



# leading edge

What's hot  
in the  
design  
community

Edited by  
Fran Granville

## PATENTLY OBVIOUS

**"Right now, there  
are easily 3000 to  
4000 Internet  
patents pending."**

**—Greg Aharonian,  
patent consultant  
and editor of the  
Internet Patent  
News Service**

## Enhancements fine-tune FIFOs

By Brian Dipert

Integrated Device Technology's (IDT's) SuperSync II FIFO buffers provide more features, lower power consumption, and higher speed than the company's SuperSync products. Both SuperSync and SuperSync II devices offer 128-kbit to

4-Mbit densities. SuperSync II performance extends to 133 MHz, however, and operating current is as low as 35 mA for narrow-bus configurations. SuperSync II 3.3V inputs are 5V-tolerant. Flexible bus matching gives you the option of running each port at  $\times 9$ - or  $\times 18$ -bit wide buses.

Other enhancements include user-selectable asynchronous or synchronous flag-timing modes, zero-latency retransmit, eight pin-configurable default threshold levels for almost-empty and -full flags, big- and little-endian byte represen-

tation, and noninterspersed parity control. All SuperSync II

FIFO buffers come in 80-lead TQFPs and in 7.5-, 10-, and 15-nsec speeds. Available for sampling now, the devices will enter volume production in January with prices ranging from \$34.70 to \$91.60 (10,000).

► **Integrated Device Technology Inc**, Santa Clara, CA. 1-408-727-6116, fax 1-408-492-8674, www.idt.com. © Circle No. 382



**SuperSync II FIFO buffers enhance feature-set, power-consumption, and performance specifications for digital communications, multimedia, and other applications.**

## Two chips implement complete ADSL modem

The MTK-20140 ADSL DynaMiTe chip set lets you design an ADSL modem with only two ICs. One chip, the MTC-20144 contains an analog front end; the other, the MTC-20146, provides the necessary digital functions. Together, they implement discrete-multitone (DMT) and asynchronous-transfer-mode (ATM) functions and an embedded controller.

The DynaMiTe chip set is ANSI Issue 2-compliant and provides direct ATM support (Utopia interface). It allows broadband connections to 26,000 ft on #24 AWG wires and to 18,000 ft on #26 AWG wires. It enables full-rate ADSL transfers as fast as 8 Mbps on downlinks and 850 kbps on uplinks. The chip set features software extensions to G.Lite and G.DMT, including ISDN support. In volume, the chip set costs \$50.—by Gary Legg

► **Alcatel Microelectronics**, Zaventem, Belgium. +32-2-718-1837, fax 32-2-718-1999, www.alcatel.com. © CIRCLE NO. 383

According to market-research company Integrated Circuit Engineering and Micrologic Research, shipments of micro-controllers and DSPs from 1993 to 1998 in billions of dollars and units, respectively, were:

1993	\$6.6	2.22
1994	\$8.3	2.66
1995	\$10.7	3.07
1996	\$11.4	3.45
1997	\$12.6	4.23
1998 (est)	\$14.7	4.80

Integrated Circuit Engineering and Micrologic Research, Scottsdale, AZ, www.ice-corp.com.

# Low-power imperative drives 12-bit A/D converters

**A** broadly applicable A/D converter must have low power, low price, and high performance.

Two new devices—the 1.75M-sample/sec AD7472 from Analog Devices and the 20M-sample/sec SPT7935 from Signal Processing Technologies—

exemplify that trio of parameters.

The AD7472 operates from a 2.7 to 5.25V supply and requires 1 mA from a 3V rail. You

can reduce its dissipation by running the successive-approximation-register-based converter at lower speeds if your application does not need maximum throughput rate in all situations. The converter has

20-MHz full-power bandwidth and includes a track/hold amplifier; overall SNR exceeds 70 dB for a 500 kHz input. The 24-lead IC, which requires an external reference, costs \$6.65 (1000); a 10-bit version, the pin-compatible AD7470, costs \$4.50.

If your low-power-conversion needs are in the mid- to high-speed range, the SPT7935 operates from a 3.3V supply with typical power dissipation of 79 mW. Like the Analog Devices' converter, this device includes a track/hold amplifier. With a 4.4995-MHz input, its typical SNR and spurious-free dynamic range are 60 dB; corresponding specifications with an 18.991-MHz input are 58 and 57 dB, respectively. You can get the 44-lead IC for \$9.90 (1000).—by Bill Schweber

► **Analog Devices Inc**, Norwood, MA. 1-781-937-1428, fax 1-781-821-4273, [www.analog.com](http://www.analog.com). ©Circle No. 384

► **Signal Processing Technologies Inc**, Colorado Springs, CO. 1-719-528-2300, fax 1-719-528-2370, [www.spt.com](http://www.spt.com). ©Circle No. 385



Using the 1.75M-sample/sec AD7472 A/D converter from Analog Devices or the 20M-sample/sec SPT7935 converter from Signal Processing Technologies, you can obtain 12-bit conversions at lower power and voltage than other available devices.

## DILBERT By Scott Adams



**FACTOID**► According to Cisco's annual report, e-mail messages outnumber regular mail messages 10-to-1.

### HEFTY CAPACITORS TARGET RESONANT SUPPLIES

A line of compact polypropylene-and-foil capacitors from Electronic Concepts targets resonant-mode power supplies. Such supplies have critical requirements for high current-carrying capability at low capacitance values. The 5PT capacitors use heavy metal electrodes in a densely packed configuration, resulting in more current per microfarad than other available units, claims the company. Specially shaped plug-in lugs accommodate high currents with low inductance. The capacitors come in five sizes; the smallest measures 0.5×0.73×0.645 in. Capacitance values are 0.01 to 0.1 μF, and voltage ratings are 400 to 1500V dc. Current-carrying capacity is as high as 45A. Prices range from \$3 to \$9, depending on rating and quantity.—by Bill Travis

► **Electronic Concepts Inc**, Eatontown, NJ. 1-732-542-7880, fax 1-732-542-0524, [www.eci-capacitors.com](http://www.eci-capacitors.com).

©CIRCLE No. 386



The high peak currents in resonant power supplies mandate the use of polypropylene capacitors like these miniature units.

**MINIATURE SOLENOIDS  
MAKE BATTERIES HAPPY**

The latching SCL1330 and non-latching SCN1330 miniature C-frame pull solenoids from Bicon are 15% more efficient than other available devices, according to the company. The increased efficiency suits the solenoid for battery-powered applications. Four AA cells in series for 6V can power more than 250,000 solenoid actuations. A short electrical pulse actuates the plunger of the SCL1330 latching model; a built-in magnet then holds the plunger in the retracted position. A pulse of the opposite polarity releases the plunger. In

# Start-up reveals C-programmable VLIW architecture

Since early this year, Equator Technologies has been one of two media-processor start-ups planning a parallel  $\mu$ P architecture (see "Media processors target digital-video roles," *EDN*, Sept 1, 1998, pg 59). The company has finally unveiled

its very-long-instruction-word (VLIW) architecture that targets applications including digital TV, set-top boxes, 3-D games, digital versatile disks, image-processing equipment, communication devices, and others. Equator presents its new MAP1000 processor as a sort of super DSP that's fully programmable with C, even for known-problematic algorithms, such as MPEG-2 encoding and decoding. The company claims that the processor offers at least four times better performance than a TI (www.ti.com) C60 DSP and 10 times better performance than a 300-MHz Pentium II. Furthermore, Equator claims the performance advantage can double in some applications.

The IC includes a processor block that can launch and complete four 32-bit, fixed-point instructions per clock, yielding 800 MIPS at 200 MHz on simple instructions. A Data-Streamer coprocessor augments the main processor

block and optimizes the data movement that's key to handling rich video streams. Yet another variable-length, decoding/encoding coprocessor handles Huffman coding for MPEG-2 yet is also reprogrammable. The only component that is mostly hardwired is a small 3-D graphics block. The IC also sports a host of multimedia-capable I/O devices, including a 230-MHz RAMDAC; NTSC/PAL in and out; multiple audio interfaces; and dual PCI buses, including one Accelerated Graphics Port master.

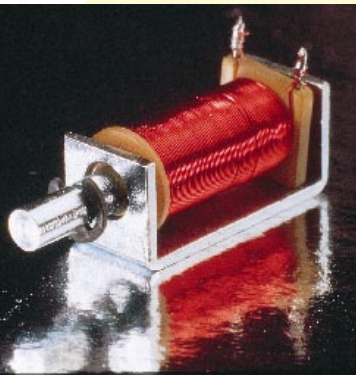
Like most media-processor vendors, Equator believes that the ability of its processor to handle multiple functions, such as 3-D gaming and high-definition TV (HDTV), will endear the architecture to manufacturers of consumer electronics. Still, the success of any media processor ultimately hinges on how it compares pricewise in a single-function device with fixed-function de-

signs. Equator claims that its processor achieves cost parity with fixed-function implementations in areas such as digital TV, HDTV, and digital set-top boxes. Moreover, the company claims life-cycle analysis will clearly reveal the advantage of its programmable approach: You can upgrade deployed systems in the field.

Equator plans to support the MAP1000 both as a stand-alone processor and as a coprocessor in PCs while the industry struggles with the PC-based-versus-TV-centric living-room argument. The IC costs \$600 (1000), but it requires little else other than RAM in most applications. Equator has developed a pair of PCI-based reference designs that demonstrates most significant applications and that sells for \$6333 per set. It also offers the comprehensive, \$12,000 imMediaTools software-development environment. Hitachi (www.hitachi.co.jp) has signed on as a manufacturing partner and also has rights to market the MAP1000. Samples are available now, and production will follow in the first quarter of 1999.—by Maury Wright

► **Equator Technologies**, Campbell, CA. 1-408-369-5200, www.equator.com.

☉ Circle No. 388



**Electromagnetic components, such as these miniature solenoids from Bicon, get smaller and more efficient.**

the SCN nonlatching model, a continuous current holds the plunger in; the plunger retracts upon removal of the current. The solenoids are available with 3, 6, 12, or 24V coil-voltage ratings and cost less than \$2 (OEM).—by Bill Travis

► **Bicon Electronics Co.**, Canaan, CT. 1-860-824-5125, fax 1-860-824-1137, www.bcrn.com.

☉ CIRCLE No. 387

## CALENDAR

JAN 7 TO 10

**Consumer Electronics Show**, Las Vegas, covers consumer technologies, emerging technologies, retail management, mobile communications, and more. Sessions focus on the emerging retail market for set-top boxes, Web-access devices, the less-than-\$1000-PC market, small-office/home-office technologies, wireless and mobile technologies, handheld

PCs, smart-card technologies, high-speed-bandwidth-delivery systems, and more. The Habitech Institute '99 provides hands-on instruction and training for installing and integrating home systems. Exhibitors' including Sun, Network Computer, and IBM, showcase their information-technology products. Consumer Electronics Manufacturers Association, Arlington VA. 1-703-907-7605.

## Chip set increases backplane bandwidth

The Cross-Stream chip set provides switching on high-bandwidth data backplanes at 32 Gbps in a minimal configuration and at hundreds of gigabits per second in parallel implementations of multiple chip sets. Those specs provide faster switching and greater scalability, says manufacturer Vitesse, than is possible with switch ICs that use either shared-memory or asynchronous or parallel switch fabrics.

The key to both faster switching and greater scalability is serial, synchronous operation. SRAM bus width and access times limit shared-

memory switches to about 20 Gbps. Parallel crosspoint architectures offer higher capacity but require several high-pin-count ICs. In contrast, Cross-Stream implements an aggregate 32-Gbps switch in a single IC, and you can gang chips for higher overall rates. Each Cross-Stream chip set includes the VSC880, a 16×16-bit, 2-Gbps serial switch-fabric IC, and the VSC870, an associated 2-Gbps synchronous serial transceiver. The VSC870 synchronizes to a central clock on the VSC880, eliminating the duty-cycle variations and data dependencies seen in

asynchronous-switch design.

The Cross-Stream chip pair can switch self-routing, variable-length-packet, or fixed-length cells, making it useful for datacomm applications that include Gigabit Ethernet, asynchronous transfer mode, Internet Protocol, or Fibre Channel. The chips will be available for sampling in early 1999. The VSC870 transceiver will sell for \$69, and the VSC880 switch will sell for \$250 (1000).

—by Gary Legg

► **Vitesse Semiconductor**, Camarillo, CA. 1-805-388-3700, fax 1-805-987-5896, [www.vitesse.com](http://www.vitesse.com). ©Circle No. 390

## Low-impedance backplane promises 1000-Mbyte/sec VME

Adding to the uncertainty of VME-board manufacturers, another proposal has surfaced to increase bus data rates. Trenew Electronic GmbH has developed a low-impedance technique that boosts VME backplane rates to 1000 Mbytes/sec.

Unlike the yet-to-be-approved VME320 approach from Arizona Digital ([www.arizonadigital.com](http://www.arizonadigital.com)) and Bustronic ([www.bustronic.com](http://www.bustronic.com)), which requires a patented, star-pattern backplane, the new VME1000 proposal from Trenew works over a traditional slot-to-slot backplane. The basis of the VME1000 concept is to reduce the backplane transmission-line equivalent impedance from 50 to 20Ω to minimize bus transition times. Ringing and reflections generated by the fast edges dissipate before the next signal edge arrives. VME1000 also takes advantage of the proposed source-synchronous transfer protocol, which reduces the handshaking from four to two edges.

The limiting factor of very fast backplane data rates is the skew of data and strobe signals. Trenew proposes the use of enhanced-transceiver-logic drivers, which the VME International Trade Association ([www.vita.com](http://www.vita.com)) is considering, to minimize skew and to drive the low backplane impedance. Terminating each unused slot with a standard resistance also decreases skew.

As board manufacturers wait for industry agreement on the next step in the VMEbus data protocol, no mad rush to certify VME1000 will likely occur. Most power users prefer to implement high-speed point-to-point datapaths than to rely on the speed of the time-shared VMEbus.

—by Warren Webb

► **Trenew Electronic GmbH**, Pforzheim, Germany, +49-7231-9734-0, [www.trenew.com](http://www.trenew.com).

©Circle No. 391



Yet another VME backplane speedup proposal promises to increase bus data-transfer rates to 1000 Mbytes/sec.

## RADICAL TECHNIQUE CLAIMS TO PUMP 90 GBPS THROUGH 100-KM FIBER

Fiber offers you truly impressive potential bandwidth, and you can already get 10 to 40 Gbps data rates using dense-wavelength-division multiplexing (DWDM) and optical amplifiers. Now, SilkRoad has demonstrated what it calls "refractive synchronization," a proprietary technology that delivers almost 100 Gbps; the company claims that the technology has achieved twice that rate in the lab. At a New York press conference, the company connected 144 TV signals, along with other data and voice, to their corresponding monitors using a single fiber link.

The technique differs significantly from DWDM in that SilkRoad uses one optical wavelength for all the data (see "Optical amplifiers literally pump up the (photon) volume," *EDN*, July 16, 1998, pg 40). While injecting the laser-generated photons into the optical fiber, the method optically narrows and modulates the photon beam and then embeds frequency-ID tags onto the photon signal. The receiver circuitry matches each tag with a corresponding channel to retrieve the data. The approach needs only simple beam splitters in contrast to the optical multiplexers/demultiplexers and amplifiers of DWDM. The company plans to announce commercial products next year.

—by Bill Schweber

► **SilkRoad Inc**, San Diego, CA. 1-619-457-6767, fax 1-619-457-6751, [www.silkroadcorp.com](http://www.silkroadcorp.com).

©CIRCLE NO. 392

**FACTOID**► 28% of all software in use in North America is pirated, according to a 1997 survey by the Business Software Alliance.

**FRACTIONAL-BRICK CONVERTERS POWER DATA, TELECOMM SYSTEMS**

The latest generation of "quarter-" and "half-brick" (2.28×1.45×0.5 and 2.4×2.28×0.5 in., respectively) dc/dc converters from Lucent Technologies targets a variety of data-networking, data-processing, and telecommunications applications. Four series—Q, QH, JAH, and JF—differ in power-output and efficiency figures. The quarter-brick QH converters deliver 50, 75, or 100W at efficiencies as high as 88%. Quarter-brick Q devices deliver 50 or 75W at efficiencies as



**New devices from Lucent's brickyard offer high power density and efficiency in data and telecomm systems.**

high as 84%. Half-brick JAH converters deliver 50, 75, or 100W at 90% efficiency. Half-brick JF units offer power outputs of 50 to 200W and feature built-in forced load sharing to accommodate other parallel-connected JF converters for increased power. Prices of 75W versions are Q: \$70.40, QH: \$85.20, and AH and JF: \$83.50 (1000). All versions feature UL recognition, CSA certification, VDE license, and the CE mark.

—by Bill Travis

► **Lucent Technologies**

Mesquite, TX. 1-972-284-2626, fax 1-972-284-2900, www.lucent.com. ©CIRCLE No. 393

## Complex PLD cuts transistor count, die size

**N**ot content with offering laser-configured versions of Altera's (www.altera.com) Flex8000 programmable logic, Clear Logic is extending its product line to pursue more lucrative (but also more nimble) prey: Altera's MAX7000 CPLDs (see

"Quick FPGA conversion without NRE charges," *EDN*, Jan 15, 1998, pg 15). Clear Logic claims that its CL7000 laser-processed logic devices (LPLDs) eliminate as many as 1 million transistors from the equivalent Altera CPLD (macrocell-count-dependent), shrinking die size from 40 to 60% on a comparable process technology generation.

How does Clear Logic achieve such aggressive goals? Unlike the Flex8000 product line, Max7000 CPLDs contain no silicon-intensive SRAM configuration elements that

Clear Logic could replace with comparatively svelte laser-trimmable fuses. However, the company still finds three optimization areas: the programmable interconnect array, the product-term AND array, and high-voltage circuits. Clear Logic replaces each 11-transistor programmable-interconnect-array element with a single-fuse counterpart and each six-transistor AND array element with a one-transistor, three-fuse alternative. Because CL7000 LPLDs aren't in-system- or PROM-programmer-configurable, the devices also

need no internal high-voltage pumps.

Clear Logic also claims that its laser-fuse approach reduces bit-line capacitance as much as 40%, translating to faster internal signal-propagation delays and lower power consumption. The company provides CL7000 prototypes within two weeks of receiving your bit-stream file or an already-programmed Max-7000 device and can supply production volumes within a month. Clear Logic targets LPLD costs 20 to 50% lower than that of the Altera counterparts, and, assuming that it can evade the wrath of Altera's legal department, will ship its first CL7000 devices in the first quarter of 1999.

—by Brian Dipert

► **Clear Logic, Inc**, Santa Clara, CA. 1-408-361-2600, fax 1-408-361-2666, www.clearlogic.com.

©CIRCLE No. 394

## ICs keep RF link simple for wireless control

Cellular phones may be the most visible edge of wireless' influence, but many other subtle wireless applications, such as keyless entry and remote control, are increasingly common. Using Temic Semiconductor's U2741B transmitter, U3741BM receiver, and 4-bit M44C890 microcontroller as a data encoder/decoder, you can build a link operating at 300 to 450 MHz and supporting data rates as high as 10 kbps. The ICs operate at approximately 1-mA currents for the receiver and microcontroller, are compact, require few external components, and can use a very simple antenna.

Employing amplitude-shift-keying or frequency-shift-keying (FSK) modulation, the transmitter with its single-ended open-collector output pushes as much as 2 mW into a magnetic loop or quarter-wavelength antenna. You can operate the transmitter and encoder from a 2 to 5.5V supply, meaning that a single Li-ion

cell is sufficient. If you use FSK modulation, the transmitter pulls the reference crystal up to ±100 ppm for larger, more noise-resistant frequency deviations. This \$1.20 (1000), 16-pin IC requires no SAW filter.

The 20-pin receiver needs no RF components, except for antenna matching. It operates from a 4.5 to 5.5V supply with a single-ended RF input that uses either discrete or pc-board-integrated antennas. The \$3 (1000) receiver includes the requisite low-noise amplifier, an IF amp, a PLL, a VCO, and a crystal interface. Antenna matching and filtering may require a SAW filter in the front end. The receiver consumes less than 1 mA because of its programmable polling operating mode; in sleep mode, it needs just 200 µA.

—by Bill Schweber

► **Temic Semiconductors**, subsidiary of Atmel Corp, www.temic-semi.de. ©CIRCLE No. 389

**FACTOID**► "Before you can do anything with a computer, you have to do something else first."—Charles Small, *High Tech Joke Book*, Oak Ridge Publications Inc, 1993.

## 2.4-GHz wireless LAN pushes PC links beyond 10 Mbps

**W**ireless-link throughput that is far lower than you usually get from your wired links can temper the joys of roaming with your PC. Using Aironet Wireless Communications' LAN adapters and their corresponding access point as the bridge

between a wired-LAN backbone and the wireless points, though, you can quickly configure a wireless LAN with data rates as high as 11 Mbps. The system operates in the unlicensed 2.4-GHz band using direct-sequence spread-spectrum (DSSS) technology; range is typically 500 ft outdoors and 100 ft indoors at maximum data rate and 1800 ft outdoors, 350 ft indoors at 1 Mbps.

The PC4800 Turbo DS LAN adapters come in Type II PCMCIA cards and support IEEE 802.11 in their 1- and 2-Mbps modes. These \$795 cards in-

clude barely noticeable snap-on "diversity" antennas, power-management software that cuts battery drain to 30 mA—from 550 mA in transmitting mode and 330 mA in receiving mode—with typical duty-cycle and data rates, and Windows and Novell device drivers. Output power is 100, 50, and 10 mW/MHz for US/Canadian, European, and Japanese use, respectively. The system includes automatic data-rate switching to a slower rate as you reach the fringe of the cell coverage.

The LAN adapters link via

AP4800 Turbo DS wireless access points, which support Ethernet or token-ring topologies. You can remotely manage these \$1995 points from any network port using Telnet or a Web browser. Like the LAN adapters, the access points use diversity antennas for improved SNR and bit-error rate, despite roaming users and multipath signals. Transmitted power is the same as for the LAN adapters; the access points op-

erate from an ac line adapter or 12V dc/1.5A.

Aironet packages this DSSS technology in its BR510 series of wireless bridges for applications involving linking buildings on a campus. These \$3695 bridges yield point-to-point/multipoint, fixed-path links with a range as large as 15 miles (24 km) yet at lower power levels than the roaming nodes when you use one of Aironet's high-gain dish or Yagi antennas.—by Bill Schweber

► **Aironet Wireless Communications**, Akron, OH. 1-330-664-7900, [www.aironet.com](http://www.aironet.com).

©Circle No. 395



Roam without giving up high-speed connectivity with 11-Mbps, 2.4-GHz, DSSS wireless-LAN adapters and access points from Aironet.

## Modular LAN-switch IC family scales from workgroup to enterprise

Ethernet switching continues to heat up as even small workgroups need the bandwidth a switch affords, leaving equipment vendors needing to address a broadening market. Small offices and workgroups need and can afford only a so-called unmanaged switch, whereas larger organizations require enterprisewide LAN management and want to buy only extensible product families. Most Ethernet-switch-IC vendors have addressed the market with products for different segments, but Vertex Networks has devised its XpressFlow 2080 family with modular compatible products that you can combine or use individually to support all segments.

For example, its baseline DS212 IC supports 12 Fast Ethernet ports and one Gigabit Ethernet port and requires only external EPROM and RAM to implement an unmanaged switch. Alternatively, you can add a microcontroller for management functions. You can also extend the IC into distributed-switching applications because it supports the company's 3.2-Gbps XpressFlow Pipe. The proprietary interface can connect switch ICs in ring configurations or to a switch fabric, such as the company's SF240 or SF280, with four and eight XpressFlow Pipe connections, respectively. The fabrics can each handle an aggregate bandwidth of 25.6 Gbps, and you can cascade two fab-

rics. In total, the family includes four multiport front ends with varying support for different mixes of Fast and Gigabit Ethernet and asynchronous transfer mode, as well as different XpressFlow Pipe configurations. At the high end, you can easily configure a 96-port, Fast Ethernet, Layer 3 routing switch. The company claims that the silicon bill-of-materials cost for an unmanaged Layer 2 switch will be less than \$5 per port and that of a similar Layer 3 switch will be \$9 per port.—by Maury Wright

► **Vertex Networks**, Irvine, CA. 1-949-252-8880, [www.vertex-networks.com](http://www.vertex-networks.com).

©Circle No. 396

**FACTOID**► The energy content of gasoline is about 44 MJ/kg, or 12 kWhr/kg. Conventional lead-acid batteries can store 30 Whr/kg or so—about 400 times less than does gasoline on a weight basis.—*IEEE Spectrum*, November 1998.