first half of 2005.

Eagle has developed proprietary technology that maximizes production throughput while lowering overall chip cost-of-test for analog, mixed-signal and RF devices. Founded in 1976, Eagle was owned

by its founders and employees until 2003, when TA Associates acquired the majority of the company. Eagle has 248 employees.

Major chip-manufacturing customers for Eagle Test's systems include Texas Instruments, National Semiconductor, Fairchild Semiconductor and ON Semiconductor. The company has also started attracting fabless chip firms, as well as assembly & test subcontractors such as STATS ChipPac and ASE.

Agilent Subsidiary Verigy Files for IPO

Agilent Technologies subsidiary Verigy has filed an S-1 Registration Statement with the U.S. Securities and Exchange Commission (SEC) for Verigy's initial public offering. Verigy, which has 1,558 employees and generated \$456 million in revenues last year, develops advanced test systems and solutions for the semiconductor industry.

This filing moves Agilent a step closer

to spinning off its semiconductor test business (including its SOC and memory test solutions) and to becoming a pure-play measurement company.

In the filing, Agilent confirmed that, following the IPO, it intends to distribute its remaining interest in Verigy to Agilent stockholders by Oct. 31, 2006, the end of Agilent's fiscal year.

The number of shares to be offered and the price range for the offering have not yet been determined.

Display Driver Maker Himax Files for IPO

Himax Technologies, a maker of semiconductors for flat-panel displays, has filed with the U.S. Securities and Exchange Commission for an initial public offering. Terms and timing have yet to be determined. Himax's display drivers are primarily used in large-sized panels, representing approximately 85.9% and 87.1% of its revenues in 2004 and 2005, respectively. Founded in June 2001, the Chinese manufacturer has experienced explosive growth, increasing by 127.8% to \$300.3 million in 2004 and by 79.9% to \$540.2 million in 2005. However, the company does not expect to sustain similar growth rates in future periods.

Himax has derived substantially all of its net revenues from sales to the TFT-LCD panel industry, which is highly cyclical and subject to price fluctuations. In 2004 and 2005, approximately 97.3% and 96.3% of its revenues, respectively, was attributable to display drivers that were incorporated into TFT-LCD panels. Himax said that, for the foreseeable future, it expects to be substantially dependent on sales to the TFT-LCD panel industry, which is intensely competitive and vulnerable to cyclical market conditions.

Two of Himax's customers, CMO and CPT, together with their respective affiliates, accounted for approximately 63.2% and 19.5%, respectively, of Himax's revenues in 2004 and approximately 58.9% and 16.2%, respectively, of 2005 revenues. CMO is one of Himax's largest shareholders (13.6% of outstanding shares as of Dec. 31, 2005).

**Table 1 -- Eagle Test Systems Selected Financial Information
(\$ Millions)**

	Year ended Sept. 30,				
	2001	2002	2003	2004	2005
Net Revenue	37,550	25,918	55,766	111,210	63,477
Net Gain (Loss)	6,358	1,646	9,604	22,053	7,419

Table 2 -- Verigy Selected Financial Information (\$ Millions)

	Year ended Oct. 31,				
	2001	2002	2003	2004	2005
Net Revenue	508	498	540	607	456
Net Gain (Loss)	(91)	(91)	(28)	(8)	(119)

Table 3 -- Himax Selected Financial Information (\$ Thousands)

	June 12, 2001 (Inception) to Dec. 31, 2001	Year ended Dec. 31,			
		2002	2003	2004	2005
Net Revenue	8,980	56,478	131,843	300,273	540,204
Net Gain (Loss)	20	513	(581)	36,000	61,558

Public Company Spotlight

LSI Focuses on Storage, Consumer Markets

LSI Logic has revealed plans to redirect R&D from non-core areas in order to focus its business on the information storage and consumer markets, where it has a significant, scalable presence and the ability to sustain differentiation. The strategy involves trimming non-core areas – including its RapidChip platform ASIC technology and its DSP unit – through decreased investment or divestiture.

With the company's increased focus on storage, LSI has canceled its previously postponed plan for an initial public offering of its wholly owned storage systems subsidiary, Engenio Information Technologies. LSI will redirect ongoing investments in RapidChip and sell its ZSP DSP unit. As a result, the company will cease further RapidChip development and realign its custom silicon capabilities to more deeply serve customers in the storage and consumer markets. RapidChip customer

designs that are currently in production or under development will continue and are not affected by this action.

The company said it expects to sell the ZSP unit, which provides licensed ASIC technology to the broadband and wireless communications markets. No time frame for completion of this transaction has been determined.

According to LSI, RapidChip technology targets a broad-based set of requirements across a wide range of industry segments and applications, while the DSP technology has been primarily deployed in areas outside of its focus markets. The company indicated that the new strategy is inconsistent with the pursuit of these kinds of broad-based ASIC opportunities in non-focus areas.

The restructuring effort is the latest move by LSI in its ongoing efforts to get back on track. Abhi Talwalkar, who succeeded company founder Wilf Corrigan as president and CEO in May 2005, launched a broad-based reorganization in Aug. 2005 to better

focus on its primary markets of custom ICs, consumer products, and storage platforms and products.

Contact:

Abhi Talwalkar, LSI president and CEO; Tel: 408 954-3108; www.lsi.com.

STMicroelectronics Aiming for Bigger Presence in China

STMicroelectronics has indicated its intention to significantly increase its presence in China with an intensified push. According to the most recent iSuppli reports, ST is currently the No. 3 semiconductor supplier to the China market, and No. 2 if microprocessor products are excluded. Since 1999, ST's sales in China have outperformed the local market, growing at a CAGR of 31%, compared to 24% for China's semiconductor industry as a whole.

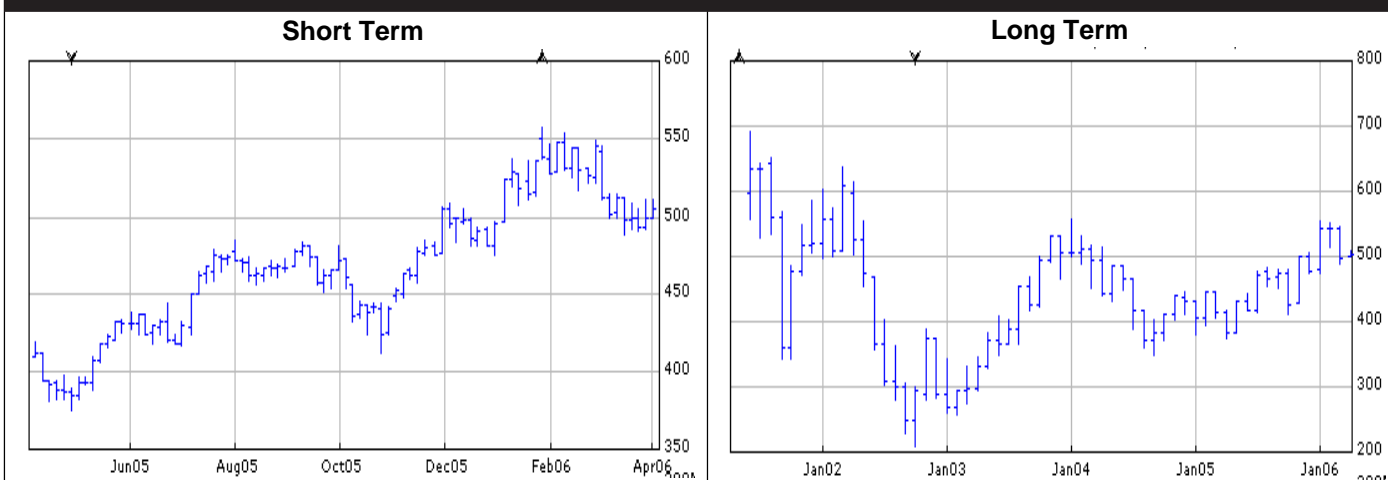
ST's China strategy will hinge on partnerships with the region's top electronics companies, which are increasing their market share in a wide variety of different applications such as telecommunications, digital consumer, industrial, automotive and smartcards. The booming segment of electronic manufacturing services (EMS) is one of the focal points of ST's market strategy in China. With the business model shifting toward outsourcing to (ODMs) and sub-contracting services, the world's major EMS

Continued on page 23

Table 4 -- LSI Logic Selected Financial Information

	Q4 05	Q3 05	Q2 05	Q1 05	Q4 04
Revenue	506.2	481.7	481.3	450	419.69
Net Gain (Loss)	37.8	(73.4)	25.3	4.7	(197.4)

Semiconductor Stock Index

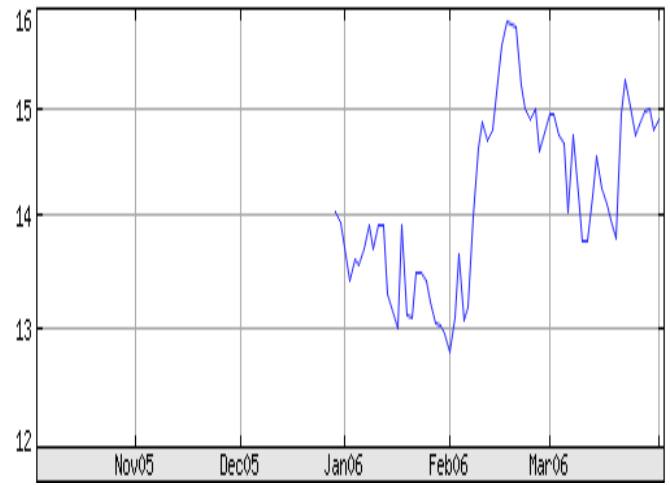


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Stock Market Scan



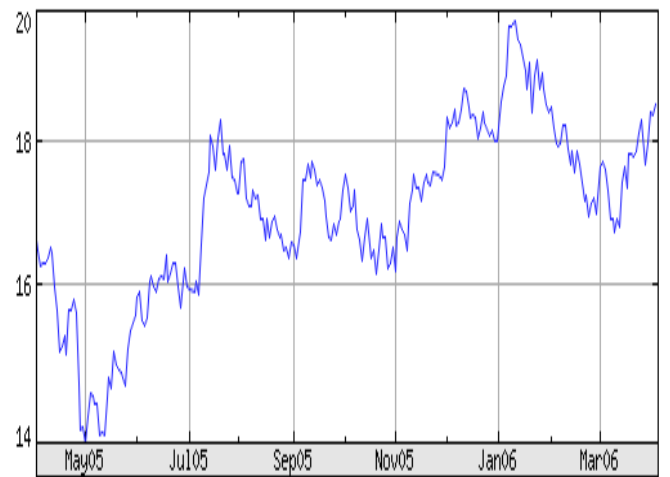
Micron Technology



Spansion



Infineon



STMicroelectronics



LSI Logic



ATI Technologies

ATI Technologies Buys Shanghai-based Macrosynergy

ATI Technologies has acquired Shanghai-based Macrosynergy, an XGI Technology alliance company, as well as related personnel working out of XGI Technology's Santa Clara, Calif., location. Macrosynergy is best known for its multimedia add-in boards for personal computers.

Approximately 100 Shanghai-based employees will join ATI through the acquisition. An additional cadre of XGI employees in Santa Clara will relocate to ATI's Santa Clara location.

The companies did not disclose financial details of the transaction.

Contact:
Dave Orton, ATI president and CEO; Tel: 905 882-2600; www.ati.com.

Micron Buys NAND Specialist Lexar Media

Micron Technology is acquiring Lexar, a manufacturer of NAND flash memory products, in a stock-for-stock merger. Under terms of the agreement, each outstanding common share of Lexar will receive 0.5625 shares of Micron stock. Micron anticipates issuing shares in exchange for 81.6 million Lexar shares outstanding. Additional Micron shares will be issued upon the exercise of assumed stock options.

The merger will combine Micron's technology and manufacturing skills in NAND flash memory with Lexar's expertise in NAND controller and system design technology to create a vertically integrated entity fully focused on the NAND business.

The companies expect to complete the merger by the end of the third calendar quarter. Upon closing, Lexar will become a wholly owned subsidiary of Micron, and Lexar's stock will cease trading on the NASDAQ stock market.

Contacts:
Eric Stang, Lexar chairman, CEO and president; Tel: 510 413-1200; www.lexar.com.
Steve Appleton, Micron chairman, CEO and president; Tel: 208 368-3900; www.micron.com.

Bluespec Closes Series B Funding

ESL startup Bluespec has closed its Series B funding with an additional \$4.5 million. This brings the total amount raised in two rounds to \$13 million from investors Atlas Venture and North Bridge Venture Partners.

Bluespec has developed a SystemVerilog-based toolset that elevates the level of abstraction for designers while providing full hardware synthesis down to RTL without compromise to the quality of the RTL (in terms of area, speed and power). The company claims its tool reduces both design time to verified netlist and design errors by up to 50%.

(See our profile of Bluespec in the March 2004 issue of *InsideChips.Ventures*.)

Contact:
Shiv Tasker, CEO; Tel: 781 250-2200; www.bluespec.com.

Essensium Acquires Software-Integration Services Provider

Essensium, a Belgium-based provider of SOCs, has acquired all shares of Mind N.V., a provider of embedded Linux, eCos and DSP software-integration services.

Created as a spin-off of the nanotechnology research center IMEC, Essensium provides SOC products and design services to OEMs, design houses and application-specific standard-products (ASSP) suppliers. Essensium acts as an aggregator, managing the full silicon development and supply chain. Essensium's acquisition of Mind enables it to offer a true software-hardware co-design capability.

Mind has extensive experience porting Linux and eCos to SOCs based on ARM, XScale, PowerPC and MIPS, and in developing complex software stacks for networking, multi-media, industrial automation, domotic (the application of computer and robot technologies to domestic appliances) and medical applications to major European customers.

Contacts:
Johan Danneels, Essensium CEO; Tel: +32 (0)16 28 65 00; www.essensium.com.
Peter Vandenabeele, Mind CEO; Tel: +32-16-30.96.66; www.mind.be.

Icera Raises \$40 Million for Soft Modems

Wireless soft modem company Icera has secured \$40 million in venture capital in a Series C funding round. Amadeus Capital Partners led this round, which included existing investors Accel Partners, Atlas Venture and Benchmark Capital.

Icera has now raised a total of \$82.5 million in venture funding since it was founded in 2002, placing it among the best-funded early-stage technology companies in Europe.

Founded in April 2002, Icera delivers wireless soft modems to mobile phone and datacard OEMs through a range of platform solutions. The company's flexible, wireless communications chips run entirely in software, and provide a complete solution for 3G-HSDPA. Down the road, the company will support the integration of standards such as HSUPA, Wi-Fi, AGPS and mobile digital video on a single, flexible baseband processor.

Icera's first wireless soft modem chipset, Livanto and Adaptive Wireless software, launched in Nov. 2005 and supports HSDPA, UMTS, GSM and EDGE multimode capability.

(See our profile of Icera in the July 2003 issue of *InsideChips.Ventures*.)

Contact:
Stan Boland, CEO and president; Tel: +44 1454 284800; www.icerasemi.com.

SiRF Technology Acquires DVB Startup TrueSpan

GPS specialist SiRF Technology has acquired TrueSpan, a company developing products that support the emerging DVB standards for reception of digital terrestrial broadcast television to handheld devices. The companies did not disclose financial details of the transaction.

Founded in Sept. 2004, TrueSpan is developing a silicon and software platform that brings high-quality digital audio and video experience to consumers in mobile environments. Its technology includes a sophisticated OFDM engine, optimized to support multiple mobile digital video broadcast standards. TrueSpan has

development teams in Long Beach, Calif., and Bangalore, India.

As part of this acquisition, SiRF also announced that **Sanjai Kohli**, founder and CTO of TrueSpan and one of the co-founders of SiRF, will become CTO for SiRF.

TrueSpan has become a wholly owned subsidiary of SiRF. About 30 TrueSpan employees, the majority of whom are based in Bangalore, have joined SiRF.

Contacts:

*Sanjai Kohli, TrueSpan founder and CTO;
Michael Canning, SiRF president and CEO;
Tel: 408 467-0410; www.sirf.com.*

California Micro Devices Buys Arques Technology

California Micro Devices is purchasing Arques Technology, a fabless manufacturer of analog semiconductor devices. The acquisition of the Santa Clara, Calif.-based firm adds white LED drivers for mobile handsets and DDR memory voltage regulators for digital consumer electronics products to the CMD product portfolio.

Under the terms of the agreement, CMD will make an initial payment of approximately \$8 million, followed by an earn-out based on performance of the Arques product line during the eighteen months after the acquisition is completed.

Founded in 2001, Arques currently has 25 employees at its Santa Clara headquarters and its Taipei and Beijing locations, most of whom will be offered the opportunity to continue working in their present positions.

Contacts:

*Gerome Tseng, Arques president and CEO;
Tel: 408 969-0868; www.arquestech.com.
Robert Dickinson, CMD president and CEO;
Tel: 408 263-3214; www.calmicro.com.*

X-FAB, 1st Silicon to Merge

XTRION and Sarawak Economic Development Corp. — the controlling shareholders of X-FAB Semiconductor Foundries and 1st Silicon (Malaysia), respectively — have agreed to merge X-FAB and 1st Silicon. As a result of the merger, all group companies will assume the X-FAB name.

The move nearly doubles X-FAB's capacities. The combined manufacturing capacity of the merged company will be approximately 700,000 200-mm-equivalent

wafers per year, and sales of the new company will likely exceed \$300 million in 2006.

Headquartered in Erfurt, Germany, X-FAB is an analog/mixed-signal foundry that manufactures silicon wafers for mixed-signal ICs. The company employs approximately 1,100 people maintains wafer-production facilities in Erfurt; Plymouth, U.K.; and Lubbock, Tex. X-FAB's modular CMOS and BiCMOS processes range from 1.0 micron down to 0.35 micron.

Founded in 1998, 1st Silicon focuses on high-volume SOC designs and innovative niche markets. Its 0.25-, 0.18- and 0.13-micron manufacturing services cover embedded non-volatile and flash memories, high-voltage and mixed-signal technologies, CMOS image sensors and charged-couple devices.

Contacts:

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Hans-Juergen Straub, X-FAB CEO; Tel: +49
361 427 6000; www.xfab.com.*

Cohu Subsidiary Acquires Assets of Unigen Unit

Cohu's Delta Design subsidiary has purchased patents, IP, certain semiconductor burn-in products and other assets from Unisys' Unigen operation for \$8 million. Acquired backlog of approximately \$14.5 million will be included in new orders for the quarter ending March 25, 2006. The acquired patents and technology enable precise temperature control and heat dissipation during test and burn-in of high-speed, high-power ICs.

Approximately 40 engineers and other personnel from Unigen's operations in Rancho Bernardo and Mission Viejo, Calif., and Chandler, Az., have joined Delta Design. As part of the agreement, Delta Design also acquired the approximately 10,000-square-foot Unigen facility in Chandler.

Cohu, through its Delta Design subsidiary, supplies test-handling solutions used by the global semiconductor industry, as well as closed-circuit television, metal detection and microwave communications equipment.

Contact:

*James Donahue, Cohu president and CEO;
Tel: 858 848-8100; www.cohu.com.*

NVIDIA to Buy Hybrid Graphics

NVIDIA is acquiring Hybrid Graphics, a developer of embedded 2D and 3D graphics software for handheld devices. Hybrid, founded in 1994 and based in Finland, will become a subsidiary of NVIDIA and will continue to market and sell its products under the Hybrid name. The companies did not disclose financial terms of the acquisition.

Hybrid's main product is Hybrid Mobile Framework, an embedded graphics software solution for consumer device manufacturers and hardware platform vendors. Hybrid Mobile Framework runs graphics on application processors, multimedia accelerators and 3D hardware; contains implementations of open graphics standards such as OpenGL ES, OpenVG and JSR 184 (M3G); and ensures all graphics components work together and provides surface composition facilities to operating systems; and is pre-integrated to nearly all operating systems and Java VMs for easy deployment.

Hybrid's customers include Nokia, Ericsson, Philips, Samsung and Symbian.

Contacts:

*Jen-Hsun Huang, NVIDIA president and
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Mikael Honkavaara, Hybrid CEO; Tel: +358
9 686 6380; www.hybrid.fi.*

Replisaurus Receives Government R&D Grant

The Swedish Governmental Agency for Innovation Systems (VINNOVA) has provided Replisaurus Technologies with financial support of approximately \$518,000 from the Forska& Väx Program. Replisaurus is one of nine companies selected from 320 competitors to receive financial support in order to perform a specific R&D project.

Replisaurus research activities will focus on the demonstration of nanometer resolution copper printing using its patented ElectroChemical Pattern Replication (ECPR) technology. ECPR is a nanoscale electrochemical deposition technique that employs a reusable master electrode as a template to fabricate metal patterns in one single replication step. By combining pattern definition and metal deposition in one step, ECPR eliminates the need for traditional photolithography and plating. One single ECPR tool replaces six tools in a typical

mask plating process (coat, expose, develop, descum, electroplate and strip).

Contact:
Patrik Möller, CEO; Tel: +46 (0)8 7521981;
www.replisaurus.com.

WiQuest Secures \$18 Million in Series B Funding

UWB startup WiQuest Communications has closed \$18 million in Series B funding. New investor Sequoia Capital led the round, which included Series A investors Menlo Ventures, Palomar Ventures and iD Ventures America. WiQuest will use these new funds to ramp production of its existing products and to further expand its growing portfolio of WiMedia and Wireless USB solutions.

In Dec. 2005, WiQuest launched the industry's first commercially available high-performance silicon, the WQST110 and WQST101 companion RF transceiver chip, which deliver wireless communication speeds up to 1 Gbps. The chipset is based on the WiMedia UWB physical layer and MAC specifications.

WiQuest is the creation of wireless technology expert Matthew Shoemake, who launched the company in Sept. 2003.

(See our profile of WiQuest in the Feb. 2005 issue of *InsideChips.Ventures*.)

Contact:
Matthew Shoemake, president and CEO; Tel: 214 547-1600; www.WiQuest.com.

Cambridge Consultants Restarts Venture Business

Cambridge Consultants, a U.K.-based design and development company, is reactivating its spin-off business with the creation of a new venture fund. Cambridge, which ended its previous venture activities in 2002, and an investment partner are jointly establishing the fund with the aim of having it up and operating by summer 2006. According to the company, several blue-chip investors have shown interest in the fund, and negotiations are already under way.

The mission of the fund is to invest exclusively in Cambridge Consultants' own new ventures. The company hopes to produce one spin-off every two years on average, with the first new venture expected to appear in 2007. Candidates for the next batch of ventures will likely come from

Cambridge Consultants' core markets, including wireless technologies, drug delivery, diagnostics, radar and electronics.

Cambridge Consultants has created more than 20 new ventures in the past 25 years, several of which are now listed on the London Stock Exchange: Domino, Xaar, Prelude Trust, CSR and Vivid (sold to Vectura). Other successful spin-offs include Alphamosaic and Inca, which have subsequently been acquired by Broadcom for \$123 million and by Dainippon Screen for approximately \$54 million.

Contact:
Ray Edgson, Cambridge Consultants ventures director; Tel: +44 (0)1223 420024;
www.cambridgeconsultants.com.

Intel Establishes \$50 Million Brazilian Venture Capital Fund

Intel investment arm Intel Capital has created a \$50 million venture capital fund to promote technology growth in Brazil, South America's largest economy.

Intel will use the fund to invest in companies that can benefit from the rapid growth of technology in Brazil. The company will provide funding to local businesses developing technologies and products for local use. These include hardware, services (broadband infrastructure and mobile wireless solutions using WiMAX technology, among other services), local content developers/providers, digital health solutions, IT service providers and software solutions.

Since 1999, Intel Capital has invested more than \$35 million in 13 Brazilian companies.

Contact:
Arvind Sodhani, Intel Capital president; Tel: 408 765-8080; www.intel.com/capital.

Foundation Capital Closes \$525 Million Fifth Fund

Foundation Capital has closed its \$525 million Foundation Capital Fund. Two new limited partners, the Stanford Endowment and Purdue University, participated in the fund as well as an existing base of limited partners. The latter group includes foundations, pension plans, and diversified fund-of-fund investors, and a group of endowments that already include universities such as Harvard, Yale and CalTech.

Foundation Capital focuses on information technology and communications companies in enterprise software and on demand services; networking, storage and telecommunications; semiconductor and EDA; and clean tech and consumer.

Contact:
Adam Grosser, general partner; Tel: 650 614-0500; www.foundationcapital.com.

Luxtera Completes \$22 Million Series C Investment

Silicon photonics company Luxtera has closed a \$22 million Series C investment from a mix of new corporate sources and returning investors. Returning investors include New Enterprise Associates, Sevin Rosen Funds, August Capital and Freescale Semiconductor.

Founded in 2001, Luxtera is a fabless semiconductor uniting the benefits of optical communication technology with the low-cost, high-volume advantages of CMOS fabrication. The company will sample the world's first CMOS photonics products in Q2 2006 and begin shipping them in Q1 2007.

Contact:
Alex Dickinson, president and CEO; Tel: 760 448-3520; www.luxtera.com.

H-Stream Wireless Lands \$12.55 Million in Series A Funding

H-Stream Wireless, a developer of ICs for low-power wireless applications, has secured \$12.55 million in Series A funding from Granite Ventures, Intel Capital, Tallwood Venture Capital and selected angel investors.

Founded in Dec. 2004, H-Stream obtained seed funding from a group of angels that included founders of VLSI Technologies, Netscreen (now Juniper Networks), Omnivision and Spreadtrum (see our profile of Spreadtrum on page 17 of this issue).

H-Stream is still in stealth mode and has released little information about its products, except to say that the startup's unique approach overcomes key roadblocks in the development of ultra-low-power wireless solutions.

Contact:
Roel Peeters, VP of marketing; Tel: 650 515-3524; www.hstream.com.

Analyzing the Analysts

iSuppli Reveals 2005 Semiconductor Rankings

While 2005 was the year of the “soft landing” for the worldwide semiconductor industry, it was not a year of soft results for the globe’s largest chip makers, with the top-three suppliers achieving growth that exceeded the market average. According to final data from iSuppli’s Competitive Landscaping Tool (CLT) service, global semiconductor sales amounted to \$237.1 billion in 2005, up 3.6% from \$228.8 billion in 2004. This moderate growth represents a soft landing following a robust 23.8% sales increase in 2004. Table 5 shows iSuppli’s final ranking of the top 20 semiconductor suppliers worldwide in 2005.

Intel in Charge

The top-three semiconductor suppliers — Intel, Samsung and Texas Instruments — all bolstered their top rankings by posting growth higher than the 3.6% market average. However, Intel distinguished itself from the other leading companies with the highest growth rate among the top 10 suppliers. Intel achieved double-digit growth in 2005, with its revenues expanding by 13%, rising to \$35.5 billion, up from \$31.4 billion in 2004. The

company extended its lead over the other players, with its market share rising to 15%, compared to 13.8% in 2004.

The microprocessor market’s 16.1% growth drove Intel’s strong gains in 2005. But while the chip giant benefited from the strength of the microprocessor market, it lost 2.9 percentage points of share during the year to AMD. In contrast, Intel performed better than any other competitor in the NOR flash memory market, which declined by 15.3% during 2005. Intel was able to minimize its revenue decline in NOR flash to only 0.3% during the year, while its competitors saw sales fall between 5.5% to 50%.

Samsung and Texas Instruments Thrive in 2005

Samsung delivered the second-best revenue growth among the top 10 in 2005, with its sales rising by 9.2% to \$17.2 billion, up from \$15.8 billion in 2004. The South Korean electronic company’s fortunes continue to be dominated by the strength of the memory market, where it derives more than 84% of its revenues.

In 2005, Samsung achieved mixed results in its core memory market. In a DRAM market that declined by 6.2% in 2005, Samsung managed to contain its revenue losses, and suffered only a 1% decrease in revenue. In contrast, Samsung saw its NAND

Table 5 -- Worldwide 2005 Top 20 Semiconductor Market Share Ranking (\$ Million)

2004 Rank	2005 Rank	Company	2005 Revenue	2004 Revenue	Percent Change	Percent of Total	Cumulative Percentage
1	1	Intel	\$35,466	\$31,396	13.0%	15.0%	15.0%
2	2	Samsung	\$17,210	\$15,759	9.2%	7.3%	22.2%
3	3	TI	\$10,745	\$10,225	5.1%	4.5%	26.7%
7	4	Toshiba	\$9,077	\$8,752	3.7%	3.8%	30.6%
6	5	STMicro	\$8,881	\$8,760	1.4%	3.7%	34.3%
4	6	Infineon	\$8,297	\$9,180	-9.6%	3.5%	37.8%
5	7	Renesas	\$8,266	\$9,000	-8.2%	3.5%	41.3%
8	8	NEC	\$5,710	\$6,503	-12.2%	2.4%	43.7%
9	9	Philips	\$5,646	\$5,692	-0.8%	2.4%	46.1%
10	10	Freescale	\$5,598	\$5,519	1.4%	2.4%	48.5%
14	11	Hynix	\$5,560	\$4,606	20.7%	2.3%	50.8%
13	12	Micron Technology	\$4,775	\$4,649	2.7%	2.0%	52.8%
15	13	Sony	\$4,574	\$4,299	6.4%	1.9%	54.7%
12	14	Matsushita	\$4,131	\$4,669	-11.5%	1.7%	56.5%
11	15	AMD	\$3,917	\$5,108	-23.3%	1.7%	58.1%
17	16	Qualcomm	\$3,457	\$3,211	7.7%	1.5%	59.6%
16	17	Sharp	\$3,266	\$3,488	-6.4%	1.4%	61.0%
18	18	Rohm	\$2,909	\$2,849	2.1%	1.2%	62.2%
20	19	IBM Microelectronics	\$2,792	\$2,503	11.5%	1.2%	63.4%
22	20	Broadcom	\$2,671	\$2,400	11.3%	1.1%	64.5%
		Other Companies	\$84,191	\$80,241	4.9%	35.5%	100.0%
		Total Revenue	\$237,139	\$228,809	3.6%	100.0%	

flash memory revenues leap by more than 47% in this red-hot market in 2005. However, in spite of this growth in a market where it commands more than 50% of the revenue, Samsung saw its market share in NAND flash fall by more than 5% in the face of an expanding group of competitors.

Texas Instruments continued to fortify its No. 3 position in the semiconductor market in 2005. The chipmaker's revenues grew by 5.1%, rising to \$10.7 billion, up from \$10.2 billion in 2004. TI's performance in the DSP, microcontroller and logic ASSP markets fueled its growth in 2005. As the world's No. 1 analog IC supplier, TI's analog growth of 0.6% slightly underperformed overall analog IC market expansion of 1.5% in 2005.

After falling out of the top five in 2005, fourth- and fifth-place suppliers Toshiba and STMicroelectronics regained their positions simply by virtue of achieving positive revenue growth. On the other hand, Infineon Technologies and Renesas Technology fell from the top five as their revenues declined by 9.6% and 8.2%, respectively.

Spansion Causes AMD's Contraction

With combined revenues of \$5.97 billion in 2005, AMD/Spansion would have jumped to number eight in the rankings, up from number 11 in 2004 — if AMD had not spun off its Spansion flash-memory division. Following the split, AMD was ranked at 15th and Spansion at 24th in 2005.

In other semiconductor ranking developments, only four companies among the top 20 achieved double-digit growth in 2005: Intel, Hynix, IBM Microelectronics and Broadcom. Two companies experienced double-digit declines: NEC Electronics and Matsushita Electric (the decline shown for AMD is a result of the split of Spansion into a separate company).

Among fabless companies, Broadcom joined Qualcomm in the top 20 for the first time in 2005. Furthermore, nVidia and ATI Technologies both moved into the top 25 suppliers for the first time.

Table 2 presents iSuppli's ranking of the world's top-five fabless semiconductor companies in 2005.

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3G Chipset Designers Must Focus on Applications in Addition to Modems

After many stops and starts, 3G mobile telephony is coming on with a vengeance. In 2004, ABI Research counted 17.3 million 3G subscribers worldwide, but by the end of 2005 there were 42 million — a year-on-year growth of 142%. And, by the end of 2010, 3G will comprise fully 30% of the mobile marketplace, equating to about 1 billion subscribers.

For 3G chipset vendors this would seem to be good news. But the issue for companies now is how to differentiate their products in a world crowded with robust competitors such as Agere, Broadcom, Ericsson Mobile, Freescale, Icera, Philips Semiconductors, Qualcomm and Texas Instruments. Some of these companies have been offering 3G solutions since 2004, which begs the question of whether they have an insurmountable lead over the others. Furthermore, is it possible to uproot a vendor that is entrenched in a handset OEM's platform? And is there any hope for a brand new vendor in this space?

The answer to these questions, says ABI, requires first identifying the chipset differentiators for today. In cellular's early years, the primary focus was the cellular modem and on improving its design. In later years, as cellular networks switched on high-speed data, the design focus veered away from the modem and toward applications such as digital imaging, music and video.

ABI's new study, "3G Chipset Architectures for Video, Music, Gaming and Television," identifies two simultaneous movements: second-generation links need to be upgraded to 3G and HSDPA, and operators are switching on advanced mobile video, stereophonic music, 3D gaming and television. Thus, it is no longer an either/or game — the chipset design focus has to be on both the modem and the applications in order to enable robust wireless connections, low power consumption, and enjoyable user experiences. 3G chipset architects are faced with a full plate. The good news is that the 3G and HSDPA cellular tide is rising; the bad news is that this rising tide may not lift all chipset vendors' boats.

ABI's new report forms part of the company's subscription "Wireless Semiconductors Research Service," which includes a number of research reports, regular market updates, forecast and industry databases, ABI insights, and analyst inquiry assistance.

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Table 6 -- Top 5 Fabless Semiconductor Ranking in 2005

2004 Rank	2005 Rank	Company	2005 Revenue	2004 Revenue	Percent Change	Percent of Total	Cumulative Percentage
17	16	Qualcomm	\$3,457	\$3,211	7.7%	10.1%	10.1%
16	17	Broadcom	\$2,671	\$2,400	11.3%	7.8%	17.9%
18	18	nVidia	\$2,079	\$1,680	23.8%	6.1%	24.0%
20	19	ATI Technologies	\$2,028	\$1,913	6.0%	5.9%	30.0%
22	20	Xilinx	\$1,645	\$1,586	3.7%	4.8%	34.8%
		Other Companies	\$22,262	\$20,135	10.6%	65.2%	100.0%
		Total Revenue	\$34,142	\$30,925	10.4%	100.0%	

Update: TAK Imaging

Printer chip specialist TAK Imaging, which we first profiled in Aug. 2003 under its former name “TAK’ASIC,” has overhauled both its mission and its management team in order to refocus on the consumer electronics market. In 2003, the company’s primary focus was applying its imaging and compression technologies to silicon for office and SOHO laser printing applications, but TAK is now targeting the much larger photo printer and inkjet printer markets.

Three imaging experts from the French National Data Processing and Automatic Research Institute (INRIA) founded TAK in 1991. Jean-Paul Verniere, Bruno Paucard and Philippe Gautier launched the company as a design house, switching to a fabless business model in the late 1990s. Over the next few years, TAK developed a series of chips for color laser printers and other PC peripherals that use image-compression technology.

Douglas Goodyear joined TAK as CEO in April 2003, and embarked on a plan to expand the company’s focus in consumer imaging applications. Goodyear was previously CEO at Tioga Technologies (acquired by ST Microelectronics in early

2003), led worldwide sales for Radisys, and held senior management posts with Actel, Sharp, AMD and Signetics, a division of Philips Semiconductor.

Goodyear brought in Christian Joly as senior VP of marketing and business development in Oct. 2004 to help guide the company in its move to the consumer electronics market. Joly joined TAK from Intellon, where he was a senior vice president. He formerly served as president and CEO of Coretex, a semiconductor design service company, and also held a number of senior management posts at LSI Logic, including director of the company’s DVD and Imaging business units.

Co-founder Verniere, who was previously president of TAK, stayed on for the transition period after Goodyear arrived, but has since left the company. The other two co-founders, COO Paucard and CTO Gautier, are still with TAK.

Other new members of the management team include Barry Waxman, senior VP of sales; John Harrison, senior VP of engineering and operations; Jonathan Michael, CFO; and Mark Lee, VP of operations.

Waxman joined TAK from startup Connex Technology, where he served as

VP of sales. He previously served on the executive staff of International Wireless, Microtouch Systems (acquired by 3M) and PixelMagic (acquired by OAK and Zoran). He has also held executive staff positions at Mylex (acquired by IBM), Adaptec (IPO) and Western Digital.

Harrison was most recently VP of engineering for GlobespanVirata’s High Speed Internetworking Business Unit. He has held management positions at T.Square (acquired by Globespan), Fujitsu Nexion, 3Com and Bytex.

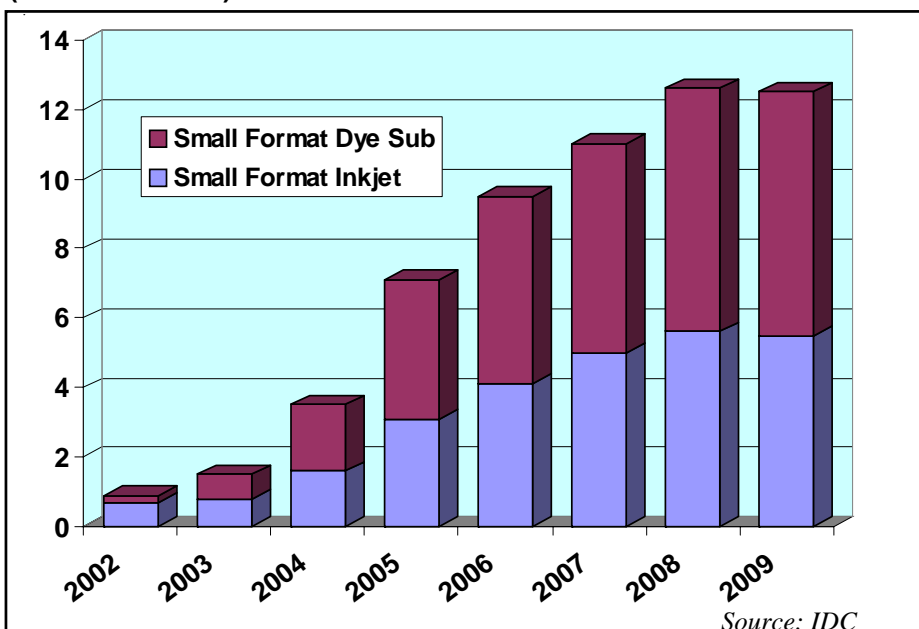
Michael previously served as senior VP of finance and CFO of IXI Mobile. He was also VP of finance and worldwide operations for Fairchild Semiconductor, which he co-founded as it spun out of National Semiconductor in 1997. Earlier, he was director of financial planning and analysis for National Semiconductor.

Lee was most recently director of operations at NetLogic Microsystems. He has held positions with increasing responsibilities at companies including Silicon Image, NeoMagic, Information Storage Devices (acquired by Winbond) and at Micro Linear.

When Joly came on as marketing veep, one of the first things he did was start moving the company toward a systems approach with a heavy investment in software. To that end, TAK last year acquired a small software firm, Compumetric Labs, a Fairhope, AL.-based company launched by QMS veterans. Now TAK’s main center of software development, the 44-member Compumetric team also manages a team of 20 software developers in Delhi, India. The Delhi developers are subcontracted from HCL Technologies, although the team works exclusively for TAK.

TAK received \$2 million in a seed round in late 1998, and \$10 million in series B funding in Feb. 2002. Sofinnova Partners and Doughty Hanson Technology Ventures led the round, which also included initial investors Innovacom, Ventech and SPEF Venture. The company closed a Jan. 2004 round for \$16.25 million, which included new investor CrossBridge Venture Partners of Japan, followed by a \$10 million extension

Figure 4 — Worldwide Small Format Photo Printer Shipments (Millions of Units)



in March 2005.

With the latest funding, TAK moved its headquarters from France to Silicon Valley. The company still has its engineering operations based in Paris, and also maintains a sales office in Tokyo.

TAK raised the Series C funds specifically to develop a new line of SOCs, called Sakura, for inkjet printers and small format photo printers in the consumer printing market. The small format photo printer market is divided into inkjet and dye sublimation, a printing process that employs heat to transfer dye to the medium. About 60% of small format photo printers use dye sublimation.

The first chip in the Sakura line is the S1, launched in June 2005. The company designed the S1 to essentially emulate an entire printer in a single chip, including not only the printing functions but also the photo processing and display capabilities as well.

The S1 interfaces to both inkjet and dye sublimation printers. The ability to interface to both technologies enables customers to produce a number of different printer models, all based on the same chip, targeting the low, middle and high end of the inkjet and dye sublimation markets.

With its heavy investment in software,

TAK can provide a complete system to its customers. The company's set of software solutions includes algorithms, GUI and hardware interface drivers. Some customers take the solution as is and go to market, while others have their own algorithms, GUI or other core IP they want to implement. The solution's flexibility renders it appropriate for any kind of business environment.

The S1 enables printers to connect directly to digital still cameras without PC intervention. The chip also connects to all kinds of memory cards, links to LCD displays, supports any kind of scanner, and supports DDR/mobile SDRAM/SRAM memory (it is the only solution today that supports DDR). The chip has a peripheral bus that enables it to connect to external communications devices, such as Bluetooth devices.

TAK's objective was to provide printer users with capabilities they have not previously had. Specifically:

- Speed — printing in seconds instead of minutes.
- Quality – results as good or better than film-based prints.
- Enhancements – common ones such as red-eye removal.

- Pre-viewing capability.
- Direct, simple multi-device interface with printers.
- Multiple functions.

The primary printer companies in the inkjet printer market include H-P, Epson, Lexmark, BenQ and Canon, among others. In the small format dye sublimation market, consumer companies such as Panasonic, Sony, Kodak and others dominate.

The market for letter/A4 size inkjet printers is big, with some 90 million inkjet printers shipped in 2005. Most of these printers will soon be photo enabled, which means they will be able to process photos directly from a source without the need to go through a PC. This is good news for TAK, as its chips are geared toward stand-alone photo processing. By 2009, the vast majority of inkjet printers will be photo enabled.

While the small format photo printer market is smaller, the consumer electronics companies that make the devices are much more open to using merchant silicon. A number of tier-one manufacturers of letter/A4 inkjet printers, by contrast, still have in-house ASIC teams that TAK must compete with.

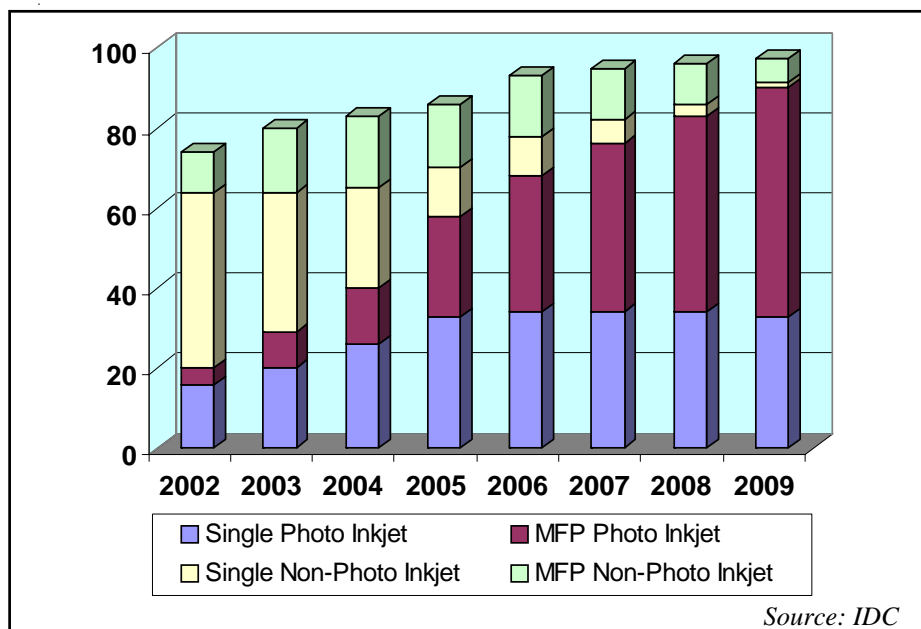
However, the makers of inkjet printers are still open to using merchant silicon, as long they are able to maintain their IP. TAK's strategy in this market, therefore, is not to try to replace these companies' IP with its own solution, but to sell them on the idea of using a common platform that enables them to implement their IP on top of TAK's architecture and get to market much faster.

TAK recently revealed the first customer for the S1, France-based Sagem Communication, which is using the chip to power its new Photo Easy 110 line of personal photo printers.

In Jan. 2006, TAK introduced the TAK S1R, a single-chip controller targeted at low-end photo printers and photo-enabled multi-function peripheral (MFP) devices.

TAK is the only remaining private company in this market, and is competing primarily against Zoran and, with its acquisition of Oasis, SigmaTel. In addition to Sagem, TAK says it has design wins in

Figure 5 — Worldwide Inkjet Printer Market (Millions of Units)



Japan and is getting good traction in Taiwan with the dye sublimation printer manufacturers. The company also claims to be making inroads on letter/A4 inkjet printers, a market it only entered earlier this year.

When we profiled TAK back in 2003, the company had just released the TAK800, a highly integrated SOC for office color printers and imaging solutions. The TAK800 is still shipping, and has had a number of design wins. The chip powers the Konica-Minolta 2430 DL color laser printer, which captured a number of industry awards in 2005, including the CNET Next Big Thing Award at CES in Las Vegas.

However, the color laser market is comparatively small – about three million units shipped in 2004, as compared to 100 million units sold in the CE market. TAK is not abandoning that market, but its next-generation Sakura chips can interface with lasers as well, so the company will basically merge the three product lines – dye sublimation, inkjet and laser – into one strategy.

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Connex Technology

Connex Technology has developed a programmable video platform for the high-definition TV market. The company's chips are based on its ConnexArray technology, a vector processor architecture optimized for the massively parallel processing required for video. Connex designed the devices to be as programmable as a typical DSP with the performance and silicon efficiency of an ASIC.

The godfather of the ConnexArray technology, Gheorghe Stefan, founded the company in late 2002 with Dan Tomescu, Paul Conley and John Sununu. The latter two, based in Washington, D.C., and New Hampshire, respectively, are no longer with the company, having opted to disengage with Connex when the company recently relocated from New Hampshire to Los Gatos, Calif. If the name "John Sununu" sounds familiar, you may recall that he is the former governor of New Hampshire and White House chief of staff in the Bush Senior administration.

Serving as chief scientist, Stefan is Romanian and on extended sabbatical from the Polytechnica University of Bucharest, where he is a tenured professor in computer engineering. Stefan came up with the basic concept of the ConnexArray about 20 years ago, spending the next couple of decades refining the idea. While teaching at a U.S. university during a sabbatical in 2002, friends and colleagues advised him to patent the ConnexArray and launch a company to commercialize it.

Tomescu, the VP of core technology, played a key role in defining the architecture of the ConnexArray and heads the effort to design and implement programming tools for the Connex system. Prior to co-founding Connex, Tomescu was VP of technology at Appfluent Technology. In 1997, he co-founded Angara Database Systems, where he served as VP of technology and chief architect for the company's main-memory database products.

When Connex moved its headquarters to Los Gatos, the company asked Paul Vroomen, who had been serving as an advisor to Connex, to head the company as president and CEO. Vroomen was previously president and CEO of SandCraft,

where he shepherded the company from a struggling IP vendor to a fabless semiconductor company. Earlier, he was VP and GM of the Consumer Business Unit at Oak Technology, and held various VP/GM roles at VLSI Technology, and Zilog.

Tom Thomson rounds out the management team as hardware director. Thomson has held design-engineering positions at Honeywell, National Semiconductor, Exponential Technology, SandCraft and QuickSilver Technology.

Connex has 26 employees, including 12 hardware engineers and 10 software and algorithm engineers. The company augments the team with 14 offshore software subcontractors, 10 of whom are based in India and four in Bucharest.

The company has a single investor, Adams Capital, which has provided Connex with \$13.5 million over two rounds of financing. Connex is close to completing a new \$15 million round, which will include additional investors.

Connex is initially focusing on the rapidly growing digital TV market. The company's value proposition is that its solution is fully programmable with a simple programming model, offers a die size that is competitive with similar function ASICs, and provides sufficient performance to enable multi-standard, multi-channel, high-definition digital TV.

Programmability in the video space is highly valued, given that the advanced video codec standards are still undergoing change. Equally as important, the major consumer electronics companies often have their own post-processing IP "special sauce." Because Connex devices perform post-processing functions, customers can deploy their IP onto Connex's programmable platform to maintain their differentiation.

Connex is aiming to meet what it believes will be the market requirements for next-generation digital TVs in the Christmas 2007 timeframe: a universal decoder that can decode H.264, MPEG-2 and VC-1, the predominant standards used variously by satellite, cable, terrestrial and IP service providers. The company also expects that TVs in this timeframe will require at least two channels of HD decoding capability.

The heart of the company's technology, the ConnexArray, is a SIMD vector processor, an architecture that can handle enormous amounts of data and is well suited to data-parallel processing. Connex's first-generation chip, the CA1024, incorporates 1,024 processing elements and can thus perform 1,024 additions per clock cycle.

Other programmable devices introduced by various companies (Quicksilver, Equator, Boston Circuits) into the video market have typically been based on multiprocessor MIMD architectures, which employ multiple processor cores from vendors such as ARC, MIPS and Tensilica. But compared to Connex's 1,024 processors, the size of the typical licensed processor core limits the number that can be implemented on a reasonable-size MIMD device to about 16 – and the number of additions per clock cycle is limited to the number of cores.

Connex claims that its CA1024 uses fewer gates than an ASIC for performing dual-channel advanced video codec and post processing (about 2.1 million vs. 2.5 million). In addition, while the CA1024 is built in 0.13-micron technology, the company's next-generation product will be a 90-nm device, enabling the number of processing elements to shrink from 1024 to 512, and the number of gates to drop by exactly half.

Connex's CA1024 replaces several different chips currently required for a dual-HD, multi-codec digital TV system, including the digital video decoder, post-processor, memory, and an analog encoder. The next chip, the CA512, will include a number of peripherals the company chose not to integrate into the first device because of the state of flux of the industry.

By focusing only on the video problem, Connex was able to implement a number of video-specific optimizations that are not possible for companies addressing a wider range of markets:

- The devices are constrained to be inter-vector compute machines; many other SIMD architectures must have large switch fabrics on chip to enable inter-processor, and therefore intra-vector, communication. Connex eliminated the switch fabric and

limited the processing-element communication to the absolute minimum — immediate left and right.

- Because video is an integer-only problem, floating-point units – which tend to use up large amounts of silicon — are not necessary.

- While most DSP devices have multiply and accumulate (MAC) capability, video's simple integer operations do not require MAC blocks, which eat up a lot of die space.

- DDR2-optimized I/O – 4 Mb of on-board memory enables deep double buffering, and I/O control is independent of instruction execution. The latter point means that, provided data is available at all times, the ConnexArray can execute algorithms 100% of the time.

- Because certain functions cannot be deployed into a parallel environment, Connex built into its chip an optimized bit-serial co-processor that can handle these kinds of tasks.

In terms of performance, Connex claims an advantage of between 25x and 100x over devices from companies such as Analog Devices, TI and Equator.

Connex built a test board to validate the ConnexArray architecture based on four 4,096-processing-element arrays, resulting in 16,384 processing elements. The company will be taping out the CA1024 this spring, with samples available during the first half of this year and first customer shipments by the end of 2006. Connex says it has a number of customers waiting for the system development kit, two of which are likely to become beta customers.

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Adamyia Computing Technologies

Having just completed its tenth year in business, Bangalore, India-based Adamyia Computing Technologies is a fast-growing provider of Bluetooth IP and product engineering services in the wireless domain. The name "Adamyia" is a Sanskrit word meaning "insuppressible spirit."

Incorporated in 1996 and employing approximately 100 people, the company was launched by six founders: Yatheendranath Tarikere, Shyamprasad Shetty, Sharadhichandra Babu, Muralidharan Nottiath, Hemavathi Sonnappa and Anilkumar Aradhya. Four of the six founders are actively running the company.

Tarikere, who serves as CEO, previously worked with PSI Data Systems, Global Edge Technologies and other organizations. In addition to working worldwide, he has contributed to projects at Indian defense organizations such as light combat aircraft, ISRO's INSAT-1C satellite, and others.

CTO Shetty has held various positions at Larsen & Toubro, Crompton Greaves and Electronica (Alkobar, Saudi Arabia). He played a major role in architecting one of the largest military wireless networks in the Middle East.

COO Babu served as a commissioned officer in the Indian Air Force before joining Adamyia.

Nottiath, the company's chief administrative officer, has worked with Global Edge Technologies and PSI Data Systems.

Profitable from day one, Adamyia was self-funded for the first five years. The company brought in one investor in 2001, Infinity Technology Investments, which provided about \$1.2 million. Infinity is India's first institutionalized angel fund.

Adamyia, which has developed good market traction with its Bluetooth IP, is now working toward establishing itself in the UWB, WiMax and other wireless markets. The company is looking to close another round of funding in the near future as it undertakes these new product initiatives.

That will likely be the last funding the company will need. Adamyia grew 100% in

2005, and this year the company expects to grow 300%, with a 50% expansion in head count. If all goes well, Adamya is looking at an IPO exit strategy within the next three years.

Adamya has two offerings: wireless IP for embedded platforms, and an engineering service that develops total solutions for customers. Although each represents about half of the company's revenues, the IP division is growing quite fast and will soon be Adamya's dominant business.

Adamya's Bluetooth IP includes the following products:

C-Blue™ — A BQB-qualified Bluetooth protocol stack written in ANSI 'C' language. Available on a range of platforms and processors, C-Blue supports all Bluetooth wireless technology basebands. According to Adamya, C-Blue is the smallest embedded protocol stack in the industry.

C-BlueProf™ — Bluetooth wireless technology profiles for applications.

C-BlueBase™ — Software Bluetooth wireless baseband controller.

The C-Blue solution is up and running on various combinations of processors, platforms and basebands (see Table 7). As a small company, Adamya generally holds off on porting its solution to additional processors and platforms until a paying customer requiring a particular solution comes along.

A unique aspect of the C-Blue architecture is the ultra-thin "Kernel Abstraction Layer" (KAL), which enables quick and efficient porting of C-Blue onto various processors and platforms. The only platform-dependent code in the C-Blue architecture, KAL enables Adamya to isolate the stack and profiles from the three external entities: the platform, processor and baseband. KAL acts on pre-allocated internal memory, freeing the global memory for applications and thus providing efficient memory management. The protocol stack does not interfere with the global memory pool.

Architected for embedded platforms, Adamya's IP is designed to have a very small footprint. The company developed a mono headset for cell phones, for example, based on low-power TI silicon with only 2 KB of RAM, on which Adamya was able to embed the complete protocol stack, headset profile, application with user interface, and power management.

The above-mentioned headset is available as a reference design, as are a number of other products, such as:

- Bluetooth mono headset for mobile phones;
- Bluetooth HiFi headset;
- Stereo wireless adapter for music systems;
- Video surveillance device;

- Wireless printer adapter;
- Serial Cable Replacement Adapter; and
- Bluetooth PCMCIA card.

Adamya also licenses its Bluetooth IP to cell phone manufacturers, and has worked with several of them to help integrate its IP – as well as other IP — into various cell phone platforms. The company is also developing several cell phone accessory product solutions.

The other side of Adamya's business, engineering services, offers end-to-end solutions in DSP and embedded systems, wireless networking and communications and system software. The company provides software-based solutions, develops reference designs, and ports and migrates systems, tools and utilities across platforms.

Adamya maintains a separate facility, the Adamya Dedicated Development Center (ADDC), where the company undertakes customer projects. For each project, Adamya dedicates infrastructure (servers, systems, etc.) as well as a technical team that works exclusively on the project. The customer posts a full-time manager at the facility to work alongside the project manager from Adamya to ensure the project proceeds smoothly.

Adamya engages with customers on various levels, depending on the nature of the task a particular customer wants Adamya to perform. This ranges all the way up to turnkey projects, in which the company works with customers from concept to delivery. The customer can engage with Adamya on a fixed-price, fixed-time or fixed-scope deliverables model, with the work carried out at the ADDC, onsite at the client's location, or a combination of the two.

Adamya has attracted a number of big-name customers for its IP and services, including TI, Philips, Honeywell, H-P, Oki Semiconductor, Infineon, National Semiconductor and a number of others.

Adamya's management team also includes senior program manager H.N. Jayasimha, an expert in DSP, embedded solutions, hardware and firmware. He previously worked at Voice and Speech Systems, where he performed significant work in voice and speech signal processing

Table 7 – C-Blue Availability

Platforms	Processors	Basebands
ARTOS Windows CE Windows DSP BIOS Linux Embedded Linux	TI C54x/C55x TI C54x/C55x TI MSP430 8051 and X86 ARM7 XTENSA TI Calypso/+	TI BRF6100, BRF6150 National Semiconductor CSR Philips Zeevo (now Broadcom) Ericsson OKI Silicon Wave Inventel Connexant NOKIA PCMCIA Card Host of USB Dongles Serial Port Dongles

and developed several products and systems.

Manohar Parajnaje, senior hardware manager, is an authority in both analog and digital circuits, and is in charge of the Reference Design Development division of Adamyia.

Sreenath Nagaraja, H.R. manager, is a veteran of several global companies, including Wipro and Motorola.

Arunkumar Bhyrappa looks after worldwide sales at Adamyia.

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Binachip

Since the mid-1990s, the explosive growth of platform-based products has spurred an associated growth in increasingly complex embedded software applications. Systems designers often find that they must move certain compute-intensive functions into hardware in order to meet performance requirements. While most of the EDA tools in the embedded space are targeted at hardware designers, Binachip is developing a set of tools specifically for embedded software designers. Plugging into the design flow at a step that has traditionally been carried out manually – moving these compute-intensive functions into hardware – the company's tools automate the translation of software assembly and binaries onto mixed hardware/software platforms.

Binachip's founder, Prith Banerjee, serves as chief scientist and is also dean of the College of Engineering at the University of Illinois at Chicago. Previously, he was the Walter P. Murphy professor and chairman of the Department of Electrical and Computer Engineering at Northwestern University, where he and several of his graduate students developed Freedom Compiler, the core technology behind Binachip's tools.

While on leave from Northwestern during 2001-2002, Banerjee founded AccelChip, a provider of MATLAB-based algorithmic synthesis solutions that was acquired by Xilinx in Jan. 2006.

Earlier, Banerjee was the director of the computational science and engineering program, and professor of electrical and computer engineering, at the University of Illinois at Urbana-Champaign.

In Jan. 2006, Banerjee brought in Susheel Chandra, a friend from their PhD student days, to serve as president and CEO. Chandra had spent the previous three years with Sequence Design as senior VP of R&D and product marketing. Before that he was GM of Mentor Graphics' Intellectual Property Division, and was responsible for founding Mentor's India operations in 1997 and serving there as GM. Prior to joining Mentor, he held technical positions with Checklogic and Sony.

Two of Banerjee's former graduate students, who had worked on the original Freedom Compiler, joined Binachip after finishing their PhDs. The company has a total of four employees at this point, with Banerjee devoting 20% of his time to the startup.

Binachip received an undisclosed amount of seed funding from the Illinois Technology Enterprise Centers program, which provides seed funding to Illinois-based technology companies. The company is currently in the process of closing its Series A round, which will likely be announced at the end of April.

Today, the embedded systems design process involves some kind of hardware platform, typically consisting of a processor, memory and peripherals. The application designers write software – the embedded applications – on top of the platform. A system architect makes the decisions about which part of the application should be mapped to software running on a general-purpose processor (GPP), and which part should be mapped onto application-specific hardware.

For the portion that will run in software on the GPP, designers use C/C++/MATLAB compilers to generate code for the particular processor. For the hardware portion, a hardware designer manually converts the

C/C++/MATLAB language specification of the problem into an RTL hardware description language – a process that can take several months.

The hardware and software development efforts therefore proceed on two parallel tracks, with the teams coming together at some point to try running the application on the target platform. If they discover they are not meeting their performance requirement, they start the process over.

Binachip's tools can reduce this process down to days by automating the task of moving portions of the application from software to hardware. A unique aspect of the company is its use of binary code instead of a high-level language such as C or Matlab. Binary enables the tool (or user, if the designer is over-riding this part of the automation) to perform hardware/software partitioning at an extremely fine-grained level, moving just a few lines of binary to into hardware, if that is all that is necessary.

Another advantage of binary is that it enables the Binachip tool to handle any kind of code, regardless of the source language. In addition, the tool can leverage architecture-independent compiler optimizations, many of which work quite well.

The designer begins by profiling the binary code using standard profiling tools. Binachip then takes the software code, along with the profiling data that indicates the location of bottlenecks, and automatically performs hardware/software co-design at the assembly language level. The tool outputs software code for the target processor, and RTL VHDL and Verilog code for the portion of the application being moved into hardware.

If the team subsequently discovers that they are missing their performance requirement when they run the application on the target platform, they do not have to reset the process and redo months of work – they just go back to the Binachip tool and instruct it to put more functions into hardware.

According to Binachip, the tool can produce an implementation that, depending on the application, can provide a 10X to 50X speedup over a pure software implementation.

One of the benefits provided by Binachip's software is that the incoming target processor can be different from the outgoing one, enabling the tool to migrate an older-generation processor to a newer generation. The company, of course, does not claim to do complete binary-to-binary translation between any two processors, but it can easily handle those with the same instruction set architectures – taking in ARM7 binary, for example, and writing out an ARM9 binary.

Binachip has three initial products in the works, with the first — Binachip-FPGA — scheduled for release in June 2006. The tool converts embedded software binary code into FPGA hardware implementations.

Next is Binachip-ESW (for Embedded Software), which will be tightly integrated with the embedded software toolkits. This will enable Binachip users to invoke the compiler, debugger or profiler from the user interface, allowing the tool to identify bottlenecks and the user to do “what if” analysis. Binachip-ESW tool will be available in the second half of 2006.

In the first half of 2007, Binachip will launch Binachip-GPP for binary-to-binary translation between general-purpose processors. Again, the tool will only target those processors with the same instruction set architectures.

Binachip intends to establish partnerships with FPGA vendors such as Altera and Xilinx, which have long recognized that applications developers represent a much bigger market opportunity than hardware developers alone. Binachip is therefore aiming to be bundled with the FPGA toolkits.

A second kind of partnership Binachip is seeking involves embedded software toolkit developers, such as Wind River Systems and Mentor Graphics. Through integration with these tools, applications developers will be able to do “what if” analysis.

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Spreadtrum Communications

Based in Sunnyvale, Calif., with most of its engineering operations in China, Spreadtrum Communications is developing chips for China's large and rapidly growing domestic cellular market. The company is developing single-chip solutions for GSM/GPRS and TD-SCDMA/GSM/GPRS mobile devices, and has integrated all of the analog, digital and power-management functions as well as a full set of multimedia features and interfaces into the chips.

Founded only five years ago, Spreadtrum has already grown to 450 employees. CEO Ping Wu and CTO Datong Chen founded Spreadtrum with Renyong Fan (VP of operations) and Jin Ji in July 2001. The company raised \$6.5 million in Series A funding at the time of founding, followed by a \$20 million Series B round in Nov. 2002 and a \$35 million Series C round in April 2004. The company has more than 30 investors, with the largest including New Enterprise Associates (NEA), Fortunetech Investment Fund, Pacific Venture Group, Vertex, Legend Capital and HuaHong International.

Spreadtrum offers three chip products:

SC6600M GSM/GPRS baseband chip – In addition to baseband functionality, the 6600 also supports a number of functions typically implemented separately on different chips. These include support for a 1.3-megapixel digital camera with video recording and playback, 64-polyphonics with stereo sound, MP3 player, USB interface and USB removable memory. Analog I/F features include a wide-range RF interface and power management on chip.

Spreadtrum began volume shipments of the SC6600 in June 2003, primarily to domestic handset makers including TCL, Ningbo Bird, Amoi Electronics, Hisense and Putian Capital.

SC8800 Single-chip TD-SCDMA/GSM/GPRS dual-mode baseband chip – Powered by the CEVA-Teak DSP core, the SC8800 enables dual-mode 2G/3G phones that operate transparently over China's TD-SCDMA and GSM networks. As with the SC6600, the chip integrates analog, digital and power management functions on a single chip.

SC6800 GSM/GPRS multimedia baseband IC – The SC6800 integrates an ARM9 processor and TeaKLite DSP, 5-megapixel camera controllers, auto-focus controllers, MPEG4 accelerator and MP3 player, and supports TV out and other multimedia application-processing functionalities.

Spreadtrum also offers a wireless module, the SM5100B, which incorporates the baseband chip, RF chipset, combo flash and software. Intended for applications such as wireless desktop phones, mobile phones, remote monitoring and remote meter reading, the module provides all the required functionality for full-featured GSM/GPRS terminals.

Spreadtrum provides its customers with IP and application software, and developed its own protocol stack software. The open platform enables customers to perform high-level development to implement their own IP and value-added features.

Compared with the Europe-initiated WCDMA and U.S.-backed CDMA 2000 3G standards, China's homegrown 3G standard, TD-SCDMA, arrived late to the game. We even heard that Chinese telecom operators were reluctant to use TD-SCDMA due to that fact. Nevertheless, the Chinese Ministry of Information Industry formally approved TD-SCDMA on Jan. 20, 2006, as the national technology standard for 3G mobile communications.

Spreadtrum projects that shipments of 3G mobile phones in China will grow to 9.5 million units by 2007, up from 3.3 million units in 2004. The Industrial Technology Information Services (ITIS), a unit of Taiwan's Ministry of Economic Affairs (MOEA), projects subscriptions for 3G services in China will increase from 15 million in 2006 to 80 million by 2008.

However, according to market research firm ABI Research, the establishment of a national 3G network will not greatly change the existing mobile landscape. The Chinese government will provide strong policy support to help TD-SCDMA operators gain time and establish a price lead over other 3G technologies, says ABI, but GSM will continue to be the dominant technology in China over the next five to eight years.

Continued on page 22

Fujitsu, Rambus Sign Patent-License Agreement

Rambus has signed a patent-license agreement with Fujitsu that covers systems, semiconductors and all other segments of Fujitsu's business, past and future, on a worldwide basis. Fujitsu's payment amounts will be based in part on the relative volume of DRAM that Fujitsu purchases from Rambus-licensed or unlicensed memory suppliers.

Contact:

Harold Hughes, Rambus president and CEO;
Tel: 650 947-5000; www.rambus.com.

Renesas, ZMD Partner on Sub-1-GHz ZigBee Offering

ZMD is working with Renesas Technology's American subsidiary to offer sub-1-GHz ZigBee wireless sensor networking solutions. The solution will combine the ZMD44102, which is currently the only commercially available sub-1-GHz transceiver for ZigBee, and Renesas' highly integrated M16C microcontroller with full-scale ZigBee software support.

The ZMD44102 is based on the IEEE 802.15.4 standard and operates in the 868- and 915-MHz bands. It offers range more than 250 meters in range at 0 dBm output power and a highly integrated hardware MAC for automatic protocol management.

The Renesas M16C microcontroller is designed to minimize electromagnetic interference (EMI) and electromagnetic susceptibility (EMS) problems, which are important issues for RF design engineers. It also offers scalable on-chip memory resources, a mix of peripherals and in-house software support.

To provide a one-stop solution, the two companies are also offering design resources, including RF reference designs, ZigBee networking software, development kits and sensor ICs.

The ZigBee networking solution will be available in the second quarter of this year.

Contacts:

Tim Dry, Renesas Technology America senior marketing manager/advanced solutions group; Tel: 408 382-7500; <http://america.renesas.com>.

Kory Brown, ZMD VP of wireless division;
Tel: +49.351.8822-306; www.zmd.biz.

Cypress, Simtek Expand Technology Agreement

Nonvolatile static RAM (nvSRAM) maker Simtek has signed a License and Development Agreement with Cypress Semiconductor that expands the agreement the two companies signed in May 2005.

Under the terms of the agreement:

- Cypress will retain the right to include nvSRAM functionality on future programmable SOC and customized ICs originally granted in the May 2005 agreement, and now with clearly defined royalty payments to Simtek for the use of its SONOS-based nvSRAM IP;
- Simtek is granted the right to use certain Cypress IP in developing future generations of nvSRAM products;
- Cypress will provide Simtek with manufacturing support;
- The two companies will work together to extend the deployment of Simtek's nvSRAM technology; and
- Simtek and Cypress will jointly develop a family of products using Simtek's SONOS-based non-volatile technology.

Upon signing the agreement, Simtek received \$2 million from Cypress, and will receive additional payments of \$1 million on June 30, 2006, and Dec. 31, 2006. The agreement also calls for Simtek to issue warrants to Cypress to purchase 20 million shares of its common stock at an exercise price of \$0.75 per share.

Contacts:

Harold Blomquist, Simtek CEO; Tel: 719 531-9444; www.simtek.com.

Tom Surrette, Cypress VP of Non-Volatile Memory Business Unit; Tel: 408 943 2600; www.cypress.com.

QuickLogic, Seagate Provide HDD Interface

QuickLogic has partnered with hard drive specialist Seagate Technology to incorporate the Seagate S-Series CompactFlash Hard Disc Drives with technology based on QuickLogic's low-power QuickIDE bridge controller. The solution addresses the difficulty of mating low power embedded processors to high-

density small form factor (SFF) hard disc drives (HDDs) due to lack of a native IDE interface, which results in designers sacrificing performance and, therefore, battery life.

QuickLogic has created a companion device to connect Seagate S-Series disc drives to Intel PXA2xx processors. The companion device integrates a full-featured IDE bridge controller and local bus interface. QuickLogic and Seagate performed benchmark tests on different data buffer sizes and disc drive densities, with the results continuously demonstrating the theoretical maximum effective transfer rate of the disc drives.

The QuickLogic companion device is available now for less than \$5 in volume quantities.

Contacts:

Kevin Yee, QuickLogic director of business development; Tel: 408 990-4000; www.quicklogic.com.

Todd Buelow, Seagate business development manager; Tel: 831 438-6550; www.seagate.com.

Legerity, 8x8 Offer Turnkey Phone-Ready PC Solution

Chipmaker Legerity has partnered with 8x8 to develop a turnkey Phone-Ready PC solution for PC OEMs. The solution enables PC vendors to bundle 8x8's Packet8 voice and video Internet phone services with new platforms that offer simplified VoIP communications and enhanced audio and video collaboration.

The Phone-Ready PC simplifies deployment of VoIP services by allowing customers to plug their existing analog phone into a pre-configured PC and immediately begin using an Internet phone service. The 8x8/Legerity turnkey solution incorporates Packet8 VoIP service with a Legerity PCI PhonePort adapter card and Packet8 Softalk, a SIP soft phone developed in conjunction with CounterPath Solutions for use with the Packet8 residential, video and virtual office Internet phone services.

Contacts:

Shoaib Mohammad, Legerity director of business development; Tel: 512 228-5400; www.legerity.com.

Christopher Peters, 8x8 VP of strategic alliances; Tel: 408 727-1885; www.8x8.com.

ASICs, IP and Design Services

National Opens New European Power Application Design Center

National Semiconductor has opened a new Power Application Design Center in Europe to strengthen application- and system-support services for engineers designing power supplies and power-management systems.

Located at the company's European headquarters in Fuerstenfeldbruck, Germany, the center provides a range of engineering services, including reference designs, product selection, circuit design, board layout and problem analysis.

Contact:

John Phelps, VP and GM for Europe; +49 (0) 81 41 35-0; www.national.com.

Peregrine Opens New England Design Center

Peregrine Semiconductor has opened its third engineering design site, the New England Design Center, in Nashua, N.H. The initial group is comprised of experienced RF/microwave design and product

development engineers with an average of 17 years' experience.

The NEDC will leverage its UltraCMOS technology to focus on highly integrated RF solutions for multimode operation of next-generation protocols such as GSM/EDGE, CDMA, WCDMA/UMTS and WLAN.

Peregrine's UltraCMOS mixed-signal process technology is a patented variation of silicon-on-insulator (SOI) technology that uses a sapphire substrate, providing high yields and competitive costs. The company's HaRP technology is a patented process involving design advancements that dramatically improve harmonic results, linearity and overall RF performance.

Contact:

Dan Nobbe, VP of engineering; Tel: 603 589-4017; www.psemi.com.

Tanaka Licenses Microbonds' X-Wire Technology

Tanaka Denshi Kogyo, a global supplier of standard bare gold bonding wire, is licensing Microbonds' proprietary X-Wire

Technology for inclusion in the Tanaka family of gold bonding wire products. Initial production will occur at Tanaka's flagship Saga Japan facility.

Canadian startup Microbonds has developed a proprietary insulated bond wire and bonding process, called X-Wire and X-Process, respectively. X-Wire not only enables greater densities by allowing wires to touch each other, it also leverages industry-standard wire-bonding manufacturing methods, equipment and processes.

Microbonds previously performed the wire-coating process at its Markham, Ont., facility, although the deal with Tanaka is the realization of its goal to have a store-in-store situation.

(See our profile of Microbonds in the Aug. 2005 issue of *InsideChips.Ventures*.)

Contacts:

Yasuo Fukui, Tanaka Denshi Kogyo president; Tel: +81-3-5222-1380; www.tanaka-precious.com.

John Scott, Microbonds CEO; Tel: 905 305-0980; www.microbonds.com.

Plants and Facilities

RFMD Expanding North Carolina Wafer Fab by 40%

RFMD is launching an \$80 million fab expansion at the company's campus in Greensboro, N.C., which RFMD expects will increase wafer-manufacturing capacity by approximately 40% for its GaAs HBT and GaAs pHEMT process technologies. RFMD also expects the expansion to reduce cost per wafer and provide available capacity to increase internal production of GaAs pHEMT, a critical enabling technology in the company's transmit modules.

This is the fifth capacity expansion RFMD has undertaken in its 15-year history. The company views its continued investment in manufacturing capacity as key to its revenue and earnings growth. When the previous fab expansion was completed in the March 2005 quarter, the company's quarterly revenue was \$150.4

million, but increased to \$208 million less than one year later in the Dec. 2005 quarter.

RFMD has begun expanding its wafer-fabrication equipment base in existing clean room facilities, and expects volume production in late 2006. The company received a Job Development Incentive Grant (JDIG) from the State of North Carolina that provides up to \$4.9 million in tax credits to assist with the expansion. RFMD also received a collective pledge of nearly \$1.5 million from the city of Greensboro and Guilford county governments. RFMD expects to add 300 new highly skilled positions at the expanded facility.

Contact:

James Stilson, VP of operations; Tel: 336 664-1233; www.rfmd.com.

Entegris Expands in Asia Pacific

Entegris is increasing its manufacturing capacity in Asia Pacific by expanding its manufacturing facility in Kulim, Malaysia. Construction of the 91,000-square-foot addition – which will house both research and development and manufacturing activity – began in February and is expected to be completed by September. The Asia Pacific region produces 55% of the company's overall revenues.

Entegris built its existing Kulim plant in 1997. Research and manufacturing at the facility focuses on the company's wafer handling, liquid dispense and finished electronics packaging (data storage, flat panel displays) products. This expansion project follows the company's opening of a new regional service center in Hsinchu, Taiwan, in Sept. 2005.

Contact:

Gideon Argov, president and CEO; Tel: 952-556-3131; www.entegris.com.

Summit Names Fabless Veteran VP of Manufacturing and Quality

Summit Microelectronics has appointed Evert Wolsheimer VP of manufacturing and quality. Before joining Summit, Wolsheimer held a number of executive positions at Xilinx, most recently VP of quality and reliability. A member of the executive team at Xilinx since 1991, he spearheaded the use of outsourcing process development and wafer manufacturing and oversaw the company's product engineering, process and packaging development, foundry collaborations, and reliability. Prior to Xilinx, his work included technology development management at LSI Logic and marketing and R&D positions at Philips.

Granite Global Ventures Adds Two New Managing Directors

Granite Global Ventures (GGV), an expansion-stage venture capital firm, has appointed Glenn Solomon and Jenny Lee as managing directors. Solomon will be based in GGV's Menlo Park office, while Lee will continue to be based in GGV's office in Shanghai.

Prior to joining GGV, Solomon led Partech International's software and Internet group, and was responsible for leading investments in the storage, security and e-commerce sectors. He previously worked with SPO Partners, a San Francisco-based private investment partnership, and Goldman, Sachs & Co.

Lee joined GGV in 2005 and recently led its investments in Oriental Wisdom, Bokee, and ChinaCars. Prior to joining GGV, Lee was a VP at JAFCO Asia and was responsible for its investments in technology companies based in China and Hong Kong with a concentration on semiconductor, Internet and services sectors. She was previously an investment banker at Morgan Stanley and was responsible for identifying potential investment opportunities within the technology and telecom sectors in Asia.

Aprio Appoints VP of Engineering

Aprio Technologies, an EDA provider of design-for-manufacturability (DFM) tools, has named Gerald Buurma as VP of engineering. Most recently, Buurma was president of Silicon Navigator, an OpenAccess-based framework and applications company. Prior to that, he was senior VP of research and development at Cadence Design Systems. He also served as VP of engineering at Toshiba America, and has held senior management positions at General Electric Semiconductor Division and National Semiconductor.

Founded in Jan. 2003, Aprio is developing the next generation of OPC tools that not only enable full-chip OPC runtimes that are 3x faster than conventional tools, they drastically cut runtimes of subsequent passes by allowing users to apply OPC only to selected areas.

PMC-Sierra Names VP of Worldwide Sales

PMC-Sierra has named Robert Liszt VP of worldwide sales. Liszt was most recently the VP of worldwide sales/North America at Agere Systems. Prior to joining Agere, he held senior management positions at companies that include NEC Electronics and Hitachi America Semiconductor.

Vertical Circuits Hires President and CEO

Sunil Kaul has joined Vertical Circuits Inc. (VCI), a die-level semiconductor stacking company, as president and CEO. Kaul joins VCI from Silicon Bandwidth, where he served as COO. He has also spent time with Fairchild Semiconductor, Digital Equipment Corp, Sun Microsystems, Temic Semiconductor and AlliedSignal.

VCI's Advanced Semiconductor Products business unit has developed a die-level vertical interconnect process for the design and manufacture of ultra-high-performance and high-density semiconductor modules.

VCI formed through the merger of TRW Components International and Cubic Memory in Oct. 1999.

Semtech Taps Intersil Exec for CEO Position

Semtech has hired Mohan Maheswaran as the company's president and CEO, effective April 3, 2006. In addition, Maheswaran will become a member of the board of directors.

Maheswaran will replace John Poe, who has been serving as Semtech's acting CEO on an interim basis since Sept. 27, 2005. Poe will remain as Semtech's chairman of the board of directors, a position he has held since March 1998.

Maheswaran most recently held the position of executive VP and GM at Intersil, which he joined by way of its acquisition of Elantec Semiconductor in 2002. He has also worked for Allayer Communications, IBM Microelectronics, Texas Instruments, Hewlett-Packard and Nortel Communications.

DiBcom Appoints Former Ericsson Executive VP of Worldwide Sales

DiBcom, a provider of silicon for mobile digital TV, has appointed Jan Pantzar as VP of worldwide sales. Pantzar was previously VP of sales at Voice Signal Technologies and, prior to this, VP of sales and supply for Ericsson Mobile Platforms. Earlier, he held executive positions with various companies, including STMicroelectronics and Cypress Semiconductor.

(See our profile of DiBcom in the April 2003 issue of *InsideChips.Ventures*.)

SMSC Hires New Corporate Controller

Joseph Durko has joined SMSC as VP and corporate controller. He will also become chief accounting officer effective May 16, 2006, upon completion of the 10-K filing process for SMSC's fiscal year ended Feb. 8, 2006. Durko succeeds Eric Nowling, who will be assuming new responsibilities within SMSC's finance organization.

Durko was corporate controller and held other senior financial management positions with the multinational publicly listed companies Movado Group, DRS

Technologies and Ventive Health, where he also served as interim CFO. He also served as director of financial reporting for TRW Automotive. Most recently, he supported OEMs and tier-one suppliers in managing supplier risk within the automotive industry as a member of a specialty business advisory firm.

PulseWave RF Adds VP of Sales

PulseWave RF (formerly PropheSi Technologies), a provider of semiconductor modules for the wireless infrastructure market, has appointed David Bolan VP of sales. Bolan most recently served as VP of sales and marketing at wireless compliance testing firm MiCOM Labs. Prior to MiCOM, he was involved in several startups, including CoWave Networks and Pico Communications. Earlier, Bolan served as VP of marketing at Repeater Technologies and as the VP of OEM sales and marketing at Spectrian.

Founded in 2002, PulseWave RF is developing digital power amplifier technology for the cellular infrastructure market. The company is implementing its proprietary control IC and driver amplifier, along with some off-the-shelf RF amplifiers, in a high-efficiency, self-linearizing power amplifier module solution for use in cellular base stations.

(See our profile of PulseWave RF under its former name, PropheSi, in the Jan. 2006 issue of *InsideChips.Ventures*.)

Former Xilinx Executive to Head Cypress Marketing

Babak Hedayati has joined Cypress Semiconductor as senior VP of worldwide marketing. Hedayati comes to Cypress from Xilinx, where he headed the company's Worldwide Product Solutions Marketing Organization. Prior to joining Xilinx, he held positions at Altera, 3DO, Zycad and National Semiconductor.

MoSys Hires Chief Financial Officer

Monolithic System Technology (MoSys) has named Jim Pekarsky VP of finance and CFO. Pekarsky joins MoSys from AccelChip, where he was the CFO

from Nov. 2003 through its acquisition by Xilinx. Prior to AccelChip, he served as CFO of Virage Logic for five years, leading the company's IPO in Aug. 2000. Earlier, he served as director and GM at Mentor Graphics.

picoChip Hires VP of Sales for Europe

picoChip has begun a significant expansion of its sales network in Europe with the appointment of David Hutton as VP of sales – Europe. Hutton has more than 22 years of experience in the semiconductor and wireless industries, having held senior sales and marketing positions at Texas Instruments, IDT and, most recently, Pericom. He has also had experience working with Europe-based semiconductor IP startups Silaria and Siroyan.

(See our profile of picoChip in the Aug. 2002 issue of *InsideChips.Ventures*.)

Samsung Expands Foundry Management Team with New VP

Increasing its foundry business marketing activities in the Americas, Samsung Electronics has appointed Ana Molnar Hunter as VP of technology for its U.S. subsidiary, Samsung Semiconductor. Hunter has spent the last 15 years working in the semiconductor foundry industry in various positions as a consultant, VP of U.S. operations for Communicant Semiconductor Technologies, and VP of EDA and customer services for Chartered Semiconductor.

Vitesse Appoints New CTO, VP of Engineering For Ethernet Div.

Vitesse Semiconductor has named Chi Fai Ho CTO and Paul Browne to VP of engineering for Vitesse's Ethernet Products Division.

Most recently, Ho was VP of engineering for Tidal Networks. Prior to that, he was senior director for Nokia, heading a business program and system technology group on 3G & GPRS gateway platforms. Earlier, he was VP of engineering for Amber Networks (acquired by Nokia), and he held various engineering and management positions with Network Equipment Technology, Cisco and

Unisys.

Browne joined Vitesse from 3Com, where he held various management positions during his six years with the company, most recently senior director of engineering. Prior to 3Com, Browne held various engineering and management positions at Audio Processing Technology, Tritel Telecommunications, CSD Hathaway and Wolfson Electronics.

JAM Technologies Adds New Marketing Talent

JAM Technologies, developer of True Fidelity digital-input audio amplifiers, has named Rick Beale VP of marketing and business development. Beale most recently was a VP responsible for marketing and sales at RF Magic in San Diego. In addition to executive marketing positions with Legerity and Bandspeed, he was co-founder of Austin, Tex., startup Surgient Networks. Beale also held senior management positions with Motorola and Agere Systems, including 10 years of hands-on mixed-signal design experience with Bell Labs.

Founded in 1999, JAM Technologies has developed what it maintains is the only new approach to audio amplification in decades. The technology matches the sound quality of analog amps and the size and low heat generation of Class D amplifiers, and is sufficiently inexpensive to go into mass-market applications.

(See our profile of JAM in the July 2005 issue of *InsideChips.Ventures*.)

Stratosphere Solutions Names CEO

Design for yield startup Stratosphere Solutions has hired EDA veteran Robert Smith to head the company as CEO and chairman. Most recently, Smith was president and CEO of InTime Software and, previously, was VP of marketing and business development at Magma Design Automation. He joined Magma from LogicVision, where he also served as VP of marketing and business development. Earlier, he spent six years at Synopsys, where he was director of marketing and, later, director of strategic alliances.

In addition, Smith has co-founded two

companies, one specializing in silicon prototyping and the other in technical documentation.

Kotura Appoints CTO

Mehdi Asghari has joined Kotura as CTO. Most recently, Asghari served as VP of research and development of Bookham, where he was responsible for the research, development, and manufacturing transfer activities behind all of Bookham's silicon-based technologies and products.

INSIDE Contactless Expands Management Team

INSIDE Contactless, a provider of advanced, open-standard contactless chip technologies, has added Charles Walton as executive VP of sales and marketing and Philippe Martineau as VP of the NFC business line.

Walton has more than 10 years' experience in the smart card sector, including several years operating a successful smart card product and services company. He was mostly recently EVP and COO for mobile security company Diversinet, which he joined as part of the acquisition of Caradas, a smart card solutions company he founded in 1998.

Prior to that, Walton was involved in both security and smart-card-related initiatives with Securify (senior VP of security services), CertCo (COO), and Spyrus (director of electronic commerce). He was also the co-founder of the CyberTrust business at GTE.

Martineau spent the past 17 years in the smart card industry working for Gemplus in France and the U.S., predominantly focused on the telecommunication industry. He held several positions within Gemplus, moving from a technical background to management positions. He served as director of marketing during his three years in the U.S. In France, he managed the Telecom Business Unit product line and later became VP of strategy.

CoWare Adds Two Execs to Senior Management Team

ESL software provider CoWare has named Tim Smith VP of worldwide sales, and Mike Faust VP of North America and Europe sales.

Smith most recently served as VP of worldwide sales at Sonics, a startup IP provider. Before that, he was VP of worldwide sales for Triscend (acquired by Xilinx), which developed configurable

SOC semiconductors. He joined that company from Memec Design Services, a provider of Xilinx engineering design services and IP to customers worldwide.

Faust joined CoWare from his position as VP of worldwide sales at EDA startup Reshape. Previously, he spent six years at Cadence Design Systems, ultimately serving as director of global account sales.

Cymer Exec Joins Luxtera as Senior VP of Operations

Luxtera has named Edward Holtaway senior VP of operations. Holtaway was the former executive VP of corporate operations for Cymer, a supplier of excimer light sources for lithography. Prior to that, he served as Cymer's executive VP of the Lithography System Solutions group and, before that, senior VP of operations and business process management. He joined Cymer in July 1998 as senior VP of process quality. Prior to joining Cymer, Holtaway spent 13 years with Brooktree, a fabless semiconductor company acquired by Rockwell Semiconductor Systems in 1996. During this time, his executive posts included director of Rockwell's San Diego operations, VP and managing director of Brooktree's Singapore operations, and VP of corporate quality.

Emerging Ventures, Cont.

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China is conducting its final TD-SCDMA trials in select cities between March and June. These latest trials follow three earlier rounds of tests, and should be the last before commercial use.

Spreadtrum will be competing with fellow TD-SCDMA chipmakers such as Commit (a joint venture involving Nokia, Texas Instruments, LG, Putian, DBTEL and Datang), Chongyou Information Technology, T3G (a joint venture of Datang, Philips and Samsung), Analog Devices and others.

The number of Chinese IC startups has

been rapidly growing over the last few years, although many appear to have relatively simple technology, few people, little cash and fairly modest expectations. But a few – such as Spreadtrum – have set their sights higher and are establishing themselves as significant technology companies. We are impressed with Spreadtrum's high level of integration in its products, as well as its ability to attract major investors and the early establishment of a global presence. We believe the company has a good chance for continued growth and success in China's telecom market.

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picoChip Launches New Family of Multi-Core DSP Chips

picoChip has launched its next generation of picoArray multi-core processor arrays for wireless systems. The first devices in the family — the PC202, PC203 and PC205 — each have different performance and features, but they all integrate about 200 or more individual processors onto each die and deliver more than 100 GIPs and 25 GMACs. With pricing from just \$25 in high volume, picoChip is claiming to have achieved the “\$1 per GMAC” metric.

All three products are programmed in standard C or assembler, making them suited to complete software radio systems.

The PC202 integrates 198 individual DSPs, as well as an ARM 926EJ-S for control and MAC functionality, and is intended for cost-critical applications such as WiMAX client-side systems and access points, and WCDMA femtocells (home basestations).

The PC203 has 248 processors and is designed for basestation applications. The PC203 can support protocols such as WiMAX and HSDPA/HSUPA, including support for advanced algorithms such as

MIMO and beamforming. It is used with an external control processor or network processor in large basestations.

The PC205 has 248 DSPs and, in addition, includes an ARM 926EJ-S. It is intended for higher-performance stand-alone applications, including software-defined radios and high-performance backhaul or mesh nodes.

(See our profile of picoChip in the Aug. 2002 issue of *InsideChips.Ventures*.)

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SyChip Introduces VoIP Processing Engine for Mobile Terminals

SyChip, a provider of RF chip-scale modules (CSMs), has introduced SyVoice 1000 (SV1000), a voice-over-Internet protocol (VoIP) IC. The SV1000 device is the newest in the SyVoice family of products targeted to mobile devices such as cell phones, single-mode wireless VoIP phones, PDAs, personal media players and portable gaming consoles.

SV1000 combines a high-speed DSP, A/D and D/A converters and power-management logic in a single IC. The device

is optimized to execute all of the real-time functions required during a VoIP call, including advanced speech coders, jitter buffer, encryption and acoustic echo cancellation. Currently, general-purpose processors are often used to execute these functions and consume three-to-five times more power due to the increased MIPS and memory required. The SV1000 consumes only 14 mA of current during a call, enabling phones to have talk times of more than eight hours with a typical cell phone battery.

SyChip will use the SV1000 in its VWLAN71xx family of chip-scale modules. The new module, the VWLAN7101, measures only 190 square mm and consists of the SV1000 and an 802.11b/g WLAN modem, and is bundled with the SyVoice Software Suite.

The VWLAN7101 (including the SV1000) will be available for OEM sampling in early Q2 2006. Pricing for the module will be \$15 per unit in volumes of 100,000.

(See our profile of SyChip in the Feb. 2001 issue of *InsideChips.Ventures*.)

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Public Company Spotlight, Cont.

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and ODM players – which are largely based in the Greater China region – will outpace the market and dictate the choice of semiconductor devices. Over its 20-year history in China, ST has established a presence in the country that encompasses manufacturing, design, research, and sales and marketing operations, complemented by a network of partnerships and joint programs with local companies, universities, research centers and government institutions. ST employs approximately 4,000 in China.

ST has reconfirmed its investment plans for China, including the already announced investment in a Wuxi-based joint memory manufacturing facility with Hynix in which ST has a 33% minority stake. When completed later this year for a total cost of

approximately \$2 billion, the Wuxi facility is set to become one of the largest and most advanced wafer fabs in the country.

ST is also planning to invest \$500 million to build its second back-end plant in China, which is expected to start production in Q3 2008. The investment will be spread over a number of years, until the new back-end facility in Longgang reaches its full ramp-up capacity of seven billion units per year.

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Photronics Closes Austin Facility, Cuts Jobs

Photronics has revealed plans to cease the manufacture of photomasks at its facility

in Austin, Tex., and reduce its global work force by approximately 6%. The majority of eliminated positions are the result of the company's decision to reduce unproductive high-end photomask manufacturing infrastructure in North America.

The company said it believes this action will serve to further tighten the focus of its research and development organization and improve its high-end customer support infrastructure.

Photronics said the development and manufacturing activities for those North American customers previously serviced in Photronics' Austin facility will now be serviced at its other photomask fabrication facilities.

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