



## Get the point?

**"This is like the marriage of two porcupines. They will have to go about it very carefully."**

**—Regis McKenna, computer-industry investor, on the settlement of a long feud between Microsoft and Sun Microsystems, in *The New York Times*, April 4, 2004**

## Embedded adapters ease Ethernet and Web communications

By Warren Webb

**K**G SYSTEMS' RECENTLY ANNOUNCED EM01 and EM02 adapter modules provide an easy connection to the Internet or Ethernet for embedded devices and single-board computers. The EM01 Ethernet-adapter module provides an interface to

10-Mbps Ethernet via an RJ45 connector. The onboard processor supports ARP, IP, TCP, DHCP, and DNS (Address Resolution Protocol, Internet Protocol, Dynamic Host Configuration Protocol, and Domain Name System) protocols and communicates with the control processor over a serial interface.

EM02 Web adapters connect embedded devices to the

Internet via modem, including GPRS (General Packet Radio Service)-type modems. The onboard processor handles all necessary communications operations and supports PPP (Point-to-Point Protocol), IP, TCP, DHCP, and DNS protocols. Both of the modules measure 3.9×2.8×1 cm and come in 28-pin, DIP-style packages. The modules require a 5V-dc power source,



**The EM01 Ethernet adapter from KG Systems is one of two new modules simplifying embedded-Web or Ethernet communications.**

and the interfaces are compatible with 3 or 5V signals. Prices start at \$32 (single units) for either of these modules.

► **KG Systems Inc**, 1-800-292-4303, [www.kgsystems.com](http://www.kgsystems.com).

## Tool lets you go with the flow

THE COMPLEXITY INHERENT in designing leading-edge ASIC chips requires customers to integrate the various tools into a coherent design flow. EDA vendors have answered this requirement by releasing "flows," design methods that show their customers how they can productively integrate the tools. Cadence Design Systems' approach, its optimized Virtuoso custom-design platform, includes a new chip-integration flow, which couples with the newest release of its Virtuoso Chip Editor. By using the platform and the new tool together, designers will be able to perform full-scale physical integration across multiple design domains, including analog, custom digital, RF, memories/arrays, and digital standard cells, from a full custom point of view.

The new flow and Virtuoso Chip Editor provide designers an automated physical-design-integration product—from floorplanning through chip finishing and tape-out. The new

chip-integration product provides a seamless bidirectional integration path to and from the Cadence Encounter digital-IC-design platform through the OpenAccess database.

Version 3.3 of the Virtuoso Chip Editor further increases layout productivity and includes immediate visual feedback on design-rule violations and advanced connectivity awareness that alerts users of accidental opens and shorts. The new flow and Virtuoso Chip Editor are available on HP, Sun, IBM, and Linux platforms. The detailed, step-by-step flow uses a distributable 15 million-transistor Ethernet switch and process-design kit as the reference design. Price for a one-year license of the Virtuoso Chip Editor starts at \$40,000.—by Gabe Moretti

► **Cadence Design Systems Inc**, 1-408-943-1234, [www.cadence.com](http://www.cadence.com).

# Integration brings NAS to the masses

AS MULTIPLE networked computers increasingly appear in homes; as consumers archive increasing amounts of audio, video, and still-image digital data; and as the value of that data increasingly encourages consumers to archive it for safekeeping, consumers will increasingly embrace NAS (network-attached-storage) devices (see "Speedy simplicity," *EDN*, Jan 22, 2004, pg 33). Mirra's (www.mirra.com) 80-Gbyte Personal Server has nailed the concept, but its \$399 manufacturer's suggested retail price is palatable only for SO-

HOs (small offices/home offices) and the most tech-crazed early adopters. D-Link's (www.dlink.com) 20-Gbyte Central Home Drive, at a \$249 suggested retail price, addresses the NAS price issue but involves a capacity trade-off. And Ximeta's (www.ximeta.com) 80-Gbyte Net-Disk NDAS (network-direct attached storage), at \$199, makes further price and capacity improvements but isn't a true NAS; it requires the installation of client-side software to directly access it.

Broadcom, with its BCM4780 NAS processor chip,

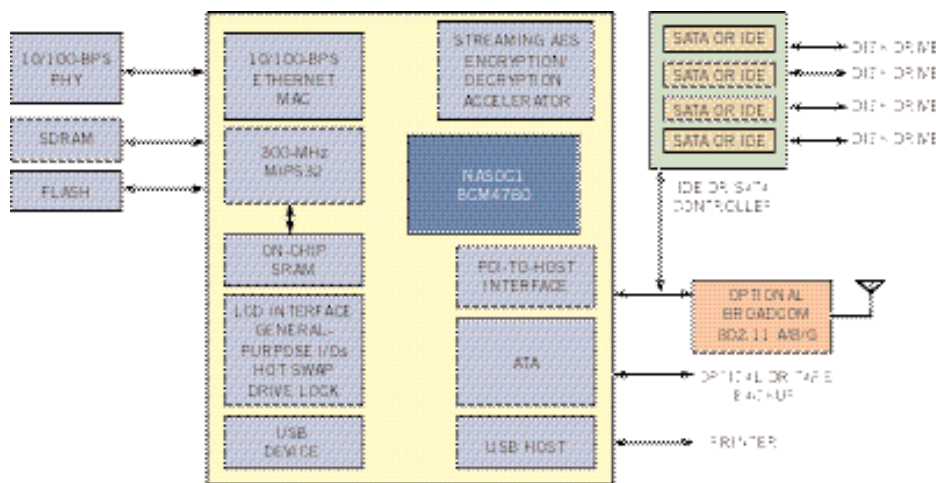
hopes to enable its partners to hit NDAS-like price points with a full NAS feature set. Supporting both NFS (Network File System) and CIFS (Common Internet File System) protocols and now available in sample quantities, the less-than-\$20 (1 million) BCM4780 integrates numerous subsystems, including a 300-MHz MIPS32 processor core, a 10/100-Mbit Ethernet MAC (media-access controller), USB client and host controllers, dedicated AES encryption and decryption hardware to prevent the transfer-rate-performance degra-

dition that a software-based alternative AES approach would incur, an LCD controller and general-purpose I/Os, an ATAPI controller intended for optical- and tape-backup drives, and a PCI host controller. The NAS' drive or drives connect through a separate PCI-to-ATA-bridge chip, and an 802.11-connectivity implementation requires either a wired-to-wireless or PCI-to-wireless bridge. However, the BCM4780 integrates most of the functions that the Central Home Drive, for example, requires multiple devices to implement.

The BCM4780 directly manages as many as four drives, in JBOD (just-a-bunch-of-disks) and RAID (redundant-array-of-inexpensive-disks/redundant-array-of-independent-disks) 0/1/1+0 configurations. It handles volumes as large as 1000 Tbytes, and Broadcom claims that the device creates a 1-Tbyte volume in less than 2 minutes. Its journaling file system, in conjunction with support for SMART (self-monitoring-analysis-reporting technology) and subsequent warning and error reporting ensure file-system and partition integrity. Broadcom forecasts that its customers will be able to achieve less-than-\$100 system prices, excluding the drive or drives, and, to speed your time to market, a full-blown reference design, including a comprehensive software suite for Windows, MacOS, and Linux operating systems, is available.

—by Brian Dipert

► **Broadcom**, 1-949-450-8799, www.broadcom.com.



The BCM4780 integrates many of the functions necessary to create a full-featured NAS.

## DILBERT *By Scott Adams*



► In the United States, cable modem continues to be the most common broadband-access technology, with DSL remaining in second place, according to InStat/MDR.

## DSP boosts deep-memory real-time DSO's bandwidth to 8 GHz

**W**ITH THE announcement of the TDS6000B series, Tektronix, whose 7-GHz-bandwidth TDS7704B boasted the widest  $-3$ -dB bandwidth of any real-time-sampling DSO, increases its bandwidth lead over competitors Agilent ([www.agilent.com](http://www.agilent.com)) and LeCroy ([www.lecroy.com](http://www.lecroy.com)). Tek's new \$74,990 TDS 6804B offers a user-selectable DSP-enhanced mode, which increases—to 8 GHz—the scope's 7-GHz unenhanced analog bandwidth. The TDS6000B units are the first in the TDS6000-series to offer a true deep-memory architecture. Memory depth is 32M samples/channel maximum, compared with 15,000 samples/channel in earlier TDS-6000 family members. The TDS6804B and the \$64,990, 6-GHz-bandwidth TDS6604B can simultaneously take 20G samples/sec on all channels, making them Tek's first deep-memory units with bandwidth of 4 GHz or more that simultaneously sample fast enough on all channels to

faithfully capture four full-bandwidth signals in real time. The widest bandwidth Agilent and LeCroy real-time scopes also can take 20G samples/sec simultaneously on all channels, but their bandwidth currently tops out at 6 GHz.

As it did on the TDS7704B, Tek specs the TDS6804B rise time from 20 to 80% of the signal amplitude, whereas scope manufacturers had previously focused on 10 to 90% rise time. According to Tek, this change responds to customer demands; several telecom standards refer only to waveforms' 20 to 80% rise times. Because rise time from 10 to 90% is at least 33% greater than that from 20 to 80%, the TDS6804B's specified 45-psec typical, DSP-enhanced 20 to 80% rise time corresponds to a 10 to 90% rise time of approximately 60 psec. Tek appears to have con-



**Scopes in the TDS6000B series offer unusually precise pinpoint triggering. Thanks to DSP enhancement, one model offers 45-psec typical 20 to 80% rise time and industry-leading 8-GHz bandwidth.**

servatively set the 45-psec spec. Competitive scopes with 6-GHz bandwidths offer typical DSP-enhanced 10 to 90% rise times of approximately 70 psec. Thus, the TDS6804B's rise time appears more consistent with the scope's 7-GHz analog bandwidth than with its 8-GHz, DSP-enhanced bandwidth. Therefore, you have to wonder whether Tek might revise the 45-psec value downward—to, say, 39

psec—as the midyear shipment date approaches. Even so, in a demo, invoking the DSP enhancement reduced by approximately 9 psec the displayed rise time of a test signal that, without DSP enhancement, appeared to rise from 20 to 80% in 66 psec.

Besides enabling the scopes to display faster rise times, the DSP enhancement also flattens the scopes' passband frequency response below the  $-3$ -dB frequency and significantly reduces

displayed channel-to-channel skew. Another TDS6000B-series enhancement, which Tek calls "pinpoint triggering," allows you to set the scopes to trigger only after they have detected a sequence of events. You can select from the same long menu of conditions to define both the A and the B events, and you can force the trigger circuits to reset if the B conditions don't materialize within a user-defined delay after the scope detects the A conditions.

To go along with the new scopes, Tek is announcing what it calls the industry's first 8-GHz active-differential-probing system. The P7380-SMA is a low-input-impedance probe that you connect to the system under test with a matched pair of coaxial cables terminated in SMA connectors. With one such probe on each of its inputs, a TDS6000B-series scope can monitor four 8-GHz-bandwidth differential signals. This capability is ideal for troubleshooting ultra-high-speed serial buses.

—by Dan Strassberg

► **Tektronix Inc.**, 1-800-426-2200, [www.tektronix.com](http://www.tektronix.com).

## Harsh environments suit rugged PC

A NEW PC/104 single-board computer from Octagon Systems delivers low-cost, low-power, Pentium II performance for transportation, automation, point-of-sale, data-acquisition, and other high-reliability or harsh-environment applications. The 2060 operates from  $-40$  to  $+85^{\circ}\text{C}$  and features standard PC I/O. In addition, the board has two serial ports, two USB ports, digital I/O, onboard video, and a CompactFlash socket for bootable and removable memory to 2 Gbytes.

The CompactFlash requires no drivers and is available with board-support packages for popular operating systems. To minimize downtime and service calls, the 2060 includes built-in diagnostics that you can run in the field without test equipment. The card also has overvoltage and reverse-voltage protection and a watchdog timer that is programmable from 2 msec to 120 sec. Software board-support packages are available for Linux 2.6, QNX, and DOS. The 2060 sells for \$374 (fewer than 100) and is available from stock.—by Warren Webb

► **Octagon Systems Corp.**, 1-303-412-2011, [www.octagon-systems.com](http://www.octagon-systems.com).



**The 2060 single-board computer has a wide temperature range, extra I/O, and installable memory and is suitable for many rugged embedded applications.**

## Interconnect takes center stage in pc-board design

**M**ANY ASIC DESIGNERS have had to cope with the fact that the physical characteristics of interconnect traces have become more important than gate characteristics. Now, pc-board designers

are facing the same problem when designing high-speed systems. The Allegro platform from Cadence now supports designs operating at frequencies greater than 200 MHz by offering a co-design methodology that allows engineers to design, model, and analyze interconnect traces.

The new platform also supports team design. As one engineer changes a part of the circuit, all other members of the team can immediately ob-

serve the change. A designer can also protect his or her portion of the design by inhibiting the other members of the team from changing that design section. The platform provides these services for Package Designer and Package SI (signal integrity). These new products increase the number of functions of the Allegro platform to support design and analysis of system interconnect. Cadence states that the term “system inter-

connect” refers to the logical, physical, and electrical connection of a signal; its associated return path; and its power-delivery system.

A signal in a pc-board system travels between IC I/O buffers and traverses die-bump pads, package substrates, connectors, and pc boards. IC packages present a challenge for designers. In at least one case, an ASIC device that passed all tests in die form, failed when the designers tested it in its package, because the impedance of the connection from the die to the pc board was greater than drive strength of the IC circuitry. Package Designer allows engineers to design the structures, such as bump ar-

rays and connectors, to provide connectivity between the die and the pc board. Designers can also evaluate various package types to choose the one with the appropriate electrical characteristics for the required operating conditions. Package SI provides the analysis tools to verify the signal integrity once you design the package and know the electrical characteristics of the I/O buffers on the die.

The platform runs on Windows, Linux, Solaris, HP-UX, and IBM AIX operating systems. The price for a one-year term license is \$54,000 for Allegro Package Designer and \$45,000 for Allegro Package SI.—by Gabe Moretti

► **Cadence**, 1-408-943-1234, [www.cadence.com](http://www.cadence.com).

## Book strives to make you “one” with your waveforms

ANY TIME YOU HAVE “integrity” and “simplified” in the same sentence, you’ve got my attention, and *Signal Integrity—Simplified* by industry veteran and *EDN* contributor Eric Bogatin is worth yours. This excellent, clear, and readable book (ISBN 0-13-066946-6) examines and explains all aspects of pc-board design and layout with the goal of helping you get it right the first time.

The 608-pg, \$89 book assumes only a basic electrical-engineering background and uses equations as necessary but not to excess. Instead, the author concentrates on an advancing your analysis in stages, beginning with rough rules of thumb, stepping up to analytical approximation, and finishing with numerical simulation. The book is easy to look through, clearly calling out a list of basic principles and also highlighting tips—about one per page—that you should keep in mind after you’ve read the section. The author discusses signal integrity, starting with basic passive components, such as resistors or pc-board traces, and then expands to the effect that associated or adjacent factors have.

Bogatin wants to make you feel the pain and buffeting that a signal traveling through a pc-board trace senses, which the time- and distance-varying impedance that the signal sees along the line influences. Your challenge is to understand the underlying causes of these impedance changes. This book quickly repays you for the time and money you spend on it.—by Bill Schweber

► **Prentice Hall**, <http://vig.prenhall.com>.

## THANKS FOR THE SMALLER-YET-DENSER MEMORIES

Flash-memory-card vendor SanDisk has announced a smaller, removable flash-memory card, initially targeting camera-equipped cell phones and digital cameras. The fingernail-sized T-Flash card measures 11×15×1 mm, builds on the company’s architecture and process technology, and, using a simple adapter, is also electrically and software-compatible with the well-established SD-card format.

Prices range from \$14 to \$39 for capacities of 32 to 128 Mbytes (OEM quantities); the company also plans to introduce larger capacity T-Flash cards.—by Bill Schweber

► **SanDisk Corp**, 1-408-542-0500, [www.sandisk.com](http://www.sandisk.com).

► **The testimonies from the hearings before the National Commission on Terrorist Attacks upon the US were downloaded from Audible.com approximately 30,000 times in the last few weeks of March. The free downloads at [www.audible.com/911hearings](http://www.audible.com/911hearings) include testimony from the former counterterrorism czar Richard A Clarke and former Secretary of State Madeleine K Albright.—*The New York Times*, April 5, 2004**

## SAS seizes the spotlight

**W**ITH THE SPECIFICATIONS for second-generation SATA (Serial Advanced Technology Attachment) nearly complete, industry attention is turning to the follow-on enhanced SAS (serial-attached-storage) interface in conjunction with a migration beyond the 3.5-in. hard-disk drive to smaller form factors that reduce power consump-

tion and improve access reliability (see "Speedy simplicity," *EDN*, Jan 22, 2004, pg 33). At first glance, you might think that, in developing its 15-mm, 2.5-in. Savvio drive family, Seagate simply turbocharged its 5400-rpm Momentus hard-disk drive (see "Speed searching," *EDN*, Oct 30, 2003, pg 101). Seagate demurs at such suggestions, claiming that it's more accurate to say that the company

pared back the specifications of its 15,000-rpm Cheetah drives to come up with Savvio.

Containing 8-Mbyte buffers and with 4.1-msec seek speeds, Savvio drives come in 36.7- and 73.4-Gbyte capacities. Seagate plans to price Savvio units approximately 10% higher than 3.5-in. Cheetah 15K counterparts with equivalent capacities and system interfaces. This

pricing might seem strange upon initial inspection, considering that Cheetah 15K has not only a higher rotation speed, but also a lower, 3.7-msec seek latency. Seagate points out, however, that Savvio consumes 40 to 50% lower power, weighs more than 1 lb less, and takes up 70% less volume than an alternative 3.5-in. drive. The low-volume factor enables you to squeeze much higher multidrive storage capacities, along with higher aggregate performance, into a chassis.

Ultra320 SCSI and 2-Gbps FibreChannel Savvio variants are now available in sample quantities with full production slated for June. Late in the third quarter, 3-Gbps SAS versions will appear; if you'd prefer to have SAS now, call Fujitsu. The company has been shipping samples of its 2.5-in. SAS drives since last

fall; for now, they come in a SATA-like single-channel version. (The SAS specification uses the second channel for redundancy, not boosted performance.) Fully featured dual-channel variants are under development. Fujitsu is seemingly sending mixed messages; it has also just unveiled 10,000- and 15,000-rpm, 3.5-in. drives that tout capacities as large as 300 and 147 Gbytes, respectively, and come in both Ultra320 SCSI and 2-Gbps FibreChannel-interface variants. However, Fujitsu sees more than 50% of its business migrating within five years to SAS and the 2.5-in. form factor.

—by Brian Dipert

► **Fujitsu Computer Products**, 1-408-432-6333, [www.fcpa.fujitsu.com](http://www.fcpa.fujitsu.com).

► **Seagate**, 1-831-438-6550, [www.seagate.com](http://www.seagate.com).

## Transceiver IC meets very-short-range needs

MANY WIRELESS APPLICATIONS don't need and, in fact, don't want range; they do need extremely low power and can tolerate low data rates. The AMIS-52100 from AMI Semiconductor is a single-chip transceiver for operation below 500 MHz; it is well-suited to applications such as 402- to 405-MHz, implantable medical devices. The IC uses well-known and simple amplitude-shift keying for transmitter-side modulation; the receiver path includes clock- and data-recovery circuitry. Its receiver optimally samples the data bit stream using its derived, synchronized clock to minimize jitter and, thus, bit-error rate. At 1 kbps, the device has a bit-error rate of  $10^{-3}$  with a -117-dBm signal; maximum data rate is 8 kbps.



**For a low-power, implantable transceiver that operates below 500 MHz, look at the 20-lead AMIS-52100 IC, which includes complete transmitting and receiving channels and sniff-mode operation.**

Because power is precious in these applications, the IC features a "sniff" mode in which it turns the internal oscillator on to full-operation mode within 15  $\mu$ sec to quickly check for a sufficiently strong signal. Users can adjust the sniff-mode threshold, the period, and many other operating parameters. The 20-lead SSOP device operates from a 2.4 to 3.6V supply; transmitting-current consumption is 25 mA, and receiver consumption is 7.5 mA. At single-digit-percent duty-cycle operation, average power consumption is far less. The \$1.95 IC (50,000) meets relevant FCC and ETSI requirements.—by Bill Schweber

► **AMI Semiconductor**, 1-208-233-4690, [www.amis.com](http://www.amis.com).

► **At the end of 2003, one in every five US households subscribed to a broadband service, according to InStat/MDR.**