

Executive summaries of market trends and opportunities in key market segments and regions worklyible

The Satellite Industry is Going Green

RIEFS

But some companies are adopting Green Technologies more earnestly

• Green technology help drive efficiencies, better products and new markets.

Green Report

Huntuns

•Some companies are specializing in the disposal of, refurbishment and resale of used satellite gear.

•Clean, renewable on-orbit power may be possible in the not-to-distant future.

• Satellites have been a key driver for the development and advancement of solar power technology.

From greenhouse gas emission controls, to e-waste, to recycling regulations, businesses in the satellite industry are not immune from tightening environmental compliance costs. Some are imposed by law, and others adopted voluntarily.

But as this market brief report finds, green technology efforts are also helping to drive efficiencies, better products, and new markets. The potential upside in costsavings and cleaner operations can be found across the value chain, from space systems, to teleports, to mobile satellite systems in the field, to satellite operators and hardware suppliers.

Power consumption represents a big piece of the operating expense of a 24/7/36 Teleport. In 2010, the World Teleport Association (WTA) spearheaded industry efforts in this area, with the organization's Green Teleport Campaign to educate members on their consumption of electrical power and ways to decrease usage. Following its survey of members, WTA issued a report. According to the report, teleports spend from \$300,000 to \$1,000,000 annually to power heating, environmental, computers equipment, and backup systems. "Through investments in more efficient systems and practices, energy costs can be rapidly reduced 20-40%, noted the report.

Reduction in the energy needed to

by Dan Freyer

power a piece of equipment has a cascading effect, reducing the energy spent on distribution, DC power systems and conver-sions as well as cooling, and sometimes even reducing the need for additional equipment. According to WTA members, payback takes



The satellite industry is now adopting green technologies.

only one to two years, with all subsequent savings going to the bottom line.

Earth Station HPAs Gain Efficiency

RRsat Global Communications Network Ltd (NASDAQ: RRsat), has achieved this kind of savings at its Hawley, Pennsylvania teleport acquired from Loral Skynet. To make its power usage much more efficient, as part (Continued on page 2) of its facility upgrade, RRsat implemented a number of "greener" systems and practices.

According to Hanoch Paz, RRsat's Senior Director of Operations North America, "We had two uplink chains, each with (1:1) 1kW Klystron power (KPA) amplifiers. The power bills, as well as the heat we needed to cool during the summer were enormous. After replacing the KPAs with much more efficient 2:1 700W HPAs, the savings from reduced power consumption by the units alone actually finance the purchase in 18 months." Separately, by turning off AC in its un-manned work areas at the teleport, the facility cut power usage by 15%.

RRsat's experience is by no means atypical. Paul Scardino, VP Sales and Marketing for Globecomm, (NADSAQ: GCOM), a telecommunication service provider, builder of ground systems and operator of teleport service, agrees that being green is very important for the satellite players. In designing earth stations, Globecomm employs several practices with earth station electronics. "First, we try to use SSPAs (solid state power amplifiers) where possible," says Scardino. Second, we employ Linearized, energy-efficient, multiple-stage, depressed collector (MSDC) TWTAs, which yield about a 50% savings," he says.

Another power-saving design approach is to use outdoor TWTAs, which don't require air conditioning. By mounting on or closer to the antenna flange, they also reduce the power draw requirement.

Like RRsat and many players, GlobeComm uses wideband TWTAs for multiple transponder services in place of multiple filter-combined Klystron HPAs when that is possible.

Greener Uplinks

In the area of amplifier product development, manufacturers are driving for higher efficiency for multiple reasons (see Sidebar on Comtech Xicom). "Across a whole range of products,



Advantech Wireless' SapphireBluTM series of High Power Amplifiers uses GaN technology which allow unprecedented ground power, high linearity and impressive savings in energy costs.

there's a need for higher efficiency," says Heidi Thelander Director of Business Development for Comtech Xicom, a leading worldwide supplier of amplifiers and RF equipment.

"These efficiency needs range from HPAs for high power facilities where you can go from 10s of kWatts to an order of magnitude reduction by replacing old klystron amplifiers with high-efficiency TWTAs, to new applications requiring mobility, which also create a push for smaller, lighter, lower power-consuming amplifiers. For all new products, we are implementing improvements and looking at how we can make them even more efficient," she says.

One of the technologies increasing efficiency in Solid State Power Amplifiers (SSPAs) for satcoms is a new generation of Gallium Nitride (GaN) transistors. GaN is a newer alternative semiconductor alternative to GaAs (Gallium Arsenide) transistor technology that has been widely used in satcoms SSPAs.

Advantech Wireless, based in Montreal, Canada, has developed a full line of Solid State High Power Amplifiers (SSPAs), covering L-band to Ku-band as a result of several years of R&D in partnership with key technology suppliers. Since introducing the products in 2010, it has seen deployments in both commercial and military markets.

" GaN technology allow us to offer our customers unprecedented ground power, high linearity and impressive savings in energy costs. For example, the 400W Ku-band GaN based BUC offers 18,400 Kw/hr savings per year compared with GaAs technology. This is True Green Technology!" mentioned David Gelerman, CEO of Advantech Wireless.

The company says its GaN technology can allow SSPAs to take up to 50% less cubic volume, consume 70% less power, and generate 30% less heat, while offering better linearity, intermod, and noise performance than GaAS-based SSPAs.

In addition, due to higher tolerance to heat and voltage increases, GaN HEMPT (High Electron Mobility Transistors) RF devices offer higher reliability by orders of magnitude, proponents say.

Comtech Xicom Technology

Comtech Xicom Technology, is a leading satcom amplifier supplier of Traveling Wave Tube Amplifiers (TWTAs), Klystron Power Amplifiers (KPAs), Solid State Power Amplifiers (SSPAs), and Block Upconverters (BUCs) for commercial and military applica-

tions around the world.

Comtech Xicom Technology's emphasis on green has helped it increase efficiency across the company's product line, from amplifiers designed for large uplinks, to mobility products that require small size, weight, heat and lower power dissipation. Xicom is introducing new high power amplifiers and BUCs with radically improved efficiency that can help customers achieve their green goals, according to the company, by offering as much as 50% space savings, up to 40% lower power consumption, at one-third the weight of traditional amplifiers.

These High Efficiency products include Ku-band TWTAs from 400W to 1.2 kW, linear Ka-band BUCs, and new Solid State Products (40W Ku BUC, 50W X-Band BUC, and 20W Ka BUC).

Comtech Xicom Technology revolutionized the mobile SATCOM market with some of the smallest and lightest feature-rich block up-converters (BUCs) available. Its series of "shoebox-sized" BUCs for mobileSATCOM applications include 40W power versions operate in the Ku-band as 50W versions for C and X-bands, and a new 20W Ka-Band BUC. Xicom's new XTLIN series of BUCs feature 25W, 50W, 75W and 110W of linear power at Ka-band. Comtech Xicom Technology revolutionized the mobile SATCOM market with some of the smallest and lightest featurerich block up-converters (BUCs) available.

Xicom's block up-converters/amplifiers were specifically designed for rugged, outdoor, mobile environments. The product line includes a new 50 Watt X—band amplifier weighing in at only 10 lbs. We also launched a 20W Ka-band BUC available in the 29-30 or 30-31GHz frequency band. These new antenna-mount BUCs are designed to meet the most demanding requirements for size, weight and high reliability.

An Easy to Use Off-site Interface

Comtech Xicom Technology also introduced a web-based interface for the Company's LCD touch screen amplifiers. The new graphical user interface (GUI) displays the identical images on a computer screen as that shown on the amplifier's LDC control panel offering an easy-to-use off-site interface for monitoring and controlling multiple amplifiers and switches.

Customers are impressed with the responsive nature of Xicom Technology's LCD touch-screen front panels and have eagerly awaited the introduction of the Web browser support based on the touch-screen graphics. The simple and intuitive color-coded operation provided by the touch-screen front panels is now available remotely without the need for proprietary software.

Secure internet access, a current Web browser (IE9, Firefox and Chrome) and the IP address of the amplifier are all that are needed to remotely monitor and control SATCOM amplifiers and systems including real-time viewing of diagnostic data. Users can access all of the functionality of the front panel touch-screen including the System, Amplifier, Events, Trends and Set-up Screens. As on the LCD front panel, the amplifiers status and output power are displayed at all times.

The touch-screen approach to the amplifier and system user interface allows improvements to be made without hardware changes. New features such as built-in uplink power control and new system configurations have been added and like the new Web browser support, are available with a



Many teleports such as Globecomm's teleport in Hauppauge, New York, pictured here, are adopting green policies when it comes to procurement and installation of ground equipment.

Greener Uplink Amplifiers and BUCs

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According to the company, a major opportunity exists for many uplinks to reap huge green energy-saving by replacing aging klystron power amplifiers (KPAs) with traveling wave tube amplifiers (TWTAs).

"Customers replacing klystrons on large uplinks with Xicom's High Efficiency TWTAs have achieved over 90% reductions in electric utility power," explains Heidi Thelander, Director of Business Development for Xicom. "For example, a 4-channel uplink running 5 KPAs with 1:4 redundancy replaced by 2 linearized 1.2 kW TWTAs with 1:1 redundancy could save over 50 kW per month or 90% power savings, and slash monthly utility bills by more than \$5,000, even at low utility \$0.15 kW-hr rate."

On top of this are large reductions in rack space requirements, and load on the air conditioning system, not to mention reduced acoustic noise shielding requirements compared to using KPAs in an uplink. Another way to take advantage of these products is adding a linearizer for up to double the linear power.

Xicom's emphasis on green has helped it increase efficiency across the company's product line, from amplifiers

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firmware upgrade. This makes amplifiers and controllers configurable for many applications and allows new future requirements to be met without hardware changes.

Antenna De-Icing and Snow-shedding systems

SATELLIT

Antenna de-icing systems can burn gas and or electric energy at earth stations in colder climes. De-Icing system manufacturers are also helping the green push. "Our new generation gas heaters introduced this year support 'greener operation', meeting more EU safety, health, and environ-



Comtech Xicom's XTD-500KAAntenna-Mount TWTA, Ka-Band, 500W

designed for large uplinks, to mobility products that require small size, weight, heat and lower power dissipation. Xicom is introducing new high power amplifiers and BUCs with radically improved efficiency that can help customers achieve their green goals, according to the company, by offering as much as 50% space savings, up to 40% lower power consumption, at one-third the weight of traditional amplifiers.

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mental protection requirements," says David Walton of Walton De-Ice. Walton De-Ice manufactures De-Ice systems which protect antennas from snow and ice using either gas, or electric powered heating, blowing and its Ice Quake antenna-shaking systems. Walton De Ice systems are employed in antennas from 0.6 to 32 meters in

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November 2013

size around the world.

Walton's new dual-redundant ignition system makes for faster, morereliable, pilot-free operation, with improved gas consumption efficiency.

HVAC and Facilities Management

According to Globecomm's Scardino, in addition to using energyefficient electronics in earth station design, managing efficient airflow in the data center and shelter areas is important. This means using the most efficient HVAC (heating, ventilation, air conditioning) management and control of the facility. Re-using exhaust from Hot Air, Gas De-Ice systems is another energy-saver.

An efficient cooling system is essential too. In its facilities, Globecomm employs double-panel, low E-rated glass windows, as well as a sun heat-reflective silver roof that also help cut energy costs.

MARKET BRIEFS

Another energy efficient solution employed in Globecomm facility with a dramatic effect is the Smart Meter Power Monitoring System. This system manages and balances load attributes for UPS (uninterruptible power supply) units so they can run at 92% efficiency. Similarly, a Cabinet Monitor System balance loads to individual cabinets.

In a similar fashion, RRsat has implemented numerous advanced "green" power-conserving systems at its global content playout center. "In addition to converting all the amplifiers to power-efficient systems, we replaced the old inefficient facility generators with modern units that consume 30% less diesel," says RRSat's Paz.

An AC management system based on Smart Humidity and Temperature Sensors shuts down and turns on AC units, and a lighting control system Believe it or not, there are companies that specialize in the disposal of, refurbishment, and resale of used satellite gear.

with motion sensors cuts building power, while outside light sensors detect sunset and sunrise light.

GlobeComm has achieved 35% savings in facilities with lighting changes alone, by using motiondetectors in the office environment, high-efficiency, fluorescent bulbs in overhead lighting, replacing old incandescent "Exit" lights with LEDs, and changing outdoor Mercury Vapor Bulbs to High Pressure Sodium.

IT managers know that using "sleep" instead of screensavers re-

Take control with a simple touch.



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Xicom Technology offers a new LCD touch screen controller that provides an easy-to-use interface for monitoring and controlling all your SATCOM HPAs.

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- Eliminates the Need for Separate External Controllers You can't beat the combination of features and

performance of Xicom amplifier controllers. Contact Xicom today and find out more.





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Turning Trash into Cash

"All of our facilities recycle almost everything we can, from drinking cans to paper, carton boxes, electronic devices, metal, etc," says RRsat's Paz. But how do you recycle satellite equipment?

Believe it or not, there are companies that specialize in the disposal of, refurbishment, and resale of used satellite gear. An example is New Era Systems, based in Pompano Beach, Florida (www.newerasystems.net). The company is a leading buyer and seller of used satellite equipment in North America. New Era Systems also de-installs and disposes of old earth station equipment, and has recycled used antennas over 9 meters in diameter from facilities in the US for installations in developing countries in Africa.

Satellite Operators Push a Greener Supply Chain

Many of the propellants used in launch vehicles and spacecraft—such as ammonium perchlorate, nitrogen tetroxide, and hydrazine and its derivatives-are toxic or corrosive, according to a report from consulting firm the Aerospace Corporation. A small number of spacecraft also use radioactive material in orbit. Launch disasters can pose environmental risks. In the US, law requires that environmental and human health risks from the routine handling, storage, and use of these materials be considered as well as the effects of unintentional release into the environment.

Through the industry value chain, buyers are flowing down the push for green practices, and this extends into space systems "We apply the principle that all activities and services which we provide to third parties, or From office operations to teleports, to ground equipment, to spacecraft, industry players in the satellite business are doing their part in the green transformation. But the impact of the satellite industry's greatest contribution to green technology extends far beyond our industry.

which are provided to us by thirdparty vendors, should comply with high standards of environmental protection," says a company disclosure by global satellite owner-operator, SES Global. "SES aims to minimize the environmental impact of outsourced activities, such as the manufacturing and launching of spacecraft," it adds.

Greener Fuel for Spacecraft

Stepping up to these challenges, space systems suppliers have been working on 'green propulsion' systems. According to ECAPS, a unit of the Swedish Space Corporation, its High Performance Green Propellant (HPGP) is environmentally benign, and much easier to transport and handle, compared to traditional hydrazine monopropellant, while also demonstrating higher on-orbit performance compared to traditional systems.

Astrium, prime contractor for the Ariane 5 launch vehicle and spacecraft manufacturer, signed an agreement to integrate technology from ECAPS, and jointly develop a system concept based on AND (Ammonium Dinitramide) technology for thruster and propellant systems. Moog, and ATK Space & Systems Divisions are other space companies that have worked with ECAPS. Clean and renewable on-orbit power may even be possible in the not-to-distant future. The University of Maryland's Space Power and Propulsion Laboratory (SPPL) has provided technology tested on the International Space Station that its researchers say could revolutionize the capabilities of satellites by extending their lifecycle through renewable power. The new propulsion method uses a renewable, onboard electromagnetic power source instead of propellants, and therefore could extend spacecraft life, say researchers.

A Bright Future, a Clean Energy Heritage.

From office operations to teleports, to ground equipment, to spacecraft, industry players in the satellite business are doing their part in the green transformation. But the impact of the satellite industry's greatest contribution to green technology extends far beyond our industry. Satellites have been a key driver for the development and advancement of solar power technology, a major renewable energy source for the world. M

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in Satellite, the World's First and Most Successful Space Industry (SSPI 2010), among numerous other publications and articles, and has helped top satellite manufacturers, operators, service providers, and equipment suppliers develop their businesses for over 20 years. He can be and can be reached at dan@adwavez.com.





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