

# leading edge

What's hot  
in the  
design  
community

Edited by  
Fran Granville



**Blue-man droop**  
“The Smurfs were trying to dance, ... but their legs weren't moving. Our originating broadcast was fine, but DirecTV had bit-starved their retransmission of it, reallocating bandwidth to the multiple football games in progress on other satellite channels.”

—Clyde D Smith  
senior vice president,  
Turner Broadcasting Systems

## Dual-core device adds networking

By Robert Cravotta

**A**NALOG DEVICES' four new ADSP-BF534, BF536, and BF537 network-enabled Blackfin processors and the BF566eM30 eMedia platform target embedded audio, video, and communications applications. The ADSP-BF566 includes dual 600-

MHz Blackfin cores with DDR support, a host-port interface, and four video ports. The ADSP-BF534 includes a CAN (controller-area-network) 2.0B controller, a two-wire-interface controller, parallel and serial interfaces, two external DMA-request lines, timers with PWM capability, a real-

time clock, and a watchdog timer. The ADSP-BF536 and 537 also include an IEEE-compliant 802.3 10/100 Ethernet MAC (media-access controller) and an enhanced DMA system to support high-network-bandwidth capability.

The 400- and 500-MHz ADSP-BF534 is available to-

day for \$9.65 to \$13.10 (10,000). The 300- and 400-MHz ADSP-BF536 and 500- and 600-MHz ADSP-BF537 are available today for \$8.05 to \$16.55 (10,000). The ADSP-BF566 is available for sampling in a 400-pin PBGA package. Analog Devices' Crosscore development tools support the Blackfin processors with the VisualDSP++ development and debugging environment. Release 4.0 of VisualDSP++ includes TCP/IP and USB support.

► **Analog Devices**, 1-800-262-5643, [www.analog.com/blackfin](http://www.analog.com/blackfin).

## VOIP goes visual

AFTER MANY YEARS' worth of unrealized expectations, VOIP (voice-over-Internet Protocol) adoption is finally exploding, fueled by a steadily broadening embrace of broadband (see “The human touch keeps the elderly and disabled technology-connected,” *EDN*, Dec 17, 2004, pg 47). Analyst company JupiterResearch, for example, recently predicted, in *Broadband Telephony: Leveraging Voice Over IP to Facilitate Competitive Voice Services*, that VOIP-telephony services in the United States would expand, from approximately 400,000 US households by the end of last year, to 12.1 million households, or approximately 10% of all US households, by 2009 ([www.jupitermedia.com/corporate/releases/04.10.07-newjupresearch.html](http://www.jupitermedia.com/corporate/releases/04.10.07-newjupresearch.html)).

With that first-generation acceptance hurdle surmounted, semiconductor companies such as Texas Instruments and their system partners such as Wintech Digital Systems ([www.wintechdigital.com](http://www.wintechdigital.com)) are focus-

ing their attention on the logical next step: integrated audio-plus-video phones. Technohistorians among you might recall that AT&T conceptually first unveiled these phones at the 1964 World's Fair. TI's claimed “ready-for-production,” \$6495 Videophone development platform includes two hardware boards based on TI's 600-MHz TMS320DM64x digital-media processor, two 5-in. LCDs, two cameras, a network switch and hub, and a full suite of application software. Prototype systems that TI based on the MPEG-4 Part 10—that is, MPEG-4 AVC, or H.264—baseline-profile video codec and demonstrated at January's Consumer Electronics Show, required 128 to 256 kbps of sustained bandwidth and delivered tolerable, albeit low-resolution, image quality and frame rates.

—by Brian Dipert

► **Texas Instruments**, 1-972-995-2011, [www.ti.com/vdppr](http://www.ti.com/vdppr).

## Switch chip mixes security, wireless, and IPv6 support

**P**USHING ITS LEADERSHIP position in Ethernet switches, Broadcom has just launched an Ethernet-switch architecture and the first chips based on that architecture. The StrataXGS III architec-

ture features a 72-Gbps packet-processing engine that integrates security features and the ability to route and switch IPv6 (Internet Protocol Version 6) packets at wire speed. The engine can process more than 100 million packets/sec. The first chips based on the design, the 500 Series, include the flagship BCM56504 with 24 GbE (Gigabit Ethernet) ports and four 10-GbE (10-Gigabit Ethernet) ports.

Broadcom claims the 24+4-port mix is critical in many applications and will provide the company a continuing advantage over competitors Marvell, Agere, and Vitesse, which don't offer chips with four 10-GbE ports. Four ports support applications in which IT managers stack multiple switches to expand capacity. Two of the 10-GbE ports connect to adjacent switches, and the other two provide redun-

dant uplink connections to the enterprise network.

Security features in the 500 Series include a one-time-programmable root key that makes encryption bulletproof and meets the requirements of FIPS (Federal Information Processing Standard) 140-2. The government is also mandating IPv6 support in all equipment that it buys. Realistically, however, widespread conversion to IPv6 is still years away.

Broadcom developed the IPv6 layers 2- and 3-capable architecture with seamless Wi-Fi (Wireless Fidelity) support in mind. Today, most Wi-Fi networks operate as independently managed and implemented islands that connect to the edge of the enterprise network. IT managers, however, are demanding networks that can connect to wired and wireless clients

with the promise of secure communications. The Series 500 design supports Wi-Fi roaming at the Layer 3 level and QOS (quality-of-service) features for devices such as VOIP (voice-over-IP) Wi-Fi phones. The integrated wireless support allows IT managers to deploy low-cost Wi-Fi access points connected to any port on the enterprise network.

Broadcom will target the Series 500 at the stackable-enterprise-switch market. Available for sampling now, the BCM56504 will sell for \$495 (10,000). According to various analysts, Broadcom owns 60 to 80% of the switch-chip market, not including ASICs that equipment manufacturers design. The new family should allow the company to maintain a leadership position. Broadcom also hopes to push the design into applications such as DSL in which Ethernet is starting to challenge ATM.

—by Maury Wright

► **Broadcom Corp**, 1-949-450-8700, [www.broadcom.com](http://www.broadcom.com).

## IP MODEL REDUCES TIME TO MARKET, INCREASES YIELD

More complex ICs, tighter design geometries, and deadline pressures mean that each design spin is getting tougher. To meet these challenges, Virage Logic has combined IP (intellectual property) and silicon in its Silicon Aware IP, which may tip the scales toward meeting these challenges. Virage based the model on its Star memory system, which offers self-test and repair.

The new model combines physical IP, including memories, logic, and I/O, with embedded infrastructure IP to provide test, diagnostic, repair, and yield improvements at processes of 130 nm and below. According to Virage Chief Executive Officer and President Adam Kablanian, "As chips get more dense and complex, yields can drop below 10%. With this approach, designers can go to advanced processes and designs and hit high-yield targets."

The company has agreements through leading foundries and ODMs (original-device manufacturers) to implement the system. For example, Virage integrates its IP with process-aware extensions from PDF Solutions Inc ([www.pdf.com](http://www.pdf.com)) so that designers can tailor the Silicon Aware IP to address the inevitable problems of processes and fabrication technologies. Thus, it can prioritize and target, with understood trade-offs, the detrimental effects of yield-reducing factors, such as multiple contacts, polysilicon shorts, opens in critical areas, and metal Layer 1 shorts in critical areas, in a designated fab. Using this approach, Kablanian says, "You can do advanced design on an immature process and get acceptable yields."

—by Bill Schweber

► **Virage Logic Corp**, [www.viragelogic.com](http://www.viragelogic.com).

## DILBERT *By Scott Adams*



► **Worldwide revenues for cable-modem services exceeded \$18 billion in 2004, up from \$14 billion in 2003, according to InStat/MDR.**

## Entrepreneur's perspective highlights the impact of "digital"

By Bill Schweber, Executive Editor

MATTHEW LORBER, president and chief executive officer of Copley Controls Corp, founded the company in 1984. His previous startups include Solid State Instruments in 1961 with Massachusetts Institute of Technology roommate and co-founder and chairman of Analog Devices, Ray Stata; Analog Devices, in 1965, again with Stata; Printer Technology in 1971; and Torque Systems Inc in 1973. Copley designs and manufactures power amplifiers and motion-control drives for semiconductor, medical-resonance-imaging, packaging, and automated-assembly/inspection systems.

**EDN:** What has been the biggest change in product architecture over the years?

**Lorber:** Everything has gone digital. Software is now handling a larger portion of the system, and there are many more networked products.

**EDN:** How has this change affected design and development?

**Lorber:** In the old days, the compensation to match the motor and drive used discrete components, but this tuning is now done in software. This gives [engineers and] the users greater flexibility. It also means we have fewer variations to build, since we can make changes in the field, or the customer can do it himself. This is a big advantage for everyone. Plus, users can make changes as their application changes or the understanding of the application changes. They can even program changes dynamically, to make the drive control shift operating modes, depending on what the drive is being called on to do.

**EDN:** What changes do you see in engineering skills?

**Lorber:** Years ago, it was impossible to get tech people. Some companies even went into schools to groom students with potential. Now, it's easier to get the people we need; in the last 10 years, there has been a much better supply of good technical people.

**EDN:** Do you have any observations about the design process?

**Lorber:** It takes a lot longer to get a mechanical part designed in than an electronic part. The biggest change in the past years is that the PC and software have changed the design process. A lot of the design activity is tremendously easier; it's all associated with less design dog work and with better control of inventory. Every business area is better controlled and understood. At the same time, new-product development is the key issue in this business, and the cost of new-product development is higher than ever.

**EDN:** Did you make any mistakes that taught you a lesson?

**Lorber:** Certainly, we have not always guessed right. We developed products for a copper process used in IC production, since the underlying technology resembled existing amplifier technology we had, but we didn't appreciate the dominance of some other competitors in that market.



### \$99 MICROCONTROLLER-DEVELOPMENT KIT INCLUDES IDE, SOFTWARE

Goal Semiconductor has recently introduced the UVK (UniVersaKit) development kit and evaluation system that supports all Goal Versa product families, as well as most industry-standard 8051 microcontrollers. The kit comes with an IDE (integrated development environment), a C compiler, and an assembler. The



**Goal Semiconductor's UniVersaKit ships with integrated development software and supports both mixed-signal and microcontroller products.**

board includes 3.3 and 5V voltage regulators, an RS-232 transceiver, switches for manual reset and interrupt triggering, eight user-defined LEDs, an I<sup>2</sup>C-based EEPROM, a piezoelectric buzzer, and user prototyping space. The UVK also includes logic for programming and in-circuit debugging of the vendor's mixed-signal Versa devices. Goal Semiconductor ships its programming and debugging software with the development kit and frequently posts updates on its Web site. The UVK costs \$99.

—by Warren Webb

► **Goal Semiconductor**, [www.goalsemi.com](http://www.goalsemi.com).

► **Matsushita estimates that consumers bought approximately 25.8 billion batteries last year, most of which were disposable.**

—*The Wall Street Journal*, Jan 4, 2005

## Real-time DSO bandwidth jumps to 15 GHz

**T**EKTRONIX HAS ANNOUNCED what it calls the world's fastest, most capable, real-time oscilloscopes. The company also announced a new probe intended to simplify connecting to such ultra-high-speed serial buses as second-generation PCI-

Express, SATAIII (serial-advanced-technology-attachment), and double XAUI (10-Gbps attachment-unit-interface) devices. According to Thomas Berghall, Tek's worldwide marketing manager for Performance Scopes, Accessories, and Solutions, "These emerging standards push data rates beyond 4 Gbps, requiring real-time-scope bandwidths in excess of 10 GHz." Several months ago, Agilent Technologies ([www.agilent.com](http://www.agilent.com)) became the first supplier to respond to this requirement when it announced greater-than-10-GHz real-time scopes that exceeded Tek's then-industry-leading 8-GHz bandwidth.

The new members of Tek's TDS6000 DSO (digital-storage-oscilloscope) family are the \$125,000, 15-GHz-bandwidth, four-channel TDS6154C, which can measure 30-psec, 20 to 80% rise times with an error that is typically less than 5%, and the \$100,000, 12-GHz, four-channel TDS6124C, which users can upgrade to a TDS6154C. The probe is the \$10,000 P7313 Z-active, low-loading, differential unit.

A key to the increased bandwidth is third-generation SiGe (silicon-germani-

um) IC technology. Tektronix collaborated with IBM Corp ([www.ibm.com](http://www.ibm.com)) to develop several SiGe ICs used in the new products. Says Berghall, "The SiGe technology deserves part of the credit for the new scopes' unprecedented timebase stability—which makes possible extremely accurate jitter measurements."

Like Agilent's faster-than-10-GHz units, the new Tek scopes use ADCs whose maximum real-time sampling rate is 20G samples/sec. The scopes must thus interleave the ADCs from two channels to sample beyond the Nyquist frequency of signals that contain components higher than 10 GHz. Therefore, when sampling in real time, the scopes can deliver their full bandwidth only when no more than two channels are active. Unlike the Agilent units, however, the new TDS6000 scopes allow using the maximum two-channel-mode memory depth of 64M samples per active channel at the highest sampling rate (40G samples/sec), enabling the capture of full-bandwidth records as long as 1.6 msec.

The TDS6124C provides 12-GHz analog bandwidth and user-selectable DSP for channel-to-channel and unit-

to-unit matching. In addition to the DSP functions found in the TDS6124C, the TDS6154C includes DSP-based bandwidth extension to 15 GHz, which linearizes the phase response and adjusts the magnitude response throughout the scope's bandwidth.

According to Tek, the P7313 probe's SiGe Z-active architecture offers typical greater-than-12.5-GHz true bandwidth, high dc impedance, 20 to 80% rise time of 25 psec, and the stable high-frequency loading of  $Z_0$  probes.

These features combine to provide high bandwidth, flat frequency response, low-loading, and low-noise differential inputs. Detachable Tip-Clip assemblies make it possible to replace a tip for a fraction of the cost formerly associated with such hardware changes. Moreover, the Tip-Clip assemblies are interchangeable depending on connectivity needs, providing a large degree of flexibility in using the probe.—by Dan Strassberg  
► Tektronix Inc, 1-800-426-2200, [www.tektronix.com](http://www.tektronix.com).



The TDS6124C (top) provides 12-GHz, real-time bandwidth and is upgradeable to become a TDS6154C, which offers DSP-extended, 15-GHz, real-time bandwidth. The P7313 Z-active differential probe (amplifier module is at the right) provides a high dc input impedance but offers the stable high-frequency loading usually associated only with low-impedance  $Z_0$  probes.

► Disposable batteries—most of them alkaline or an older zinc-carbon technology—were an \$18.2 billion business globally last year, compared with \$12.5 billion for rechargeable batteries, according to a study by Freedonia Group.

## Stable, flexible clock-recovery module broadens sampling scopes' appeal

**W**ITH ALL of the hoopla about faster and faster real-time DSOs, most EEs can easily forget about sequential-sampling scopes—more popularly known merely as sampling scopes and, to Agilent Technologies' customers, as DCAs (digital communications analyzers). Sampling scopes are real-time scopes' older, often less costly, but wider-bandwidth siblings (see "Getting the most from wideband scopes: dos & don'ts," this issue, pg 46). Whereas real-time scopes are only now pushing to bandwidths greater than 10 GHz, sampling scopes have, for more than a decade, been delivering bandwidths nearly 10 times as great.

That is not to say that sampling scopes don't have drawbacks: They need repetitive—albeit, not necessarily periodic—input signals. They need a trigger that precedes—

by an ultrastable delay—each occurrence of the waveform they are trying to capture. Notwithstanding their enormous bandwidth, they acquire waveforms slowly. Their waveform memory is relatively shallow. And their sampling heads often suffer damage from voltage transients and even from only modest but sustained overvoltage.

Even so, such drawbacks are manageable to devoted sampling-scope users, most of whom are involved in characterizing wideband components. These EEs love their sampling scopes because no other kind of instrument can so readily provide such detailed views of waveforms that contain significant information at frequencies of 20 GHz and more.

Although, for several years, the scopes have been able to derive trigger signals from their input waveforms, the

shortcomings of available trigger, or clock-recovery, facilities have presented a major impediment to the instruments' wider acceptance. Agilent says that its introduction of the 83496A clock-recovery module for its 86100 series of DCAs is about to change all that. The 83496A brings a lot to the party: The instability of the output clock signal is measured in femtoseconds, greatly reducing the scope's internal jitter and enabling dramatic improvements in jitter measurements. In addition, the module accepts inputs over much broader frequency ranges than did predecessor units, and the design accommodates these wide-range inputs without requiring range changes.

In an Agilent spokesperson's words: The \$5500 Golden PLL option gives users much greater measurement precision and significantly in-

creased test margins. The PLL's tunable 30-kHz to 6-MHz loop bandwidth for the first time enables compliance testing that is configurable across industry standards. The 83496A can derive a clock from NRZ signals that have any rate between 50 Mbps and 13.5 Gbps. With less than 300 fsec rms of output-clock residual jitter, the 83496A can enable the host DCA to accurately measure extremely low levels of signal jitter.

Prices begin at \$18,000 for a 50-Mbps to 7.1-Gbps unit with differential electrical inputs. A unit with the same input frequency range but with multimode optical inputs costs \$22,000. An extension to 13.5 Gbps of either unit's frequency range adds \$21,000.

—by Dan Strassberg

► **Agilent Technologies**, 1-800-829-4444, [www.agilent.com](http://www.agilent.com).

## Tiny device packs in features

The 3×3×0.85-mm LPC9102 and LPC9103 processors are the newest members of Philips Electronics' 8-bit LPC900 microcontroller family. These tiny 80C51-based devices target space-constrained applications and include an internal 7.3728-MHz; a 1%-accurate RC oscillator; brownout-detection and power-on-reset circuits; a four-input, 8-bit ADC that you can configure as a single-output DAC; an analog comparator with selectable reference; two 16-bit timers; a real-time clock; and a UART. They include 128 bytes of RAM data memory and 1 kbyte of flash program memory that is organized into 256-byte sectors and 16-byte pages and that supports single-byte erasing. The LPC-

9102 and LPC9103 have a voltage range supporting operation from 2.4 to 3.6V.

These devices are available in a 10-pin HVSON package and provide eight of those pins for 5V-tolerant I/O when using the internal oscillator and reset options. All of the port pins are 20-mA-LED sink-capable, and the device can support a maximum current of 120 mA. The current draw in power-down mode with comparators disabled is less than 1 μA. These devices are available now for 87 cents (10,000).—by Robert Cravotta

► **Royal Philips Electronics**, [www.semiconductors.philips.com](http://www.semiconductors.philips.com).

► **InStat/MDR forecasts that shipments of desktop and notebook PCs, PDAs, and similar devices will rise from about 791 million units in 2004 to more than 1 billion units in 2008.**

## Start-up offers Ethernet silicon for enterprise Wi-Fi support

Wi-Fi (Wireless Fidelity) is so hot that investors are willing to back companies such as start-up SiNett, even though the company's first chips aren't purely WLAN (wireless-LAN) plays. Instead, the OneEdge switch-processor family focuses on making Wi-Fi support an integral part of enterprise networks. The offerings will compete with the new Broadcom (www.broadcom.com) StrataXGS III family of Ethernet chips (see "Switch chip mixes security, wireless, and IPv6 support," this issue, pg 14). The Broadcom ICs clearly offer more wired-Ethernet capabilities, but SiNett is counting on more robust wireless support to win sockets.

The OneEdge family features the SN5024 unified-access WLAN switch and the SN6004 WLAN controller. The SN5024 integrates an Ethernet switch/router with

enterprise wireless support and targets sockets in mainstream enterprise switches. The SN6004 offers only the enterprise WLAN support and targets use in dedicated wireless appliances that users add to wired networks or in a switch in conjunction with a stand-alone switching/routing chip. Depending on volume and configuration, the chips will sell for \$100 to \$200. The vendor will ship chips in the second quarter but offers an FPGA-based development board allowing design teams to get an early start.

SiNett's core competence is clearly wireless integration in the enterprise. The products answer the demands of IT managers moving Wi-Fi support from islands on the edge of the network into the core of the network. Bringing WLAN support into the core enables seamless roaming across a corporatewide LAN, including across geographically

spread campuses. The SiNett chips support session persistence across virtual LANs and subnets. The chips offer Mobile IP support, including unidirectional and bidirectional tunnels.

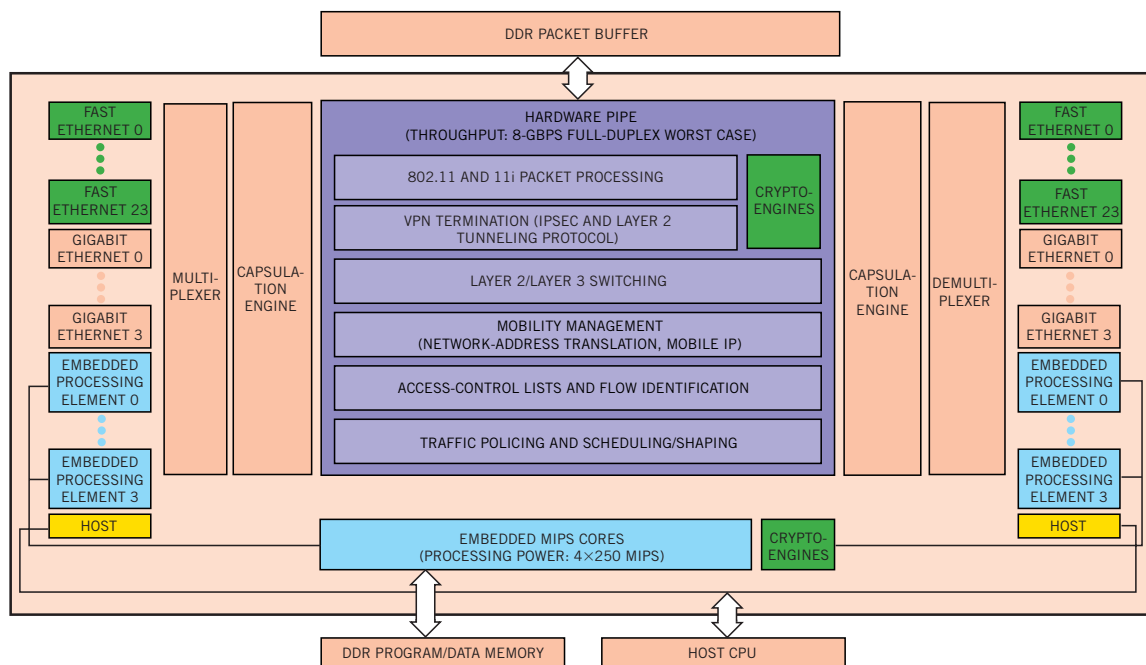
Security features include a flexible policy engine and wireless-firewall functions. SiNett Vice President of Marketing Shrikant Sathe states, "OneEdge's TRAPS [trust-aware-perimeter-security] feature set provides line-rate cryptography and VPN [virtual-private-network] services, centralized security management, trust-based access policies, and firewalling—all targeting wireless processing in an integrated networking environment. [Broadcom's] StrataXGS does not offer security features, such as VPN termination and trust-aware policies, and has limited centralized security and firewall capabilities."

It will be interesting to see

whether the SiNett products' features can win the company business because the first-generation switch chip is a bit behind the times in wired-Ethernet support. Like the Broadcom BCM56504, the SN5024 includes a 24+4 mix of Ethernet ports. But Broadcom's new offering has GbE (Gigabit Ethernet) and 10-GbE (10-Gigabit Ethernet) ports, whereas the SiNett chip has 100-Mbps Fast Ethernet and GbE ports. The SiNett chips are considerably less expensive than Broadcom's newest offerings, and that advantage could win the company business in designs that don't require GbE support on each port. Moreover, most enterprise networks evolve over time, so wireless appliances enabled by the SN6004 may be more applicable to many existing networks than switches with integrated wireless support.

—by Maury Wright

►SiNett Corp, 1-408-522-



The SN5024 unified-access WLAN switch integrates an Ethernet switch/router with enterprise wireless support.