ELECTRONICS REPORT
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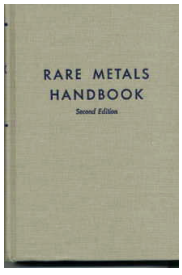
ET TRENDS

BUSINESS & MARKET NEWS

PDA Alive and Well? - Some major vendors, like Dell, have shifted away from PDAs since the product has not faired well against smart phones. In fact, Smartphones are apparently more profitable, with a bigger potential. Surprisingly, PDAs jumped nearly 40% in Q1-07, according to a new survey by Gartner. One reason may be customer demand for devices with GPS and low-cost e-mail functions. But PDA vendors, like Mio Technology, had a 162% rise in PDA shipments in Q1-07, with particularly strong sales of its GPS-enabled car-navigation units in southern European countries. Samsung also saw PDA sales rise from 2,150 shipments in 2006 to 451,000 units in Q1-07 thanks to a strong marketing campaign for its BlackJack wireless e-mail device by US-based Cingular Wireless. Overall, the PDA market reached 5.1-million units shipped in the first quarter, up 39.7% over the same quarter last year. ***I'm not convinced that PDAs can beat the latest and greatest phones. Smartphones will just add whatever functions are in demand while remaining the all-important telephone link. People love to talks. But we need to be careful of the PDA definition that has been blurring for several years. Recall that Dell decided to stop selling handheld devices entirely, not that long ago. As consumer interest swings quickly from simple handsets to feature-rich Smartphones, the first quarter of 2007 marked the 13th consecutive quarter of decline in shipments of PDAs with no telephone abilities. And Apple is getting ready to sell millions of iPhones.***

Silicon Innovation - Beyond the Valley - We tend to think that all the *smart* people work in Silicon Valley, but I'll add ST-Micro as one of the top innovators. STMicroelectronics NV has already pioneered some neat MEMS products, and intends to sample biochemical sensors and "electronics-on-plastics" in 2008. Add to this, sampling of micro-fuel cells by 2009. ST will also combine MEMS, power MOSFET and advance analog for new applications. The fuel cells are targeted to fit PDAs, Smartphones, and eventually bigger portables like PC laptops. ST intends to move even faster into biochemical sensors and electronics on plastic. Their big on sensors - for industry, in the home, on people, and also disposables and designs that are easy to integrate. What about "electronics on plastic"? Not much was revealed, but I'm guessing that ST has organic semiconductors coming close to a launch - what we've been calling "Printed Electronics". See more in Printed Electronics report. (Sources: EE Times, ST website)

MATERIALS



Rare Elements Getting Too Rare (Source: EE Times) - The world may be running out of rare metals used to form key components in high-tech devices from cell phones to semiconductors to solar panels, per New Scientist. Reserves of elements from platinum to indium, and tantalum are being used up at an alarming rate. These are chemical elements where no synthetic replacement can be developed. Even more

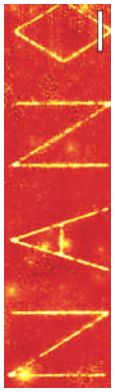
common metals like zinc and copper, are in increasingly short supply as they are used in rapidly developing economies like India and China. Over the last year, thefts of copper from power lines and electrical substations have soared, as has the price of copper. University of Augsburg (Germany) has predicted that supplies of indium and hafnium could be exhausted by 2017. Shortages of rare metals could slow or prevent the development of new products. ***[We need to get back to looking at alternate metals again - one prompted by the 1972 book, "Limits to Growth".]***

NANOTECH (ELECTRONIC EMPHASIS)

The IEEE Standards Association (IEEE-SA) has launched the IEEE Nanoelectronics Standards Roadmap (**NESR**) initiative and hosted a Workshop in May in New York City. The workshop was a continuation of the IEEE-SA Nanoelectronic standards framework for nanomaterials, devices, functional blocks and applications developed in conjunction with key industry participants. Plans call for contributors to finalize a first draft of the Roadmap for presentation at a second workshop in October 2007. By the end of the year, the Roadmap will be published, paving the way for the initiation of high-priority standards. The Roadmap will be updated annually. The committee represents diverse segments of the nanoelectronics community including materials, devices, integration of nanoelectronics, and Nanoelectronic regulations. According to IEEE, "The introduction of nano-enabled electronic products is clearly accelerating and this means there will be an urgent need for standards in the near future to address all aspects of nanotechnology from raw materials to devices and high-volume manufacturing". According to Nathan Tinker, NESR coordinator and co-founder of the Nano- Business Alliance, "the IEEE Roadmap will help the industry prioritize the standards it needs and focus its resources. Our efforts are meant to provide practical support for other efforts in the field, such as the nano-related technology roadmaps put forth in the International Technology Roadmap for Semiconductors and the International Electronics Manufacturing Initiative." IEEE intends to create a broad Nanoelectronic standards roadmap built on a roadmap it developed for carbon nanotubes in 2003.

Quantum Dots and "Almost" Lasers (Tech. Rev/ MIT/LANL) - Quantum dots (Q-dots) are tiny semiconductor crystals that range from 2- to 10-nanometers in size that can fluorescent to emit bright light in different hues. They can be made using simple, inexpensive chemical processes. Color is changed by altering the size of the nanocrystals. Quantum dots have found use in medical imaging and are close to being used in photovoltaic cells and LEDs. Researchers have been trying for a decade to use the semiconductor nanocrystals to make lasers. Any lasing material must be able to amplify light and nanocrystals have proved exceedingly deficient here. The Los Alamos National Laboratory made a breakthrough and engineered a new type of nanocrystal that can amplify light. The nanocrystal has a core and a shell made of different materials so that it can separate the electrons from the positively charged holes: the core traps the electrons, while the shell traps the holes. Without the separation in the tiny nanocrystals, the charged particles interact and annihilate each other in picoseconds, but that's not enough time for the material to amplify light. For a material to emit light, its electrons need to be excited, either by light or electric current, so that they move from their normal low-energy state to a higher energy level, leaving behind a positively charged hole. If a photon of a specific energy comes along, it

stimulates the excited electron and the hole to recombine, a process that emits two photons. The photons either leave the material, creating light, or they can get reabsorbed by unexcited electrons in the material. For a material is to amplify light, it needs to have more excited electrons than unexcited ones. Semiconductor nanocrystals have 2 electrons in the low-energy level and both need to be excited to create 2 electron-hole pairs. But in the tiny crystals, the two electron-hole pairs interact, and one annihilates the other. Here's a way around the problem. Make a nanocrystal that can amplify light with just one electron-hole pair. The nanocrystal has a CaS core wrapped with a ZnSe shell and this leads to charge separation. The electrons stay in the core, but the holes go to the shell. This separation changes the properties of the nanocrystal. The result is that only one electron gets excited and forms an electron-hole pair. Now when this pair recombines in the presence of a photon and generates two identical photons and both the photons leave the material. The next goal is to pump the nanocrystals electrically instead of with photons. ***[Unless the Q-dots can be electrically excited, they will remain an R&D item for lasers. We seemed to have a very long list in the Nanoworld of "almost". A long list of "almost" don't add up to much of anything].***



GENERAL TECHNOLOGY

The Future May Be Plastics - But its Plastic Phones (Source: EE Times) - Every second 4 people are born - but 32 mobile phones are sold. There are now 2.7-billion mobile devices in the world and that's 3X as many as the number of cars or PCs. Today, someone's first Internet experience is likely to be on a mobile device, not a computer. Motorola believes that faster connectivity is the right vision for the future. Emerging network protocols will improve the user experience. WiMAX and LTE (long-term evolution) will allow a typical MP3 file to be downloaded in 10 seconds instead of 2-minutes using EV-DO, or 6-minutes using an Edge network. LTE is a project to improve the Universal Mobile Telecommunications System mobile phone standard, one of the 3G mobile phone technologies. Motorola believes that large companies will continue to benefit from mobile investments. Enterprise mobility is going to be a huge opportunity for companies to be more competitive on a mobile basis. FedEx, for example, uses mobile devices to cut 10-seconds off every stop, resulting in millions of dollars in savings.

It's a Bird, a Plane, it's RotoCop - (Guardian Unlimited) - UK's Merseyside police are launching a "spy drone" next month to check and reduce anti-social behavior and public disorder. The 1-meter wide drone was originally used by the military for scouting. It weighs less than 5-pounds, according to BBC, and can record images from a height of 500-meters. The hovering spy bots are controlled by remote or pre-programmed GPS navigation system, are extremely quiet and can be fitted with night vision cameras. They will also be used for monitoring traffic conditions. This is another way of putting more coppers on the street and maxing technology is a powerful way of achieving this. The drone will be used primarily to support our **anti-social behavior taskforce** AXIS, in gathering all-important evidence to put offenders before the courts. The trial begins in June and will last three full months. ***[Note Heads Up Display. Google will probably be buying some for street maps].***

TELECOM

Global WiMAX and Strong Growth - ***I have an admitted bias toward WiMAX and may stacking the deck with the positive reports, but there seems to be a steady stream of pro-WiMAX. I'll also concede that many Intel reports and statements are as much PR as fact. But when Intel speaks, people listen.*** According to Intel Capital and DigiTimes, the global WiMAX market is set for robust growth in 2008 per. There is a continuing emergence of WiMAX devices as well as initiatives by telecom services providers. A number of new WiMAX devices will debut in 2008, including built-in WiMAX modules for notebooks based on Intel's Motevina platform (802.16e). The system is referred to as CPE (consumer premise equipment). WiMAX networks being set up around the globe starting in 2007 will gradually come on line in 2008 and thus boost expansion of the WiMAX industry. Intel's current strategy is to focus on the development of WiMAX chips for CPE products while exploring the size of the WiMAX market and making mid-course corrections as needed. Intel is also helping develop chips for base stations by investing in other companies such as Picochip and IP Access. Taiwan-based makers are likely to play a key role in the supply chain of the global WiMAX industry through their input in product development and manufacturing capability as they did in the PC industry.

WIMAX TO OVERTAKE 3G According to Intel - (Source: C/NET) - WiMAX, rather than 3G, will do for notebooks what the cellular phone did for telephones. That is, increase the number of units sold in the market exponentially, according to Mooly Eden, corporate vice president and general manager of Intel's Mobile Platforms Group, whose frank and insightful comments are always studied in minute detail by analysts and media. Today, 27% of all people on the Internet are doing so with wireless and the numbers are going to grow much faster. In 2003, when Intel launched Centrino, and said Wi-Fi would be everywhere, people laughed. Today the attach rate is 95%". Intel states that the 3G attach rate was less than 10% but fully expects WiMAX to be as successful as Wi-Fi, and estimate that 100-million people will be connected by 2008. Intel planned to offer 3G in conjunction with Nokia but the financials didn't make sense, so Intel decided to go with WiMAX.

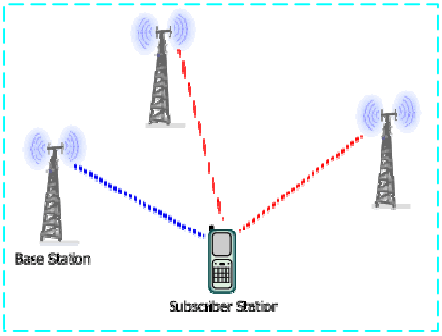
WiMAX First Aid - DIGITIMES - CHT (Taiwan), in technological cooperation with Nortel WiMAX & Wireless Mesh, demonstrated the application of WiMAX to medical first-aid care at the 2007 Taipei Summit Asia-Pacific WiMAX Conference & Exhibition. Audio and video are transmitted. The demo was a simulation of a person injured in a traffic accident traveling by ambulance while doctors at the hospital monitor the situation via WiMAX-delivered webcam video (see previous photo). The doctors can communicate and assist paramedics through the channel. At the same time, the injured person's medical records are immediately passed to the receiving hospital.

Telemed Future - (Source: EE Times) - Future medicine will have a very high "electronics" content if the rising trend continues. The idea is to use add sensors and monitors to existing personal electronics, especially mobile communications devices. A small Australian company is using Bluetooth to log and transmit medical data to a central network through mobile phones. Alive's Bluetooth products are already used in the recovery of cardiac outpatients and

the diagnosis of sleep apnea, and a range of products in development aim to make advancements in health monitoring for diabetics, mountaineers and athletes in training. The core of the Alive technology is Bluetooth enabled health monitoring devices such as heart rate & activity monitors, ECGs, blood oximeters and blood glucose meters that communicate with software on your mobile phone to log and upload information to a central internet server. The information can be uploaded in real-time over a GPRS mobile data connection if constant monitoring is required, such as in the case of cardiac arrest patients who are beginning to use exercise as part of their recovery, or saved onboard the device on an SD card to be batch uploaded at a convenient time if the data isn't so urgent. This means that vital health information can be relayed to medical professionals without the need to visit a hospital, constantly, daily, or as required. It's a major step forward in convenience for people who need various body metrics monitored, and could serve to relieve stress on overcrowded health systems.

WiMAX Statistics- WiMAX has shown an 85% increase in subscribers according to research firm Maravedis (Montreal, CN). Estimates are that 52% of the deployments still used proprietary equipment, 36% use the 802.16-2004 standard, and just 12% use the new IEEE 802.16-2005 mobile WiMAX standard. The U.S., Spain and Australia are the top 3 countries for new subscribers. In Q1-07, they accounted for 0.5 million WiMAX subscribers bringing the fast-rising total number to 950,000. Countries in the Asia and Pacific region accounted for 38% of deployments, Europe 33%, North America 17%, and Latin America 13%. WiMAX service revenues in 2006 totaled $322 million with an Average Revenue Per User of $40.76. Residential subscribers were 58% and business accounted for 42%.

Mobile WiMAX Status - (EE Times/RF Review/Internet) ***I continue to be upbeat, but concede that a lot has to happen to make it a big deal. But WiMAX is getting considerable attention in the trade press and the media and expectations can be a consumer driver.*** Service providers and infrastructure manufacturers regularly announce advanced wireless services, capabilities and equipment contracts. Successful of mobile WiMAX will depend on the provider's investment, the infrastructure equipment and the availability of affordable consumer products. Mobile WiMAX is based on the IEEE 802.16e standard that has finally reaching an endpoint (We hope; IEEE is not that fastest spec maker). WiMAX, while a contender among several systems, is expected to be used for next-generation broadband networks. The WiMAX Forum has done a comprehensive job of defining the main specifications in a number of "system profiles" that specify which features of the standard are mandatory and which are optional. This flexible system ensures interoperability, but leaves room for innovation and differentiation. The 802.16e standard covers a wide range of frequencies. Manufacturers seeking to qualify a product, can specify the band classes they are targeting. Most transceivers and RF front-end modules will cover multiple band classes for economy of scale. But requirements will demand a high level of integration making WiMAX a significant technical challenge although many designers



are already familiar with rules for fixed WiMAX. There is some similarity between Wi-Fi and WiMAX since both use OFDM-based standards, but there are key differences that make WiMAX much more difficult to design and manufacture. Here's an example in sub-carrier spacing; Wi-Fi: 312.5-kHz verses only 10-kHz for WiMAX. The tighter sub-carrier spacing requires more electronics and closer tolerances. Expect to see a high level of chip integration. Mobile WiMAX networks are already being deployed and they are expected to be built out quite rapidly in the USA. Manufacturers will need to bring products to market in the shortest possible time. Mobile WiMAX represents significant challenges to RF designers but they are on their way to meeting their time-to-market, power, size and cost goals.

Talking Smart - Smartphones could top 100-million units in 2007 (DigiTimes and Berg Insight). There's little doubt that smart phones are becoming the dominant advanced telecom device and PDAs fading somewhat. Global shipments of Smartphones running advanced operating systems will reach 113-million units in 2007. The CAGR of 25.6% for Smartphones will bring shipments up to 365-million units by 2012 giving them a 22% of all handsets worldwide; 10% today. Symbian OS was the leading Smartphone operating system in 2006 with a market share of 63%. Linux was the second largest platform, followed by Windows Mobile. Nokia's uses Symbian OS. But Microsoft's performance in the Smartphone segment is consistently improving, even though Windows Mobile is still far from threatening either Symbian OS or Linux for the top market positions. The Palm OS has virtually disappeared from the market and is now being converted into a version of Linux. Apple's OS X will become a new entrant on the Smartphone operating systems market in 2007 with the launch of the iPhone. ***[Never underestimate Steve]***

IP

Foreign Patentees in China - Japan applied for 37,848 patents in China last year, more than any other country. Half of the ten top foreign enterprises filing patent applications in China were Japanese companies. The US followed Japan with 23,494 patent applications. South Korea ranked third. Samsung filed more patent applications in China than any other foreign company; 4,355 applications in 2006. Five of the top ten foreign companies were Japanese businesses. Two of them were from South Korea. Other companies filing applications came from the Netherlands, the US, and Germany. International applications accounted for 19.7% of total patent applications that were granted in China last year. The Chinese Patent Office authorized 268,002 patents in 2006; increase of 25.2% (People's Daily Online).

Smell-O-vision Redux? - The idea of adding smell to movies was first tested at the 1939 Worlds Fair but never caught on. How about a wireless version? Motorola thinks it's a good idea, or at least worth patenting. Motorola received a patent for a "Communication device having a scent release feature and method thereof." The phone becomes a wireless-enabled Glade Plug-In by using the phone's battery to heat a replaceable scent pack to releases the fragrance. Is market ready for a scent-

generating phone? I don't think so, but just look at the PR and fad value. Let's see Apple top that with their iPhone...or, let's hope that they don't. Laughable or not, Moto has had a long history of add-on patents for mobile, like the silent alert that became ubiquitous after their patents expired.

INTERNATIONAL NEWS

Vietnam, the Low Cost Money Magnet - Vietnam has enticed about $4.3-billion of foreign direct investment in the first five months of 2007, posting a year-on-year rise of 18.7% (Vietnam Economic Times). So far this year, Vietnam has licensed 372 new foreign-invested projects with a registered capital of over $3.7-billion, increasing 32.4% in volume and 25 % in absolute value over the same period of 2006. Vietnam has targeted to lure $12.2- billion for 2007. As of March 07, Vietnam had 7,067 foreign-invested projects with a total registered capital of nearly $63.6-billion.

R&D in Israel - Motorola is joining the rush of top multinational technology companies that are stepping up their R&D activity in Israel. Motorola will be the next to expand its activity with a government-backed R&D site that will initially employ 200 engineers and researchers. Over the next five years, the Israel Investment Center will grant Motorola around $12-million, plus $900 per employees for up to 60-months, for a maximum of 200 employees. The researchers will be hired over the next 3-years to focus on product development for cellphones, computers and software products lines. Motorola said it is already looking into the possibility of expanding activities at the facility and hire between 300 and 500 engineers within 5-years. The company has been operating in Israel since 1964 and currently employs 3,500 across several sites developing a wide range of products and technologies.