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That's One Small Step for Man...



Virgil Labrador

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CALENDAR OF EVENTS

November 3-4, Moscow, Russia
Broadband Russia and CIS Summit 2004
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November 3-5, World Trade Centre, Mumbai, India
Satellite & Cable TV India Tradeshow 2004,
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November 9-13, Hanoi, Vietnam
Vietnam Telecomp 2004
 Web: www.adsale.com.hk
 Tel: (852) 2811 8897
 Fax: (852) 2516 5024 Email: exhibition@adsale.com.hk

November 17-18, London, UK
6th Annual Global MILSATCOM Conference
 Jamison Nesbitt
 Tel +44 (0) 20 7827 6746
 E-mail: jnesbitt@smi-online.co.uk

November 19, London, UK
VSATs: Satellite Solutions and the Bottom Line
 Jamison Nesbitt
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 E-mail: jnesbitt@smi-online.co.uk

November 29-30, Singapore
VSAT Satellite Communications
 Amy Tan
 Tel: (65) 6536 8676 / Fax: (65) 6536 4350
 Email: mktg1@abf.com.sg
 Website: www.abf-asia.com

November 30-December 3, Strasbourg, France
9th Annual ISU International Symposium on "Civil, Commercial and Security Space"
 E-mail: symposium@isu.isunet.edu

December 2-5, World Trade Center, Istanbul, Turkey
Broadcast, Cable & Satellite eurasia 2004 – A CeBIT Event - Fair and Conference
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 Fax: +90.212.334 69 34
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 Web: www.cebit-bcs.com

December 7-8, Shangri-La, Pudong, Shanghai, China
Emergency Communications Asia 2004
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 Website: www.terrapinn.com/2004/eca_CN

2005

January 16-19, Honolulu, Hawaii, U.S.A.

PTC '05
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February 2-3, Le Meridien Etoile, Paris, France
SatCom Europe 2005
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 Website: www.terrapinn.com/2005/satcom

February 14-18, Johannesburg, South Africa
SatCom Africa 2005
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 Website: www.satcomafrika.com

April 11-14, Istanbul, Turkey
Caspian Telecoms 2005
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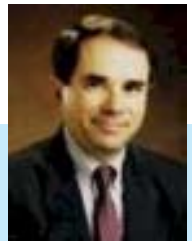







FEATURE

ISCe's article

SM

Bruce Elbert has over 30 years of experience in satellite communications and is the President of Application Technology Strategy, Inc., which assists satellite operators, network providers and users in the public and private sectors. He is an author and educator in these fields, having produced seven titles and conducted technical and business training around the world. During 25 years with Hughes Electronics, he directed major technical projects and led business activities in the U.S. and overseas. He is the author of *The Satellite Communication Applications Handbook*, second edition (Artech House, 2004). Web site: www.applicationstrategy.com / Email: bruce@applicationstrategy.com

INDUSTRY NEWS

Arianespace to Launch 50 Nanosatellites in Historic Mission

To celebrate the 50th anniversary of the launch of the first man-made satellite, Arianespace will launch a cluster of 50 nanosatellites for the International Astronautical Federation (IAF) in 2007.

Each nanosat will weigh about one kilogram, and will be dedicated to a scientific experiment under the responsibility of researchers at universities or other organizations. Arianespace said all 50 of the nanosats will be launched at the same time, on one rocket, from the French company's launch facility in French Guyana. The nanosats will last in orbit for about 2 years. Each nanosatellite to be orbited will represent a different country.

The mission was first proposed by the Russian Space Agency at this year's IAF Congress in Canada to commemorate the first satellite launch in 1957. The Russian space industry and IAF, in partnership with the leading space agencies from around the world, are supporting the mission.

Jean-Yves Le Gall, Arianespace CEO said the company is very proud to be participating in the commemoration. "We have already orbited some 40 auxiliary payloads of the same type we will launch in 2007. Just like 50 years ago, when the first man-made Earth satellite was launched, these nanosatellites will signal a new era for scientists worldwide," he said.

ILS Proton Launches AMC-15 Satellite

A Russian Proton launch vehicle placed SES Americom's AMC-15 satellite into orbit last October 15. The Proton lifted off at 3:23 a.m. in Baikonur with spacecraft separation from the Breeze M upper stage nearly seven hours later, at 10:18 a.m. (12:18 a.m. EDT, 4:18 GMT).

AMC-15, an A2100 model satellite built by Lockheed Martin Commercial Space Systems, carries both Ku- and Ka-band payloads. SES Americom's customer for this satellite is EchoStar's DISH Network direct-to-home service.

The successful launch is the third satellite to be launched by ILS for SES Americom this year. ILS started its launch year in February by orbiting the AMC-10 satellite on an Atlas vehicle, and it launched AMC-11 in May on another Atlas. The two remaining Americom payloads are set for December launches,



A Russian Proton launch vehicle lifts off putting the AMC-15 satellite into orbit Friday. (ILS photo)

ber," he said.

with AMC-16 satellite on an Atlas V vehicle and WorldSat 2 on another Proton vehicle.

Dany Harel, SES Americom vice president for satellite and space systems, said the Proton Breeze M launch was picture-perfect in the darkened skies over Kazakhstan, and on spec as we monitored every stage. "We thank the ILS team for delivering AMC-15 into transfer orbit. Now we and our Lockheed Martin spacecraft partners can get the satellite ready for service to our customer, EchoStar, by Decem-

Loral and Creditors' Committee Finalize Terms of Reorganization

Loral Space & Communications Ltd. (BULLETIN BOARD: LRLSQ) and the Creditors' Committee appointed in the chapter 11 cases of Loral and its subsidiaries have reached an agreement on the revised economic terms of a proposed plan of reorganization.

With the agreement, Loral said it is set to file a revised Plan and a Disclosure Statement with the Bankruptcy Court by October 22, 2004. Approval of the plan will allow Loral to exit chapter 11 under current management in the first-quarter of 2005. The plan revises the terms of a plan previously filed on August 19, 2004.

Under the revised plan, Loral's two businesses, Space Systems/Loral and Loral Skynet, will emerge intact as separate subsidiaries of reorganized Loral (New Loral). Space Systems/Loral, the satellite design and manufacturing business, will emerge debt-free.

INDUSTRY NEWS



Space Systems/Loral's Assembly, Integration and Test (AIT) facility in Palo Alto, California. (Loral Space photo)

The common stock of New Loral will be owned by Loral bondholders, Loral Orion bondholders and certain other unsecured creditors. In addition, bondholders of Loral Orion and other unsecured creditors of Loral Orion will receive an aggregate of \$200 million in new senior secured notes to be issued by reorganized Loral Skynet, New Loral's satellite services subsidiary.

Loral Orion unsecured creditors also will be offered the right to subscribe to purchase their pro-rata share of \$30 million in new senior secured notes to be issued by reorganized Loral Skynet.

Based upon current estimates, creditors of Space Systems/Loral, Loral SpaceCom Corp. and Loral Satellite, Inc. will be entitled to share in a recovery consisting primarily of cash, as well as New Loral common stock that is expected to result in a blended recovery of approximately 33%, subject to significant decrease in the event claims materially exceed current estimates.

Approval by the Bankruptcy Court of the plan will enable the New Loral to emerge as a public company that will seek listing on a major stock exchange. Under the plan, existing common and preferred stock will be cancelled and no distribution will be made to current shareholders, Loral said.



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For detailed information on PTC'05, visit www.ptc05.org

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INDUSTRY NEWS

New Skies to Provide Satellite Services in Japan



New Skies will be employing NSS-6 and NSS-7 for the satellite services in Japan.

New Skies Satellites N.V. (NYSE:NSK) (AEX:NSK) was awarded last October 10 a Radio Station License by the Japanese Ministry of Internal Affairs and Communications. The license, in combination with the Telecom Business Registration granted to New Skies in July this year, enables the company to offer international and domestic satellite services directly to both Japanese and non-Japanese companies for links to, from and within Japan.

Scott Sprague, New Skies' senior vice president said the authorization will allow New Skies customers to access its global network directly from Japan for domestic and international transmissions.

"This opens up a highly developed market and a world leader in digital video and high-definition television to New Skies' high-powered Ku-band video contribution and distribution network, as well as to our advanced portfolio of Internet and data services," he said.

Samantha McCloskey, New Skies' vice president, special event services, said since the company brought its ad hoc bookings in-house two years ago, business from special events transmissions doubled.

"With this authorization to access the Japanese market, we plan to use this experience to target one of the world's most advanced broadcasting markets with one of the world's only all Ku-band digital transmission networks, starting with this service for the Japanese Grand Prix," she said.

Concurrently, New Skies announced that it has been chosen by The Wire & Wireless Group to provide several European broadcasters with live digital coverage of Formula One racing from the Japanese Grand Prix in Suzuka, Japan. The service, which will take place between October 8 - 10, 2004, will employ the NSS-6 and NSS-7 satellites to deliver the entire event, including the practice, qualifying and race sessions, to audiences throughout Austria, Germany, Italy and Switzerland.

Earlier, the Wire & Wireless Group tapped New Skies for the digital coverage of Formula One racing from the Japanese Grand Prix in Suzuka, Japan. The service employed NSS-6 and NSS-7 satellites to deliver the entire event, including the practice, qualifying and race sessions, to audiences throughout Austria, Germany, Italy and Switzerland. **SM**

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EXECUTIVE MOVES

NASA Names Rex Geveden New Chief Engineer

NASA Administrator Sean O'Keefe has named Rex Geveden as the agency's chief engineer and director of the independent technical authority, effective Nov. 1, 2004.

Geveden succeeds Theron Bradley, Jr., who announced his retirement Oct. 4 after a distinguished career as a senior manager and nuclear engineer with the U.S. Navy's nuclear propulsion community. Bradley had been chief engineer at NASA since June 2002.

A native of Mayfield, Ky., Geveden was deputy director of NASA's Marshall Space Flight Center, Huntsville, Ala. since July 2003. As chief engineer he is responsible directly to Administrator O'Keefe for the overall review and technical readiness of all NASA programs. The Office of the Chief Engineer assures that the development efforts and missions operations are being planned and conducted on a sound engineering basis with proper controls and management of technical risks.

At Marshall, Geveden shared responsibility for one of NASA's largest field installations, which has more than 6,500 civil service and contract employees and a \$2.3 billion annual budget. He previously served as deputy director of Marshall's Science Directorate, leading research and development projects in space science, materials science, biotechnology, Earth science and space optics.

He also led NASA's Gravity Probe B (GP-B) program, steering development of sophisticated hardware designed to test two features of Albert Einstein's Theory of General Relativity. The GP-B spacecraft was successfully launched earlier this year from Vandenberg Air Force Base, Calif.

Geveden also was project manager for several other successful efforts, including the Optical Transient Detector and Lightning Imaging Sensor Earth-orbiting satellites, which produced data for the world's first global map of lightning.

He served as chief engineer for the Waves in Space Plasmas project, a study that involved the measurement of the characteristic frequencies of plasma, the form of matter that comprises more than 99 percent of the visible universe.

As manager of the Microgravity Science and Applications Department at Marshall, Geveden led a team of 350 scientists to develop safer and more cost-effective materials for future missions and investigations into the reaction of chemicals in a microgravity environment. His organization delivered many of the early payloads to the International Space Station.

NASA Administrator Names New Chief Scientist

NASA Administrator Sean O'Keefe has appointed Dr. James B. Garvin, chief scientist for NASA's Mars and lunar exploration programs, as the new Chief Scientist, effective immediately.

Grunsfeld is training for an astronaut assignment to a long duration mission, the specifics of which will be announced at a later date. He will also provide expert support and counsel to NASA's Astronaut Office. Grunsfeld was appointed NASA's Chief Scientist in Sept. 2003. He has been supporting Administrator O'Keefe at in Washington directing NASA's space-based science objectives and ensuring the scientific merit of agency programs.

"John's extensive background in physics and astronomy, together with his un-

matched hands-on experience in conducting science operations in space, made him the ideal advisor to steer agency science decisions during his management tenure in Washington," Administrator O'Keefe said. "His unique skills will be sorely missed here, but I know he will continue to provide his valuable input to the decision process from his Johnson Space Center vantage point as well."

Garvin, who earlier this year announced the Mars Exploration Rovers had found strong evidence liquid water once existed on the martian surface, will work to ensure the scientific merit of NASA's programs, including those embracing exploration.

Grunsfeld is a veteran of four Space Shuttle flights and five successful spacewalks to upgrade the Hubble Space Telescope (HST).

Grunsfeld received a bachelor's degree in physics from the Massachusetts Institute of Technology in 1980. He earned a masters degree and a doctorate in physics from the University of Chicago in 1984 and 1988, respectively.

Swales Aerospace Appoints James T. Brady to Board of Directors

Swales Aerospace has announced that James T. Brady, Mid-Atlantic Managing Director of Ballantrae International, Ltd., a management consulting firm, has joined Swales' Board of Directors.

Brady has over forty years experience in business and financial management. He currently serves on the Board of Directors and is Chairman of the Audit Committee for Constellation Energy Group, McCormick & Company, Inc., T. Rowe Price Group, Inc., and Aether Systems,

Executives Moves



Inc. From May 1995 through April 1998, Brady served as the Secretary of Maryland's Department of Business and Economic Development.

Prior to his service as Secretary, Arthur Anderson LLP employed Mr. Brady for thirty-three years. During his last seventeen years there he was Managing Partner of both the Long Island and Baltimore offices.

"As we focus more of our resources in pursuit of new opportunities for our small and microsatellite capabilities and for our thermal management technologies,

Brady's extensive and diverse business experiences will be a valuable asset," Tom Wilson, Swales CEO said.

Brady, who resides in Frederick, Maryland, holds a bachelor's degree in Business Administration from Iona College. He holds three honorary doctorate degrees from Iona College, Villa Julie College and Loyola College in Maryland.

Brady also has a long history of community leadership, including having served as Co-Chair of two Maryland gubernatorial transition teams, Board member of Maryland Business for Responsive Government, Board of Visitors of the University of Maryland Biotechnology Institute and many other business and advisory councils.

Pace Micro Promotes Chris Dinallo to VP of Technology

Pace Micro Technology has appointed Chris Dinallo to a newly formed position of VP of Technology while Steve Payne has joined the company as Director of Operations & Finance. Based in Boca Raton, Fla., both executives report will directly to Mike Pulli, president of Pace Americas.

Pulli said Chris has shown remarkable vision and knowledge of where the industry's technology is heading. "He will lead Pace's technical strategy for the U.S. market going forward including OCAP and NGNA initiatives," he said.

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Executives Moves

Steve Payne's business skills coupled with his strong background in finance, operations and customer service in high growth markets, such as telecommunications, are the perfect match to help lead our operations and finance initiatives as we move to expand our footprint in the U.S. market, Pulli added.

Chris Dinallo joined Pace in 2001 as Chief Technologist to focus on U.S. cable digital set-top box development. In his position, Chris will continue his previous responsibilities of technological directions for set-top box development, which include following industry standards, such as SCTE, OCAP and emerging NGNA initiatives. In addition, Chris joins the Pace Americas executive team involved with on-going business, new

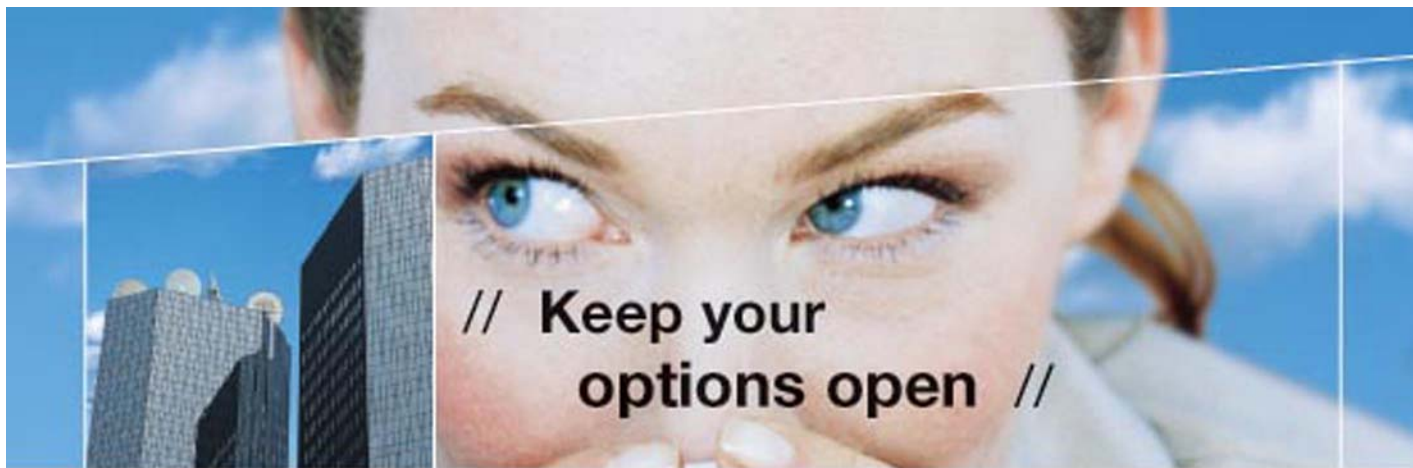
business development and direct technical point of contact for MSOs.

Prior to Pace, Chris was Engineering Director at Netspeak Corporation, a Voice over IP (VoIP) software provider. Earlier in his career, Chris was the Software Engineering Director and Site Manager at Oak Technology's Software Design Center, and held various senior engineering roles at IBM.

Since 1984, Chris' engineering disciplines have been in the areas of operating systems, multimedia subsystems, MPEG video, DVD, and Voice over IP developments.

Highlights of Chris' career include many of the world's first innovations such as:

the rotational firmware for the world's first 2 1/2" disk drive; co-developing the IBM DOS kernel that surpassed the 640KB memory barrier; audio architect of IBM's OS/2 Multimedia Subsystem; multimedia architect for the object-oriented subsystem residing beneath the Taligent OS; Dynamic boot-loader of the MACH microkernel as implemented in IBM's Workplace OS; and world's first 32bit software-only DVD 1.0 compliant playback system built for personal computers; and development of telephony 'soft-switches' for VoIP initiatives using H.323, MGCP and SIP protocols. **SM**



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New Products

Delphi to Manufacture Satellite Modems

Delphi Corp. (NYSE:DPH) will co-develop and manufacture the next generation of transceiver modems for Stellar Satellite Communications Ltd.

Delphi will supply two new models of two-way satellite communicator modems to Stellar including a high-volume telematics modem for both mobile and fixed equipment applications. The other sophisticated Delphi modem will utilize sensors and software to relay information to and from equipment requiring advanced field intelligence, according to Jeff Owens, Delphi vice president and president of Delphi Electronics and Safety.

Both modems support global remote management of equipment and assets through Orbcomm's satellite network for two-way satellite data communications. The modems will meet the rigorous performance and reliability standards of Delphi products, and will benefit the industry by providing a consistent supply of automotive-grade new and replacement modems.

Stellar will include the two modems in a number of different applications for industrial customers including commercial vehicle fleet and logistics management for trucks, barges, fishing vessels, locomotives, heavy machinery and containers. In addition, the modems can monitor fixed assets including pipelines, oil wells, energy meters and storage tanks to share information through satellite data messaging. The modems will be capable of providing two-way tracking and monitoring of gas and oil production equipment, liquid petroleum operations, environmental and weather information and utility meters.

STMicroelectronics Adds Single-Chip DVB-S2 Silicon Tuner to Its Satellite Set-top Box IC Family

STMicroelectronics (NYSE:STM) has announced the availability of a new Set-Top Box (STB) silicon tuner — the STB6100 — that complies with the stringent requirements of the new DVB-S2 specification for satellite broadcasts.

According to ST, DVB-S2 increases the capacity of satellite communications links by 30% compared to the original DVB-S standard — close to the theoretical performance limit - enabling the most effective deployment of high data-rate applications such as HDTV (High Definition TV) and broadband Internet.

ST supplies silicon chips for set-top boxes — across satellite, cable, and terrestrial services - and was closely involved with the DVB (Digital Video Broadcasting) technical groups working to optimize the DVB-S2 specification. In May 2004 the company announced the development of a modulator design compliant with the new standard, which it is making available to broadcast equipment manufacturers to enable them to introduce equipment capable of broadcasting DVB-S2 signals to 'kick-start' the market for DVB-S2 receivers. The STB6100 tuner was developed in cooperation with RF Magic Inc.

The STB6100 is backwards compatible with current DVB-S broadcasts and can be used today as part of a DVB-S2-ready receiver, ST said. With price an overriding concern for STB consumers, the new device allows manufacturers to minimize their costs by using a single 32-lead package, with few supporting components, in place of the complex traditional discrete tuner circuitry. In addition, it eliminates the need for specialist RF expertise as the RF processing circuitry is integrated onto the chip. The STB6100, ST explained, is programmed through a simple two-wire serial interface, and is intended for use with an 8PSK demodulator chip.

Comtech EF Data Releases Flexible, High Performance Multi-Channel Satellite Modem

Comtech EF Data Corp., a subsidiary of Comtech Telecommunications Corp. (NASDAQ: CMTL), has announced the availability of the CDM-Qx, the first 70/140 MHz Multi-Channel Satellite Modem packaged in a single rack unit chassis.

Comtech said the modem offers exceptional flexibility, redundancy and performance with four configurable slots. The unique architecture, according to Comtech, allows cost-effective deployment of multiple modulators, demodulators or modems.

Comtech said flexibility is integral to the CDM-Qx, with a variety of configuration options and support for an assortment



Comtech EF's Satellite Modem

of interfaces. Data rates from 10 kbps to 20 Mbps are available with a frequency range of 50 to 90 and 100 to 180 MHz. Turbo Product Coding forward error correction, an array of modulation techniques and optional, built-in redundancy are all

NEW PRODUCTS

featured in the CDM-Qx. This product is interoperable with other Comtech EF Data modems, seamlessly integrating into existing networks.

CDM-Qx is the first Comtech EF Data modem to present the powerful DoubleTalk Carrier-in-Carrier functionality. Designed for bandwidth compression, Carrier-in-Carrier is based on Applied Signal Technology's DoubleTalk™, which uses "Adaptive Cancellation," a patent pending technology that allows full duplex satellite links to transmit concurrently in the same segment of transponder bandwidth.

Loral Skynet and Remote Work Central to offer IP-based Satellite Teleworking Solution

Loral Skynet has partnered with Remote Work Central, a provider of telecommuting and teleworking solutions worldwide, to provide secure telecommuting and remote access connectivity services to small and medium enterprises, including SOHOs (small and home offices), government and non-government organizations (NGO), using Loral Skynet's SkyReach i200 IP-based service.

With SkyReach, Remote Work Central will offer its customers Internet and email access, and file transfer applications. Using VSAT satellite technology and Loral's satellite fleet, SkyReach offers two-way Internet connectivity at speeds of 2 Mbps on the forward link and 512 Kbps on the return link. Remote Work Central end-users will have access to a selection of on-site equipment and various bandwidth options to meet specific networking needs.

Remote Work Central said it will initially install 50 sites throughout North America, Latin America and the Caribbean.

"Using state-of-the-art IP technology, SkyReach allows organizations to create an instant network that can connect multiple sites, regardless of geographic location," said Patrick Brant, president, Loral Skynet.

C-Com Launches New Mobile High Bandwidth Service

C-Com Satellite Systems Inc. (TSX VENTURE:CMI) has teamed up with Ottawa based RAMTelecom to deliver high-speed satellite based mobile Internet services using ViaSat LinkStar technology.

RAMTelecom, through their Network Operation Center located in Ottawa, will be providing broadband services for the C-Com developed iNetVu Mobile platform, which will be able to deliver upload speeds of up to 2Mbps and download speeds of up to 60Mbps, according to a statement released by the two firms.

"The iNetVu Mobile antenna, which has been specifically modified by C-Com to work with the Viasat LinkStar modems, will be able to offer mobile customers operating from remote locations the same instant high-speed and secure communications available today only to fixed users located in large metropolitan areas," said Leslie Klein, President and CEO of C-Com Satellite Systems Inc.

RAMTelecom President Ralph Misener said the system fully supports different grades of high-speed data, Voice over IP and video sessions for those Enterprise clients who need immediate access to the Internet while on the move.

"Now customers can travel virtually anywhere within the satellite coverage area, arrive at any destination and be connected to the Internet at high speed within minutes," he said.

Conexant Introduces Single-Chip Set-Top Box Solution for Entry-Level Free-to-Air Satellite Market

Conexant Systems, Inc. (NASDAQ:CNXT) has announced a digital video broadcast satellite (DVB-S) compliant set-top box (STB) system solution for the basic, entry-level free-to-air (FTA) market. The FTA market includes basic STBs that can receive unencrypted content from international satellite broadcasters at no charge, and advanced STBs which allow users to view additional premium content for a small incremental cost.

Conexant said the low-cost CX24138 builds upon the technology of the company's CX2414X/5X interactive direct broadcast satellite (DBS) system solution, and introduces a new feature-set and package required by manufacturers and operators in China and other Asia-Pacific regions.

Free-to-air satellite and terrestrial services are gaining in popularity, particularly in Asia, the Middle East, North Africa and Eastern Europe. FTA enables users to expand their viewing options beyond local broadcast content to a wide range of free programming offered by international broadcast sources without subscription. According to Michelle Abraham, a senior industry analyst with In-Stat/MDR, the FTA STB market is expected to reach 45 million units in 2008.

NEW PRODUCTS

Conexant's CX24138 combines an MP@ML MPEG-2 video decoder, a digital audio decoder, a programmable transport stream de-multiplexer, an on-screen graphics display controller, a QPSK demodulator/forward error correction unit, TV encoder, and a high-performance, embedded 32-bit ARM920T RISC processor with integrated peripheral I/O ports. This highly integrated solution enables a low-cost STB with proven performance.

Acura RL Debuts AcuraLink Satellite Communication System With Industry's First Standard Real Time Traffic Feature

When it goes on sale October 14, the all-new 2005 Acura RL luxury sedan will feature the new AcuraLink satellite communications system as standard equipment. This new system delivers

state-of-the-art in-vehicle communication and is the first North American application of a standard real time traffic information system that puts continuously updated accident, construction and flow (where available) information at the driver's fingertips.

The AcuraLink real time traffic feature is reportedly the first standard system to offer personalized traffic information relative to the driver's current location and destination. The frequently updated traffic information is displayed graphically on the RL's navigation system allowing drivers to avoid congestion and minimize drive time.

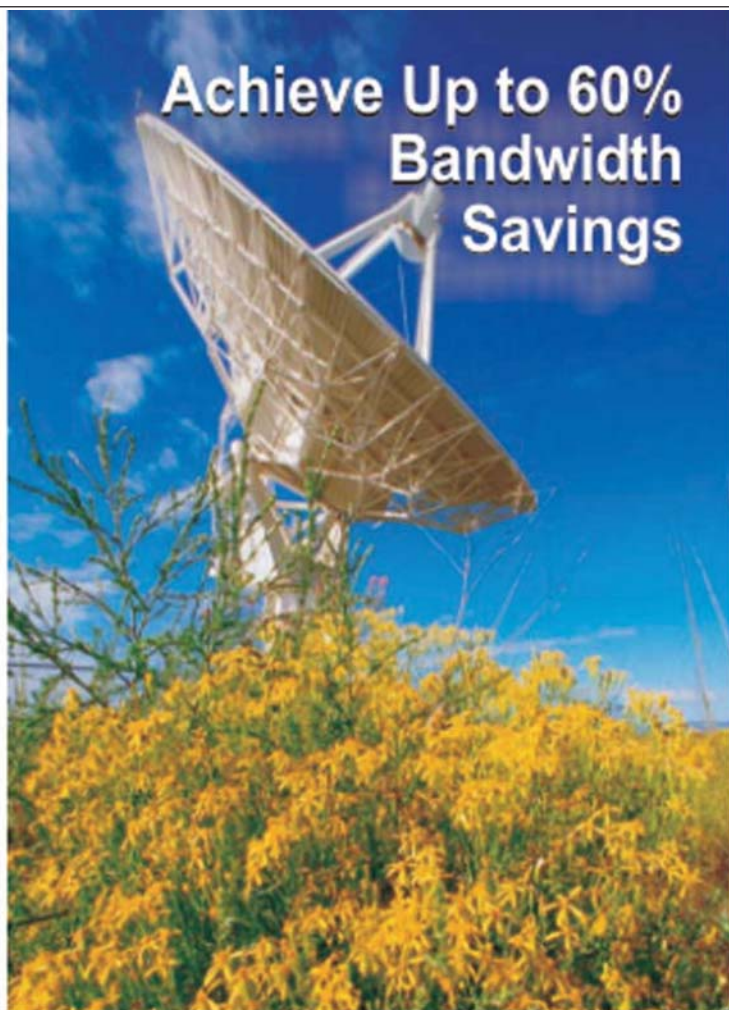
"Since the average rush hour commuter spends over 50 hours a year sitting in traffic, this system gives RL owners a real advantage on the freeways," said Tom Elliott, executive vice president, auto operations. "Unlike radio or television traffic reports, the RL's real time traffic system provides a constant flow of relevant information reflecting conditions along a driver's chosen route. It really should save people a lot of time and aggravation." **SM**

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COVER STORY

What is a VSAT?

Bruce Elbert

President

Application Technology Strategy, Inc.

The Very Small Aperture Terminal (VSAT) could probably be defined as a small satellite-earth terminal intended for two way communications. The confusion comes about when we try to define what, precisely, we mean by “small”. Coupled with this is a second and equally important question regarding the meaning of “communication”. In this article, I attempt to shed light on these questions and address how VSATs support a growing market for wide-area telecommunications.

Executive Issues

The timing of this issue of SatMagazine is synchronized with the just-ended Satellite Applications Technology Conference (SATCON), held in New York on October 26 and 27. In conjunction with SATCON, the Global VSAT Forum (GVF) held its annual Summit and Executive Roundtable. The session considered how VSATs can better address vertical markets in such areas as rural communications to developing regions, disaster recovery and temporary services, backhaul in cellular and wireless data networks, and transmission to and from oil and gas installations. Perhaps the most central issue for providers of networks in vertical markets is that of size. Is the payoff worth the work and financial commitment needed to properly address a vertical market?

Disaster recovery poses the revenue challenge in that the buyer only wants to pay when disaster strikes. The seller must worry about how fixed costs for equipment, satellite capacity, staff, etc. can be amortized for customers that will not pay for an equivalent full time circuit. Strategies based on reduced fixed charges coupled with higher usage charges are traditional in this segment. The challenge for VSATs used by development agencies like the World Bank, US Agency for International Development and Medical Missions for Children is that while the need is great, the financial resources are extremely limited.



The panel I chaired dealt mainly with VSATs used within the backbone infrastructure of mobile telephone and wireless data (Wi-Fi and WiMAX) networks. In countries/regions like Nigeria, Indonesia and the Caribbean, VSATs provide key backhaul links between base stations on islands and in towns that are yet to be served by fiber or microwave. In Indonesia, for example, eight C-band transponders on Palapa C2 are needed to provide these links to about 80 base stations in the eastern half of the country. This is projected to expand considerably in the coming year as demand for

GSM cellular service increases. On the other hand, developers of GSM and wireless services in these regions find that the cost of satellite bandwidth, which must be committed to on a long term basis, can render extension of the service uneconomic.

What we see here is that developers and operators of networks in these vertical markets are concerned not about the technology, but about the cost of acquisition and operation. There needs to be a strategy for each market that meets the particular price point, yet delivers a service that is superior to the best alternative. In what follows, I address key aspects of VSATs related to what they are, what they can do in vertical as well as other markets, and how one goes about putting them to use.

Definition from a physical perspective

Small is a relative term – particularly in comparison to an earth terminal with a large aperture antenna (between 3 and 13 meters, depending on the frequency band, satellite and VSAT requirements). A large earth terminal is something that only a network operator would own and manage. Most VSAT networks employ a large terminal for various functions, including network management, access to terrestrial networks (e.g., a gateway

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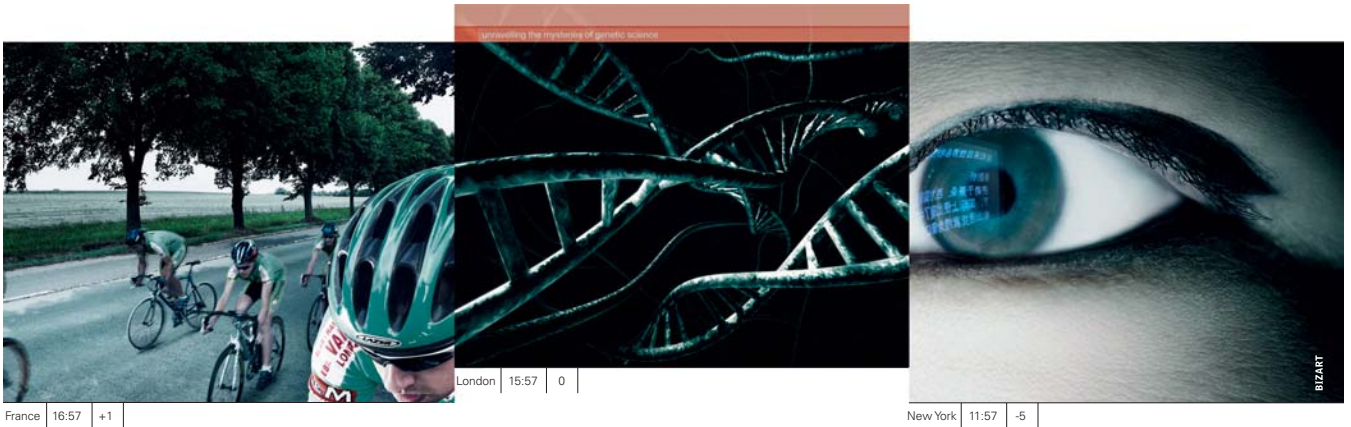
function), and sharing of the resource among a number of users. The VSAT, on the other hand, would be placed on the customer premise and operated more like a cable modem or router, requiring little in the way of local support. Network management and gateway functions form the core of a hub station, historically requiring a major investment in the range of \$500,000 to well over a million dollars. The price of hub entry has been an impediment to VSAT expansion, but there is a hub-less market that is growing in importance. Inherent in the hub-style network is a star topology wherein communications run between hub and VSAT on a single hop basis. Familiar networks of this type include those used by Wal-Mart and the US Postal Service. Mesh networks, where VSAT connects directly to VSAT without passing through the hub, are coming back into vogue. The US military employ the mesh to provide connectivity within a theatre as well as between the theatre and a central command.

Providing VSAT technology involves more than stamping out reflectors and bending chassis out of sheet metal. Today's

VSAT consists of hardware, computer processing power and memory, and lots of software code. Furthermore, users of VSATs expect that they can be installed quickly and almost anywhere. Timelines are measured in weeks and sometimes days. Some markets take this further to demand portability and mobility. Making such a VSAT work from an RF perspective at Ku band frequencies and mega-bit-per-second data rates also means that the effective area of the antenna must be sufficient. This amounts to an equivalent diameter of 90 cm to 1.8 m at Ku band and 2 to 3 m at C-band (still popular in rainy regions like equatorial Africa, South America, and Southeast Asia). Ka band VSATs, discussed in last month's article, could bring the corresponding antenna down to 60 cm, provided that users accept a lower availability in heavy rain.

Aside from size and base cost, VSATs must be easy to operate and reliable, both in terms of the equipment (hardware and software) and service. Acceptability in this area is based on experience with devices you would purchase at a local consumer

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electronics store and mobile phone shop. To use a VSAT, one wouldn't want to be the satellite equivalent of a Cisco certified network engineer. In my experience, an administrative person with interest in the particular application can provide whatever tending a VSAT needs. It is most important that someone be available to check both the terminal and the associated application device in case of difficulty. Actual management and troubleshooting of the link can be provided remotely at the network operations center (NOC) or hub station.

Definition from a technology perspective

The first VSATs might have been large by today's standards, but they were different as well in terms of their technology. Most were designed to provide a dedicated point-to-point link (e.g., a nailed up circuit) that transparently passed a symmetrical bit stream in both directions. Introduced first for the Intelsat Business Service (IBS) and later defined as Intermediate Rate (IDR) links, they can still be found in the cellular backhaul and Internet extensions as well.

True VSATs in terms of dish size appeared some 15 years ago to replace star data networks composed of the old multi-drop terrestrial leased lines employed in the IBM mainframe environment. These and other connections supported proprietary data communications protocols, and the VSATs and associated hubs were highly proprietary as well.

Getting the data over the satellite involves the familiar multiple access techniques: time division multiple access (TDMA), which is the most common in the industry; frequency division multiple access (FDMA), best used for voice services or where a transparent link is needed; and code division multiple access (CDMA), now exploited for short burst transmissions with minimal delay and improved multiple access efficiency.

VSAT networks now support the Ethernet local area network (LAN) coupled with the Internet. IP-based VSATs that connect to LANs now probably represent over 90 percent of those sold for star networks, which dominate the landscape. A couple of VSAT standards that support IP, namely Digital Video Broadcast – Return Channel by Satellite (DVB-RCS) and Data Over Cable Service Interface Specification (DOCSIS), are vying for

attention and will eventually dominate the consumer and some enterprise sectors. However, any standard brings with it some limitations in terms of user requirements that can be addressed. This is leaving some wiggle room for specialists who better

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address the needs of vertical markets and high-value special situations such as those addressed at the GVF Summit.

Definition from an application perspective

The common theme of the VSAT user is, "I need connectivity out there!" They want to make phone calls, get access to the Internet, and reach into the enterprise network. What information they actually put through the VSAT varies as much as the basic communication mode just cited. And the platforms at the remote end likewise can reflect extraordinary circumstances. Some of the examples I have seen include: commercial and private jets, recreation vehicles, trailer parks, super yachts, luxury hotels on remote islands, and ranches in places where one needs to drive two hours to find a working telephone.

The VSAT network addresses the unique aspects of satellite communication (propagation delay, error rates and availability) and interfaces with the user side. However, there will still be challenges in meeting user requirements. The application system will likely include a LAN with attached client computers. Depending on the special nature of the user requirement and information delivery mechanism, other equipment and software will likely be needed.

In my experience, most enterprise VSAT networks derive from a strategic need or application of some time. Examples include the first department store credit-verification network for Wal-Mart, and the pay-at-pump facility for Chevron. We now find strategic applications that are broadband in nature (our working definition of broadband is the transmission at 500 kbps or greater), such as distance learning, private commercial video channels and high-speed Intranet access in far-flung or mobile environments. What VSATs are required to do is deliver these applications in the same form and with the same quality of service as fiber. Cost, as we shall see, is another matter.

VSATs have an undeniable edge when it comes to multicast delivery of files and multimedia content. Some readers may recall an Internet-fostered initiative of the 1990s called the Multimedia Backbone (MBone). This unceremonious name was coined for an overlay of the Internet that used special routers and servers to provide point-to-multipoint transfer of real-time streams of video and audio, combined with text and graphic information.



Presentations at universities and engineering conferences were multicast to remote sites so individuals and groups in meeting halls could participate. Lacking true broadband services and a reliable broadcast medium, the MBone largely disappeared, replaced perhaps by player technology from Microsoft and Real Networks. Now we find that broadcasters like DIRECTV and EchoStar offer this kind of capability on a one-way basis; VSAT service providers add a bi-directional feature to better serve users who need more

than a one-way channel.

Achieving a multimedia service is much easier now than it was in the last decade with the appearance of off the shelf appliances and supporting software and protocols. A case in point is the Digital Content Distribution System (DCDS) developed by SONY. Using custom software along with off-the-shelf software, a management hub is established that takes care of content acquisition and authoring, storage and retrieval, scheduling, delivery over a satellite link and quality control. SONY also produces a state-of-the-art video player called the NSP-1. This little device performs the function of content cache, multimedia processor and display controller. Taken together, DCDS provides impressive capabilities for networks that produce custom video and audio programming in retail and other commercial environments.

Bottlenecks and their Removal

The executive session by the GVF clearly points to bottlenecks that impede a greater reliance on VSATs in vertical markets. To achieve the application benefits in a realistic manner continues to be a challenge. Here is a summary of the bottlenecks and suggestions for their removal.

Financial. The cost of VSAT hardware and software has dropped substantially and no longer represents the hurdle it once was. Today, potential buyers see very significant operating costs to cover satellite, hub and backhaul circuit usage. The user may today be able to afford the cost, but cannot predict what their need will look like a year later. Therefore, what we need is a

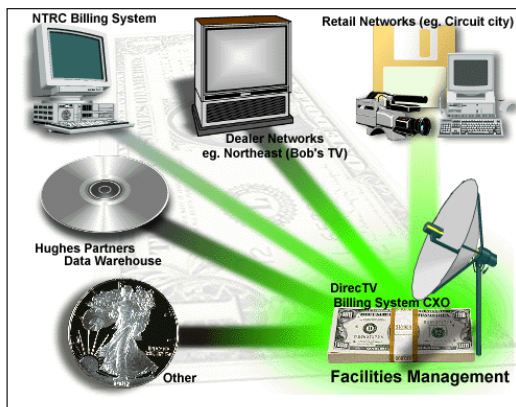
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system not unlike that of the disaster recovery industry. Under that scenario, the user pays a relatively low monthly charge and experiences an increase when usage grows. A service agreement could allow the user to modify or terminate the arrangement under reasonable financial conditions. We probably can no longer live in a world of satellite and teleport leases that effectively tie the customer to the operator for one's entire career.

Logistical. VSATs and hubs are fixed to one place. Traditionally, this required a permanent installation and a long operating life. The problem with this approach is that it takes a lot of time to prepare the site and get things installed and into service. The other side of the coin is that most of these initial charges cannot be recovered when service is terminated. What we need instead is fast deploy (and redeploy) of earth station equipment. The user and operator will have greater flexibility and sunk costs will go down. Higher equipment cost to provide this flexibility will be driven down as more of it is fielded (right now, the market for a portable VSAT is ten to twenty times that of a fixed installation). Looking at the hub, transportability amounts to installation in a suitable shelter that can be placed on a flatbed truck. These are common in the cellular industry for temporary cell sites. Transportable VSATs and hubs would be flexible and resalable. Already, eBay is offering DIRECTV and DISH network equipment and Gilat SkyStar VSATs.

Security and confidentiality. Any organization that would put its internal data over a wireless link will be concerned about the secure operation of the system. The technology for this, in terms of encryption and conditional access, is readily available. Also, satellite wide area networks employ Virtual Private Network (VPN) security technology, such as IP-Sec, which protects data and resources before information even reaches the VSAT or hub. There are still issues getting traditional security technology, such as IP Sec, to interface properly with the software of the VSAT. Recently, Gilat and HNS announced that they have working solutions, and other suppliers are talking this way as well. I would therefore be confident that this particular bottleneck can be opened for any new project.

Regulatory. Restrictions on the use of transmit earth stations have given VSAT network developers a lot of headaches. In some countries, VSATs are almost impractical because of limitations posed by the local authorities. The GVF is a leading force for change in the world, working with operators, users, governments and the ITU to facilitate the expansion of this technology to places where it will do the most good. I recom-



mend a careful reading of the white papers and initiatives of the GVF; readers can follow up with the GVF for additional guidance.

Resources. The final bottleneck relates to directed resources needed to put VSATs into practice. These include suppliers, knowledgeable users, and the folks that will operate the network once it is in and

working. I have seen many times that people almost anywhere have learned what they need to know to use satellite communications and get the most from it. Much of this was gleaned in the field and during training courses I've led for the US Telecommunications Training Institute and UCLA. The keys are: (1) find people who are interested and have a basic understanding of the application system itself, (2) survey the suppliers and make them show you that they can do the job, and (3) allow the time to understand what you want to accomplish, how the project will be managed, and for proof of network performance as well as training of staff.

Bottlenecks are not what they were back in the not-so "good old days". We are at a time when VSATs are a known quantity and when many organizations believe that they can solve their problem. But, putting this together is still a fairly complex process. My recommendation is to take the time to study each and every element, from all dimensions (technical, management, application and financial). I believe that the members of our industry are better prepared to help overcome the bottlenecks, and often all we need to do is ask for the help. **SM**



Bruce Elbert has over 30 years of experience in satellite communications and is the President of Application Technology Strategy, Inc., which assists satellite operators, network providers and users in the public and private sectors. He is an author and educator in these fields, having produced seven titles and conducted technical and business training around the world. During 25 years with Hughes Electronics, he directed major technical projects and led business activities in the U.S. and overseas. He is the author of *The Satellite Communication Applications Handbook*, second edition (Artech House, 2004). Web site: www.applicationstrategy.com / Email: bruce@applicationstrategy.com

FEATURE

VSATs Installation Tolls for Cost Effective Deployment in a Consumer Market

By **Juan M. Martinez**
Integrasys, SA

The VSAT market has turned and focused into the consumer market, due to the large volumes of installations world-wide, opening a new world of possibilities and business opportunities.

By its design, VSATs are conceived as Rx/Tx equipment. By its functionality, they are used for data, voice and video communications. By its dimensions they are very appropriate both for civil (corporate networks, emergencies, etc) and military applications (support and strategy). And, finally, its capacity to offer broadband with competitive costs against terrestrial networks, makes them the future of the satellite industry.

Recent market analysis and forecasts indicate that there is actually room for satellite broadband technology in the convulsed scenario of telecommunications world, envisioning a steadily increasing penetration of this technology in the coming years. This trend is backed by the inherent advantages of satellite communication systems, such as rapid deployment and low initial investment to reach wide coverage areas; synergy with successful broadcast video services; reduced number of operations centres and direct provisioning.

There are very important technologies involved in new VSAT markets, such as the communication protocols (IP,ATM,MPEG) or the network topologies that have been well developed to provide an excellent service; however, the busi-



ness issues currently rely on: low cost, high bandwidth, and easy integration with other networks and applications .

There has been a great effort done by industry in reducing the cost of VSAT equipment, to be able to compete with terrestrial networks in an open consumer market, but there are other costs involved, such as installation and commissioning, that still need to be addressed.

The VSAT world has had traditionally a high degree of professionalism and costly personnel involved in installation and commissioning. The elements that compose a simple installation (dish, horn, waveguides, transmitter, LNB, receiver) are easy to assembly, but their functionality and the operations

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Integrasys' SATMOTION POCKET (US patent pending 10/408710) is a simple and low-cost tool for VSAT installers.

to be performed to make them operational (downlink alignment, configuration, line-up, fine adjustment and final commissioning) are quite complex and require time, skilled personnel and co-ordination with the NOC.

This is a real and hidden fact, which makes VSAT installation expensive and do not allow to take full advantage of the technological developments towards cost improvement such as standardisation efforts like DVB-RCS, antenna and ODU pre-assembly, IDU pre-configuration...

The greatest competitive advantage that two-way satellite internet

operators offer to potential customers is to be able to cover areas where no other communications are available. These areas represent the real satellite business opportunity, but increases very much installation difficulties and costs, as no communications are easily available in the field for NOC co-ordination.

In these areas, the installer has only the VSAT and the satellite, and possibly a field strength meter. He has not always remote assistance, sometimes due to technical reasons, other just because there is no other way of communication with the NOC rather than the satellite itself. Measurement instruments are not always available or the measurements are not valid because the measurements required to

successfully complete the installation are not based on the VSAT transmitted signals, but those of the received downlink and, by no means, the transmitted CW line-up carrier measurement information available at the NOC: EIRP level, cross-polarization isolation, interference.

Complex installations... and expensive

Back to basics, the theory is very clear: a misalignment of 1° in the polarization of the reference axis causes small losses in the polar coupling ($20\log(\cos 1^\circ) = -0,001 \text{ dB}$), but increases 35 dB

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the x-polar component (isolation lost= $20\log(\cos 89)$). Obviously, this is an undesirable effect in operation and not only for that particular VSAT, but also for other VSATs within the same network.

If this is a real fact for just one single installation, how could it impact hundreds or thousands of simultaneous installations in an actual consumer market? What can be done by the satellite operator to avoid this situation? Will this business be, as it is desired and expected, a big success or will it be a chimera for all: users, installers and operators ?



“Complex techniques, professional installations”. This was the paradigm of the 20th century. However, already in the 21st, it seems we have a new one: *“Complex techniques, professional installations, low cost”*.

The satellite and the VSAT is everything the installer has when he is on the roof...and all he needs.

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sional VSAT installations in the field without the need for special equipment nor additional expensive tools, instruments or knowledge.

The measurement system (spectrum analyzer, switching matrix, server computer and server software) can be hosted at the Hub station, NOC or at any other place under the satellite fingerprint. Just using a satellite downlink and a simple PDA or laptop PC plus software, the installer receives the polar and x-polar information from the measurement system using the receiver portion of the VSAT he is aligning. The communication between the installer PDA and the IDU is wireless, so a small wi-fi access point is connected to the IDU ethernet port allowing more than 50 meters range up to the antenna. The lack of voice communications between the installer and the NOC is no longer a problem applying this solution; all the information regarding the VSAT CW line-up carrier gathered by the NOC carrier monitoring system is made available in real-time to the installer hands.

The PDA user interface is simple, but highly powerful in functionality; it manages both, the VSAT configuration parameters while graphically displaying in real time the CW carrier as it is received by the NOC measurement system. The SATMOTION POCKET system puts on the installer hands a professional tool using a handy PDA or laptop PC which provides the installer with all the monitoring capabilities available at the NOC.

The system handles multiple concurrent line-ups by means of a multi-CW scheme where the measurement system is time-shared by up to 10 concurrent installers per analyzer without performance degradation; configuring additional analyzers into the system, it is possible to support any number of concurrent installations.

SUMMARY

Currently, VSAT consumer business deployment exhibits hidden costs due to the required qualified installation personnel and NOC co-ordination to perform installations at the customer site.

The massive deployment of the two-way market no longer can support this fact in terms of costs, time and quality.

Traditional measurement hardware plus control software modules combined with the Internet technologies and quality measurement procedures are the guidelines that

Integrasys has applied, by means of its SATMOTION POCKET product, to simplify and dramatically reduce costs of consumer VSAT installation and commissioning. **SM**



JUAN M. MARTINEZ,
Product Manager, INTEGRASYS, SA

He holds a MSc in Telecommunications Engineering & MSc in Software Development and a BSEE degree in Electronic equipment. With 10 year experience in telecommunication project management, he has had several key positions in software development, engineering and Sales Divisions in different telecom companies.

He is currently Product Manager for Satellite Carrier Monitoring Product-line at INTEGRASYS, SA. He can be reached at juan.martinez@integrasys-sa.com or www.integrasys-sa.com

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FEATURE

Doomsday “Liquidation” for Voom?

By Chris Forrester

Voom is the catchy name given to Rainbow Media’s HDTV satellite platform operating over the US. Twenty-one superb HD channels come from Rainbow while another 80-odd are made up of generally available HD services as well as ‘ordinary’ standard-def channels. However, a depressing report from investment bankers Bear Stearns states that Voom might end up being liquidated. Indeed, Bear Stearns is not alone with this Doomsday view. Tom Eagan of Oppenheimer and Co., in an October note to investors, said Voom will have a difficult time growing subscribers due to heightened HD competition, especially from DirecTV.

Rainbow Media Enterprises is currently a subsidiary of Cablevision, the giant cable system where the Dolan family (founder Charles, and his two sons James and Tom) sit in control. It is Charles who is highly supportive of the HD-on-satellite, and is backing a spin-off where Rainbow is floated as a separate business. Charles Dolan will be resigning his chair/CEO position on Cablevision’s board. Bear Stearns states “we do not believe [new chair/CEO] James Dolan is a proponent of the satellite business”. Charles Dolan will still hold a significant (indeed, a controlling) number of shares in Cablevision.

The detailed 62-page Bear Stearns report, issued in October, pulls no punches on the prospects for Voom, which uses a mix of its own satellite Rainbow 1, and 16 transponders of leased capacity from SES Americom, at about \$1m per transponder/year for its transmissions. “We believe the Cablevision spin-off of Rainbow Media (RME) is part of a larger picture, that of a refocusing of the

parent company with new priorities and leadership,” says the report’s author, senior analyst Raymond Lee Katz. Katz says post spin-off Cablevision’s investors will be more comfortable with the business as a longer-term investment that might lead to it outperforming its peers. The bankers talk about Cablevision’s stock bouncing back to \$28 a share by the end of next year (it has been as low as \$16 over the past year, and is currently about \$20). By comparison, Katz now values RME at a barely \$2.60 a share (down from his earlier valuation of \$8.68), and suggests that price could slip and slide down to \$1.33 following initial distribution of stock.

Cablevision has some spectacular assets under its belt, some 3m mostly New York-based subscribers plus the New York ‘Mets’ and ‘Nicks’, the Madison Square Garden (MSG) channel and Fox Sports NY. But last month the Mets said they’d be launching their own channel effective 2006.

RME has an estimated income this year of \$1,026m, or 25% of Cablevision’s total. The spin-off, initially announced in June 2003, could now be in place by year-end, says Bear Stearns, and putting an end to the cash drain on Cablevision, but it stresses there could be a very bumpy road ahead especially given that Voom has already spent around \$1 billion (by Dec 2004), with just 28,700 subscribers to



its name (at the end of August). In mid-October at a high-profile MIPcom event in Cannes, on the French Cote d’Azur, Greg Moyer, the recently appointed joint-CEO of Voom’s 21 HD channels (HD Originals), said that the market had to understand that these early adopters had in effect signed up during Voom’s soft-launch phase. There had been only limited test-marketing in specific markets, and besides there was a shortage of set-top boxes. Cablevision say that whatever the reasons, only 1200 homes were waiting for signals/equipment, and that churn was running at 30%, and twice the churn rate of DirecTV and Echostar. Moyer’s show-reel of HD content was spectacular, and made compelling viewing.

Bear Stearns agree with the quality of Voom’s content, saying Voom has a competitive HDTV advantage (for the “short term”), and predict subscriber sales this year of (to us a fairly optimistic) 75,000, another 350,000 next year, 508,000 in 2006, 508,000 in 2007 and then tailing

FEATURES

Voom's threat from DirecTV

“With DirecTV expanding its HD offerings with four new satellites, [they] will have the capacity to deliver 1,000 additional local and high-definition channels as well as 150 national high-definition channels,” says Scott Kipp, contributing analyst with The Diffusion Group. “This will put DirecTV in an excellent position to grab a significant portion of the 70m US households that will be “HDTV-ready” by 2007.”

off (because of the rival cable and DBS HD offerings) to 381,000 in 2008 and just 286,000 in 2009. This is the nub of the problem, and will lead, says the report, to a negative cash-flow of \$477m this year, \$612m next year with Voom “out of currently available funds by early 2007”. Voom posted losses of \$36m in Q1 2004 and \$61.6m in Q2 2004. Q3 2004 losses are expected to exceed \$80m.

Katz goes on to say that he does not expect Charles Dolan to “quit the business with less than a year of operation, and with an estimated \$650m available for financing, we recognise that [a liquidation] probability is still greater than zero.” Bear Stearns then present a Liquidation Scenario, which includes (a small) chance

Rainbow Media's assets (after spin-off)

- ◆ Rainbow Programming
- ◆ American Movie Classics
 - ‘WE’ Women’s Ent’t
 - Indep. Film Ch.
- ◆ Mag Rack VOD channels
- ◆ Rainbow HD (Voom)
- ◆ IFC Films
- ◆ IFC Productions
- ◆ IFC Entertainment
- ◆ IFC Theatre
- ◆ Rainbow Cinemas (263 screens)

Data: Bear Sterns

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that Dolan would sell off Rainbow's satellite assets and spectrum, and "fold that business".

Voom – what's it about?

Fee: \$79.90 a month for full offering, \$40 for 'basic' (everything except HBO, Showtime and other premium channels)

Channels on offer:

"The most HD, anywhere", says Voom's blurb

- HD News
- HD Cinema (1-6)
- Classics
- Epics
- Gunslingers
- Divine HD
- Monsters HD
- Equator HD
- WorldSport HD
- Rush HD
- Rave HD
- Ultra HD
- Auction HD
- Gallery HD
- MOOV HD
- Animania HD

The bank's report suggests that liquidation is not likely in the next 15 months, "but we believe some portion of the market will still assume there is a reasonable chance for it to occur". Bear Stearns might simply be guilty of covering its backside, and alerting investors to possible rough waters ahead, but they suggest that Charles Dolan will keep Voom in business until the cash runs out, around early 2007, with the options then allowing him to hold onto Rainbow's three cable networks (AMC, WE and IFC). These are valued by the bank at \$3.2bn, and might win considerable interest from buyers at auction. Rainbow's DBS business could be worth around \$790m through a sale of assets, valuing spectrum at \$130m, and \$150m for its wholly-

owned satellite "Rainbow 1". Katz says "Another DBS company may be the likely buyer...."

Katz pulls no punches in alerting investors of the potential downside, which comes at the end of a challenging period for Cablevision, not least an SEC investigation into the company's previously disclosed accounting regularities. Katz fairly stresses that his assumptions are far from hard and fast, and are undertaken in an area where there has been little or no information from management on their plans for the future.

Set against this somewhat downbeat scenario are much more robust statements from executives like Moyer. He says that some 10% of US homes have now invested in HD equipment, which will lead to a 40% ownership level within 3 years. "Our proposition is that HDTV is going to expand dramatically, and we hope to capture a large slice of that market. We are audacious, we are driving trends in the degree of programming choice and picture quality." Moyer has been with Voom since 1999. Previously he spent 13 years at Discovery. Finishing up as chief creative officer.

Moyer says Voom has to be competitive and has been test-marketing various options and is now ready to move rapidly ahead. And soon it will migrate from MPEG2 to MPEG4 compression, thereby squeezing more channels into existing transponders.

Moreover, Rainbow has made no secret of its plans to expand orbital capacity. Recently, it acquired two new orbital slots (175 deg W, and 61.5 deg W),

favouring Hawaii and the Western half of the US respectively. Rainbow also holds 5 ka-Band licences (at 62 deg W, 71 deg W, 77 deg W, 119 deg W, 129 deg W), and according to a recent filing Rainbow is soliciting information from satellite manufacturers. One option would be to use these Ka-band frequencies for local-into-local programming, thereby matching that already offered by DirecTV and EchoStar.

But if the Bear Stearns report paints a pretty bleak picture, it is worth remembering that Voom's Rainbow 1 satellite is nestled in at the exact same position as EchoStar's 61.5 deg West slot, representing a terrific opportunity to tap into Charlie Ergen's subscribers. That's also the more upbeat view from Oppenheimer. If Voom manages to grow to more than 200,000 subscribers in the next 15 months, then Oppenheimer's senior analyst Eagan puts Voom's valuation per subscriber around the \$1,000 to \$1,200 range. While this is well down on the \$1550 per-subscription valuation for DirecTV and EchoStar it does give a useful \$300-600m overall valuation for Voom, plus the satellite's resale worth.

Despite the challenges from DirecTV and EchoStar (and those pesky cable companies), we at 'satmagazine.com' like Voom. We like its line up, we like it being audacious, and we'd like it to be a success. The satellite industry needs more HD, not less, and Voom seems to us to be sound value for money. We hope discerning subscribers agree. **SM**



London-based Chris Forrester, a well-known broadcasting journalist is the Editor for Europe, Middle East and Africa for SATMAGAZINE. He reports on all aspects of the industry with special emphasis on content, the business of television and emerging technologies. He has a unique knowledge of the Middle East broadcasting scene, having interviewed at length the operational heads of each of the main channels and pay-TV platforms. He can be reached at chrisforrester@compuserve.com

VIEWPOINT

Satellites Help Forecast Major Earthquakes

By Tom Bleir
Chief Technology Officer
QuakeFinder

Earthquakes are a terrifying and devastating natural disaster. They can strike without warning. They often cause billions of dollars in property damage, completely disrupt daily lives, and normal community services and business activities. To be able to predict a major trembler would be a wonderful benefit to those living and working in earthquake country.

One Silicon Valley company may be closing in on a reliable method of earthquake prediction and they're doing it from space.

QuakeFinder, a start-up company based in Palo Alto, California, has developed a satellite and ground-based detection method that, when completed and tested, would allow for warning of an earthquake one week in advance.

QuakeFinder uses a network of commercial ground-based sensors for local coverage, relying on curious homeowners who are willing to have sensitive magnetometers buried in the ground of their property. To date there are 55 ground sensors buried in private yards throughout Northern California, and they measure Extremely Low Frequency (ELF) magnetic field fluctuations that have been observed prior to earthquakes.

Each of these sites has three magnetometers that connect to the Internet via a radio link and modem. The sensor transmits changes in the earth's magnetic field near the fault lines to

QuakeFinder's Operations Center in Palo Alto where this data is collected and analyzed. Essentially, these electronic components allow activity, a.k.a. magnetic fluctuations, to be "tracked."

Changes in the earth's magnetic fluctuations (ELF activity) prior to several large earthquakes have been observed. The most notable ground based observation was by Professor Tony Fraser-Smith at Stanford University in conjunction with the 1989 Loma Prieta earthquake activity, which he recorded large magnetic anomalies for two weeks before the actual earthquake.

Researchers at QuakeFinder believe there is a correlation between these fluctuations and the occurrence of earthquakes. The ground sensors are part of a collaborative science project currently being funded by QuakeFinder, NASA, Stellar Solutions Inc., and the California Space Authority. The project's goal is to monitor these ELF activities and provide short term (days to hours) warning to the State of California OES personnel. This research has been underway since 1999, and involves a growing network since the ground sensors can only detect earthquakes



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within approximately 10 miles of the sensor location.

To balance that data, QuakeFinder is also gathering ELF signals in space, via two low orbiting satellite sensors for global coverage. On June 30, 2003, QuakeSat 1, a 10-pound, 4-by-4-by-12-inch satellite was launched as a “proof-of-concept” for collecting ELF precursor signals from space. The satellite design is based on the CubeSat concept invented by Stanford and Cal Poly where each CubeSat is 4-by-4-by-4. QuakeSat 1 is, in fact, a triple CubeSat, which is large enough to include a one-foot long magnetometer that extends on a telescoping boom.

These satellites are designed to detect magnetic fluctuations associated with large earthquakes – magnitude 6.0 or higher – which occur worldwide, 70 to 100 times per year. To date, QuakeSat 1 has recorded over 2,000 ELF collections over earthquake areas

“Our satellite has the advantage of providing worldwide coverage,” said Tom Bleier, QuakeFinder’s chief technology officer. “QuakeSat flies at an altitude of 840 kilometers in a polar orbit around the earth, covering almost every point within 2 to 3 days.”

The ELF data is downlinked through two ground stations, one at Stanford and one near Fairbanks Alaska. The ground

stations and satellite sensors work together detecting ELF signals. Data analysis is currently underway and thus far it looks promising. These fluctuations are seen both before and after large quakes, they are a key indicator that an earthquake may be imminent.

QuakeFinder also has a research agreement with the French to utilize their

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recently launched earthquake satellite, DEMETER, to look for the same type of signals seen by QuakeSat 1.

Notable observations have also been made by other satellites including the Russian satellite Cosmos 1809 and an older French Satellite Aureol-3. The Cosmos satellite collected ELF activity of a 1987 Armenian earthquake. Aureol-3 has conducted worldwide statistical surveys of earth's magnetic fluctuations during the 1990's.

Currently QuakeFinder is in the planning phase for QuakeSat 2 a larger more powerful satellite with more sensitive magnetometers and a larger data capacity. This means it would be designed to detect even smaller magnetic fluctuations in the earth and will be combined with more powerful ground processing algorithms. The new satellite will be a crucial addition to the research

project. QuakeFinder hopes that with this new data, a statistically significant correlation can be found for these devastating earthquakes.

With its network of ground sensors and satellites, QuakeFinder hopes to significantly improve on the science to more accurately predict earthquakes. Although this is a very difficult and complicated problem, the long-term goal of QuakeFinder is to make earthquake forecasting as accurate and accepted as hurricane forecasting is today. **SM**



Tom Bleier is Chief Technology Officer of QuakeFinder, he can be reached at phone at (650) 473-9870 or email at tbleier@quakefinder.com. For general information contact QuakeFinder via phone at (650) 473-9870 or email at info@quakefinder.com

REGIONAL UPDATE

Middle East Satellite Turmoil

By Chris Forrester

The Holy month of Ramadan is perhaps the world's most moveable religious feast. Because the Islamic world's calendar depends on phases of the moon, the Islamic year's twelve equal months of 28 days creep forward when compared to the Western world's calendar by about 10 days each year. Consequently, 2004's Ramadan festival started on October 16. Next year's Ramadan will start on October 5. Ramadan is also the peak-viewing month for TV in the Middle East. It is Christmas, Thanksgiving and a year's worth of Sweeps Week rolled into one frantic TV month. It is a period of daytime fasting, which means huge family oriented feasts at dusk. And after the feast the TV hits are rolled out.

In one crazy period viewers get giant variety shows, quizzes and the best movies. They also get the Ramadan dramas. These telenovellas (and often bought from South America) are the daily staple for broadcasters, and the backbone for dozens of Middle East television channels. Get a good drama and the audience builds, day by day as word of mouth spreads the message like wildfire. Setting aside the imported material, the Cairo press last week reported that this year's crop of 'mosalsalat' (soap operas) include some 50 series shot in the Middle East. The story lines are all too familiar: 'Afandeenah's Daughter', starring Egypt's massively popular local actress Elham Shaheen, which tells of a servant girl and shows her journey from rags to riches after refusing to give any concessions. But if a star is popular then logic dictates

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that the is hired for a second Ramadan drama on a competing channel, where Elham performs the role of a nurse working for a rich disabled man who lost his ability to walk after being in an accident which killed his wife.

Imagine the network schedules being wall-to-wall with these stories, of the business leader with 3 teens but himself locked into a mid-life crisis, or

Fresca, a girl who sells cheap snacks on an Alexandria beach, who falls in love with a journalist, marries him but her real ambition is to be a belly-dancer in Cairo..... It's probably my own journalism that's at fault if the immediate melodrama of the moment doesn't fully translate onto the page.

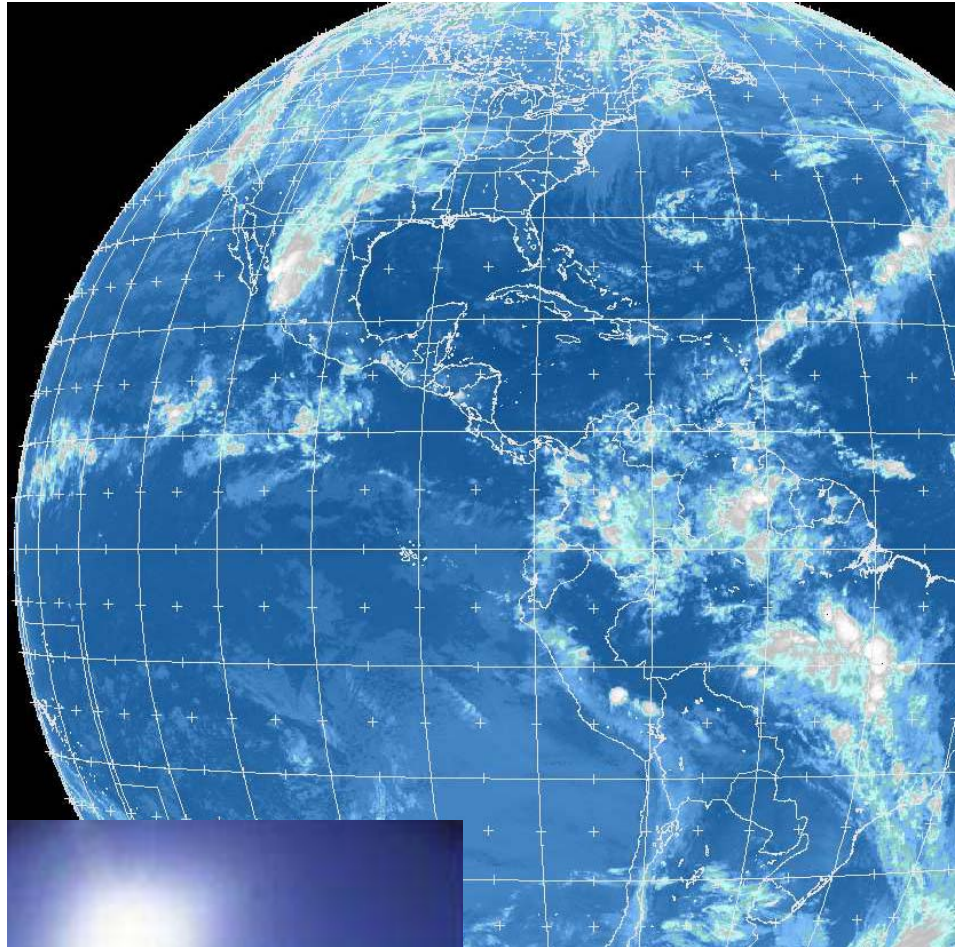
The battle between the channels, at this time but throughout the year, is

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immense. Egypt's digital 'hot bird' is NileSat, which now carries 240 free and pay-TV channels, and the line-up of planned channels has almost exhausted NileSat's capacity. Indeed, Middle East satellite broadcasting might well be about to go through another major upheaval. The reason is 'NoorSat' (which means 'Light'), the name given to the half-dozen transponders in Intelsat's Middle East spot-beam on Intelsat 10-02 at 1 deg West. 10-02 was launched in June and operational in August. NoorSat is part-financed by a consortium led by Saudi Arabia-based Mawared Group (which also backed the ill-fated Iridium sat-phone constellation), and which also owns Middle East sat-platform Orbit. NoorSat's general manager is former ArabSat CEO Omar Shoter, and he is talking about adding a second "and perhaps a third NoorSat" in time.

NoorSat now joins ArabSat and Nilesat, the two established pan-regional operators, and sees itself as possibly acting as a consolidator in the pay-TV arena. ArabSat (its first craft was launched in 1985) was the satellite of choice for its telco-members, and used exclusively for telephony and data traffic until December 12 1990, when the Egyptian Satellite Channel went on air. The following year Middle East Broadcasting (MBC) joined ArabSat, and the local rush for satellite capacity started. Kuwait joined in December 1991, but it wasn't until 1996 that perhaps the Arab world's most popular stations, Beirut's Lebanese Broadcasting (LBC) and Future TV were added to a line up that by then included almost all of the national channels, as well as key international services like CNN, and local challenger Al Jazeera (Dec 1996).



ArabSat has had its problems, not least the near-catastrophic failure of its Alcatel-built ArabSat 3A (at 26 deg East) back in late 2002. Other technical glitches have forced them to buy or rent expensive replacements (including Canada's Anik D2, an urgent lease on an older PAS craft, and later a large portion of Eutelsat's 'old' HotBird 5 (EuroBird 2) craft, now dubbed ArabSat 2D, at 26 deg East). Indeed, capacity on ArabSat's handful of craft has been tight for some years. This should be eased soon with the launches of ArabSat 4A and 4B, the first of which comes on stream in Q4/2005, and then Q1/2006. It is also fair to say that ArabSat has been

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complacent. After all, a full portfolio of clients can make you lazy, and profits were never the name of the game at ArabSat's Riyadh, Saudi Arabia, headquarters. ArabSat is now "under new management" and the old days are definitely over. An aggressive marketing push for ArabSat is now underway in readiness for next year's 4A launch.

NoorSat's arrival has prompted ArabSat into greater action, but the same applies to the Middle East's shining satellite success story: Nilesat. Nilesat 101, Egypt's first satellite, was launched on April 28, 1998, with a brief to add digital Ku-band choice to the region's growing number of broadcasters. A second satellite, Nilesat 102, launched in August 2000 and gave immediate expansion possibilities to Showtime and Arab Radio & Television, two rival pay-TV platforms. Both satellites are in effect full, with a total of 240 channels (end-Oct), and Nilesat has been searching for a mechanism to allow expansion from their 7 deg West slot, but co-ordination and frequency shortages as well as cash limitations have held them back. Part of the problem has little to do with NileSat's outstanding commercial success, because

it operates as a Dollar business, but the collapse of the Egyptian currency relative to the dollar. Fresh funding for a third satellite would be expected from Egypt's commercial banks, which today would have to find twice as much local currency to fund each dollar of any proposed Nilesat 103.

Consequently, Nilesat's chief engineer (and in effect CEO) Salah Hamza has been searching for potential partners for 103. He admits to talking "to everyone", and that includes Eutelsat, SES Astra and Intelsat as potential partners in one form or another. Another solution might be to go ahead with a rapidly-build 103 from Astrium or Alcatel with a 'soft' loan from the satellite builder. Either way, Hamza says he is confident he'll have extra capacity to sell by this time next year – and that's speedy!

ArabSat, Nilesat and now NoorSat all have one goal: to win loyalty the Kingdom of Saudi Arabia. Kuwait and the United Arab Emirates are useful additions

to the Gulf's richest and most populous State. Orbit says it remains optimistic that 'NoorSat' could prove to be the catalyst for greater co-operation amongst the various pay-TV platforms operating over the region. The logic is that instead of three struggling pay-TV platforms competing for viewer loyalty, there should be one satellite where all three platforms are present and allowing viewers to pick and choose their channels from the rival bouquets. The market will be looking to see whether a Hot Spot for all broadcasters makes commercial sense. The chan-



nels need the capacity, and besides, next year's crop of Ramadan dramas are depending on it! **SM**



London-based Chris Forrester, a well-known broadcasting journalist is the Editor for Europe, Middle East and Africa for SATMAGAZINE. He reports on all aspects of the industry with special emphasis on content, the business of television and emerging technologies. He has a unique knowledge of the Middle East broadcasting scene, having interviewed at length the operational heads of each of the main channels and pay-TV platforms. He can be reached at chrisforrester@compuserve.com

EXECUTIVE SPOTLIGHT

For our special issue on VSATs, *SatMagazine Managing Editor, Virgil Labrador* interviewed *Gilat Chairman Shlomo Rodav. Petah Tikvah*, Israel-based Gilat, which started as a small start-up company in 1987, is now one of the leading VSAT companies in the world today. It has undergone a major financial and management restructuring in 2003. Rodav, who became Chairman of Gilat in April 2003 and assumed the position CEO in July 2004, explained the impact of the changes in Gilat since its restructuring during the interview. Excerpts:

For the benefit of our readers, could you provide a brief summary of the recent changes in the ownership of your company and management structure?

Gilat has concluded major changes in the past year and a half and the company's situation today is a completely different story than what it was in the past. The positive turnaround can be attributed to a variety of factors that included technology development, focused activities, organizational changes and financial restructuring that have improved our positioning in the market, our efficiency and financial results.

The following are some of the highlights of what we have already done to stabilize and turn the company around:

Since April 2003, Gilat completed the following actions:

- Formulation of strategy going forward
- Changes in senior management positions
- Implementation of a global management team
- Implementation of economic measures to streamline costs
- Introduction of management tools, more managerial discipline
- Regaining our technology leadership position
- A financial restructuring process that eliminated \$309 million in debt, converting this into equity while renegotiating the

company's long-term loan terms with the banks

- The conversion of the new convertible bonds that were issued as part of the financial restructuring in April 2003. \$73 million out of \$88 million of convertible bonds were converted, leaving the company with just \$15 million in debt and \$115 million in long-term bank loans at excellent return rates, due in 10 years
- An agreement for the modification of the terms of the outstanding loan by Bank Hapoalim to Gilat

In addition, several important strategic decisions were taken:

- Take StarBand out of Chapter 11 (completed November 2003)
- Take rStar private - In April the company completed the acquisition of all of the shares of common stock of rStar Corporation not already owned by Gilat for \$0.60 per share in cash. As a result, rStar ceased to be a public reporting company.
- The company began trading on the Tel Aviv Stock Exchange (TASE) in February 2004, in addition to being traded on the NASDAQ.

All of these steps taken together have created a dramatically improved financial situation for the company, a very

conservative balance sheet, improving performances in the past few quarters and a more tight-knit global management, positioning us well to favorably meet the challenges ahead.

With the stabilizing and efficiency measures successfully behind us, the Company began a few months ago to define its forward-looking strategy, focusing on the growth of the business.

The current owners of Gilat are Bank Hapoalim, Israel largest bank, holding 14.8%, Eliezer Fishman holding 9.5% and the balance is held by the public and other investors holding, each. Less than 5%.

How have these changes affected your company's position in the market and your approach (or strategy)?

In early 2004 Gilat released its new SkyEdge family of products. This revolutionary VSAT system clearly places Gilat at the top of the technological leadership in the industry again, where it has been for most of its history, being the first to market with new innovations. We clearly see the SkyEdge as one of the most important parts of the Company's forward looking strategy.

The first fruits of the company's actions implemented in 2003 began to be visible as of the beginning of 2004. Among the positive indicators, the company had a positive EBITDA in each of the quarters and positive cash flow, for the first time in many quarters. The company's financial situation is now

EXECUTIVE SPOTLIGHT

stable and improving which allows for future growth and far more flexibility in our decision-making.

What areas of the VSAT market do you see where the growth areas will be? And how is your company addressing these different areas (or market segments)?

Gilat's business stands on two legs - technology sales and networks operation. Looking forward, we will continue to strengthen both of these areas. In the networks operation area, we will be focusing on Enterprise, SOHO/SME vertical markets, and on new channels. We have established ourselves as the clear market leader in rural networks and we plan to continue to expand this business.

Governmental projects focusing on education and telecommunication infrastructure is another market we are aiming for. Gilat has the demonstrated ability to do large-scale turnkey projects, from A-Z, in very short periods of time. Just recently we were able to deploy over 3,000 VSATs and a hub in four weeks time for the Venezuelan Presidential referendum, an unprecedented deployment pace. Gilat can be viewed today as a complete satellite-network-system-house, capable of providing end-to-end satellite-based solutions for almost any application.

In addition, we are going to be focusing more and more on non-fixed applications such as portable, transportable and in-motion solutions.

Finally, our company is moving from being a vendor of satellite access to being a vendor of satellite network solutions in which VSATs may be only part of the overall solution. We have been able to add to our VSAT networks hybrid solutions, which include, for example, DSL, wireless and other technologies.

Where do you see that US consumer broadband market going?

The VSAT consumer market in the US has not met expectations of all players, including Gilat. The potential in that market still exists, but the success in that market is less a technological issue than a business one, due to the heavy initial investments that need to be poured into the market up front. The future growth of this market depends on a serious deep pocket operator that will commit to the required initial investment in customers acquisition and commitment to the procurement of large quantities.

You recently launched your SkyEdge Product Family and signed some key deals—what is the advantage and benefits of this product family?

Over the years, VSAT technology has seen a variety of developments that have increased efficiency, quality and affordability. The evolution of VSAT markets has generated separate systems for separate markets. However, until recently, the technology did not allow the integration of different VSAT platforms, to work harmoniously on the same hub, and serve all markets, as part of a single system. The introduction of SkyEdge removes this limitation and opens a world of opportunity for VSAT operators and users.

This breakthrough allows operators to expand their business horizons, being able to support numerous applications and not having to make significant investments in additional hubs in order to do so. The entry barriers for the business will go down; costs will be reduced through a small mini-hub offering, savings on space segment, network management and other areas. More operators will be able to start service businesses with a smaller initial investment, resulting in more people benefiting from VSAT technology.

SkyEdge consists of five tailored VSAT products, all operating via a single hub. The SkyEdge family of products can support a wide range of applications and markets, including an enhanced DVB-RCS VSAT, which is interoperable with the variety of SkyEdge VSATs. These VSATs can be mixed and matched on a single network, and simply managed using one network management system and one segment of bandwidth.

In September, we announced the first SkyEdge deal with Australia's second largest telecommunications company, SingTel-Optus. The agreement was for a SkyEdge hub and remote sites for the expansion of Optus's already existing Gilat networks, which will be upgraded to SkyEdge as well.

What can we expect from Gilat in the next year?

Gilat will continue to expand its technology sales and networks operation businesses. We will increase our focus on certain vertical markets and we will deliver tailored solutions for these markets.

We have received a good reception for our SkyEdge product family and our sales funnel has more and more SkyEdge prospects, surpassing that of our traditional legacy products. In the coming year, we will introduce additional phases of the SkyEdge system that include among other things, the DVB-RCS platform and compatible DVB-RCS hub.

While Gilat is not providing any forward-looking statements regarding its finances or operations, we can say that we will continue to strive to constantly improve our financial position. **SM**

MARKET INTELLIGENCE

Three A's for VSAT: Affordable, Available, and...African

by Martin Jarrold
Chief, International Programme Development
GVF

For much of the Internet era, bandwidth has been a limited commodity in most of Africa, largely because of regulatory hurdles that prohibit competition amongst carriers, capacity constraints of a limited number of service providers, and because the excessive costs of such bandwidth have reduced the demand. Restructuring of the telecom sector is now taking place in a growing number of countries in Africa, and a number of initiatives are beginning to change the bandwidth landscape.

Most recently, the SAT-3, WASC, and SAFE undersea optical fiber cables have been completed, providing high-speed high-bandwidth links between Europe and Asia and 14 West African coastal countries. The recent establishment of the West African Section (WASC) has already resulted in efforts by operators in Gabon, Cote d'Ivoire, Namibia, Nigeria, Senegal and South Africa to establish large international Internet links. This is substantially increasing connectivity in the capital cities of these countries and helping to build the case for establishing national backbones. A similar project is planned for Africa's east coast (EASSY), and along with the proposals for a southern African fiber network (SRII) and COMTEL for the countries of the Common Market for Eastern and Southern Africa (COMESA), the coming years may well see most of the major cities in Africa with much improved telecommunication capacity.

However, until terrestrial national backbones and networks become much more extensive, unserved areas will need to rely on satellite connectivity. Further, Africa's vast and often inaccessible terrain makes it prohibitively expensive to roll out traditional wireline networks and implement fiber optic links in the Continent's hinterlands. This makes low-cost satellite services attractive, particularly to small- and medium-sized enterprises (SMEs), large organizations – in the public and private sectors – as well as personal users.

Underscoring continued expectation for growing demand in these areas, several new satellites serving Africa have recently been launched which dramatically increase the availability of bandwidth to even the remotest parts of the Continent. The full extent of available Ku-band satellite bandwidth in Africa is shown in the associated map produced by the IDRC Acacia program, which shows the footprints of all of the Ku-band satellites overlaid on the Continent.

In addition to VSAT services provided via 28 C-band beams (not illustrated in this particular map), a significant number of European and African providers have entered the Ku-band VSAT market since services first broke ground in 2002 using Panamsat's PAS-10 satellite. Now, Ku-band services over Africa are available on PAS-1R, PAS-10, NSS 7, Atlantic Bird 7 (the renamed Stelat 5), Nilesat 101 and several Intelsat satellites including IS-904 and IS-901.



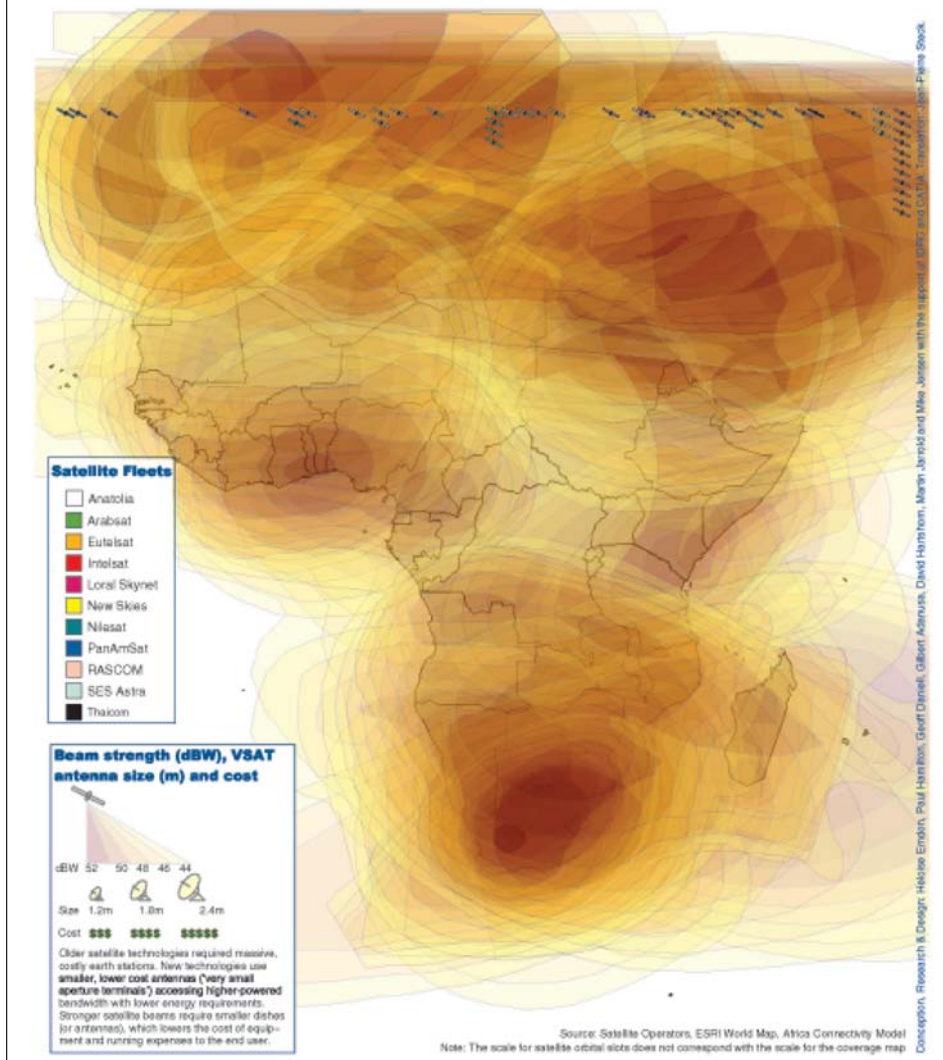
New Skies Satellites' new NSS-7 satellite also has a global Ku-beam covering the entire continent except for parts of East Africa, and it has a spot beam covering Southern Africa and another for West Africa.

At the same time, recent developments in Internet-based VSAT systems have now rendered the technology into a commodity. A central hub can be placed at a location where the upstream Internet costs are lowest (whether in Africa or in other regions, such as Europe or North America), while serving many thousands of low-cost terminals in Africa via satellite using small diameter antennas (0.6 to 1.8 metres) and associated customer-premises equipment, which for enterprise- and consumer-class systems can cost less than US\$2,000 and US\$1,000, respectively. The markups on equipment and installation after cost increases imposed by shipping, duties and clearance payments means that by the time the equipment is installed, up to US\$3,000 can be added to the end-user's FOB cost. So bulk shipments and streamlined clearance procedures, along with elimination of duties for ICT equipment, are important in maintaining the advantages of low cost for the service.

One of the key advantages of VSATs is their ability to deliver access quickly. The recent availability of low-cost terminal equipment is helping to

MARKET INTELLIGENCE

Open and Closed Skies: Satellite Access in Africa



Total Ku-band Coverage of Africa: Every square inch of Africa is covered by satellite bandwidth, but restrictive telecom policies stop this from supporting Africa's development. There are 48 satellites with coverage, pointing 36 Ku-band frequency beams (shown here) and 28 C-band beams (not shown) over Africa which can be accessed to provide international and national voice calls, broadcasting, data and Internet services.

disaster recovery, as well as a host of corporate and government applications.

There are already many thousands of public and private African organisations – from banks, stock exchanges and Internet Service Providers (ISPs), to schools, hospitals and rural/semi-urban telecentres – that use VSATs to deliver business, educational and health information. But mass deployment of high-bandwidth VSATs could benefit more of these end users, as well as SMEs and individuals that are currently constrained by dial-up connections that are slow, unreliable or non-existent.

Access to competitively priced bandwidth opens a much wider array of opportunities for institutions to make development applications available to users. Larger organizations are already using services at 2 Mbps or more to create virtual private networks (VPNs), and as Internet use becomes a key part of organizational operations, even users with cheaper terrestrial links may need a back-up route to the Internet cloud that is not dependent on the local operator for infrastructure.

Until recently, the PTOs have been the main users of VSAT technologies in Africa, deploying VSAT networks to extend their national telephone infrastructure and Internet access. However, liberalisation has opened up avenues for new licensed service providers both in the voice traffic market and Internet business. VSATs have also been deployed to provide Internet services in countries such as the Democratic Republic of Congo, Ghana, Mozambique, Nigeria, Rwanda, Tanzania, Uganda and Zambia. **SM**



encourage this trend. Increased global volumes have driven prices down creating options for delivery of a wider range of applications, including rural telecoms, distance learning, telemedicine,

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STOCK MONITOR

APT SATELLITE HOLDINGS	ATS	1.95	1.59-4.60
ANDREW CORP.	ANDW	19.8	8.80 - 21.67
ASIASAT	SAT	16.85	14.31 - 22.80
BALLAEROSPACE	BLL	70.95	42.30 - 72.46
BOEING	BA	49.69	31.00 - 51.49
BRITISH SKY BROADCASTING	BSY	45.40	40.07 - 59.24
CALIFORNIAAMPLIFIER, INC.	CAMP	7.36	3.19 - 17.20
COM DEV INTL	CDV.TO	3.64	1.23 - 3.80
COMTECH TELECOMM.	CMTL	21.73	13.62- 39.52
DIRECTV GROUP	DTV	17.26	14.70 - 18.81
ECHOSTAR	DISH	30.60	29.27 - 41.00
FREQUENCY ELECTRONICS INC.	FEI	14.00	8.96-17.13
GILAT SATELLITE NETWORKS	GILTF	5.50	4.50 - 9.86
HARRIS CORPORATION	HRS	50.26	28.70 - 51.19
HONEYWELL SPACE SYSTEMS	HON	36.14	25.94 - 37.65
INTEGRAL SYSTEMS INC	ISYS	16.03	15.29 - 22.12
KVH INDUSTRIES INC	KVHI	12.69	12.36 - 34.729
L3 COMMUNICATIONS	LLL	65.43	41.63 - 64.32
LOCKHEED MARTIN	LMT	51.67	43.10 - 55.00
NEW SKIES SATELLITES	NSK	7.71	4.49 - 8.16
NEWS CORP	NWS	35.33	29.80 - 39.74
NORSAT INTERNATIONAL INC.	NSATF.OB	0.58	0.38 - 1.03
NTL	NTLI	57.08	3.76 - 20.15
ORBITAL SCIENCES CORP.	ORB	13.60	7.11-14.19
PANAMSAT	SPOT	23.15	13.80 - 26.01
PASIFIK SATELIT NUSANTARA	PSNRY.PK	0.15	N/A
PEGASUS COMMUNICATIONS	PGTV	23.04	11.70 - 51.00
QUALCOMM, INC.	QCOM	72.11	34.33- 73.33
RADYNE COMSTREAM	RADN	8.01	2.02 - 13.426
SCIENTIFIC-ATLANTA	SFA	33.15	19.46 - 38.59
SIRIUS SATELLITE RADIO INC.	SIRI	3.022	1.40 - 4.20
SES GLOBAL	SDSFa.F	6.75	5.17 - 8.85
TRIMBLE NAVIGATION	TRMB	27.20	13.48- 28.78
VIASAT	VSAT	23.99	12.20 - 28.91
XM SATELLITE RADIO	XMSR	27.21	10.02 - 30.96

Company Symbol Price 52-week Range

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