SatMagazine

Maritime SATCOM

Battle Royale
Machine Mastery
Delivering Bits
Middle East Strides
One Million By 2016
Remaining Afloat With OTT
Pervasive Force

Solomon's Solutions
Game-Changers
Competing For Space
Ten Major Points
Business Growth
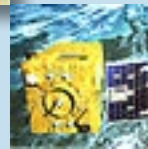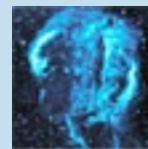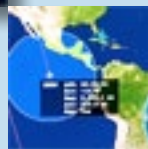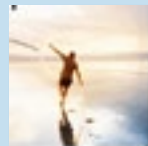**CommunicAsia**

Publishing Operations

Authors

Maxime Baudry
Evelyn Boswell
Mike Conschafter
Jim Dodez
Chris Forrester
Patrick French
Simen Frostad
Alan Gottlieb
Katia Gryadunova
Brent Horwitz
Hartley Lesser
Roger Rusch
Rick Simonian
Johan Svanberg
Pattie Waldt

InfoBeam

Industry View: Ten Points For Your Consideration

I attended 14 sessions, typed up 48 pages of notes, and read all the articles published in the trade journals while attending Satellite 2012. The sessions were better attended than in past years and the conference added a cellular feedback system for polling. This was available to the 50 percent of the audience that carried the latest smart phones. Part of the polling was devoted to advertising for Proton and Baikonur. By *Roger Rusch*, TelAstra, Inc. — Page 58

Uplink: A New Power For Business Growth
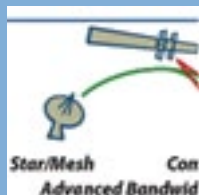
The HX System from Hughes is designed and optimized for small to medium-size networks, and employs the key features needed for a wide range of applications, such as Internet access, IP trunking, cellular backhaul, Virtual Network Operator (VNO) hosting, and communications on-the-move (COTM). A key feature of the HX System is the ability to cost-effectively scale to large networks, providing operators with an effective platform on which to start small and grow as their business grows. — Page 62

Event: Offering Global Satellite Players Vast Opportunities For Global Expansion
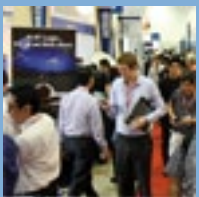
The Asia-Pacific region is earmarked for significant growth—2012 will see many of the world's largest satellite companies, including GlobeCast, Inmarsat Global, Intelsat, MEASAT Satellite Systems, Newtec and Thaicom amongst others, assembling at CommunicAsia and BroadcastAsia, Asia's largest ICT and media communications event. As the Asian satellite market continues to grow, these industry players are using the event as a strategic platform to address the critical issues surrounding Asia's marketplace, while accentuating their presence in the region. — Page 66

Insight: A Pervasive Global Force... Maritime SATCOM

The maritime market is a pervasive global force, consisting of six major segments—shipping, offshore oil and gas, commercial fishing, passenger vessels, government and military vessels, and yachts. There are more than 250,000 vessels in the maritime market that are good future prospects for broadband communications and they are enjoying an increasing range of options (and prices) for bringing this critical benefit onboard. by *Jim Dodez*, KVH Industries, Inc.— Page 68

Case Work: Solomon's Solutions
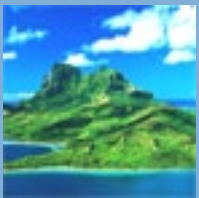
Founded in 2003, Pactel International provides enhanced satellite communications solutions for a variety of markets throughout the Asia-Pacific region. One of Pactel's key advantages lies in its ability to leverage supplier relationships to create reliable, cost-efficient networks for remote sites and rural locations across Australia, Indonesia and Pacific Islands. By *Katia Gryadunova*, Pactel International Pty Ltd.— Page 70

Focus: Game-Changing Trend Drivers For The Cruise Industry

Traditionally, cruising was all about "getting away." Today, it's still about getting away while staying connected. Does that sound paradoxical? Well, it is. And therein lies the challenge for communication companies serving cruise operators. By Brent Horwitz, MTN Satellite Communications— Page 72

Advertiser Index

InfoBeam

A WISE Release (Imagery)

NASA unveiled a new atlas and catalog of the entire infrared sky today showing more than a half billion stars, galaxies and other objects captured by the Wide-field Infrared Survey Explorer (WISE) mission.

"WISE delivers the fruit of 14 years of effort to the astronomical community," said Edward Wright, WISE principal investigator at UCLA, who first began working on the mission with other team members in 1998.

WISE, built by Ball Aerospace & Technologies, launched on December 14, 2009, and mapped the entire sky in 2010 with vastly better sensitivity than its predecessors. It collected more than 2.7 million images taken at four infrared wavelengths of light, capturing everything from nearby asteroids to distant galaxies. Since then, the team has been processing more than 15 trillion bytes of returned data.

A preliminary release of WISE data, covering the first half of the sky surveyed, was made last April. The WISE catalog of the entire sky meets the mission's fundamental objective. The individual WISE exposures have been combined into an atlas of more than 18,000 images covering the sky and a catalog listing the infrared properties of more than 560 million individual objects found in the images. Most of the objects are stars and galaxies, with roughly equal numbers of each. Many of them have never been seen before.

WISE observations have led to numerous discoveries, including the elusive, coolest class of stars. Astronomers hunted for these failed stars, called Y-dwarfs, for more than a decade. Because they have been cooling since their formation, they don't shine in visible light and could not be spotted until WISE mapped the sky with its infrared vision. WISE also took a poll of near-Earth asteroids, finding there are significantly fewer mid-size objects than previously thought. It also determined NASA has found more than 90 percent of the largest near-Earth asteroids.

Other discoveries were unexpected. WISE found the first known Trojan asteroid to share the same orbital path around the sun as Earth. One of the images released today shows a surprising view of an echo of infrared light surrounding an exploded star. The echo was etched in the clouds of gas and dust when the flash of light from the supernova explosion heated surrounding clouds.

At least 100 papers on the results from the WISE survey already have been published. More discoveries are expected now that astronomers have access to the whole sky as seen by the spacecraft.

The Company also shipped the Global Precipitation Measurement (GPM) Microwave Imager (GMI) to Goddard Space Flight Center for integration with NASA's Global Precipitation Measurement Mission spacecraft.

The GMI instrument will play an essential role in the worldwide measurement of precipitation and the Earth's environmental forecasting when it launches aboard the GPM space-borne Core Observatory in 2014. The GPM mission is a joint effort between NASA, the Japan Aerospace Exploration Agency (JAXA) and other international partners. The GPM mission will improve climate, weather and hydrological predictions by providing more accurate precipitation measurements from space.

Ball Aerospace's role in the GPM program included the design, development and fabrication of the GMI. Roughly eight feet tall, the conical-scan microwave instrument is a powerhouse of radiometry. GMI is designed to improve on-orbit calibration and advanced space-borne radiometry by rotating at 32 revolutions per minute, using four very stable calibration points on each revolution to calibrate the data it has scanned. This allows for

WISE captured this image of the immense Andromeda galaxy, also known as Messier 31 or simply M31.

Work being completed at Ball Aerospace on the Company's GMI instrument. Photo courtesy of Ball Aerospace.

temporal sampling of rainfall accumulations as well as more frequent and higher quality data collection.

GMI's design is based on successful microwave sensors built previously by Ball Aerospace including the Shuttle Radar Topography Mission (SRTM), Spaceborne Imaging Radar-C (SIR-C), GEOSAT Follow-On (GFO) and the Submillimeter Wave Astronomy Satellite (SWAS).

Following launch, Ball Aerospace will provide post-delivery support at NASA's Goddard Space Flight Center (GSFC) and launch site as well as post launch support. Ball Aerospace & Technologies Corp. supports critical missions for national agencies such as the Department of Defense, NASA, NOAA and other U.S. government and commercial entities.

Montana State Goes For Launch

The Montana State University satellite that rode into space on a NASA rocket has now gathered information longer than the historic U.S. satellite it was built to honor, said the director of MSU's Space Science and Engineering Laboratory (SSEL).

Almost four months after the October 28th launch, and shortly after learning that NASA had selected another MSU satellite for possible launch on a NASA rocket next year, SSEL Director David Klumpar cheered as he suddenly realized that Montana's only satellite had collected data for 111 days as of February 15th. Since then, the satellite has well surpassed the entire 111-day mission of its history-making predecessor, Explorer-1, the first successful U.S. satellite. "HRBE is working great," Klumpar said. "On February 15, we surpassed our goal."

HRBE, pronounced "Herbie," is the nickname of the tiny student-built satellite that was originally called Explorer-1 [Prime] and is now called the Hiscock Radiation Belt Explorer, or HRBE. The

MSU freshman Matthew Handley, left, and SSEL Director David Klumpar watch as information is downloaded from MSU's orbiting satellite. (MSU photo by Kelly Gorham).

satellite was renamed in November to honor the late William A. Hiscock, an MSU physics professor who headed the Montana Space Grant Consortium and the MSU physics department.

MSU students and faculty were thrilled when ham radio operators, first in Spain, then successively in France, The Netherlands and England, reported hearing from the satellite within three hours of its launch from the Vandenberg Air Force Base in California. HRBE later passed through an intense band of energetic electrons that was bombarding Earth's upper atmosphere above Alaska.

Since then, HRBE has been monitoring variations in location and intensity of the Van Allen Radiation Belts, which were discovered around the Earth by the original Explorer-1, Klumpar said.

MSU's satellite could orbit for 12 more years before its batteries die or it burns up in the atmosphere, Klumpar said. For an indefinite time before then, MSU students will continue to communicate with the satellite two or three times a day as it passes within range of their antenna on top of Cobleigh Hall. The satellite can be as far east as the Great Lakes or as far west as the California coast and still emit a signal strong enough for MSU to receive.

The computers allowed

him to see that the satellite was straight south of Mexico City and 305 miles above Earth. It was traveling at 18,000 miles an hour.

About six minutes later, Handley picked up the first beep that indicated HRBE was close enough to download data. Handley directed the satellite to send the information it had gathered since its last report.

That information—accompanied by loud squeals—looked like random letters and numbers scrolling onto the computer screen. Actually, they were codes that gave the status of the satellite's electrical systems, levels of radiation above the atmosphere, and more. About 15 minutes later, Handley lost touch with HRBE

as it neared the north coast of Alaska and passed around the other side of the Earth.

Ham radio operators play an important part in the mission as they contact MSU whenever they hear HRBE's "heartbeat," a beep that occurs every 15 seconds, Klumpar said. A map in the Space Operations Center keeps track of those operators. They live in Germany, Australia, Sudan, Japan, all over the United States and the rest of the world.

HRBE's February 15th milestone wasn't the only reason Klumpar and the students of the SSEL had to celebrate. That same day, they learned that NASA had selected an MSU satellite as one of 33 small research satellites to piggy-back on rockets it plans to launch in 2013 and 2014. The SSEL will build the satellite with partners from Colorado, Maryland, North Carolina and Kentucky, Klumpar shared.

"It's really a great endorsement of the fantastic work our students do that NASA selected us to participate in another NASA launch," Klumpar said. "We are training students who will be the next generation of space scientists and engineers."

The new satellites, like HRBE, are cubes that generally measure about four inches on each side and weigh 2.2 pounds. That's a standardized size that allows university-built satellites, called "CubeSats," to

The path of MSU's orbiting satellite appears on screen in the university's Space Operations Center. (MSU photo by Kelly Gorham).

InfoBeam

fit into an enclosed container called a P-POD and ride on a NASA rocket.

MSU's new satellite will be the same size as HRBE, Klumpar said. It could launch on a NASA rocket, possibly as early as 2013. The mission may last a little over seven years before the satellite reenters and burns up in Earth's atmosphere.

Unlike HRBE, the new satellite will be built out of nano-carbon-impregnated plastic instead of aluminum, Klumpar said. As it will be built with an unusual technique using technologies that grew out of the printing industry, the mission will be called PrintSat.

Members of The PrintSat Team will design the satellite on computers. Then, instead of sending their plans to a machine shop for fabrication, they will push a button. Computers will guide lasers as they build the satellite one layer at a time.

The process, called 3D printing or additive manufacturing, is used in building Formula 1 race car components and in the sport of motorcycle racing—the PrintSat Team want to show that it's a viable, affordable process for satellites, Klumpar said.

"Successful demonstration of the technology used in PrintSat will further lower the costs and speed the development of very small satellites, enabling future scientific missions comprised of dozens of satellites flying in formation," Klumpar said.

Jim White, president of Colorado Satellite Services, one of Klumpar's partners, said, "Additive manufacturing (also called 3-D printing) has evolved in the past few years to be a very inexpensive and fast way to make mechanical parts.

With PrintSat, the entire structure of the small satellite will be printed. As the first use of additive manufacturing for a satellite, we plan to show it's not only cheaper and faster, but that we can make parts that cannot be made in traditional ways.

"This also opens up new avenues for making specialized parts and for creating entire fleets of small satellites that can do things single satellites can't," White said.

Story by Evelyn Boswell for MSU News Service

Shakin' It Up

Brüel & Kjær is to provide ASTRIUM with an LDS vibration shaker system for mechanical vibration and shock testing of satellites.

Built within the scope of Republic of Kazakhstan SBIK satellite project, the system is for the new satellite Assembly, Integration and Test Complex (AITC). Brüel & Kjær will provide a Head Expander and LDS V994 Shaker, which will be equipped with a large auxiliary

The LDS V994 Shaker being prepped for a project.

slip table—and a special, extra bearing positioning. As part of the mechanical testing facilities, a shaker capable of operating in three axes was required.

ASTRIUM—an EADS company—has been selected as prime contractor from KGS (the JSC National Company "Kazakhstan Gharysh Sapary" reporting to the national space agency of Republic of Kazakhstan) for the SBIK satellite system.

The agreement covers the supply of Earth observation satellites equipped with a high-resolution optical sensor, an Assembly, Integration and Test Centre—and the entire ground segment of the system, which will carry out in-orbit operation, data acquisition and processing. ASTRIUM will also provide all satellite launch and test services.

New Spatial Capabilities For Chile

Astrium's teams have successfully completed the in-orbit delivery of the SSOT satellite system, which launched from the European spaceport in French Guiana on December 16, 2011.

In accepting delivery, the Chilean Air Force (FACh) confirmed that the conditions for the handover of the satellite, FASat Charlie, have been met in full within three months of its launch, thanks to its exceptional performance.

The SSOT program comprises a satellite and an operational ground segment based in Santiago, Chile. The satellite has a panchromatic resolution of 1.45m, representing unprecedented performance for a satellite weighing only 117kg. The 20 Chilean engineers operating it were trained at the Astrium site in Toulouse, where the system and satellite were developed and built.

SSOT is the latest satellite system to be exported by Astrium. Astrium is playing an active role at FIDAE 2012, which is currently taking place in Santiago, participating in conferences on space that have brought together, under the auspices of the Chilean Air Force, representatives from space agencies across Latin America.

Loopy Lighting So Far, Far Away

Thanks to NASA's Image Of The Day Gallery, we can observe the wispy tendrils of hot dust and gas glowing brightly in this ultraviolet image of the Cygnus Loop Nebula, taken by NASA's Galaxy Evolution Explorer.

The nebula lies about 1,500 light-years away and is a supernova remnant left over from a massive stellar explosion that occurred 5,000 to 8,000 years ago.

The Cygnus Loop extends more than three times the size of the full moon in the night sky and is tucked next to one of the 'swan's wings' in the constellation of Cygnus. The filaments of gas and dust
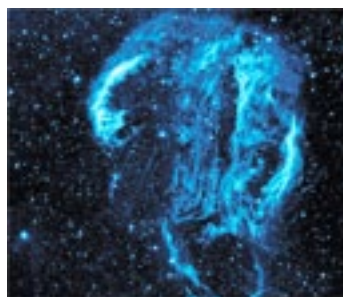
visible here in ultraviolet light were heated by the shockwave from the supernova, which is still spreading outward from the original explosion.

The original supernova would have been bright enough to be seen clearly from Earth with the naked eye. (Image credit: NASA/JPL-Caltech)

Satellite Services Rule

SES announced that satellite has become the leading TV infrastructure in Europe, ahead of terrestrial and cable reception.

Approximately 84 million European households have satellite DTH as their primary TV reception mode, an increase of 22 percent over the last four years.

In the same period, terrestrial TV lost nearly 16 million homes, while cable lost over 2 million. IPTV, the TV distribution over tele-

communication networks in IP format, has grown from a very low level to some 16 million households.

These are the results of the year-end Satellite Monitor that SES presents annually and that is based on primary research in 35 European and North African countries. The study is based on more than 62,000 interviews, conducted by leading market research institutes under the lead of TNS Infratest, Germany.

The main growth markets for satellite in 2011 were the U.K., Germany, Ukraine, Poland and Italy. The main growth drivers are the development of digital reception and HD.

Currently, satellite is the leading digital infrastructure, reaching nearly 44 percent of all 186 million digital TV homes in Europe. The digitalization rate of satellite is 97 percent, compared to 70 percent in terrestrial reception and 48 percent in cable.

The entire report and stats are available here.

The new study that SES presented in London also reveals that ASTRA is extending its position in the European markets. Around 142 million TV households are served by ASTRA, 7 million more than the year before and 25 million more than four years ago. More than half of the European TV homes (57 percent) receive their signals

from ASTRA. 73 percent of all European satellite homes are ASTRA households, a total of 62 million.

As a leader of digitalization and HD, ASTRA is also the leading HD platform in Europe. More than 23 million of the total 29 million satellite HD households in Europe are ASTRA households. The ASTRA Satellite System transmits 267 HD channels.

Worldwide, SES broadcasts more than 1200 HD channels on its fleet of 50 satellites and reaches 258 million TV households.

"This success confirms our view that satellite reception is the most attractive and future-proof mode for households to watch TV", said Norbert Hölzle, Senior Vice President Commercial Europe, in London.

"The trend in Germany, where satellite overtook cable for the first time in history, is confirmed in the UK as well as in Europe overall, where satellite outgrew the other reception modes. The number and variety of channels, the quality of the broadcast, and the large reach of satellite remain compelling arguments for households to decide for a satellite dish. The factual growth of satellite and ASTRA in the digital world confirms their leading role.

"It puts us in a strong position to compete with other networks and combine our strengths with DSL and broadband reception. The

combination of both in the connected TV will be the best of all possible worlds for the TV viewer."

Transponders + Revenues

NSR (Northern Sky Research) recently released the industry's first systematic assessment of key financial metrics for FSS satellite operators.

This new study, "Satellite Operator Financial Analysis," analyzed a wide range of metrics including overall revenues, cash flows, capital expenditure requirements, debt levels, and return on satellite investments.

Beyond a detailed assessment of the top publicly reporting FSS operators, this study also ranked operator's by each metric based on their 2010 score as well as undertook a statistical analysis of the main qualitative financial metrics in order to establish benchmarks for the industry in terms of general, average values for these metrics as well as the typical distribution of the metric values.

One particularly pertinent metric for FSS operators is average annual revenues per leased transponder, which

was determined by dividing an operator's total annual revenues by its number of leased transponders as of the end of its fiscal year.

While this should not be treated literally as transponder pricing because FSS operators often obtain revenues from other sources besides capacity leasing, the average annual revenues per leased transponder still provides considerable insight into trends among operators and by region.

As a whole, the FSS industry tends to average US$2.1 million per year in revenues per leased transponder. More telling, though, was that there was a very large standard deviation associated with average annual revenues per leased transponder of about US$1.5 million. This was primarily driven by a small number of operators who could generate well in excess of this mean value, in terms of average revenues per leased transponder. Conversely, the median value for average annual revenues per leased transponder actually fell under the average at US$1.7 million. This indicates that the majority of operators actually earned less than the average.

This last point is best illustrated by assessing this metric based on where each FSS operator obtains the majority of its revenues.

For FSS operators dominant in Western Europe, they typically averaged nearly US$2.8 million per year from each leased transponder, while those with most revenues coming from the Americas actually averaged the least per leased transponder at just under US$1.8 million.

For FSS operators seeing most of their revenues coming from Asia, they actually came in just above the Americas averaging just over US$1.8 million per year from each leased transponder. However, the variability in average revenues per leased transponder in Asia was more than twice that of the Americas indicating that parts of Asia were much more lucrative than the Americas (e.g., Japan), while other parts of Asia were much less so. This trend is illustrated by the fact that the median value of annual revenues per leased transponder in the Americas was higher than in Asia.

For FSS operators deriving most of their revenues from Central and Eastern Europe, the Middle East and Africa,

these players averaged nearly US$2.2 million per year from each leased transponder, but, again, the range of values was nearly as large as Asia indicating substantial variability in pricing in this region.

Average annual revenues per leased transponder, even if not exactly corresponding to average transponder prices, is nonetheless a very useful industry benchmark for the FSS sector. On one side, it allows easy comparison to be drawn between individual operators as well as illustrating different regional trends.

From the other point of view, this benchmark, which is statistically derived from more than 150 data points, allows for quick revenue estimates for business planning either on a per satellite basis or for estimating revenue generation potential for individual operators.

Analysis by Patrick French, Strategic Analyst, Satellite Communications Group

The Terminal-ator— A 2K Expansion

Hughes Network Systems has announced that its long-time customer, Skyband of Saudi Arabia, is expanding its broadband satellite services business with an order for more than 2,000 additional HX satellite terminals.

In 2009, Skyband purchased a multi-satellite HX Gateway, which is designed to unlock the maximum value from high-quality, IP broadband networking, including specialized applications such as mobility. It makes it easy for operators to expand broadband services across virtually all multi-satellite coverage situations, while maintaining the powerful network management, extensive diagnostics and scalability of the proven HX System.

Efficiency and flexibility in using satellite bandwidth is at the core of the HX

Ave. Annual Revenues Per Leased Transponder

Mean: US$2.1 M
Median: US$1.7 M
Standard Deviation: US$1.5 M

US$ Millions per Transponder per Year

$0.0 $1.5 $3.0 $4.5 $6.0 $7.5

Source: NSR

InfoBeam
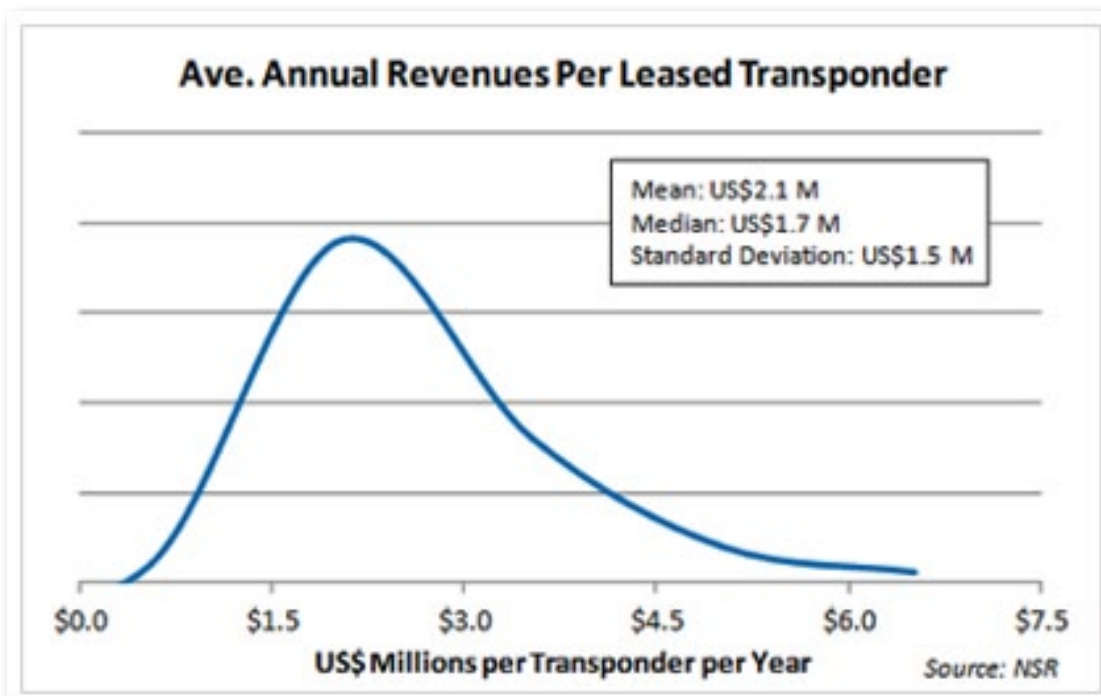
System design. Based on the industry-leading Internet Protocol over Satellite (IPoS) standard, approved by ETSI, ITU, and TIA, the HX System can be readily configured to provide a specified Quality of Service (QoS) for each link to a particular terminal, enabling operators to provide services tailored to a customer's specific requirements. An optimized bandwidth allocation scheme is employed which mitigates cost of space segment, whereby idle terminals release their bandwidth assignments to a shared pool. HX remote terminals use FDMA/TDMA channels to communicate with the HX Gateway in star mode, or simultaneously to other terminals in mesh mode, with each channel supporting high-speed data rates.

Skyband is one of the first VSAT (very small aperture terminal) service providers in the Kingdom of Saudi Arabia. Skyband offers a wide range of communications solutions including managed network services, ATM and banking connectivity, GSM networks and backhaul, video conferencing, and broadband IP applications to a variety of enterprise and government sectors. The HX System is ideal for these and other specialty markets such as Virtual Network Operator (VNO) hosting and Communication-On-The-Move (COTM) for airborne/maritime/land, including defense and Intelligence, Surveillance, and Reconnaissance (ISR) solutions.

An Atmospheric Amazement

Five sounding rockets streaked into the pre-dawn sky on March 27, 2012, leaving trails of milky white clouds in a little understood part of the atmosphere.

The first rocket was launched to the cusp of space at 4:58 a.m. Eastern Daylight Time and the subsequent launches occurred at 80 second intervals. The goal of the Anomalous Transport Rocket Experiment (ATREX) was to improve understanding of the process that drives fast-moving winds high in the thermosphere.

Fiery trails from four of the five sounding rockets are clearly visible in this time-lapse photograph (top) of the

launch. The second image shows two of the clouds left in the wake of the experiment;

the rockets released trimethyl aluminum, a substance that burns spontaneously in the presence of oxygen.

The harmless by-products of this glowing reaction were visible to the naked eye as far south as Wilmington, North Carolina; west to Charlestown, West Virginia; and north to Buffalo, New York. Both photographs were taken near the launch site at NASA's Wallops Flight Facility in Virginia.

Throughout the experiment, researchers used specialized cameras in North Carolina, Virginia, and New Jersey—as well as temperature and pressure instruments on two of the rockets—to monitor the clouds. By measuring how quickly the clouds move away from each other and integrating that information into atmospheric models, they hope to improve their understanding of the 320 to 480 kilometer (200 to 300 mile) winds in the thermosphere.

First noticed by scientists in the 1960s, the winds are thought to be part of a high-altitude jet stream that's distinct from the one lower in the troposphere, where commercial aircraft fly. Observing the turbulence produced by these winds should make it possible to determine what's driving them.

An improved understanding of the upper jet stream will make it easier to model the electromagnetic regions of space that can damage satellites and disrupt communications systems. The experiment will also help explain how the effects of atmospheric disturbances in one part of the globe can be transported to other parts of the globe in a mere day or two.

The launches are part of a broader sounding rocket program at NASA that conducts approximately 20 flights a year from launch sites around the world.

Speaking Of Those Sounding Rockets...

Kratos Defense & Security Solutions, Inc. was totally involved with the successful launch by NASA of the sounding rockets as indicated in the previous news story.

The Oriole rocket system in that launch was produced by Kratos' Rocket Support Services (RSS) business unit located in Glen Burnie, Maryland. This was the first Oriole rocket launched by NASA and was one of five rockets launched from the NASA Wallops Flight Facility in Wallops Island, Virginia, over a six minute period as part of a study of the upper level jet stream. The rockets carried payloads which released chemical tracers that created milky, white clouds at the edge of space that were visible throughout the U.S. Mid-Atlantic region.

As noted by NASA, the mission, dubbed the Anomalous Transport Rocket Experiment (ATREX), was performed to gather information needed to better understand the process responsible for the high-altitude jet stream located 60 to 65 miles above the Earth's surface. NASA has initially purchased six Oriole rocket systems from Kratos to support the program.

Dave Carter, President of Kratos' Defense Engineering Solutions division, said, "We are very pleased with the successful inaugural Oriole launch by NASA and look forward to a long and fruitful

relationship providing Oriole rocket systems to support the NASA Sounding Rocket Program. The Oriole rocket system is very versatile and was developed to support technology research and missile defense target programs, in addition to scientific research."

Eric DeMarco, Kratos' President and Chief Executive Officer, said, "The NASA Sounding Rocket Program has a long and enviable history supporting upper atmospheric and other suborbital scientific research. Kratos is proud to provide the Oriole to augment NASA's family of suborbital rocket systems."

An 'Enabler' For The U.S.A.F.

The ultimate compliment is to do to something so well that folk keep coming back for more...even rockets!

Orbital's Minotaur-1 vehicle on a launch pad.

Orbital Sciences Corporation has announced that the U.S. Air Force has exercised an option order for a Minotaur I space launch vehicle to support the ORS-3 "Enabler" mission for the Operationally Responsive Space (ORS) Office of the Department of Defense.

This most recent Minotaur I space launch vehicle ordered by the Air Force will be launched from the Mid-Atlantic Regional Spaceport (MARS) facility at NASA's Wallops Flight Facility at Wallops Island, Virginia in 2013.

"We are very pleased to continue to provide cost-effective military space missions for the U.S. Air Force," said Mr. Ron Grabe, Orbital's Executive Vice President and General Manager of its Launch Systems Group. "For the past 15 years, the Minotaur program has provided highly reliable and affordable launchers that combine government-owned propulsion systems with commercial rocket technology to support Department of Defense and other U.S. government space missions."

The Minotaur I is a four-stage solid fuel space launch vehicle utilizing Minuteman rocket motors for its first and second stages, reusing government-owned motors that have been decommissioned as a result of arms reduction treaties.

To date, Minotaur I has conducted 10 missions with a 100 percent success rate, delivering 32 satellites into orbit, while the entire Minotaur product line (see description below) has established a perfect 23-for-23 mission record.

The Enabler mission will be the fifth Minotaur I rocket to be launched from the MARS facility, following the TacSat-2, NFIRE, TacSat-3 and ORS-1 missions that were conducted from the Eastern Virginia launch site in 2006, 2007, 2009 and 2011, respectfully.

Weather Works

Following the safe arrival of the MetOp-B weather satellite in Kazakhstan, the sophisticated craft is now being carefully assembled and tested before launch on May 23rd.

MetOp-B will provide essential data for weather forecasting and climate monitoring. Developed as a joint undertaking between ESA and Eumetsat, the MetOp program comprises a series of three identical satellites for continuous observations until year 2020.

The first in the series, MetOp-A, was launched in 2006 and marked a new era in operational meteorology—it was Europe's first weather satellite to orbit Earth from pole to pole.

The satellites carry a host of sensitive instruments to provide key information on a wide range of variables such as temperature and humidity, wind speed and direction over oceans, ozone and other atmospheric gases for numerical weather prediction and climate monitoring.

With MetOp-A still in service, the two satellites will orbit in tandem, increasing the wealth of data even further.

MetOp-B arrived at the Baikonur Cosmodrome on 6 March after being transported from Toulouse, France on an Antonov cargo aircraft.

Two separate flights

The MetOp-B satellite payload module being lowered onto the trolley for its first inspection after arrival at the launch facilities in Baikonur. Credit: ESA

carried the satellite's solar array and the supporting equipment that is being used to prepare the satellite for launch.

MetOp-B will be launched on a Soyuz rocket with a Fregat upper stage.

Now that the satellite and support equipment has been unpacked and inspected to make sure that it wasn't damaged in transit, it will spend the next weeks being thoroughly tested before being encapsulated in the rocket fairing.

"We are extremely pleased to see MetOp-B arrive safely at the launch facilities," said Luciano Di Napoli, ESA's project manager.

"The next weeks are extremely important to make sure this advanced satellite is in perfect condition for launch."

The MetOp satellites are built by a European consortium led by EADS Astrium.

The MetOp program is Europe's contribution to a cooperative venture with the U.S. National Oceanic and Atmospheric Administration (NOAA). The satellites are designed to work in conjunction with the NOAA satellite system, flying in complementary orbits to offer maximum coverage.

MetOp-B being readied for testing after arriving at the launch facilities at Baikonur. Credits: ESA

Gottlieb On Maritime...

A Battle Royale—Distribution Partners + Customers Vs. Inmarsat

By Alan Gottlieb, Managing Director, Gottlieb International Group, Inc., and Contributing Editor

Singapore March 15th: Here at the *ACi Maritime Communications Conference*, the clouds of war are gathering. Inmarsat's Distribution Partners (DPs) and customers are rising up in unprecedented fury in response to Inmarsat's recently announced price hikes. Driven by an ill-advised telephone company-like strategy, the communications giant has instituted unexpected dramatic and crippling price increases to its Standard, low use plans. This has sliced the margins of their distributors and has incited customers to action. Time is almost up—as discontent mounts into open revolt, Inmarsat terminals could soon be sinking into the sea.

Led by Adonis Violaris, Director of Telaccount Overseas Ltd., member of Bernhard Schulte Shipmanagement, shipping companies at the Conference broadsided Inmarsat's Michael McNally with a barrage of attacks and threatened to move their business to Iridium and KVH if the price increases are not rescinded. Make no mistake: the opposition is organizing, and boots are on the ground.

In further affirmation of the seriousness of the issue, the Cyprus Shipping Chamber and the German and Hong Kong Ship Owner's association have been directed by their member companies to take the price hike issue to the International Chamber of Shipping reflecting the consequences of what many believe to be an unjustified and ill timed effort to compensate for the strategic errors that have led to the huge recent decline in Inmarsat stock price.

Strategies That Failed

Such blunders are not new to Inmarsat. After spending billions to launch the *i4* constellation, billions more are now at risk with the *Global Xpress* project, all due to the entrenched monopoly's managers failing to recognize that the world was moving toward a fixed-priced broadband model—until they actually saw the wholesale migration to VSAT systems hitting their bottom line.

Now, this team of managers has placed the Company on a path toward war with the very distribution partners Inmarsat so desperately needs to sustain and grow its business. To

understand the gravity of management's mistakes, one only needs to examine how Inmarsat's new strategy evolved and how it affects their Distribution Partners and customers.

Initiated as a move to shield its distribution from purchase by private equity firms or competitors, the "going direct" strategy was introduced with the purchase of **Stratos** and, later, **Segovia**. DPs, infuriated by what appeared to be a thinly veiled effort to infringe upon their turf and recognizing the trend toward fixed-priced broadband, countered with their own VSAT offerings. During the same period, the availability of over-ocean Ku-band VSAT increased, and to this day, continues to increase. By 2014, nearly 95 percent of the world's shipping routes will have Ku-coverage, thanks to Intelsat's new, *Global Mobility Network*.

Despite the proliferation of Ku-, Inmarsat still held one card: as ship owners often charter their vessels and never know exactly where there ships need to travel, communications coverage must be global, and VSAT systems occasionally fail. Therefore, the new VSAT services required a backup, and until Inmarsat's recent price increase announcement, *Fleet Broadband* (**FB**) was the ideal solution. In the meantime, VSAT's continued pressure on the Inmarsat revenue stream mounted and Inmarsat desperately sought a competitive solution to VSAT. Enter... *Global Xpress*.

Why Not Ku-Band?

After years of deriding Ku- VSAT as an unreliable substitute for Fleet Broadband due to its Rain Fade characteristics, Inmarsat found itself needing to deploy the very same Ku- technology that it had vigorously opposed. But now, that option was no longer available. The FSS operators had already appropriated the necessary orbital slots.

Inmarsat's i5 satellite

While it may have been possible to negotiate a deal with the FSS operators for Ku-band transponder space or a Hosted Payload arrangement, Inmarsat management decided that, rather than make a humiliating run to its FSS competitors, it would take the only other possible alternative: launch a totally new, Ka-band constellation. Never mind the fact that Ka- is much more sensitive to Rain Fade than Ku-band and requires an even more precise and expensive antenna than Fleet Broadband. With this new strategy, Inmarsat management could position themselves as visionaries rather than be condemned for a lack of foresight and missing the turn in the market.

Since the introduction of the "visionary" inspired Global Xpress service, doubts have begun to emerge among satellite engineering experts as to the viability of Ka- for the "mission critical" maritime applications now being adopted in the rain intensive maritime environment. Given the questionable viability of Global Xpress and the fact that it is unproven, Inmarsat needed

a way to assure a distribution path for its new service. This realization resulted in the purchase of **Ship Equip**, an aggressive young company that saw the shift in the market to VSAT and cleverly rode the trend up to $55 Million in Revenue and 1,000+ VSAT installations—all while the managers at Inmarsat were touting the narrow-band virtues of the i4 service and deriding VSAT as unreliable.

Buying A Distribution Channel

Recognizing that much of their business had been built upon the uncharacteristically high demand for VSAT in the Norwegian region, Ship Equip's insightful managers and investors recognized that the market that had produced their stunning rise was becoming saturated. The "low hanging fruit" had been "picked" and now Ship Equip would face a rapidly growing army of competitors in markets less receptive to the purchase of VSAT services. It was time to cash out. To do it they needed a buyer with a less savvy view of the shifts in the market. Enter Inmarsat, a company who so desperately needed a channel to launch its Global Xpress service that it was prepared to pay far more than anyone else, despite the fact that Ship Equip has likely seen an end to rapidly accelerating growth.

After spending nearly $159 million for the Company, Inmarsat management slowly began to realize that this new channel might not be enough to assure success. Inmarsat developed a new tactic to "strong arm" its distributors and customers to purchase Global Xpress: a new hybrid Ku- and L-band service called *Xpress Link,* featuring an upgrade path to Global Xpress and combined with a dramatic price rise on its low usage Standard Plan Fleet Broadband products.

Inmarsat packaged its own service, Xpress Link, which consisted of Ku-band with an FB back up with unlimited Fleet Broadband as part of the package. The Company then instituted its new FB pricing strategy aimed specifically at competing DPs that sell VSAT, hiking the retail price of the basic Standard package by more than 200 percent, and by 40 percent on the larger Standard packages, up to 50 Megabytes with all-voice charged extra.

The supposition is that Inmarsat assumed that by making it uneconomic for its competitors to use FB as a backup service, and then giving that service away as part of the new Xpress Link service, it could force its customers to buy into its upcoming Global Xpress service; thus disregarding the potential effects of the price rise on its own loyal DPs as well as a large market of other low-end users in the fishing and bulk carrier vessel segments that might never upgrade to a VSAT service. To understand the effect of this move on the DPs, one needs to understand how the wholesale pricing structure of the service has been altered by the price increases.

While the end-users seldom pay the suggested retail price, the real news is the dealer cost for the Standard Package goes up from $35 to $100. This slashes dealer margins on long term contracts and places dealers in the awkward position of having to raise prices to their customers or take a huge hit on margins—an especially delicate situation inasmuch as distributors have many contracts in place with a locked-in, three-year duration. Those distributors fortunate enough to have the contractual flexibility to pass along the price rises to clients are facing an unprecedented level of resistance from those customers.

Adding to the furor over the increases was the effective date of the price rises. The changes go into effect May 1st, right in the middle of the shipping industry's budget year, thereby confronting the shipping community with an unbudgeted and dramatic price rise.

Gottlieb On Maritime...

Rupert Pearce, Inmarsat's CEO, summed up his new strategy, "Because VSAT isn't global, VSAT isn't resilient, VSAT does crash when in adverse weather conditions. And VSAT above all was not built for maritime, unlike Global Xpress. They've appropriated the edge of beam coverage around the world of Ku-band networks. So ship owners have to have Fleet Broadband alongside it. Well guess what, it's just become uneconomic for VSAT operators to do that. So they're going to have to suck it up or move to Xpress Link."

Pearce's tirade rhetoric as well as his ill-informed understanding of the market is stunning. Not only are Ku-band VSAT providers not relying on the edge of Ku- satellite beams—the major ocean routes are now completely covered by Ku—the higher frequency of his proposed Global Xpress is much more vulnerable to adverse weather conditions than proven Ku-band VSAT. Furthermore, his inflammatory and arrogant attitude, totally inappropriate for the CEO of a large, publicly held company, as well as his outrageously misleading commentary, will, no doubt, further contribute to the vast rift forming between Inmarsat and its once loyal and supportive network of distributors and customers. How the new policy will affect each segment of the market is telling and bodes ominously for Company as well as personal futures.

DPs In Revolt

For those DPs selling VSAT, the Inmarsat policy markets a bitter assault on their businesses for the following reasons:

1. As provider of Ku- VSAT services, most of the DPs buy their own bulk bandwidth from satellite operators, manage and repackage it for SPs and end-user customers. This gives them the flexibility to allocate bandwidth as they see fit to maximize the profitability of their services. With Xpress Link and Global Xpress, this advantage disappears, and they become only commissioned sales agents receiving a 17 percent commission;

2. We understand from our sources that Inmarsat intends to provide the complete service potentially eliminating value-added packages that enhance differentiation between the providers including installation, repair, software and support thereby eliminating the opportunity for DPs to increase their margins by selling these services. This renders obsolete any third party value-adds, including software that, in some cases, has cost DPs million of dollars to develop;

3. They are rumored to demand that DPs must agree to sell only Inmarsat services;

4. Inmarsat, not the DPs or SPs, will own the customer;

5. Inmarsat will compete directly with its DPs with both channels under *Frank Coles*, the new president of maritime, a dubious distinction that gives little comfort to the DP Community that the channels will be managed independently;

6. Finally, we hear that Inmarsat is now offering to install Xpress Link services with no upfront payment from the customer—a desperation based practice further inflaming competing DP partners;

7. All of this is in addition to the dramatic wholesale price rises discussed previously. The net affect of such policies can only cause a stampede of DPs moving away from Inmarsat to Iridium as a Ku-band Back Up and to **KVH Industries**, a firm that has cleverly developed the ultimate alternative for VSAT communication, the *V11*, a service that does not use, or need, Inmarsat.

The KVH V11—Inmarsat Not Needed

This very clever service targets Inmarsat's core market, the lucrative large fleets of Tankers and Containerships. KVH's timely response features a unique 1m antenna that combines C- and Ku-band into one complete package. Using Spread Spectrum technology, the service will deliver relatively unlimited fixed price, high speed broadband at up to 1 Megabits per second speeds (or metered, if desired), and will be available this summer.

Due to the fact that both services are on a single antenna, KVH will offer Iridium as a backup in the unlikely case that the system requires remote diagnostics or service over a satellite link. In our view, this service is a major advance over the *V7* offering much better coverage and a backup C- service that is for all intents and purposes, as rain immune as Inmarsat's Fleet Broadband.

The likely end result of the Inmarsat policy is that its major DPs will be aggressively pushing **OpenPort** services and in parallel will seek their own C-band Back Up alternatives. Other DPs and resellers will rush to KVH. We also believe that this potentially market moving service is the forerunner of other C-band based back up solutions, all of which may have a potentially devastating affect on Inmarsat's market share.

For the end users that already have FB terminals, the affect of the price changes is far reaching.

Slamming The Shipping Customers

While Inmarsat has lowered its prices slightly on the SCAP offerings in a further effort to compete against VSAT, its management has failed to recognize that a large segment of the market (*i.e.,* Bulk Carriers and some Container Vessels and Fishing Vessels) does not have sufficient data requirements or communications budgets to afford the SCAP or VSAT and, therefore, will be adversely penalized by these unjustified price hikes to FB and F55 and F77 prices.

For these, and other small vessel segments, reeling from low freight rates and struggling to survive, the effect of the 40 percent plus price hikes on the "Standard" plan is significant. The fact that Inmarsat, who is currently making a profit, would hike prices to users in a time of economic trouble is astounding.

In response, and in addition to the actions underway by the Cyprus and German shipping communities, the Greek IT Managers in Europe are starting to build up an alliance against Inmarsat pricing. **A.M.M.I.TE.C.**, the *Greek Association of Maritime Managers in Information Technology & Communications*, is actively involved in these efforts and is seeking the participation of similar shipping organizations around the Globe. In addition, rumors abound that anti-competitive legal action is under consideration including taking the case to the European Commission.

Given the fact that Inmarsat has sold thousands of Fleet F77 and FB terminals based on the data and voice rates available at the time of purchase, ship owners not protected by long term contracts with DPs are now faced with the choice of either pushing these terminals into the sea, paying significantly higher prices for the same service, or purchasing OpenPort terminals, or heading over to KVH. We expect the Inmarsat price hike issue will soon explode onto the floor of maritime organizations and courtrooms around the world.

In Conclusion

Inmarsat is under enormous pressure. Its "go direct" strategy has infuriated its once loyal distribution partners and is pushing them to alternative suppliers and competitive technologies. The viability of its highly touted Global Xpress for maritime applications is being questioned. A new wave of Ka- competitors threatens to create over capacity in the Middle East, a market Inmarsat management projected to be a major new source of revenue for Ka-band, and Global Xpress is unlikely to be widely adopted by the major trans-Atlantic and Pacific Carriers due to insufficient capacity on high demand trans oceanic routes. Finally, the lucrative revenue stream from **LightSquared** is ending.

Ultimately, we believe that shareholders and the Inmarsat Board will recognize that management's misunderstanding of the market and its customers has submerged the communications giant in a toxic brew of circumstances, and will act to terminate this bizarre strategy that ultimately threatens the long term viability of Inmarsat.

About the author

Mr. Gottlieb is Managing Director of Gottlieb International Group Inc. Established in 2001; his firm, located in Washington D.C., is a recognized global authority on the use of VSAT on Commercial Vessels. His firm provides Market research, Business Development and Sales Training in Maritime and Oil & Gas Satellite Communication Markets. Major clients include Satellite Operators, Equipment Manufacturers, VSAT Vendors and Private Equity firms. His publications include Buying VSAT, The First Independent Guide, and numerous articles published in SatMagazine, Digital Ship and other publications. He is a frequent speaker at Digital Ship, ACi Conferences, Riviera Marine maritime satellite conferences and Orange Business Live.

Editor's Note

The Battle of the Saintes, painted by *Thomas Mitchell*, was fought between the British and the French fleets in 1872 as a part of the conflict that occurred after the rebellion in the-then 13 colonies. These naval engagements took place, starting on April 9th, with the decisive action fought on April 12th. The name Saintes comes from a group of islands located between *Guadeloupe* and *Dominica* in the West Indies. (Image courtesy of the **History of the Sailing Warship in the Marine Art** website at *http://www.sailingwarship.com*).

Baudry On M2M...

A Fast Growth Market—Machine Mastery

By Maxime Baudry, IDATE, and Contributing Editor

M2M is a growing segment for the satellite industry, although satellite still has only a small share of the machine-to-machine market which is largely dominated by cellular systems: around 2 percent in terms of volume and 6 percent of revenue in 2011, according to IDATE's findings.

For most operators, M2M is still very much a niche market, but everything points to real growth potential for these applications.

While it is sectors such as fleet management and maritime security that have driven the sector's development up to now, new markets have been emerging over the past several years, especially in the area of energy, but also in the homeland security/military arena.

Satellite M2M: A Fast-Growing Market

There are several factors driving the growth of satellite M2M applications, starting with:

- Clear assets in terms of coverage: once classic and low-cost wireless solutions (chiefly GSM and 3G) are no longer available—satellite becomes the only possible solution for M2M applications. This is especially true of vast desert areas, and of oceans where demand for M2M solutions is high: for tracking fishing vessels, dangerous cargo, monitoring offshore wind farms, etc.

- Tremendous increase in applications requiring M2M. Examples here include smarts grids in the area of energy, tracking shipments—whether on land, sea or in the air—and for the military which are heavy users of M2M applications for tracking combat assets (Blue Force Tracking), in addition to having the means to pay for very high-end and so very expensive products.

- Complementary nature of terrestrial and satellite networks to deliver M2M links end-to-end. Manufacturers have been innovating over the past several years by rolling out hybrid equipment which is being used more and more by operators. Orbcomm was a pioneer in this field, and was then followed by players such as Iridium and Inmarsat.

- Stricter regulation. Recent developments in maritime regulation, notably the adoption of stricter regulations over monitoring commercial vessels, have been beneficial

to satellite which is the only possible solution for this type of application outside of coastal areas.

As a result, according to IDATE, the global satellite M2M market is expected to grow to 2.3 billion EUR by 2016. The region with the highest rate of progress will be Asia-Pacific thanks to developments in countries such as China, Indonesia, Vietnam and India.

Core Markets Are Niche Markets

Fleet management, industrial security and maritime security are sectors that operators have been targeting for some time, and ones where they are starting to earn a solid return on their investments.

Other sectors that will sustain the satellite M2M market in future have begun taking shape over the past several years. Examples include the energy sector, through the deployment of installations both offshore (chiefly wind farms) and in the desert (solar plants), which will be a major source of growth. This is also true of the homeland security/military sector which has initiated a number of projects, including container tracking, battlefield assets tracking, and so on—for which a satellite solution is crucial.

Users may also have very specific needs depending on the application being considered, such as the need for miniaturised modules for fleet management. But certain technical criteria have by now become commonplace for any type of solution:

- High enough bitrates (in the several Kbps) to support the transmission of a more or less large volume of data due to the use of a growing number of sensors.

Baudry On M2M...
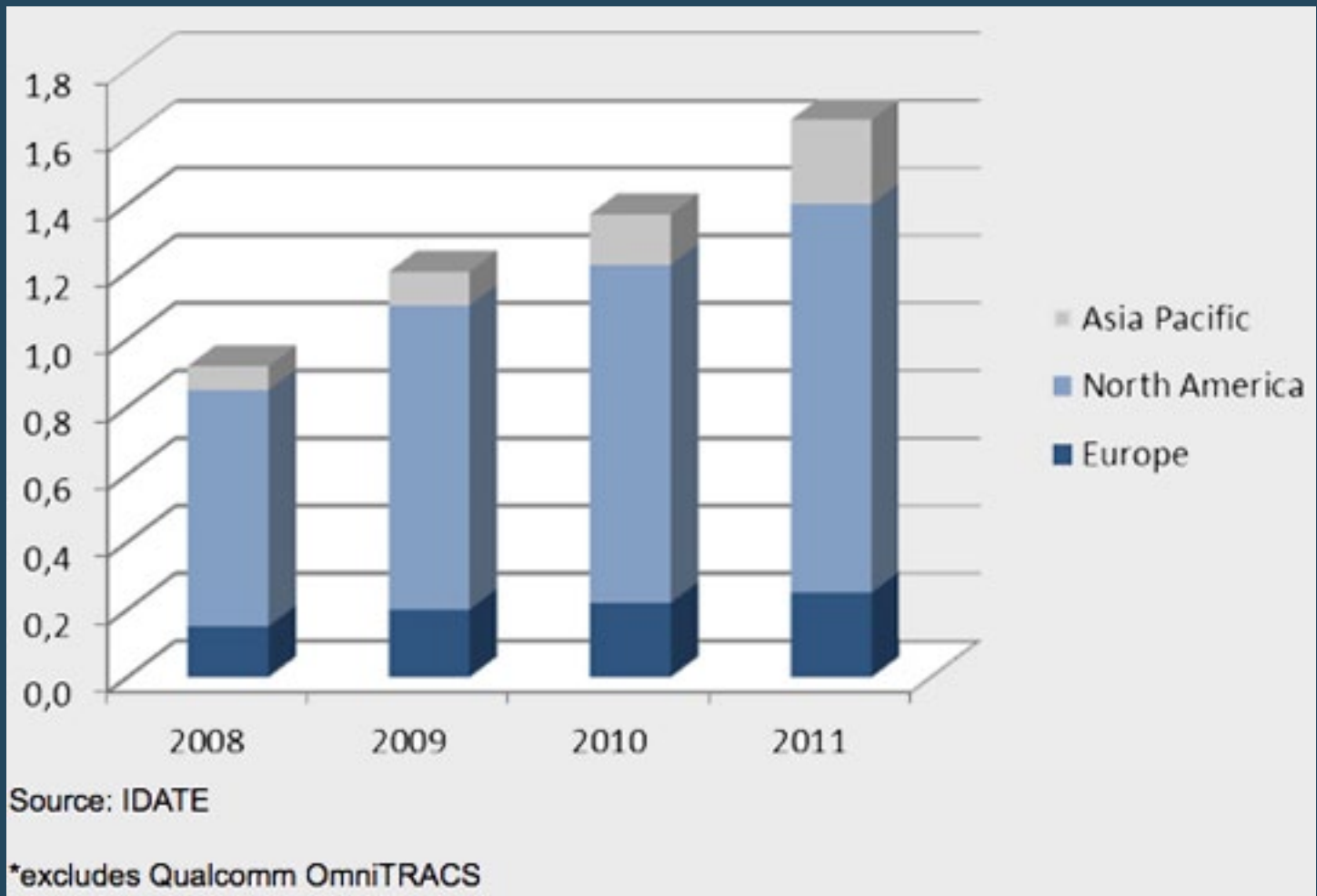
Figure 1. Growth of the satellite M2M market, in volume* (Million modules)

- Two-way transmission capabilities, especially to be able to receive confirmation that data has been received.

- Lowest possible latency and the ability to have virtually real-time transmissions (currently, 15 ms for the most powerful systems).

- Lowest possible energy consumption.

Satellite Operators Adopting Various Positions

When positioning themselves in the M2M market with respect to terrestrial technologies, and especially cellular, satellite operators have several strengths they can capitalise on, but certain weaknesses as well.

It is by focusing on these strengths that satellite companies can distinguish themselves, from both a technical and marketing perspective, and adopt specific positions in each target market.

Thanks to the scheduled launch of a significant number of "new generation" satellite systems, these players will be able to keep up with the need for increased bandwidth in the M2M market, and the development of new applications, including the ability to deliver photo and video M2M content.

For the most high-end solutions, bitrates will soon be in the neighborhood of 100 Kbps, which is ten times what they are today.

About the author

Maxime joined IDATE as a senior consultant in April of 2006. His main area of endeavour is monitoring the satellite industry, the telecommunications services market and operator strategies. Before coming to IDATE, Maxime worked for two years for a major strategy consulting firm specialised in the space industry, where his work focused primarily on industrial analysis of satellite telecommunications for space agencies and the sector's equipment providers. Mr. Baudry holds a Masters degree in Technology & Management (Ecole Centrale de Paris), and is a graduate of the Ecole Multinationale des Affaires/ Bordeaux Business School (E.S.C Bordeaux & Fachhochschule Münster's ERASMUS program).

The Middle East Continues To Make Strides

By Chris Forrester, Editorial Director, Broadgate Publishing + SatNews Publisher's European Editor

The SES Stand At CABSAT

The Arabsat Stand At CABSAT

The annual Dubai *CabSat* show was another humdinger and bigger than ever—some major players were in town to show their flags and make heavyweight statements that the Middle East/Africa markets are just as important to them as North America, Europe, or the Asian region. Indeed, while Arabsat's giant booth dominated the satellite 'end' of the hall (Sony and the likes of Panasonic were at the other end), it was SES which had a significant presence, both in terms of booth size and staffing, especially when you include the O3b booth and YahSat/YahLive contingent. It was also interesting to see SES Platform Services present and busy.

Dubai... where size matters

There were a slew of **YahSat**/*YahLive* stories issued, not the least includes the signatures on a **Newtec** deal (with YahSat) and strong statements from YahLive as to the HDTV contracts they were securing. The only dilemma, and perfectly normal at the start of any new venture, was the near-silence as to what the value in transponder rental leases represented in the short term.

Eutelsat were not to be outdone, and while their floorspace might not have been as large as Arabsat's (or that of SES) again it was noted that CEO *Michel de Rosen* was in town making courtesy calls along with *Jacques Dutronc* (Eutelsat's Chief Development and Innovation Officer) and *Andrew Wallace* (CCO) amongst many other Paris-based visitors.

Of course, these senior folk have plenty to discuss. Topmost was people's curiosity whether Eutelsat and Arabsat would solve their 25.5 degrees East squabble which directly affects Eutelsat's project with Qatar's *Es'Hail 1* craft that is due to launch later next year. Despite smiles all around—and suggestions from some of the parties directly involved that an agreement is extremely close—there was no 'white smoke' or even a burnt kebab to suggest a deal had been struck.

The pressure, however, is on for a bargain to be struck, given that Qatar's Es'hail 1 is in build, and a large slice of its Ku-/Ka-band capacity already sold or committed by Qatari governmental and broadcasting interests. Al Jazeera is just waiting for a successful launch, for example. Incidentally, while Qatar Satellite Company was NOT present at CabSat as far as square footage was concerned, they were very much in evidence at the Doha QitCOM event last week.

Arabsat was busy with a constant stream of visitors. Their team were enthusiastic about the growth of HDTV, promising 40+ channels would be on air by the end of this year. There was also optimism about their planned expansion "to the East", and the possibilities about acquiring Malaysia's *Measat* (see separate story).

Arabsat's arch-rivals **Nilesat** had a smaller booth at CabSat, and without *Salah Hamza* who, despite just gaining promotion to CEO (officially he was 'Chief

The Forrester Focus

Dubai predicts 7,000 media/ IT-related companies

Dr. Amina Al Rustamani heads up Dubai's Media City and related business parks, already home to some 4,500 businesses in the various "City" Free Zone enterprises scattered up and down the Sheikh Zayed Road, Dubai.

Speaking at the Dubai CabSat show she says that, at least as far as Dubai is concerned, the recession is over, and declared that 2012 is the year where she expects more growth. However, even in the past year or two when Dubai was undoubtedly still suffering from the global recession, Dubai managed to attract 654 new companies to one or other of its business parks.

Of course, some businesses closed during the downturn, but now Dr. Al Rustamani says it is time to be positive again. She is cautiously optimistic that Dubai's relentless growth should continue, telling journalists that adding another 7,000 IT-related companies over the next 10 years is quite possible.

"It's not that people just get amazed with what they see physically—the first thing they look at is the legal framework, not just the real estate... What made these projects successful is two factors—the Dubai factor, and the second is the commitment of the government to make this a free zone and really operate as a free zone," she told Arabian Business.

She says that despite ample talk of doom and gloom these past few years, and global stories reporting the 60 percent fall in Dubai real estate prices, the Emirate is back on a growth curve.

Dubai's five core 'City' Free Zone real-estate schemes are currently 82.1 percent filled, and between them employ almost 70,000 people, not the least including some of the Gulf's major broadcasters.

Engineer' previously), had too much on his plate in Cairo to travel to Dubai.

Nevertheless, the numbers—in terms of channels—are simply staggering, and seem to continue to grow like a garden weed. **Nilesat/Eutelsat**'s 7 degrees West hot spot neighbourhood (and not forgetting **Noorsat,** which also has a slice of this action via its 'virtual' satellite operation using Eutelsat capacity) is now carrying a massive 822 channels, and growing day by day (and up 35 percent in 2011).

Arabsat, not to be outdone, claimed 450+ free-to-air TV channels on its system, 35+ HDTV (and a 3D channel) just at the moment, and the fruits of three payTV networks, as well as "the largest Arab community in the sky". The claim is more than validated by its **GlobeCast** links over North and South America and the Asian/Australia reach where the GlobeCast Global Arab Bouquet delivers.

It is worth remembering that despite three years of doom and gloom, and where the Gulf economy—and in particular Dubai—was squeezed, the general consensus is that the Emirate is back on its feet and looking forward again. Indeed, the chutzpah (not a word you hear much in Arab circles) exhibited by Dubai is just enormous. The tallest building on the planet at the Burg Khalifa, the biggest this, and the grandest that! Cheeky Dubai is building a brand new airport, spending US$34 billion on a brand-new facility that will be the biggest and busiest on the planet when it opens in 2027.

OK, I hear you say, they've plenty of desert to fill. And you are right, but they've also got the 'vision'—a vision that will

Qatar Makes FTTH Commitment

The gas-rich state of Qatar used QitCOM, its annual high-tech fair and conference, to announce that it would be funding the deployment of FTTH to all business premises and 95 percent of households by 2015.

The deployment will be under the control of Qatar's National Broadband Network Company. The Minister of Business and Trade, Sheikh Jassim al-Thani, is Q.NBN's board chairman.

"The establishment of Qatar National Broadband Network Company with the mandate to build a nationwide high-speed fibre optics network is crucial to the development of business, economic growth, innovation and enhanced services to all citizens and residents. It should transform the way we live and work. And I am confident that we will receive the utmost co-operation possible from all parties concerned to achieve the network rollout as planned," Sheikh Jassim said.

provide in various Gulf locations 10 new shopping malls (and the one beneath the Burg Khalifa is truly enormous) on the basis, it seems, that 'if we build it, they will come'.

Broadcasting shares this same optimism. The suggestions locally are

Nilesat 201 is the third telecommunications satellite Nilesat has placed into orbit since 1998.

Amos 4 + 6

Together with Amos 5, two new satellites (Amos 4 and 6) will greatly expand Spacecom's capacity. Extra capacity is coming on stream covering Central and Eastern Europe, and the Baltic regions, as well the Middle East generally and Africa in particular. This expansion in capacity will drive Spacecom's revenues forward dramatically, and some reports suggest that the overall aim is to see a tripling of revenues within about five years. The diversification is necessary. Some 35 percent of Spacecom's current revenues flow from the 'Yes' DTH operator over Israel. Thankfully, Yes has expanded, both in the number of channels on offer and with its shift to HDTV (and even 3D). Amos 4 will go to 65 degrees East, and is now scheduled for a 2013 launch, perhaps using a SpaceX rocket with which it has a launch option. Amos 6 will go to 4 degrees West, scheduled for launch in 2014 and will replace Amos 2.

that the Arab Spring, as well as creating a clutch of new governments will unleash plenty of private cash some of which will percolate into new privately-funded TV channels where previously they were forbidden.

Indeed, as a proof of this trend, even ultra-conservative Saudi Arabia's deputy minister for culture and information, Dr. *Riyadh Najm*, speaking at Arabsat's media forum, said he was confident that private channels would be allowed to domicile themselves in Saudi Arabia, a near-unthinkable decision just a few years ago.

In other words, this region will continue to provide growth for satellite operators and the industry's broadcasting equipment vendors. Which is why so many players were busy at CabSat. The future looks bright!

And, speaking of the Middle East, as we were, Israel's AMOS 5 satellite is "ready to work"

Spacecom's Amos5, launched on December 11, 2011, by **ILS** from Baikonur, was commercialised on January 25th. Some C-band clients have recently been relocating from Spacecom's temporary leased capacity (the former *AsiaSat-2*) to the new satellite at 17 degrees East. However, there are also further considerable expansion plans afoot with rumours that a new satellite order for *Amos-6* can be expected in the next few weeks, and that the new craft will be equipped with Ku-band and extra capacity from Ka-band.

Gil Ilany, Spacecom's VP/Marketing, in London recently for a series of briefings, said the in-orbit tests had all wrapped, and that EIRP-levels were working out to be as high as planned for both its C-and Ku-band deployments. Amos-5 was built to focus on Africa, and has, says Ilany, a wide portfolio of customers now signing up for service. "The potential deals are most attractive, although most customers were waiting until all was well. Those people are now confirming their business, and this includes clients in Europe."

The Forrester Focus

Gil Ilany, V.P., Marketing, Spacecom

The bulk of that business is coming from telcos and similar service providers. Now the extra capacity can come into play and **Amos**—although not alone—sees considerable business coming from trunking, backhaul and similar satellite-based traffic in both broadcast and data services. Ilany says that they are seeing good, solid business being done at attractive transponder rates. The growth in demand meant potential revenues were not subject to over-supply of bandwidth, said Ilany, and that prices/transponder are holding up very well.

Ilany is sensitive about what that business backlog might be in U.S. dollar terms, and with Spacecom being a quoted company, was reluctant to be specific without his CFO's approval. However, he said that they were anticipating a high fill rate. "We are experiencing much greater demand than we anticipated," he added.

Amos-5 additionally has a powerful C-band footprint with concentrations on Nigeria and another that connects one powerful beam across Central Africa (include the former French territories which also enjoy a Ku-band focus) through to East Africa. Its Africa Ku-band coverage also includes a Southern Africa beam, with beams also hitting Nigeria and Kenya/East Africa.

Elevation angles are excellent, which reduces the risk of interference. Ilany says this is key because local regulations in Africa are less enforced than Europe and thus teleports always have to worry about interference. Ilany added that all of its existing teleport clients were on board with the new satellite, and gearing up for new services.

Ilany recognises that Ku-band, and its rain fade problems, represents a harder sell than C-band, but says Spacecom is seeing more and more interest in Ku-band for its DTH potential. "And this also includes cellular backhaul, where we are in discussions with a major player who will use us for mobile cellular backhaul in Ku-. Backhaul is a critical infrastructure
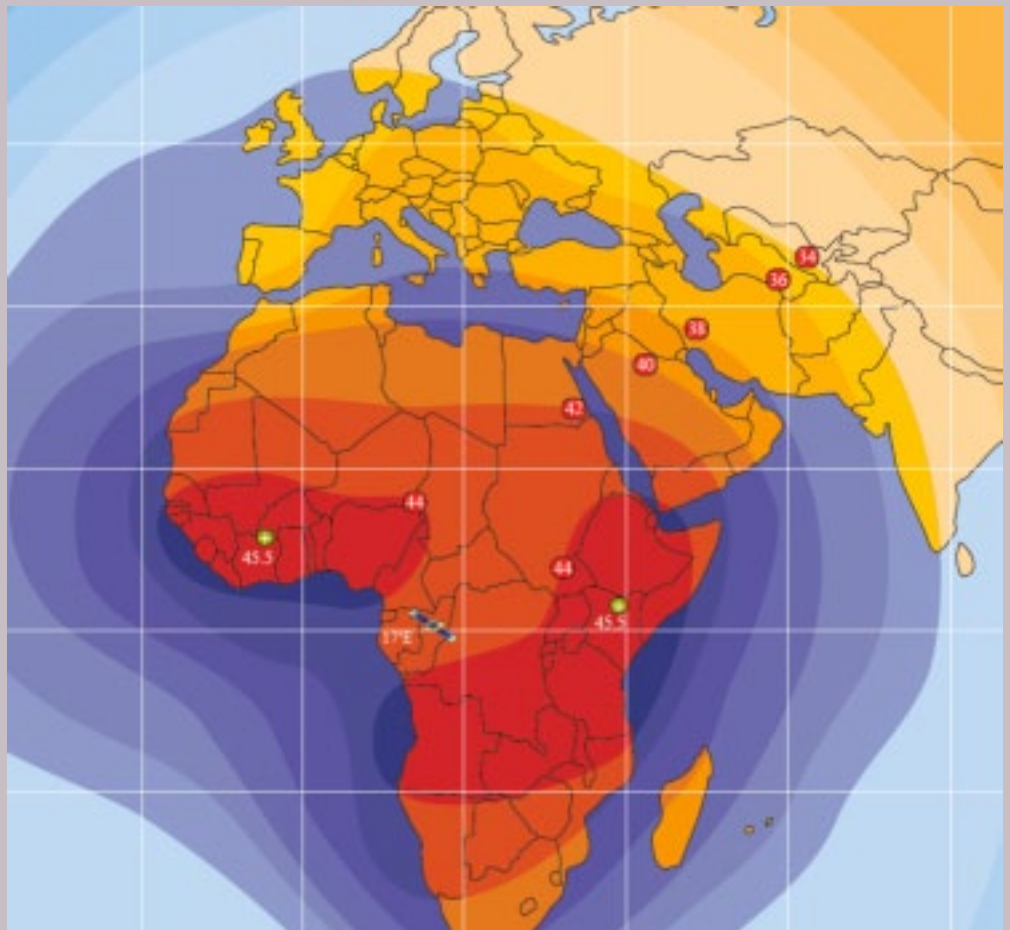
Amos-5: Pan-African C-Band Beam

for mobile operators in these regions. Its usage is booming. There is some microwave and a little fibre, but our satellite sector is growing in importance. With the right configuration and the right planning it all works with very high availability—and it's more cost effective. Amos-5 has a powerful C-band beam peak just West of Nigeria, and a Ku-band peak with concentrations over Nigeria, but both providing great coverage over Central Africa including the Francophone territories and stretching to East Africa.

"We also have a lot of aspirations for DTH in the region. A European investor is looking at a major play in Southern Africa, for example. We are also in contact with major DTH entrepreneurs in West Africa, and the same in East Africa. Many of the pay-TV projects start, or depend, on DTH for their core infrastructure and then roll out a terrestrial service on DTT. We are talking to these sorts of players and hope to be able to announce deals before the end of the year. DTH is the best quality, and the lowest costs for consumers."

Ilany added that most of the embryonic and would-be DTH broadcasters planning for Africa national or regional coverage need to carve out new customer niches while recognising that sport might

not be part of their offering. This assumes that **Multichoice**/*SuperSport* continues to dominate sports-based pay-TV transmissions over the region, although there could be more interest as and when the current TV rights come up for renewal.

One current change to Spacecom's portfolio of clients (at 4 degrees West) was caused by the USA's withdrawal of the military from Iraq just before the Christmas holiday. This reduced the demand from the U.S. Department of Defense (DoD) and governmental demand, generally. Amos was supplying capacity for troop entertainment and home contact. This has freed up some much-needed capacity, says Ilany. He said that Spacecom's aim is to have five satellites working from 3 orbital slots within the next 3 years.

Amos 5: technical specs
C and Ku-band frequencies
14 x 72 MHz tsp (C-band)
x 36 MHz tsp (C-band)
18 x 72 MHz tsp (Ku-band)

One Million By 2016—Container Tracking Systems, That Is…

By Johan Svanberg, Senior Analyst, Berg Insight

The installed base of container tracking systems will reach one million by 2016. According to a new research report from the analyst firm Berg Insight, the number of active remote container tracking units deployed on intermodal shipping containers was 77,000 in Q4-2011.

Growing at a compound annual growth rate (CAGR) of 66.9 percent, this number is expected to reach one million by 2016. The penetration rate of remote tracking systems in the total population of containers is estimated to increase from 0.4 percent in 2011 to 3.6 percent in 2016. Berg Insight's definition of a real-time container tracking solution is a system that incorporates data logging, satellite positioning and data communication to a back-office application.

The market for container tracking solutions is still in its early stage. Aftermarket solutions mounted on high value cargo and refrigerated containers will be the first use cases to adopt container tracking. **Orbcomm** has after recent acquisitions of **Startrak** and **PAR LMS** emerged as the largest vendor of wireless container tracking devices with solutions targeting refrigerated containers. **Qualcomm**, **ID Systems** and **Telular** are prominent vendors focusing on inland transportation in North America, which is so far the most mature market for container tracking solutions. **PearTrack Systems**, **Honeywell Global Tracking**, **EPSa** and **Kirsen Global Security** are examples of companies offering dedicated solutions targeting the global end-to-end container transport chain.

"Ever since the events of 9/11, there have been a lot of activities to bring container tracking solutions to the market," said *Johan Svanberg*, senior analyst, **Berg Insight**. He adds that it is, however, first now that technology advancement, declining hardware prices and market awareness are starting to come together to make remote container tracking solutions attractive. "Container telematics can help stakeholders to comply with regulations and meet the high demands on security, information visibility and transportation efficiency that comes with global supply chains," said Mr. *Svanberg*.

Adoption Acceleration

Shipping container tracking is a subset of asset tracking and aims at securing assets and increasing operational efficiency. Berg Insight's definition of a real-time container tracking solution is a system that incorporates data logging, satellite positioning and data communication to a back-office application. Tracking and monitoring of shipping containers came in focus after 9/11. Many companies saw an opportunity and started ambitious container tracking projects. However, neither the technology nor the market was ready at the time. Today, mobile and satellite networks can provide ubiquitous online connectivity at a reasonable cost and mobile computing and sensor technology delivers high performance, as well as excellent usability. All of these components combined enable the delivery of supply chain management, security management and operations management applications linking containers and enterprise IT systems.

Intermodal shipping containers are standardised, reusable containers used in intermodal transport systems worldwide. Container trade is the fastest growing segment in seaborne trade, having grown nearly 10 percent annually since the 1980s. Maritime transportation and the increased containerisation of goods are key enablers to make the global supply chain work efficiently. Today, more than 80 percent of international trade goods are carried by sea. At the end of 2011, there were approximately 20 million cargo containers worldwide, the equivalent of 30 million TEUs.

Berg Insight is of the opinion that the market for shipping container tracking solutions has entered a growth period that will last for several years to come. The number of tracking systems with GPRS or satellite communication for intermodal containers in active use is forecasted to grow at a compound annual growth rate of 66.9 percent from 77,000 units at the end of 2011 to 1.0 million by 2016. The penetration rate of remote tracking systems in the total population of intermodal containers is estimated to increase from 0.4 percent in 2011 to 3.6 percent in 2016. Aftermarket solutions mounted on high value cargo and refrigerated containers will be the first use cases to adopt container tracking.

The U.S. satellite communication provider Orbcomm has, after the recent acquisitions of StarTrak and PAR LMS, emerged as the largest vendor of intermodal container tracking solutions with GPRS or satellite communication. The company had achieved an installed base of 15,000 units at the end of 2011. PearTrack Systems and Qualcomm Enterprise Services are the second and third largest providers having 10,000 and 7,000 systems installed on intermodal containers respectively. Honeywell Global Tracking is the fourth largest system provider after the acquisition of EMS Global Tracking. Other significant players include ID Systems, Telular and Cubic GTS from the U.S., Pointer Telocation from Israel and EPSa and Global Tracking Technology from Europe. Most players have generally a broader market scope than maritime shipping containers, covering all types of asset tracking. CSB Technology, Kirsen Global Security and Starcom Systems are examples of vendors with products specifically developed for intermodal shipping containers.

There has been a consolidation trend in the container tracking market in the past two years with several major M&A activities. Francisco Partners acquired Cybit in January 2010 in a deal worth about 28 million euros. This deal was later followed by the acquisition of Masternaut in April 2011. ID Systems further acquired GE's Asset Intelligence division, a leading international provider of trailer tracking solutions. In May 2010, Cubic acquired Impeva Labs and formed Cubic Global Tracking Solutions. Orbcomm acquired StarTrak in May 2011, followed by the acquisition of PAR LMS in December 2011 in a deal worth about US$10 million. EMS Global Tracking was acquired by Honeywell in August 2011, which formed the new business unit Honeywell Global Tracking. The latest transaction was done in December 2011 when Telular acquired asset tracking specialist SkyBitz for US$ 42 million.

Berg insight anticipates that there will be a continued strong focus on container transport security and increased supply chain visibility in the coming years which will favour the container tracking market. Tracking solutions can help transportation chain stakeholders to comply with regulations and security programs as well as increase the transportation efficiency. Proving the commercial value, finding efficient solutions for reverse logistics and bringing down hardware prices are key components to increase the adoption rate for container tracking solutions.

About the author

Johan Svanberg is a Senior Analyst with a Masters degree from Chalmers University of Technology. He joined Berg Insight in 2007 and his areas of expertise include embedded connectivity, wireless M2M markets and mobile applications. Further information is available at:

http://www.berginsight.com

Installed base of active container tracking units (World 2010–2016)
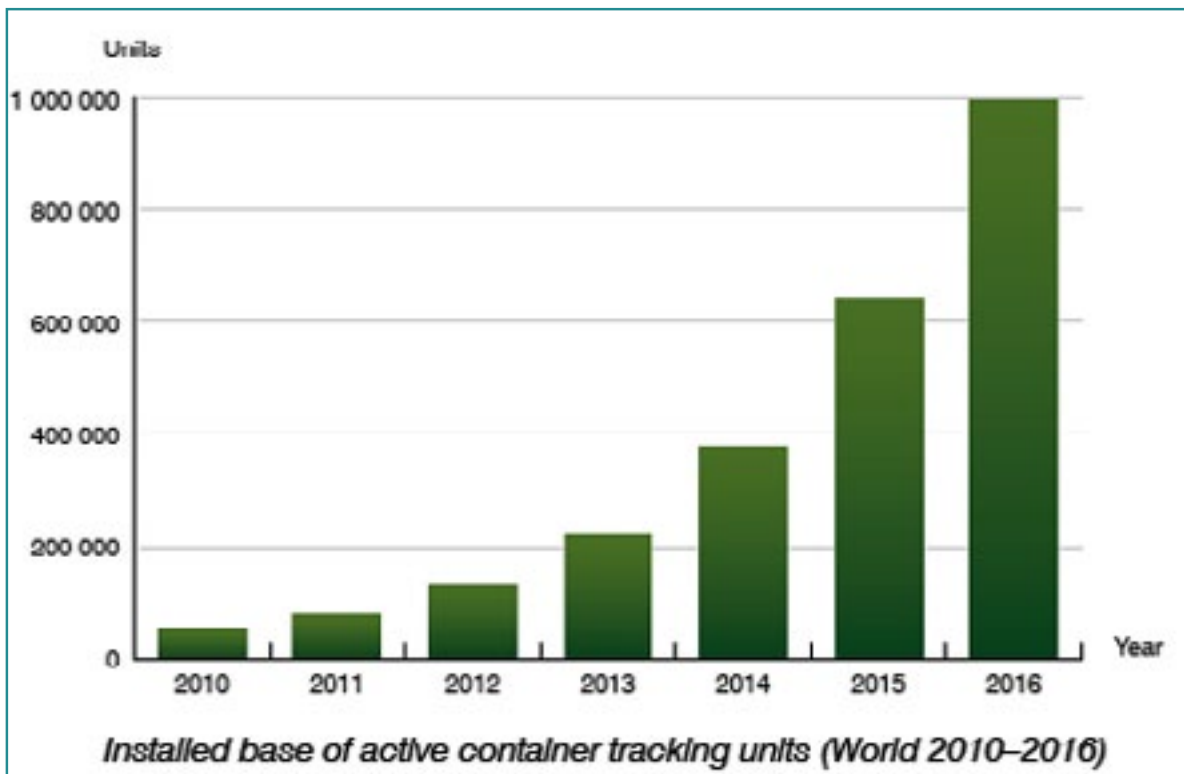
Remaining Afloat With OTT Via Satellite

By Simen Frostad, Chairman and Co-Founder, Bridge Technologies

Satellite has played the key role over the past five years or so in bringing connectivity to users who are either in a remote location, or not so remote but too far from the cable infrastructure. Apart from access to the Internet, a satellite connection does, of course, enable the end user to receive broadcast media in just about any location. However, many providers of satellite broadcast content restrict their offerings by geographical region—what do viewers do if they want to watch a Scandinavian channel in Alexandria, Greece, or content broadcast from Australia for viewing in Hawaii?

Cruise ship cabin photo courtesy of Norwegian Cruise Line

The promise, and increasingly the reality, is that **OTT** (*Over-The-Top*) services will enable any viewer with access to a broadband connection to view content in any location—without restriction. OTT services, providing broadcast-style content as an IP stream, are potentially available to anyone, wherever they are located.

This makes increasing good sense to a generation of digital media consumers who are coming to believe in the 'anything anywhere' mantra. It makes sense to expatriate communities far from their home country; and it also makes sense on a more mundane level to the family at home wanting to watch content on demand in the garden or the kitchen. Broadcasters are keen to cater to these changes in viewing habits and to keep those far-flung nationals at work abroad connected with their own culture.

While OTT will definitely open up a new vista for the viewer in Alexandria and Honolulu, viewers in most centers of population will be able to view OTT services via a cable-based connection. Let's look at a really extreme example of a remote location—one that will help illustrate some of the issues involved in delivering and receiving OTT content by satellite.

The sector I'm talking about happens to be one of the fastest growing markets for satellite services: the maritime user. We can include in this sector crews of ocean-going cargo ships, oil rig crews, and cruise ships. Cruise passengers spend a lot of money on their holidays, especially at the high end of the market, and cruise companies want to provide them with all the toys. Just because they are on vacation on the high seas doesn't stop them wanting to check the news, track stock prices in real time, and stay in touch with the office, in addition to accessing a broad range of media content. They will also want WiFi in their cabins and outside their cabins, too, if they have mobile devices such smartphones and iPads. In addition to the equipment needed onboard for receiving the satellite signal and uploading to the transponder, the ship must be fitted with all the cabling necessary to supply each cabin, and the set top box (STB) and WiFi router for each cabin. Depending on the way the media services are packaged as part of the cruise ship's marketing mix, there may also be some kind of conditional access system that allows high-rolling premium passengers to have access to services that are not available to those cruising in economy class. In other words, the complexity of a floating digital media community is not dissimilar to a typical land-based set up.

However, all this has to be provided to several thousand users aboard a ship hundreds of miles from the nearest cable, and possibly thousands of miles from specialist technicians who would normally be providing maintenance to land-based customers.

As the quality of OTT services are going to be judged by all of us with the yardstick we apply as broadcast consumers when on land, no high-end cruise operator can afford to provide OTT or Internet access that fails to measure up. And there's the rub: how does a cruise ship's crew cope with keeping this new world of IP based services up and running smoothly?

The answer, quite simply, is that they don't. They simply can't be expected to: the skills involved are too specialized, and no cruise operator could afford to hire those skills for every ship in the fleet—even if there were enough skilled personnel available for hire.

However there is a solution to this conundrum. It's the same solution that is available to any land-based supplier of cable-based digital media services—the only difference being that for these suppliers it's still an option (although a very expensive and inefficient one) to do without it. The solution is that the whole floating network can be monitored and maintained remotely from

SatBroadcasting™

Cruise ship cabin photo courtesy of Crystal Cruises

On-board infrastructure: how to maintain digital media services thousands of miles from home.

As with any digital media delivery chain, the key to a watertight service on board ship is a true-end-to-end monitoring capability. This means monitoring analysis technology needs to be installed at every point where the signal undergoes change or processing.

On a ship, the entry point of the network is the satellite dish and receiver, and the first task for any monitoring system is to check at this point that the signals are being received as expected. The VB270 probe provides the RF functionality here, validating the measurements, and verifying the presence and integrity of the content.

any location on the globe by a suitably skilled person or by a small team in place to provide true round-the-clock support.

The same two-way connection via satellite that allows passengers to browse the web, send emails, view the gameshow final, and tweet their shore-bound friends about it afterwards—this same connection can also be relaying a continuous stream of data about the performance of the on-board network to a remote monitoring centre. At this centre, a technician with digital media network skills can peer into every last corner of the shipboard network to diagnose and correct any malfunctions.

A cruise operator can monitor and maintain the services for a whole fleet in this manner, from the identical remote centre: alternatively, the monitoring and maintenance service may be operated by a third-party provider.

The point is that all of the information required to diagnose any problem with a network that could be on the other side of the globe, is available to the skilled personnel at the remote center. In many cases, any service interruption or quality issue reported by a passenger can be tracked down, diagnosed, and fixed remotely, without crew involvement. All that's left for the crew technicians on board to do is swap out a component if the fault is caused by hardware failure—there's no need for them to get into the murky waters of dropped packets, jitter, and PIDs.

As land-based providers have found out, it makes very compelling economic sense to install this capability for remote diagnosis and remedy, even if they are using cable, and have maintenance staff on the road 24/7. It's far more cost-effective, easier, and quicker to sort problems out this way than to roll the trucks out to the customer premises. However, for the cruise operator, it's not only more cost-effective, it's completely essential: the whole edifice of onboard interactive digital services and connectivity could not function without it.

About the author

Simen K. Frostad is Chairman and co-founder of Bridge Technologies. With 22 years of industry experience, Simen founded Bridge Technologies in 2004, after creating the world's first IP/MPLS contribution network for Scandinavian sports coverage. Simen had previously built the first multi-camera hard disk recording system for episodic drama production in 1998, and the first nonlinear sports editing facility during the 1994 Winter Olympics.

For the ship's 'headend', a VB330 will provide the capacity to monitor the heavy traffic volumes likely. The 10 gigabit architecture is a necessity with up to a possible 2,500 concurrent users in a typical cruise ship today.

Even if only 250 cabins are accessing HD VOD at the same time, with each stream requiring between six and 12 mbits/s, that's a lot of packets to monitor. Then for the true end-to-end capability that will allow a remote monitoring centre to identify and resolve any problem at any point in the network, each cabin's 'home network' can be fitted with the microAnalytics system, which comprises a miniature hardware probe at the STB, reporting data on the viewer's quality of experience, together with software clients that provide the same stream of information from any mobile devices used by the passengers. This software client can be made available by the cruise operator and downloaded to each device the cabin's occupants will be using during the cruise, as part of the app used to view digital content.

Back at the remote shore-based monitoring center, the technicians will see continuous live data and analysis of the network's performance, from ingest from the satellite, right through to the viewer's screens.

Prime

Competing For Space

By Mike Conschafter, Director, Space Systems, Aerospace Industries Association (AIA)

The U.S. space industry currently faces dual threats; major reductions in federal aerospace spending and overly restrictive satellite technology export policies. If we continue on this path, without implementing the right reforms, our nation risks the scenario of a weakened space industrial base that is unable to fully meet U.S. national security needs or sustain our technological edge against foreign competitors.

Competing for Space: Satellite Export Policy and U.S. National Security clearly details the impact that inappropriate export controls and inadequate trade policies have had on the U.S. satellite industry. It also offers recommendations that will make U.S. firms more competitive in the global marketplace while at the same time protecting our national security. The Aerospace Industries Association (AIA) believes that actions to modernize the export control system and enhance space trade among our allies are long overdue and will build a stronger, more robust U.S. satellite industry and supplier base that are able to meet the challenges associated with budget-constrained government customers.

We surveyed AIA members this year on the topic of export regulations and the message was clear: outdated export controls are hurting U.S. companies. Data supports this view. The U.S. held 73 percent of the worldwide share of satellite exports in 1995—this fell to a staggering 25 percent by 2005.

Today, U.S. law requires export agencies to still look at a nut, bolt, or screw for a commercial satellite and an anti-tank missile through the same regulatory prism.

Clearly, it's time for a change.

This is an urgent call to our national leaders to bolster opportunities for satellite exports by modernizing the U.S. export control system. AIA's recommendations center on the creation of market conditions that would allow U.S. firms to compete and win their fair share of international commercial space business—nothing more, nothing less.

Maintaining a strong industrial and supplier base is, in itself, a major national security issue; enabling this critical sector to compete internationally will become increasingly important as government spending is constrained. Modernizing the nation's export control system will result in a healthier space industrial base
—allowing the United States to better focus on sensitive technologies and safeguard national security while creating high wage, high skill jobs.

For our national policymakers, promotion of satellite exports should rank among the most viable options to aid our economy, reinforcing U.S. preeminence in space and ensuring our aerospace industrial base remains second to none.

Marion C. Blakey, President and Chief Executive Officer, AIA

The Foundation
More than a dozen years ago, Section 1513(a) of the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999 shifted export control jurisdiction of all satellites—including commercial communications satellites and their parts and components—from the Commerce Department, the agency responsible for licensing "dual-use" exports, to the State Department, the agency that monitors the licensing of munitions exports. The Section 1513(a) restrictions for satellite exports were put in place after the 1998 Cox Commission investigation that addressed concerns about Chinese access to U.S. high technology.

The shift, intended to protect sensitive space technologies and preserve U.S. preeminence, has since contributed to the loss of U.S. commercial satellite market share and fostered the competitiveness and capabilities of U.S. competitors abroad. Simply put, we have legislated away our nation's dominance in space.

The companies that comprise the domestic space industrial base developed the capabilities and services that have fueled the nation's economy and ensured U.S. technological dominance for generations. U.S. economic and technological leadership enabled the country to prevail in the Cold War and set the stage for U.S. global leadership in the 21st century. As we enter a new era of budget austerity and the threat of draconian sequestration cuts loom, failure to revise export controls could result in an ongoing loss of critical industrial base suppliers and pose an increasing risk to national security.

The Industry Speaks: 2011 AIA Member Survey
In 2011, AIA conducted a survey of its membership to assess the space industry's most recent concerns with current export regulations. Twenty member companies provided detailed responses to the survey, and this resulting report was reviewed and approved by AIA's Space and International Councils. These AIA member firms that provided detailed survey responses are a very comprehensive group accounting for over 75 percent of total 2010 sales by U.S. satellite and component manufacturers as identified by Space News' "Top 50 Space Industry Manufacturing

and Services 2011 Report"—totaling more than $30 billion in 2010 sales. Key results include:

- *More than 90 percent of respondents indicated a connection between export controls and eroding space industrial base capabilities. Respondents reported that U.S. export controls stand as barriers to domestic companies and create an advantage for foreign competitors*

- *A significant number of respondents favor a major overhaul of U.S. export controls. Section 1248 of the Fiscal Year 2010 National Defense Authorization Act (NDAA) tasked the Departments of Defense and State with considering the prospect of moving appropriate space components from the United States Munitions List (USML) to the Commerce Control List (CCL). More than 70 percent of AIA survey respondents voiced concern that the Section 1248 report would help their firms only if it resulted in Congress authorizing the President to make substantial revisions to USML Category XV (space vehicles)*

- *100 percent of respondents said that current export control restrictions have at least some adverse impact on their businesses*

- *Respondents noted that current policies have created the unintended consequence of fueling foreign competition for U.S.-dominated market share. The result: a dampening of sales opportunities to boost U.S. space technology innovation*

- *More than 70 percent of respondents blamed ITAR for lost sales, with many small businesses characterizing losses as "significant."*

Prime

AIA Recommendation: Modernize Satellite Export Controls

- *The U.S. government should expeditiously complete and release its review of space systems and components under consideration for removal from the United States Munitions List (USML)*

- *Congress should return authority to the administration for determining the export control jurisdiction of space system technologies*

- *The U.S. government should exercise this renewed authority to remove low/no risk technologies from the USML and designate them for inclusion on the CCL, which allows for greater flexibility while preserving the appropriate technology transfer safeguards*

AIA Recommendation: Promote U.S. Space Industry Exports

- *Selected space systems should receive support under the administration's National Export Initiative, which set the goal of doubling U.S. exports over the next five years*

- *The Export-Import Bank should develop a greater focus on support for the U.S. satellite manufacturing sector. The use of credit guarantees should be considered for domestic projects if international competitors are backed by government guarantees*

- *Additional resources should be provided for the Commerce Department to develop and support space export strategies. With adequate funding, the Commerce Department can help level the playing field for U.S. firms trying to compete and win in the global marketplace*

- *International military sales have for decades strengthened the U.S. aerospace industry and enabled allies to cost-effectively acquire new capabilities. The Defense Department should encourage our allies to acquire U.S.-built spacecraft and systems.* **See the Appendix at the close of this article.**

Introduction

The U.S. space industry currently faces major funding reductions from its core customer – the federal government–and at the same time current export policies limit it from conducting effective commercial business abroad. As small businesses and suppliers respond to this scenario by closing their doors, without reform, a weakened U.S. space industrial base may be unable to meet national security needs or sustain its technological edge against international competitors.

The details of the national security risks posed by inappropriate export controls and the absence of export-focused trade policies on the strength and competitiveness of the U.S. space sector will now be offered. It is AIA's position that addressing both areas will enhance space trade among U.S. allies and lead to a stronger U.S. space industry and supplier base that is better equipped to meet the challenges of budget-constrained government customers.

Representing more than 90 percent of the U.S. aerospace industry, AIA works to educate government decision makers regarding issues critical to the country's economic strength, technological competitiveness and defense readiness.

"I remain concerned that our own civil and commercial space enterprise, which is essential to the military space industrial base, may be unnecessarily constrained by export control legislation and regulation."—Gen. Kevin Chilton, former commander of U.S. Strategic Command and former space shuttle commander, during a 2009 hearing before the House Armed Services Committee."

—Gen. Kevin Chilton, former commander of U.S. Strategic Command and former space shuttle commander.[1]

Prepared by AIA's **Space and International Councils**, this report makes recommendations and includes findings from an AIA survey that provides new insight regarding the impact of current export restrictions on space industry manufacturers of all sizes.

A multitude of studies have previously provided findings and recommendations on ways to improve the U.S. space industry's competitiveness. (*A list of relevant studies and a brief summary of each can be found later in this presentation.*)

In particular, a February 2008 study from the **Center for Strategic and International Studies** (**CSIS**) found that current export control policies adversely impact U.S. firms —especially in the 2nd and 3rd tier—and their ability to compete for foreign space business.

Today, the call for reform should be urgent. With federal space budgets under pressure and satellite export policies that remain inappropriate, U.S. industry—including many small to medium-sized businesses—may be forced to reduce or eliminate involvement in the space sector. This scenario, described in the AIA's 2010 report Tipping Point, could lead to a devastating loss of space capabilities essential to national security. While some commercial satellite prime contractors have found ways to mitigate the impact of current policies, lower tier suppliers remain threatened, along with the overall competitiveness of the U.S. space industry.

An August 2011 **Futron** analysis of the space industry in 10 countries stated: *"Only the United States has shown four straight years of competitiveness declines… By contrast, Russia, China and Japan have improved their own space competitiveness by 12 percent, 27 percent and 45 percent, respectively."*[2]

Stable domestic federal budgets are critical to the U.S. space industry—the export market is simply not large enough to assure its health. Without stabilizing government space budgets, developing effective export promotion strategies and modernizing the U.S. export control system, the United States faces the real and daunting possibility of losing its preeminence in space. The goal of this report is to convey the urgency to policymakers about the need for updated export policies that we believe will strengthen the U.S. space industrial base and enhance national security.

Outdated Export Controls:
Dulling Our Security Edge

U.S. defense technology can be a force multiplier on the battlefield–providing our troops with an edge over their opponents. Effective export controls can sharpen that edge. Export controls keep our most advanced technologies, weapons and equipment out of the hands of our adversaries. Unfortunately, the current U.S. export control system is not optimized to protect sensitive technologies while also maximizing the economic and national security benefits of international trade.

International technology trade helps U.S. aerospace and defense companies create jobs and fuel economic growth. The industry supports more than one million American jobs and according to AIA estimates, created a $51.2 billion aerospace trade surplus in 2010.

Global trade also strengthens U.S. alliances and improves our security posture by providing allies and friendly nations with the capabilities they need to work jointly or unilaterally in support of shared security goals.

The current U.S. export control system was designed decades ago to meet the demands of a Cold War-era, bipolar security environment. According to a 2009 report, Beyond Fortress America, prepared by the National Research Council of the National Academies, the U.S. export control system has not been updated to reflect post-Cold War conditions. The current system closes off business opportunities with foreign customers and increases costs for U.S. industry and small businesses. This

ultimately weakens the industrial base and its ability to support the nation's security and economic interests.

Worldwide Share of Satellite Exports 1995 2005

These challenges are particularly acute in the space sector. Numerous studies have highlighted the negative impact of excessive export controls on the American space industrial base. These studies focus on the impact of Section 1513(a) of the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999. This legislation shifted export control jurisdiction of all satellites–including commercial communications satellites and their parts and components–from the Commerce Department, the agency responsible for licensing "dual-use"

exports, to the State Department, the agency that monitors the licensing of munitions exports through the *U.S. Munitions List* (**USML**).[4] This move placed satellites under the *International Traffic in Arms Regulations* (**ITAR**), government regulations that control the export of defense-related articles. The *Section 1513(a)* restrictions for satellites export were put in place after the **1998 Cox Commission** investigation of Chinese access to high technology.

While the move was intended to protect sensitive space technologies and preserve American preeminence, what resulted was a widespread loss of commercial satellite market share among U.S. manufacturers as illustrated by a 2008 report by CSIS (*see the chart on this page*). During a 2009 hearing before the House Armed Services Committee, General Kevin Chilton, former commander of U.S. Strategic Command and NASA astronaut stated, "I remain concerned that our own civil and commercial space enterprise, which is essential to the military space industrial base, may be unnecessarily constrained by export control legislation and regulation."[5]

In addition, an unclassified 2010 study by the **National Reconnaissance Office** (**NRO**), the U.S. agency that operates many of America's most sensitive satellites, found that smaller second and third-tier satellite vendors have "*insufficiently diverse business*"–likely due in part to current export restrictions. The NRO study found that such a limited market impacts the supplier base most severely, ultimately with a negative impact on U.S. security programs. Specifically, the study pointed out that, "*The limited supplier base may compromise long-term availability of some critical components and can negatively affect current program schedules.*"[6]

Other cases of a weakening space industrial base can be found by reviewing the *Defense Production Act* (**DPA**) *Title III Program* (**Title III**), a program that provides funding streams in order to preserve domestic military supply chain capability. It is worrisome to note that at least 13 out of 20 current DPA Title III projects are aimed at supply chain materials necessary for the U.S. space program.[7] Current Title III programs related to the space sector include: readout integrated circuits that support sensitive U.S. surveillance satellites; radiation hardened electronics that are used for missile defense and space applications; and Lithium Ion batteries required for satellite power.[8]

"*The (current export control) system has the effect of discouraging exporters from approaching the process as intended. Multinational companies can move production offshore, eroding our defense industrial base, undermining our control regimes in the process, not to mention losing American jobs. Some European satellite manufacturers even market their products as being not subject to U.S. export controls, thus drawing overseas not only potential customers, but some of the best scientists and engineers as well.*"

—Former U.S. Secretary of Defense Robert Gates. Speech on Export Control Reform before Business Executives for National Security. April 20, 2010.[9]
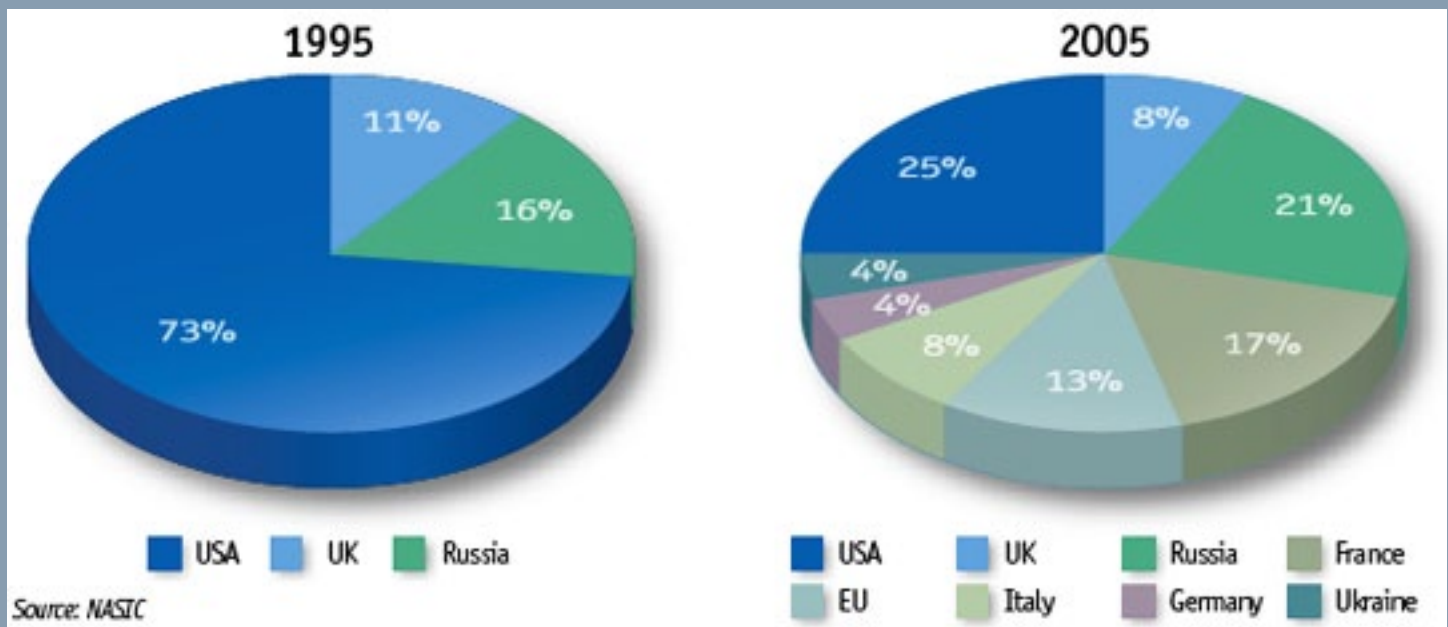

Figure 1. Worldwide Share Of Satellite Exports

Supporting The Industrial Base

The U.S. space and defense industrial base—a collection of specialized manufacturing firms and innovative small businesses—is responsible for the design and development of space systems and components for commercial customers and the U.S. government. These companies are unique: their major customers are agencies of the U.S. government such as NASA, the Defense Department and those in the intelligence community. With relatively few opportunities to compete on contracts that can take years to complete, the industry's high-stakes business development paradigm has been referred to as "betting the ranch on winning in Vegas."[10]

But as government spending on space and security programs decreases, contraction within industry is inevitable. The result will mean less competition and innovation, and reduced capabilities to produce systems needed by the government. Ultimately, some firms may fail outright. U.S. policymakers can counteract this trend by removing existing barriers to new commercial opportunities for American space and defense manufacturers. "*In the process of protecting technology, the United States has created an incentive for foreign suppliers of space systems hardware to develop competing technology. In addition, other space agencies are motivated to develop their own technologies, rather than buying U.S. technology, when their source for technology in the United States is not always available due to ITAR licensing issues.*"

One major barrier to U.S. export competitiveness is the presence of all satellites and related components (however innocuous) on the USML, which forces industry and its suppliers to rely more and more on diminishing domestic federal programs in order to remain alive. Foreign competitors have used our own policies against us by marketing their satellites as devoid of U.S. parts and components – "*ITAR Free*." Meanwhile, efforts to promote exports within the Obama administration, such as the *National Export Initiative*, are not adequately optimized to support exports of commercial U.S. satellite technology.

AIA Survey Results

The 2011 AIA member survey referenced in the Executive Summary offers new insights about the challenges associated with the current export regime. The survey provides a valuable snapshot regarding the cost of the status quo for the industry, U.S. jobs and our security and economic interests.

Do you see a connection between export controls and space industrial base capabilities?

More than 90 percent of respondents saw some connection between export controls and eroding space industrial base capabilities. Respondents reported that export controls present barriers to U.S. companies, which our foreign competitors do not face.

One small U.S. space business stated that due to ITAR barriers, their "market share and profitability has been reduced significantly." Another firm cited that "ITAR controls are hurting the competitiveness of U.S. suppliers in areas where there is similar technology available in other parts of the world." One business cited ITAR controls as restricting firms from selling to international satellite builders and also added that foreign market protection exacerbates the challenge.

Their statements reflect a threat to the profitability and investment environment that encourages U.S. companies to research and develop new capabilities.

"…there is a danger here that export controls, if not reviewed and refined, can in fact create the opposite kind of a situation here, where our industry is no longer competitive; therefore our industry is declining; therefore their ability to provide for us is also declining."

– General C. Robert "Bob" Kehler, Commander, United States Strategic Command[11]

How would the U.S. government's interim report on NDAA Section 1248 help your business?

The *Fiscal Year 2010 National Defense Authorization Act* (**NDAA**)—signed into law in 2009—included *Section 1248*, which tasked the State Department and the Defense Department to evaluate the national security risks of removing space components from the USML. An interim report was released in 2011.

More than 70 percent of respondents voiced concern that the 1248 report would only help if it results in Congress authorizing the President to make substantial revisions with the *USML Category XV* (*space vehicles*). Among space system suppliers, the predominant interest was to address inappropriate restrictions on "*specifically designed or modified systems, or subsystems, components, parts, and accessories.*"

"In the process of protecting technology, the United States has created an incentive for foreign suppliers of space systems hardware to develop competing technology. In addition, other space agencies are motivated to develop their own technologies, rather than buying U.S. technology, when their source for technology in the United States is not always available due to ITAR licensing issues."

– AIA Member

The current export regime results in firms treating small components with the same level of scrutiny as the completed full assembly of a space system. For example, the full extent of export control scrutiny must be applied to items such as special fasteners, sheet metal brackets, composite molds and other components. Although unique for space, these items are not critical technologies and their export does not warrant USML level pre-and post-shipment compliance measures.

Do current ITAR regulations adversely impact your business?

All respondents mentioned that current export control restrictions had some adverse impact on their businesses.

One AIA member noted, "The impact of the ITAR upon business operations is ever-present. Nearly all program data provided to nearly any country requires some ITAR authorization. Accordingly, nearly all of the literally thousands of exchanges/exports necessary in the course of an average satellite program must be conducted under a license or agreement. Even routine, non-sensitive low level exchanges with the closest allies, because they relate to what is considered a 'defense article,' become defined as 'technical data.'"

ITAR licenses, record keeping requirements, and increased potential for delays magnify the risk and cost of competition for U.S. businesses. Ultimately, these circumstances damage the reputation of U.S. industry, and reduce predictability and profitability for the U.S. exporter, thus threatening the health of the domestic space industrial base.

Another firm stated, "The transfer of commercial communications satellite components to the CCL would provide welcome relief to the U.S. commercial satellite sector and increase our firm's competitiveness. Such a shift would reduce our European competitors' significant marketing advantage of being able to offer 'ITAR-Free' *satellites free of U.S. components."*

A variety of firms cited instances where, due to ITAR satellite, component restrictions and the cost of compliance, they made the decision to avoid certain non-U.S. markets.

Do you see a connection between foreign competition and the current state of U.S. space industrial base capabilities?

Respondents noted that current policy clearly had the unintended consequence of fueling the development of foreign competition for what had previously been U.S.-dominated market share.

One respondent firm noted that in the past 10 years, the European Space Agency (ESA) has attempted to develop a European unfurlable mesh antenna reflector. While the effort has yet to be successful, the motivation for ESA still exists as long as the United States restricts exports of its own mesh antenna technology.

Has your company lost sales due to ITAR-free marketing by foreign competitors? Could you quantify the value of the lost sale?

More than 70 percent of respondents described lost sales due to ITAR. Specific sales opportunities in Europe, Canada, Asia and other parts of the world were described. Many small businesses cited a "significant" loss of sales.

One small firm attributed annual sales losses of $5 million annually to the current export control regime. While other companies found the losses difficult to quantify, most agreed that the current export regime was hurting their competitive posture. They also stated that they are forced to dedicate significant resources to managing ITAR compliance that would otherwise go toward reinvestment.

Another mid-size firm remarked that the ITAR-free positioning of potential customers in Europe and Israel for their components results in lost revenue of between $500,000 and $2 million for every ITAR-free satellite manufactured. Their customers are also beginning to identify ITAR control in writing as a negative consideration in the bid and proposal process.

One respondent specifically referenced a lost sale opportunity of satellite components—non-sensitive components available on the global market – where ITAR delays and restrictions resulted in a foreign firm deciding to do business with a non-U.S. competitor.

Recommendations

Revise Satellite Export Controls

Instead of preventing other countries from developing space capabilities, barriers to export for U.S. satellite products have prompted numerous countries to create indigenous space capabilities and leverage their growing market share to support research, development and innovation. As U.S. global market share declines, many domestic companies – particularly second and third-tier suppliers – are increasingly reliant on sales to the U.S. government, or are considering abandoning their space business altogether. In the absence of a healthy, cutting-edge, space industrial base in the United States, our government may be forced to rely on non-U.S. suppliers for key space system components.

Without meaningful steps to stabilize government space budgets, modernize the export control system generally and enhance space trade among our allies, the United States faces a real and daunting possibility of losing its preeminence in space, along with its ability to compete in the global space industry. In order to prevent the loss of space industrial capabilities needed for U.S. security, AIA urges the Departments of Defense and State to complete expeditiously a final response to the National Defense Authorization Act's Section 1248 that directs a review of moving satellite and space-related items off the USML.

AIA strongly urges Congress to pass legislation that would return discretion to the President for the removal of satellites and related components from the USML—subject to restrictions, Congressional oversight and other measures appropriate for safeguarding U.S. national security.

AIA Recommendations

- *Promptly complete and release the U.S. govern-ment review of the space systems and components considered for removal from the USML.*

- *Congress should return authority to the President for determining the appropriate*

- *U.S. agency for export control jurisdiction over satellite and space technologies.*

- *The U.S. government should use this renewed authority to review and approve the movement of low/no-risk technologies from the USML to the Commerce Control List (CCL). The CCL, maintained by the U.S. Commerce Department's Bureau of Industry and Security, is the more appropriate regu-lator for low-risk commercial technology exports.*

Support the U.S. Space Industry By Promoting Exports

While the Obama administration's 2010 National Space Policy recognizes the importance of international space collaboration, it lacks a focus on the space and satellite industries that contribute to an "increased transparency and stability among nations and provide a vital communications path for avoiding potential conflicts."[13]

AIA believes that a stronger partnership between the industry and government would create new opportunities for U.S. exporters. During an AIA-sponsored government and industry forum in 2011, one of the most repeated requests from industry was for reform of the U.S. export control system. There were also calls from industry for the U.S. government to advocate more aggressively in support of American space industry exports, toward the goal of a level playing field in the global marketplace.

International competitors today can count on government resources and advocacy for critical business pursuits. In 2010, the French-Italian firm Thales Alenia Space won a $2 billion contract to build more than 60 satellites for U.S.-based Iridium after aggressive action from the French export credit agency, COFACE. COFACE agreed to cover 95

Opportunites Lost To Non-U.S. Competitors:

• Germany currently operates TerraSAR-X, a commercial Earth observation radar satellite for which there is no U.S. equivalent. According to a 2009 Space News report, the U.S. National Geospatial-Intelligence Agency (NGA) awarded contracts to three companies to provide commercial radar satellite data, each of which will rely on foreign-owned satellites because no U.S. firm operates spacecraft collecting the imagery sought by the NGA.

• U.S. policy currently limits commercial Earth imagery sales to those offering a resolution of no less than 0.5m Ground Sample Distance, while foreign competitors are developing the commercial capability to exceed that resolution for systems that will be offered to the global marketplace.

According to the Kyodo news agency, in early 2011 the Japanese government was considering the purchase of a U.S. missile warning satellite. This capability would be useful to monitor missile launches from North Korea as well as for disaster monitoring purposes. With the right export reforms and U.S. government backing, such a move would bolster both U.S. and Japanese security while also supporting a healthy U.S. industrial base.

– Associated Press, "Japan mulling purchase of defense satellite from U.S.," July 9, 2011.[12]

percent of a $1.8 billion facility that would ensure most of the financing for the project.[14] It was reported that because the U.S. manufacturer competing against Thales was technically making a domestic sale, it was ineligible for U.S. Export-Import Bank credit guarantees.

As a bulwark against foreign government influence, some in industry have advocated the development of a U.S. government-wide strategic plan for federal export promotion and export financing programs for space systems. This type of plan would encourage international space cooperation in a way that sustains U.S. market leadership while giving international customers access to the best technology at the best available price.

The **Wideband Global SATCOM** (**WGS**) is a useful model for understanding how this type of cooperation can work. The WGS is a satellite communications system planned for use in partnership by the U.S. Defense Department and the Australian Department of Defence. The Australian government is currently funding a sixth WGS satellite in return for a portion of the satellite's bandwidth. The U.S. Air Force is also seeking a ninth WGS satellite to be financed in part through international agreements.

Additional cooperation of this type can support a robust U.S. space industrial base, strengthen the capacity of our global partners and is ultimately a win-win for both the United States and its allies.

AIA Recommendations

- *Selected space systems should receive atten-tion under the administration's National Export Initiative, which set the goal of doubling U.S. exports over the next five years.*

- *The Export-Import Bank should be activated to support more effectively the*

- *U.S. space manufacturing sector. The use of credit guarantees should be considered for domestic projects if international competitors are backed by government guarantees.*

- *Additional resources should be provided for the Commerce Department. With adequate funding, the Commerce Department can help level the playing field with additional support to U.S. firms trying to compete and win in the global marketplace.*

Boeing technicians prepare a GPS satellite for mass properties testing at the company's facility in El Segundo. Mass properties testing ensures that a satellite meets weight, center of gravity, dynamic balance, and moment of inertia requirements in preparation for launch and operation. Boeing GPS testing uses a robust spin rate of 40 rpm. Two GPS IIF satellites are currently in service, two are complete and await launch, and eight are in various stages of manufacture. Photo courtesy of Boeing.

- *International military sales have for decades strengthened the U.S. aerospace industry and enabled allies to acquire new capabilities cost-effectively. The*

- *U.S. Defense Department should encourage our allies to utilize U.S. spacecraft and systems.*

Conclusion

The U.S. space industry and its supplier base, which provides our nation with critical national security capabilities, survive in large part because of U.S. government programs. In light of significant spending constraints faced by the federal government, there is a renewed sense of urgency that the United States should reevaluate its export control system and trade promotion strategies in order to strengthen both our space industrial base and national security.

Numerous government, industry and research institutions have found that current export control policies negatively impact our U.S. businesses and national security.

While many members of Congress remain rightly concerned about ensuring sensitive U.S. satellite technology not fall into the wrong hands, many are also beginning to recognize the flaws in the current system that hamstrings the U.S. space industrial base. Members of Congress including long-time champion of export control modernization Rep. *Howard Berman* (D-Calif.), have become more and more interested in trying to find a new approach that balances technology protection while also allowing U.S. firms to compete abroad.

As Rep. *Michael Turner* (R-Ohio) put it during a 2009 House Armed Services Committee Strategic Forces Subcommittee hearing, "*I hope, in a bipartisan way, our committee can work together on a pragmatic approach that strikes a balance between protecting our unique, advanced space technology and capabilities and promoting a viable defense industry that competes in the global marketplace.*"[16]

Other members of Congress have called for changes as well. Rep. *C. A. "Dutch" Ruppersberger* (D-Md.), Ranking Member on the *House Permanent Select Committee on Intelligence*, has been an outspoken advocate for satellite export reform, stating that "*Now our American manufacturers are limited in what they can sell anywhere, and it's really become a huge business in Europe to circumvent ITAR… And consequently we're at a great disadvantage. We can't sell what we need to, and right now Europe is taking advantage of this and it's hurting us.*"[17]

Rep. *Dana Rohrabacher* (R-Calif.), who has backed legislation in support of satellite ITAR reform, has said, "*America needs a vibrant aerospace and space technology industry. Everyone agrees ITAR reform needs to happen. We need to make sure that our high tech exports aren't strangled by regulations.*"[19]

In addition, in an August 2011 op-ed in the *Washington Examiner*, James Jay Carafano of the conservative **Heritage Foundation** argued that America was "*forfeiting*" its leadership in space due to excessive export controls. Carafano states that when satellites were moved to the USML, "*In one stroke, Congress had managed to boost both our foreign satellite manufacturing competitors and China's commercial space industry.*"

American satellite manufacturers produce some of the most advanced technologies and highest quality products on the planet. Unfortunately, superior products alone will not enable U.S. industry to be the unquestioned market leader if industry's ability to compete is constrained by inappropriate regulations and is not supported by U.S. trade policies.

It is the recommendation of AIA and many others that removing inappropriate market restrictions and providing critical U.S. government export promotion will position our satellite and space sector manufacturers to once again be second to none.

Appendix

Background and current status of export reform efforts

As former Defense Secretary *Robert Gates* remarked in an April 2010 speech, "*The problem we face is that the current system—which has not been significantly altered since the end of the Cold War—originated and evolved in a very different era, with a very different array of concerns in mind.*"[20]

During his 2011 Senate Armed Services Committee confirmation hearing, current Defense Secretary *Leon Panetta* also expressed similar views on export controls.[21]

To help policymakers more fully understand the current landscape of export control policies, it is important to review what led us to this point.

The current export control system was designed in the Cold War era when the United States was ramping up spending

ATK's ORS-1 satellite

in order to become the global leader in innovation and high technology. During this period, from 1961 to 1989, U.S. spending on national security space alone rose from under $10 billion annually to over $40 billion.[22] For much of this time it was a bi-polar world—the United States and the Soviet Union had the only major space programs, and stringent controls were essential to preventing our adversaries from benefiting from U.S. technological innovation. U.S. industry did not require exports for their survival as government spending provided ample business for both large and small firms.

With the end of the Cold War near, U.S. leaders—representing Republican and Democratic administrations—began to consider changes to the export framework that had dominated the post-war era. Presidents *Ronald Reagan*, *George H.W. Bush* and *Bill Clinton* all took steps to facilitate the export of U.S. commercial satellites, providing growth opportunities for the U.S. space industry.

In 1988, President Ronald Reagan lifted a ban on the use of Chinese launch vehicles for U.S. commercial communications satellites. In 1992, during the administration of George H.W. Bush, the State Department transferred jurisdiction of some commercial communications satellites to the Commerce Department.

From 1989 through 1996 Presidents Bush and Clinton made multiple "national interest" determinations allowing launches of commercial communications satellites on Chinese rockets and, eventually, Russian and Ukrainian launch vehicles.[23]

"It is time we undo the damage this restriction has unintentionally created for U.S. business, U.S. competitiveness, and U.S. national security. It is critical that we resolve this matter and prevent China from overtaking U.S. satellite manufacturers. I'm proud to have worked with my colleagues on both sides of the aisle to develop this common sense solution…"

—Rep. Howard Berman (D-Calif.)[15]

1998 Cox Commission Investigation

After a series of scandals related to allegations of Chinese access to U.S. high technology were uncovered in the mid-1990s, Congress created a committee in 1998 known as the *Select Committee on U.S. National Security and Military/Commercial Concerns with the People's Republic of China*, commonly referred to as the "**Cox Commission**" in reference to its chairman, Rep. *Christopher Cox*.

The Cox Commission was responsible for investigating these incidents and ultimately produced a bipartisan report (*a declassified version was released in May of 1999*). The report detailed instances of Chinese espionage and attempts to obtain information on U.S. nuclear weapons.

The report also examined Chinese launch failures during the Bush and Clinton administrations. In these instances, Chinese rockets carrying U.S. commercial communications satellites failed and the U.S. firms that manufactured the satellites were asked to provide information in support of the Chinese accident investigation. The report explains how the U.S. firms provided information related to the Chinese rocket fairings and inertial control systems that could have been used to strengthen Chinese rocket—and ICBM—design capabilities. The Cox Commission's investigation led to the inclusion of a provision—*Section 1513*—in

the *Strom Thurmond National Defense Authorization Act for Fiscal Year 1999*. Section 1513 moved control of all satellites and related technologies to the State Department's *United States Munitions List* (**USML**), thereby making their export subject to more stringent controls as required under *section 38* of the *Arms Export Control Act*.[24]

The report details that after the 1996 Chinese launch failure with the **Intelsat 708** satellite on board, the commercial communications satellite's electronic encryption boards were not recovered. It concludes that these boards were mounted close to the satellite's hydrazine propellant tanks and were likely completely destroyed. The Commission specifically noted that, "*…the National Security Agency remains convinced that there is no risk to other satellite systems, now or in the future, resulting from having not recovering the FAC-3R boards from the PRC.382.*"[25]

The Strom Thurmond National Defense Authorization Act sought to ensure that U.S. space business activity not harm national security and most of its provisions related to the Cox Commission aimed to restrict the proliferation of missile technology to China. While the intent of those involved in the Cox Commission was to prevent export of missile and militarily sensitive technologies to China, the result was that all satellites—even commercial communications satellites and their component parts—are now part of an outdated system of export controls that hampers export even to close allies…a system that former Defense Secretary Gates has described as failing at the "*critical task of preventing harmful exports while facilitating useful ones.*"[26]

Impact Of The National Defense Authorization Act For FY 1999

Not long after all satellite technologies were placed on the USML, the U.S. global market share of satellite manufacturing revenue dropped precipitously.[27] Many began to argue that changes in the law had gone too far. The Cox Commission was largely concerned about the transfer of sensitive high technology to China. However the resulting legislation ended up severely restricting the transfer of commercial satellite information and technologies abroad – even to U.S. allies.

Like all technologies captured on the USML, commercial satellites and related components are subject to a "one size fits all" control regime. Nuts, bolts, screws, hoses and other components indistinguishable from their commercial counterparts now require a State Department export license that prohibits retransfer to any party not accounted for in the original license and requires ongoing tracking of access to such items, no matter how innocuous. In contrast, foreign competitors are able to ship

U.S. satellite communications ground station, courtesy of the DoD

parts and components under minimal or no scrutiny because their governments treat them as commercial commodities. This lack of a level playing field creates compliance costs and delays that affect the competitiveness of U.S. manufacturers without commensurate benefit to U.S. national security interests.

Such drastic measures may have even been unintentional to many in Congress responding to the Cox Commission. In fact, a review of the Congressional Record during the passage of the Strom Thurmond National Defense Authorization Act shows that Congress was mainly concerned about protecting sensitive nuclear, missile and intelligence satellite technology. Yet, by placing commercial satellite technology on the USML, Congress inadvertently put a clamp on the ability of U.S. industry to compete overseas for non-sensitive commercial satellite sales. Today, such outdated restrictions have unintentionally damaged U.S. security by impairing the vitality of the U.S. space industrial base.

In 2008, after years of concern voiced by the space industry that the law required unnecessary regulation of benign technology, the **Center for Strategic and International Studies** (**CSIS**) released a report that laid out how U.S. space firms were struggling under needlessly restrictive export regulations. According to the report, the United States is the only country today that classifies commercial communications satellites as munitions. Further, outdated export controls were cited as the number one barrier to foreign markets by industry. In the report CSIS shows that the United States held 73 percent of the worldwide share of satellite exports in 1995—this fell to a staggering 25 percent by 2005.

One of the most disturbing trends identified by the CSIS study was that export controls are particularly suffocating to the 2nd and 3rd tier of the space industry. The study detailed hundreds of millions of dollars in lost sales attributed to ITAR licensing.

Multiple reports and other public statements on satellite export restrictions paint a clear and comprehensive picture that the National Defense Authorization Act for Fiscal Year 1999 went too far (*for a comprehensive guide to these studies, see the appendix section of this article*).

As U.S. firms became restricted by heavy export control restrictions, their ability to access global markets decreased, thereby limiting available funds to invest in new commercial systems. At the same time, European space investments actually increased to develop new commercial satellite systems. According to the Commerce Department, "*there has been little innovation in satellite busses by U.S. manufacturers after the change in export controls in 1999.*"[28] While some of this data may reflect fluctuations in the market for GEO satellites, it is possible to argue a relationship between changes in the law and U.S. satellite market share.

The impact on the industrial base may have not been realized due to a post-9/11 increase in government funding for space programs that sustained much of the industrial base. However, with current federal budgets projected to be flat or declining in many areas, the need to find ways to strengthen our commercial satellite sector while maintaining stable investments in federal space programs could not be greater.

Congress has begun to recognize the necessity of legislative action. In 2010, Rep. Howard Berman (D-Calif.) introduced **H.R. 2410** with the goal of providing flexibility to commercial satellites and related components under the USML. In 2011, Rep. Berman also introduced **H.R. 3288**, *Safeguarding United States Satellite Leadership and Security Act of 2011*, to continue efforts to strengthen and modernize satellite export controls.

Calls to reform the export control system are made not just by the space industry, but by a broad range of technology sectors. To help modernize what most regard as an antiquated and largely ineffective system, President Barack Obama, in August 2009, directed an interagency review of the U.S. export control system writ large. This review would take a comprehensive look at weapons and dual-use technologies. The administration's goal was to determine how to strengthen national security and competitiveness of key U.S. manufacturing and technology sectors by focusing on current threats, as well as adapting to the changing economic and technological landscape that provides security, economic and foreign policy benefits from technology trade.

The administration's review determined that the current U.S. export control system—for all technology sectors—is "overly complicated, contains too many redundancies, and, in trying to protect too much, diminishes our ability to focus our efforts on the most critical national security priorities."29 As a result, the administration launched an effort known as the *Export Control Reform Initiative* (**ECR**). This ongoing effort will review the current U.S. export control system and make changes that are "*designed to enhance U.S. national security and strengthen the United States' ability to counter threats such as the proliferation of weapons of mass destruction.*"30

The U.S. government currently maintains two different primary control lists, the *Commerce Control List* (**CCL**) and the *United States Munitions List* (**USML**). The lists are administered by two different departments and hold different structures, different levels of specificity and different definitions. The CCL notably offers varying levels of control requirements while the USML has a "*one size fits all*" approach demanding significant pre- and post-shipment compliance activity. The CCL also itemizes technologies on the list while the USML uses broad definitions of what is captured on it.

The administration plans to conduct the ECR Initiative in three phases. *Phase I* seeks to develop the methodology for building new control lists that are "*positive lists*," which describe controlled items using objective criteria (horsepower, speed, accuracy, or other precise descriptions). In *phase II*, the administration will restructure the USML and CCL into lists that apply varying degrees of control depending on the item. A new section of the CCL will be established to hold essentially commercial/dual-use formerly USML items. A "*bright line*" process will end jurisdictional disputes over an item by clearly identifying whether that item should be on the USML or CCL. These initial phases will be conducted by the Executive branch with Congressional consultation.

As part of *phase III*, both the USML and the CCL will be combined into one list falling under the jurisdiction of a *Single Licensing Agency* (**SLA**). An SLA will streamline the review processes and ensure export decisions are predictable, efficient and transparent.

As part of ECR phase I and II, the administration is looking to find ways to focus controls around those technologies that pose the most significant threat to national security. In the words of the administration, the aim is to build "*higher fences around fewer items.*"31 In addition, as part of these reviews, U.S. government departments and agencies are looking at all the categories of the USML to determine which items should be subject to USML or CCL control. Spacecraft systems and associated equipment are part of *USML Category XV*. Adjustments to Category XV, unlike every other category on the USML, will require legislative action to amend the Strom Thurmond National Defense Authorization Act and return discretion to determine the jurisdiction of this technology to the administration.

Largely due to the growing chorus of concern that overly restrictive export controls were impacting U.S. security, the *Fiscal Year 2010 National Defense Authorization Act*—signed into law in 2009—included *Section 1248*, which tasked the Departments

of Defense and State to evaluate the national security risks of removing space components from the USML.

The report will better inform Congress regarding the commercial space technologies that would be appropriately controlled under the CCL. The 1248 report will be incorporated into the Obama administration's National Space Policy. The Policy contains a section on export modernization, stating that departments and agencies should "*seek to enhance the competitiveness of the U.S. space industrial base*" consistent with the results of the ECR Initiative.

By taking such a position, the White House and its National Security Council staff were deferring to the ECR Initiative for final word on export control recommendations related to space. Former National Security Council director of space policy, *Peter Marquez*, stated that "*When that export policy gets announced, it will supersede the portions of this space policy dealing with export control.*"[32] When this AIA article went to publication, the results from the ECR Initiative's Category XV review or the 1248 report had not yet been publicly released.

What the interim 1248 report does provide is an initial conservative assessment of satellite systems and components that could be removed from the USML. The interim study did find that commercial communications satellites, along with most of their components, could be appropriately moved from the USML to the CCL without posing an unacceptable national security risk.

In addition, the interim study concluded that the President of the United States should be provided "*with the authority and flexibility to determine the export licensing jurisdiction of satellites and related components*".[33] It is important to note that in the preliminary 1248 report and in proposed rules supporting the ECR Initiative, the administration is not advocating any changes to current technology transfer policies with respect to China.

National Export Initiative

On March 11, 2010, President Obama signed an executive order creating the "*National Export Initiative (NEI)*."[34] This initiative recognizes the loss of jobs incurred by the recent economic and financial crisis and is designed to help stimulate job growth by bolstering the private sector's ability to export, with the goal of doubling exports over five years. In order to accomplish this goal, the administration's initiative seeks to remove trade barriers by helping U.S. firms—especially small businesses—conduct business abroad.

The administration's NEI represents a potential opportunity for many small U.S. space firms to take advantage of trade missions and U.S. government advocacy. Currently, space firms have not been a prominent component of the NEI due largely to the export restrictions that remain in place. However, if the right reforms were made to the current export control system, a variety of small space industry suppliers would be better able to utilize the government resources offered through the NEI.

Some aspects of the NEI may even be appropriate to advance with selected space firms under the current export controls system. For example, if a U.S. firm is able to identify an export opportunity, the NEI has created a task force directed to work with lenders to deliver financing to small business exporters and expand business counseling on export finance programs. The NEI also seeks to educate small business exporters on market access issues, tools that could be used by some small space supplier firms to identify areas for exports.

A Synopsis Of Major Studies Calling For Satellite Export Reform

Numerous officials and reports have documented the impact of export restrictions on the U.S. space industrial base. Since the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999 moved satellites to the USML, the following reports and groups have either captured the disastrous consequences of ITAR licensing on commercial satellites or have recommended changes to satellite export control regulations:

- *2000—Booz Allen & Hamilton Report; U.S. Defense Industry Under Siege—An Agenda for Change: "We estimate that this particular U.S. industry (communications satellite manufacturers) could lose up to $1 billion of sales annually if the export controls issues are not resolved."*[35]

- *2007—Institute for Defense Analysis Study; Export Controls and the U.S. Defense Industrial Base: "In interviews with individual firms it is apparent that companies are already being constrained in supply chain choices by export control restrictions. In some cases export control measures are actually encouraging R&D and capital investment overseas, as well as discouraging R&D partnerships with firms and the DOD." The report goes on to cite the case of Canadian TELESAT as an example of a major customer permanently moving away from U.S. manufacturers after the change in export jurisdiction from CCL to ITAR.*[36]

- *2007—U.S. Air Force and Commerce Department Defense Industrial Base Assessment—U.S. Space Industry: "...the U.S. share of satellite manufacturing has decreased 20 recent for all commercial communication satellites (COMMSATs) sales and 10 percent for geosynchronous orbit (GEO) COMMSATs since 1999." "A Tier 2 company commented, 'ITAR restrictions and limits are a major impediment to be able to respond to proposal requests and subsequently sell products in foreign markets.' A Tier 3 company '...is withdrawing from the space business due to a sustained absence of profitability and a refusal of some foreign customers to procure equipment that requires U.S. ITAR licensing.'"*[37]

- *2008—National Security Space Office Survey: A survey by the Defense Department's National Security Space Office of nearly 200 small U.S. space companies found that 70 percent of those companies surveyed stated that ITAR restrictions inhibited their ability to compete for foreign business. More than 40 percent of companies cited ITAR restrictions for hiring difficulties. Many of the survey's findings show that our U.S. small space businesses are the most vulnerable to fluctuations in government funding and compliance burdens.*[38]

- *2008—Report to Congress of the Independent Assessment Panel on the Organization and Management of National Security Space: "A critical factor in the developing threat to U.S. space supremacy is the accelerating proliferation of space technology. The growth in international space design, production, and operations spurred in part by U.S. restrictions on the export of space technology [under the International Traffic in Arms Regulation (ITAR)] is leveling the playing field so*

that many nations now compete with the United States in space."[39]

- *2008—Space Foundation Paper on ITAR and the U.S. Space Industry: "ITAR restricts the ability of U.S. firms to compete because foreign companies do not operate under equal restrictions. Technology remains on the USML, even when it is commercially available in other countries, because lists of critical U.S. military technologies are seldom updated."[40]*

- *2008—House Permanent Select Committee on Intelligence Report on Overhead Architecture: "Government and industry participants described how ITAR has motivated European companies to establish an international (non-U.S) collaborative R&D environment where ITAR-banned technologies are produced indigenously, thereby defeating the premise of ITAR."[41]*

- *2008—Center for Strategic and International Studies Study on the Space Industrial Base and Export Controls: "Export controls are adversely affecting U.S. companies' ability to compete for foreign space business, particularly the 2nd and 3rd tier. And it is the second- and third- tier of the industry that is the source of much innovation, and is normally the most engaged in the global market place in the aerospace/defense sector."[42]*

- *2009—House Committee on Foreign Affairs Subcommittee on Terrorism, Nonproliferation and Trade; Hearing on Export Controls on Satellite Technology: "Now, the space industry has made credible arguments that the International Traffic in Arms Regulations, known as ITAR, has hurt business and the space industrial base. This claim is echoed in private at least by the Intelligence Community who sometimes find it more and more difficult to source satellite-related equipment domestically."[43]*

- *2009—National Academies' Beyond 'Fortress America' Report: "...the export control system enforced in the United States today has failed to evolve with changing global conditions, and now produces significant harm to U.S. military capability, to homeland security, and to the nation's economic competitiveness."[44]*

- *2010—Annual DOD Industrial Capabilities Report To Congress: "In the vacuum left by U.S. companies in international markets, foreign firms have been energized to fill the void and even create "ITAR-free" products that have no U.S. components that might prevent exporting to third countries. The cost and difficulty of export licensing becomes a competitive disadvantage to lower-tier U.S. firms with fewer financial resources."[45]*

Prime

- **2010—Aerospace Industries Association Report, Tipping Point:** *"At a time when the U.S. government should be encouraging growth across all sectors of the economy, export controls are limiting growth in the space sector, especially among component suppliers. In the absence of a healthy, cutting-edge U.S. space industrial base our government may be forced into reliance on foreign suppliers for key components, accelerating the loss of U.S. leadership in space."*[46]

- **2011—Joint Defense Department and Director of National Intelligence National Security Space Strategy:** *"Export controls, however, can also affect the health and welfare of the industrial base, in particular second- and third-tier suppliers. Reforming export controls will facilitate U.S. firms' ability to compete to become providers-of-choice in the international marketplace for capabilities that are, or will soon become, widely available globally, while strengthening our ability to protect the most significant U.S. technology advantages."*[47]

- **2011—Heritage Foundation Report "China's Space Program: A Growing Factor in U.S. Security Planning":** *"(The United States) is seeking to reform export controls and the International Trade in Arms Regulations, which have harmed the international competitiveness of American satellite manufacturers. These efforts, as long as they continue to address specific security concerns and do not slight the continued need to protect key American technology advantages, deserve support from Congress and Secretary of Defense Leon Panetta."*[48]

Endnotes

[1] http://integrator.hanscom.af.mil/2009/July/07162009/07162009.htm

[2] http://www.futron.com/SCI_2011.xml

[3] http://csis.org/files/media/csis/pubs/021908_csis_spaceindustryitar_final.pdf

[4] http://www.ogc.doc.gov/ogc/contracts/cld/hi/105-261.html

[5] http://www.spacenews.com/resource-center/sn_pdfs/SPN_20090323_Mar_2009.pdf

[6] http://www.nro.gov/news/articles/2010/2010-02.pdf

[7] http://www.acq.osd.mil/ott/dpatitle3/projects.htm (file unavailable)

[8] http://www.acq.osd.mil/ott/dpatitle3/projects/bp.htm (file unavailable)

[9] http://www.defense.gov/dodcmsshare/newsphoto/2010-06/hires_100617-N-0696M-051.jpg

[10] http://www.boozallen.com/media/file/80445.pdf

[11] http://www.stratcom.mil/speeches/2011/67House_ArmedServices_Subcommittee_Strategic_Forces_Testimony/

[12] http://www.breitbart.com/article.php?id=D9OCEPTO2&show_article=1

[13] National Space Policy of the United States of America, June 28, 2010, p. 1 http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf

[14] http://www.aviationweek.com/aw/jsp_includes/articlePrint.jsp?storyID=news/awst/2010/06/07/AW_06_07_2010_p34-231779.xml&headLine=French%20Guarantee%20Assures%20Iridium%20Next%20Future

[15] http://democrats.foreignaffairs.house.gov/press_display.asp?id=888

[16] 2009 House Armed Services Subcommittee on Strategic Forces hearing on the space industrial base: http://www.gpo.gov/

[17] Malenic, Marina "Congressman Calls For Satellite Acquisition Overhaul, Looser ExportControls," Defense Daily, Nov. 19, 2008 http://findarticles.com/particles/mi_6712/is_34_240/ai_n31138460/

[18] http://washingtonexaminer.com/opinion/columnists

[19] http://rohrabacher.house.gov/NewsDocumentSingle.aspx?DocumentID=112628

[20] http://www.bens.org/mis_support%2Gates%2Export%20Speech%204-20-10.pdf (site appears to be down)

[21] http://armed-services.senate.gov/

[22] http://www.aia-aerospace.org/assets/aia_report_tipping_point.pdf

[23] http://www.house.gov/coxreport/pdf/ch9.pdf

[24] http://thomas.loc.gov/cgi-bin/bdquery/z?d105:h.r.03616:

[25] http://www.house.gov/coxreport/chapfs/ch6.html

[26] http://www.defense.gov/news/newsarticle.aspx?id=58830

[27] http://csis.org/files/media/csis/pubs/021908_csis_spaceindustryitar_final.pdf

[28] U.S. Air Force and U.S. Department of Commerce, "Defense Industrial Base Assessment: U.S. Space Industry Final Report," August 31, 2007, p. 31 http://www.bis.doc.gov/defenseindustrialbaseprograms/osies/defmarketresearchrpts/exportcontrolfinalreport08-31-07master___3---bisnet-link-version---101707-receipt-from-afrl.pdf

[29] http://www.export.gov/ecr/index.asp

[30] http://www.export.gov/ecr/index.asp

[31] http://www.aia-aerospace.org/assets/Sec_1248_Report.pdf

[32] http://www.thespacereview.com/article/1660/1

[33] http://www.aia-aerospace.org/assets/Sec_1248_Report.pdf

[34] http://www.whitehouse.gov/the-press-office/executive-order-national-export-initiative

[35] http://www.boozallen.com/media/file/80445.pdf

[36] http://www.acq.osd.mil/mibp/docs/ida_study-export_controls_%20us_def_ib.pdf

[37] http://www.bis.doc.gov/defenseindustrialbaseprograms/osies/defmarketresearchrpts/exportcontrolfinalreport08-3107master___3---bis-net-link-version---101707-receipt-from-afrl.pdf

[38] National Security Space Office, Barriers to Entry and Sustainability in the U.S. Space Industry, 2008

[39] http://www.armyspace.army.mil/ASJ/Images/National_Security_Space_Study_Final_Sept_16.pdf

[40] http://www.spacefoundation.org/docs SpaceFoundation_ITAR.pdf

[41] http://www.fas.org/irp/congress/2008_rpt/hrpt110-914.pdf

[42] http://csis.org/files/media/csis/pubs/021908_csis_spaceindustryitar_final.pdf

[43] http://foreignaffairs.house.gov/111/48443.pdf

[44] http://books.nap.edu/openbook.php?record_id=12567&page=23

[45] http://www.acq.osd.mil/mibp/docs/annual_ind_cap_rpt_to_congress-2010.pdf

[46] http://www.aia-aerospace.org/assets/aia_report_tipping_point.pdf

[47] http://www.defense.gov/home/features/2011/0111_nsss/docs/NationalSecuritySpaceStrategyUnclassifiedSummary_Jan2011.pdf

[48] http://www.heritage.org/research/all-research.aspx?categories=report

About the Aerospace Industries Association

The Aerospace Industries Association was founded in 1919, only a few years after the birth of flight. The nation's most authoritative and influential voice of the aerospace and defense industry, AIA represents more than 150 leading aerospace and defense manufacturers, along with a supplier base close to 200 associate members. AIA represents the nation's leading designers, manufacturers and providers of:

- Civil, military and business aircraft
- Homeland and cybersecurity systems
- Helicopters
- Materiel and related components
- Unmanned aerial systems
- Equipment services
- Space Systems
- Missiles
- Aircraft engines
- Information technology

About the author
Mike Conschafter is Director, Space Systems at the Aerospace Industries Association (AIA). In this capacity, Mike coordinates space policy issues related to the Department of Defense, U.S. Air Force, Missile Defense Agency and other government organizations.

Before joining AIA, Mike advised U.S. Congressman Doc Hastings (R-WA) on defense, science, and energy affairs. In addition to his role as a policy advisor, he managed security and science appropriations for Mr. Hastings' district in Washington state where he was instrumental in securing funding for critical DOD, Department of Energy, Department of Homeland Security and National Science Foundation programs. Mike also worked on issues related to DOE's Hanford Site, the Pacific Northwest National Laboratory, and organized an annual series of briefings on DOE and National Nuclear Security Administration programs. Prior to his work in the House of Representatives, Mike served in the office of U.S. Senator Lindsey O. Graham (R-SC). He supported the senator's commitment to defense and science issues, specifically related to DOE's Savannah River National Laboratory and other state research organizations. During his tenure Mike led the creation of the Senate Hydrogen and Fuel Cell Caucus.

Mike holds a B.A. in history and political science from the University of North Carolina at Chapel Hill and completed post-graduate coursework at the National Defense University at Ft. McNair.

Poster credit: ULA

Satellite Export Reform: Myths & Facts

MYTH: *A recent uptick in U.S. satellite manufacturing revenue is a trend that clearly shows that the current export control system does not need to be changed.*

FACT: *The U.S. space industry—from top tier firms to suppliers—remains competitively disadvantaged by the current satellite export regime. The overall trend is clear—the United States held 73 percent of the worldwide share of satellite exports in 1995—this fell to a staggering 25 percent by 2005. This study and a myriad of others have shown that the current system is not optimized to allow U.S. firms to compete against their international counterparts. A 2011 review of the U.S. space industry by Futron clearly showed that the United States is falling behind in space competitiveness. As the space industry's main customer—the U.S. government—reassesses its spending priorities, many space and defense firms will require stronger international and commercial sales in order to survive. It is more important than ever for national leaders to address export control modernization.*

MYTH: *Removing satellites and related components from the USML will harm U.S. national security.*

FACT: *Sensitive satellite and launch technologies will certainly need to remain under strict export control of the USML. However, there are a variety of low/no risk commercial satellite systems and components—many of which are already available on the international market—that should be considered for control under the less restrictive CCL. As the National Defense Authorization Act for Fiscal Year 1999 moved all satellites and components to the USML, even commercial communications satellites and widely available subcomponents remain under munitions list export control. Preventing export of nonsensitive technologies actually results in damage to the U.S. industrial base, making our small businesses less competitive and potentially less able to meet the national security needs of the U.S. government. Clearly, we need a more nuanced export system for today's space technologies.*

MYTH: *Why modernize export controls for satellites now? The Europeans have developed their own capabilities and would not buy U.S. space products even if export controls were changed.*

FACT: *There are a variety of U.S. manufacturers that currently do business with European countries. These firms have unequivocally stated that the correct changes to the current export control system would benefit their business in Europe. Other companies are looking elsewhere for business—especially in the Middle East, where many countries' budgets remain stable and interest in technology is increasing. In South America, the Chinese have been reported to be aggressively pursuing satellite sales to Brazil, a country in which U.S. companies lack a substantial presence.*

MYTH: *Why should we be concerned about satellite export control modernization? Won't it just help large companies who win billions of dollars in U.S. government contracts anyway?*

FACT: *The large and small U.S. companies that comprise our space and defense industrial base are critical to U.S. national and economic security. Without these companies, we would not be able to lead the world in technology and would be unable to produce the systems needed to provide our warfighters with an edge on the battlefield. It is imperative that we protect sensitive technology from export, but it is similarly important for our security that we provide these firms with the tools needed to win export business against their foreign competitors. Export control modernization could arguably help U.S. second- and third-tier suppliers the most. These small businesses often lack the resources to manage the complicated and challenging export control regime. This causes many small firms to make the decision to stay out of the space market entirely or can cause significant sales losses among small firms that remain in space markets. A reinvigorated export control system would have immense benefits for the U.S. space industry, especially second- and third-tier small businesses.*

Focus

Global Maritime Communications: Delivering Bits Through The Confusion

By Rick Simonian, President, Maritime Solutions, Harris CapRock Communications

As one of the oldest forms of long-distance transportation, maritime vessels have been the backbone of commerce in nearly every region of the world for thousands of years. Approximately 90 percent of world trade is carried by the international shipping industry, nations' defense and security efforts depend on navies and coast guards, millions of passengers every year go on cruise and ferry vessels, and there is a vast armada of service, supply and scientific vessels worldwide.

Most of the landmasses around the world have experienced a dramatic increase in connectivity over the past 20 years through expansion of terrestrial and cellular networks, as well as micro-wave and satellite coverage. Although communications to ships have improved during this period, the connections at sea still greatly lag behind what people are used to on land. The convergence of voice, video and data to all-IP networks has simultaneously simplified and complicated the end-user's decision process. Users now know that it is possible to connect every device and data source on a ship to a single network, and they expect that the solutions should be as simple as their home enterprise solutions. But the IP revolution has also driven an explosion of new products and services, dramatically increasing demands on maritime communication networks.

Apart from the many technical intricacies of maintaining a reliable link from a vessel to a satellite hundreds or thousands of miles away, the satellite communications industry has simply experienced growth faster than many users can keep up with it. Although the technology exists to produce an at-sea communications experience similar to that experienced by a user's home office, many customers have trouble selecting the combination of technologies, network equipment and services that address their needs most efficiently and cost effectively.

Bringing The Sea Home

Few markets within the high technology industry have experienced growth and evolution quite as rapidly as maritime SATCOM. Even as recently as 10 years ago, making a phone call or accessing a corporate network from a ship was a tightly controlled luxury; now this connection is becoming an expectation of passengers and crew. Satellite communications have become the standard for many offshore operations, and the capacity of satellite technology has expanded to include hardware, software and capabilities that didn't previously exist. Not only has this growth expanded our ability to connect to virtually every ocean region, but it has also improved operational efficiencies, safety, and crew morale and welfare. But as overworked radio officers and IT staff will quickly point out, once the end-users are given a connection, they just want more!

Onboard stabilized antennas today are smaller, more functional and more reliable than they have been in the past. This translates into less-intrusive hardware, requiring far less time and maintenance from crew members and technicians, with lower risk of downtime. The recent trend has been for single antennas to operate on multiple satellite bands and to automatically switch between satellites to overcome blockage or movement out of a satellite footprint.

After 20 years of this technology being used for government vessels, we're seeing a migration to the commercial marketplace. In short, users can get a lot more function out of the same amount of hardware, which substantially cuts equipment costs and maintenance requirements. Baseband technology, which is basically how digital information is carried between the satellite, the ship and the Land Earth Station, has also improved the effectiveness of satellite service, taking advantage of technologies such as **TDMA**, **CDMA** and **dSCPC** to maximize the number of bits that can be sent over the scarce satellite spectrum.

With widening hardware capabilities, SATCOM users have also developed higher expectations of service. Whether users are engaged in social networking, supply chain processing, basic voice, video and data communication, or utilizing onboard applications for business and passenger information, seafarers require more bandwidth from their networks. At **Harris CapRock,** we have seen our typical user's monthly data consumption double over the past two years, and the demand is not abating.

Given the rate at which these developments have progressed, it's safe to predict that the landscape of satellite technology five years from now may very well bring an entirely different set of capabilities and user demands, as maritime operations grow digitally closer to their home offices. And with these developments, we can undoubtedly expect to see new problems and confusions arise.

Multiple Options Breed Inefficiencies

In fact, technological developments have already created quite a bit of confusion for users shopping the SATCOM market. With so many different technologies to address varied needs, choosing the most appropriate solution from a laundry list of signals and hardware is no easy task. Should a network use an open or closed (proprietary) system? C-, Ku-, L- or Ka-band? What about hybrid networks that also use **GSM** or **WiMAX**? What type of antenna? It's not easy to decide what will suit the needs of extensive operations when there are so many technologies available.

Focus

Sometimes buying decisions are made just on cost, or on a portion of the true lifecycle cost, and many times the marketing hype of a solution is not matched by real-world performance which can leave a bitter taste in the buyer's mouth. The decision making process is daunting to even the most knowledgeable IT department. On top of that, changes to industry regulations and growing data transmission requirements make implementing a satellite network even more difficult. After all, when signing a long term contract, can the company be confident that its needs several years from now will be met by the same solution they are committing to today?

Even beyond the pace of technology changes, the industry is also changing quickly. Regional service providers are being consolidated through mergers and acquisitions. Operators are trying to become service providers. Telecommunications companies are entering the maritime satellite market. Distribution channels and pricing models are changing radically. The multitude of responses to a tender for fleet communications services can force buyers to think through another separate set of questions. How much bandwidth is needed and how should it be managed? Are bundled services necessary? Is a global or regional provider needed? How long should a contract last? Should the costs be treated as capital or operational expenses? Are applications bundled with the service or should those be separate contracts? The good news for the buyers is that competition and innovation in this market is alive and well!

Partnering To Allow Focus On Customer Missions

The truth is that many users really aren't interested in the types of signals available or choosing an antenna. They're more concerned with how well the network operates and how much it costs. Users seek confidence in knowing that they're receiving reliable coverage beyond their current geographic regions. They need the administrative capabilities to monitor assets, resource availability, crew and guest usage, and security. They want it future-proof. And they need it to be affordable. The customer basically wants an Ethernet cable connected from the mainland to the ship!

This is what has driven many companies to consider using a communications partner to help select and deliver the right combination of services and technologies to meet their needs. By managing the entire system, communication service providers have the ability to build a solution looking through an unbiased lens that optimizes technologies to address the specific needs of a client while also charting a course for the future. By working with a capable global service provider, users can focus more on their core missions and less on worrying about the complexity of the communications solution.

In addition, a communications service provider can build a service plan that will grow alongside its customers' operations. For example, some of our customers with large fleets are well served by a cost-effective 60 cm antenna with C-band service to provide basic voice and text messaging services. As we work with the fleet, or portions of the fleet, to build a case for increased performance or additional applications, we can lead the transition and upgrade process.
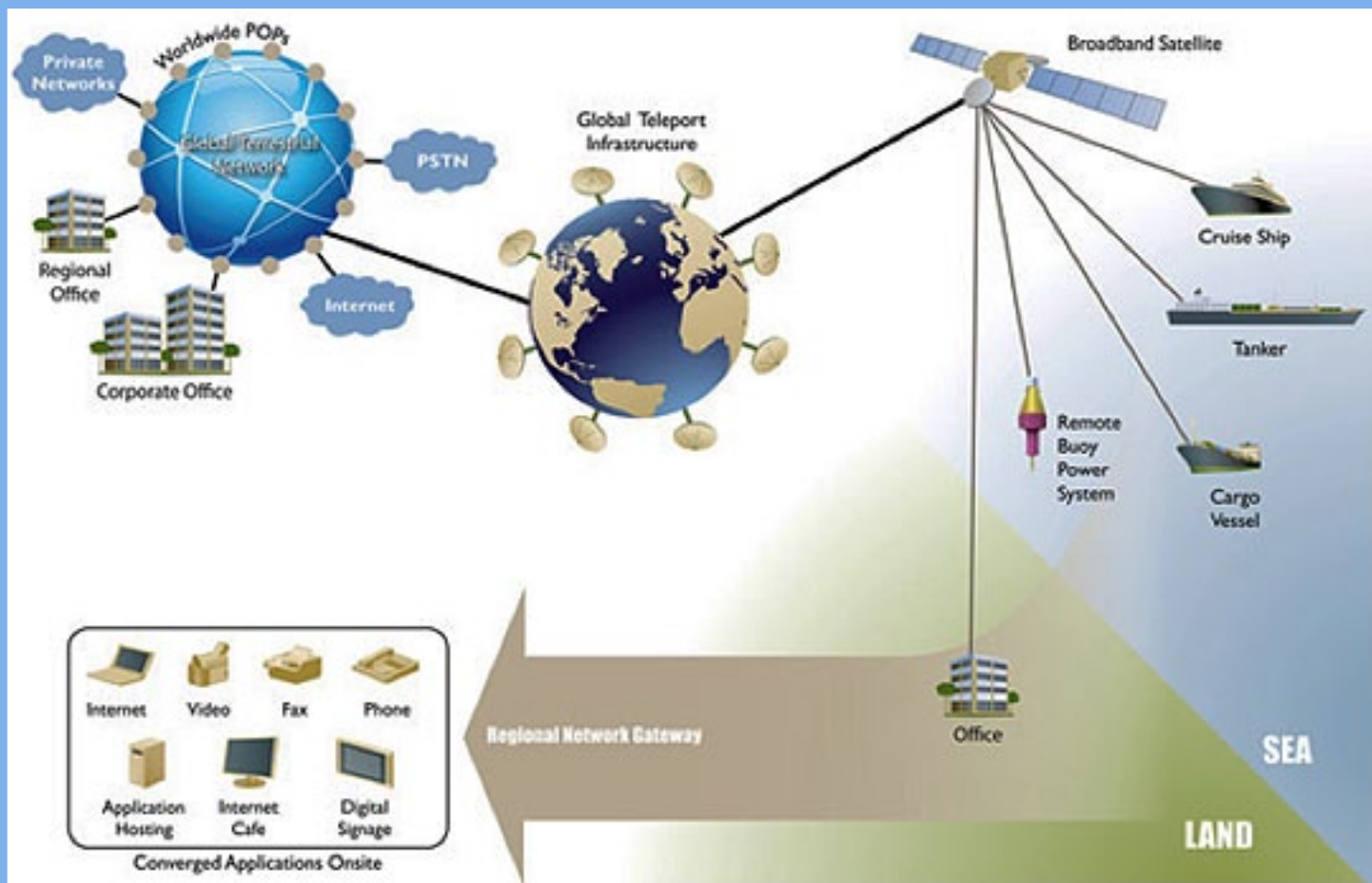
Harris CapRock's Global Teleport Infrastructure Newton Road infrastructure in Aberdeen, Scotland

On the other hand, some of our sites are better served by a high-capacity submarine fiber connection rather than satellite, or a hybrid network with both satellite and shore-side wireless networks. At the high end, we can now deliver more than 100 mbps of service to a single vessel nearly anywhere in the world, a level of service not practical just two years ago! Maritime communications customers ought to be focused on how they serve their own customers, how they make money and how they distinguish themselves in their market; a communications service provider can enable that focus by handling the complexities of the network.

Maritime technology has progressed rapidly to support the mission critical communication needs of the world's fleets, but that progress is far from over. We can expect to see many more innovations in the coming years, specifically for communications networks. By building a scalable and evolving global network with a combination of technologies to suit each company's needs, an end-to-end service provider allows crew and passengers across the oceans to continue to grow digitally closer to their home offices and reach operational efficiencies previously inconceivable.

About the author

Rick Simonian is president of Maritime Solutions at Harris CapRock Communications, a premier global provider of managed satellite and terrestrial communications solutions specifically for remote and harsh environments serving the energy, government and maritime markets. Harris CapRock owns and operates a robust global infrastructure that includes teleports on six continents, five 24/7 customer service centers, AssuredCare customer service and network management program, local presence in 23 countries and more than 275 global field service personnel supporting customer locations across North America, Central and South America, Europe, West Africa and Asia-Pacific regions. Harris CapRock offers a variety of end-to-end solutions supporting maritime operations for cruise, commercial shipping, marine systems, seafloor networks, and service and supply applications.

Industry View

Ten Points For Your Consideration

By Roger Rusch, President, TelAstra, Inc.

I attended 14 sessions, typed up 48 pages of notes, and read all the articles published in the trade journals while attending *Satellite 2012*. The sessions were better attended than in past years and the conference added a cellular feedback system for polling. This was available to the 50 percent of the audience that carried the latest smart phones. Part of the polling was devoted to advertising for Proton and Baikonur. Nonetheless, the polling provided a way to interact with the audience on significant issues where subjective opinions could be displayed. The exhibit area was packed from one end to the other with approximately 280 exhibitors.

First, and most importantly, the satellite communications industry is thriving. Profits are growing, however, there are signs that it may be slowing down a bit. Some of the new satellite launches have been stretched out. The number of commercial GEO satellites ordered dropped from 28 in 2010 to 17 in 2011. Most operators are expecting a larger fraction of unused capacity as new, higher-capacity satellites are launched.

Since the conference, I have been thinking about what was said and have discussed such with various investors. It seems that we are in the midst of some major—even revolutionary— changes to the satellite industry. Here is a summary of the 10 key topics I believe are of significant importance.

1. ***Good News***—Ka-band is now mainstream and will transform the business. It is definitely accepted as conventional technology today and no longer to be feared. **DirecTV** has been broadcasting in Ka-band with great success for nearly a decade. **Eutelsat** reports good results with KASAT. ViaSat has introduced Excede service, which is comparable to most terrestrial alternatives and praised by users and reviewers. Big Ka-band satellites have 10 times throughput of the ordinary C- and Ku-band satellites and cost one-fifth as much to transmit a Megabyte of information.

High Throughput Satellites (**HTS**) are in operation over Europe, North America, and the Middle East, and most FSS satellites under construction now include some Ka-band transponders. These satellites represent a vast expansion of transmission throughput that may take a little while to absorb. Not all of these innovative systems will be successful. The migration from C- and Ku-band to less expensive Ka-band is likely to put pressure on transponder prices over the next five years.

As just one data point, **ViaSat** claims its *ViaSat-1* satellite has 140 Gbps of capacity, which is more than all traditional C- and Ku-band capacity covering North America. ViaSat also stated they are already beginning to explore Q-band and V-band, so there may be even greater increases in capacity on the more distant horizon.

Artistic rendition of the ViaSat-1 satellite, courtesy of ViaSat

Newtec and **NovelSat** have also made impressive gains in ground segment spectrum efficiency over standard DVBS2 and are turning their attention to designing systems to better exploit the higher bandwidth Ka-band systems.

2. *Good News*—All-electric satellites double satellite capability or cut launch costs in half. This breakthrough caught many off guard. This technology is a factor of two for improvement. Today, satellites are launched with 42 percent spacecraft and 58 percent fuel. In the future, that will be 83 percent payload and 17 percent fuel.

This represents a huge difference in launch cost or a huge expansion on payload capability. Boeing has a contract to build four all-electric satellites and other satellite manufacturers are also making plans to deliver such systems. The down side is the four to six months necessary to transfer a satellite to GEO. As 80 percent of satellites are replacements, this delay may be acceptable in many cases. However, I understand **Elwing** has a plasma propulsion technology currently being tested at NASA that may reduce this wait to only two to three months.
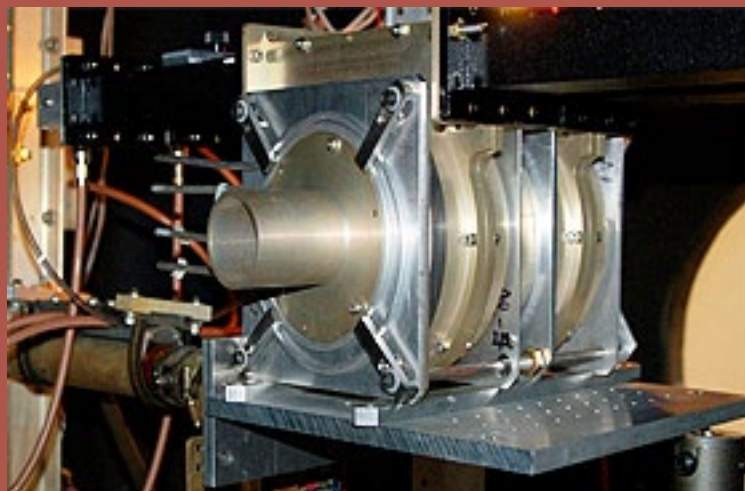

Photo of the Elwing Thruster, courtesy of the Elwing Company

3. *Struggles*—MSS operators plan to use FSS bands and FSS operators are providing MSS services. Some call this convergence, but this is really about broadband service demand. The reality is trouble for everyone. Intelsat and Inmarsat are both experiencing difficult financial times. Intelsat has no Ka-band capability and has decided to poach MSS maritime traffic from Inmarsat. All the FSS operators are experiencing interference, often from mispointing of mobile FSS terminals.

To expand its high-speed data services, **Inmarsat** will use Ka-band satellites for *Global Xpress* service. MSS operators are also preparing for substantial expansion with the production of satellites for *Globalstar 2*, *ORBCOMM 2*, and *Iridium NEXT*. The MSS industry now has five major operators competing in a business that produces only 10 to 15 percent of the FSS operator revenues.

Inmarsat's Global Xpress program, including Ka-band satellite launch costs, will required the firm to invest some US$1.2B.

Industry View

4. *Bad news*—Government cutbacks and military withdrawals from global hot spots will reduce revenues for many operators. Many operators derive 10 to 25 percent of their revenue from government sources. New government programs are drying up. Fewer troops on the battlefield cuts telecommunications demand across the board.

A Raven UAV being hand-launched during the Iraqi conflict, photo courtesy of Army Times

The likely reductions may be balanced by increased use of satellite services for surveillance, *e.g.*, *Unmanned Aerial Vehicles* (**UAV**). Unfortunately, there are indications that even funds for surveillance transmissions have been constrained. CFOs indicated that revenues would be impacted by tens of millions of dollars. One employee of a defense advisory firm said that his firm was expecting a 10 to 20 percent layoff necessity, the first in decades. Government cutbacks alone will slow satellite industry growth.

5. *Amazing*—Iridium is a fantastic success—so far. Iridium's CEO *Matthew Desch* was the toast of the town as he received the *Executive of the Year Award*. [His predecessor, *Robert Kinzie*, was selected as Executive of the Year in 1998, one year before his company declared bankruptcy.]

Iridium Communications has been growing steadily with $384 million in revenues, up 10 percent in 2011. It added 35,000 voice subscribers in 2011 and 56,000 machine-to-machine (M2M) subscribers, which produce far less revenue. *Caveat Emptor*. The company is facing the likely reduction of revenues from reduced government spending. Its aging constellation operates with satellites that are almost 13 to 15 years old but continues to function effectively even though it was only designed to operate for five years. Twenty-four percent of the original satellites have failed. There are holes in the coverage due to component failures. Service availability has suffered and the fragile satellites are facing a hostile space environment over the next three years until replacement satellites are launched at the end of 2015. Competitors are offering less expensive services and user terminals.


Matthew Desch, CEO, Iridium Communications

6. *Opportunity*—Everyone is headed for the Latin American market. Nature and satellite operators abhor a vacuum. Five years ago, Africa was the continent of satellite opportunity. There was a scarcity of transponders and prices were high. Now fiber cables have surrounded the coastal areas of Africa. Several satellites have been built for dedicated service and there is ample unused capacity over Africa, although often at price points the less affluent market will not support.

Latin America now has rapidly growing demand for communication services. Chile has wired the entire country with fiber, including Easter Island. Argentina has Ku-band satellites under construction and is studying Ka-band satellites. International operators from North America and Europe are staking out slots to provide service. Even **Eutelsat**, a company that focuses most of its attention on Europe, has won a license to serve South America.

7. *Turmoil*—LightSquared is in deep trouble. The FCC has withdrawn its conditional waiver as well as its ATC service approval due to GPS interference issues. There was a great deal of discussion about how this could have happened. Inmarsat's revenues were augmented by payments from LightSquared, which have now stopped.

LightSquared is attempting to resolve the issues by introducing GPS receivers that are compatible with its terrestrial transmissions. The FCC has initiated a proceeding to define requirements, but the process will take some time to define and for changes to be implemented. Conference panel members estimated that the interference issues could be resolved within two to 30 years. My estimate is that a realistic estimate would be at least 10 years as there are millions of GPS receivers deployed today. The process could be shortened if someone would provide financial incentives for replacements.
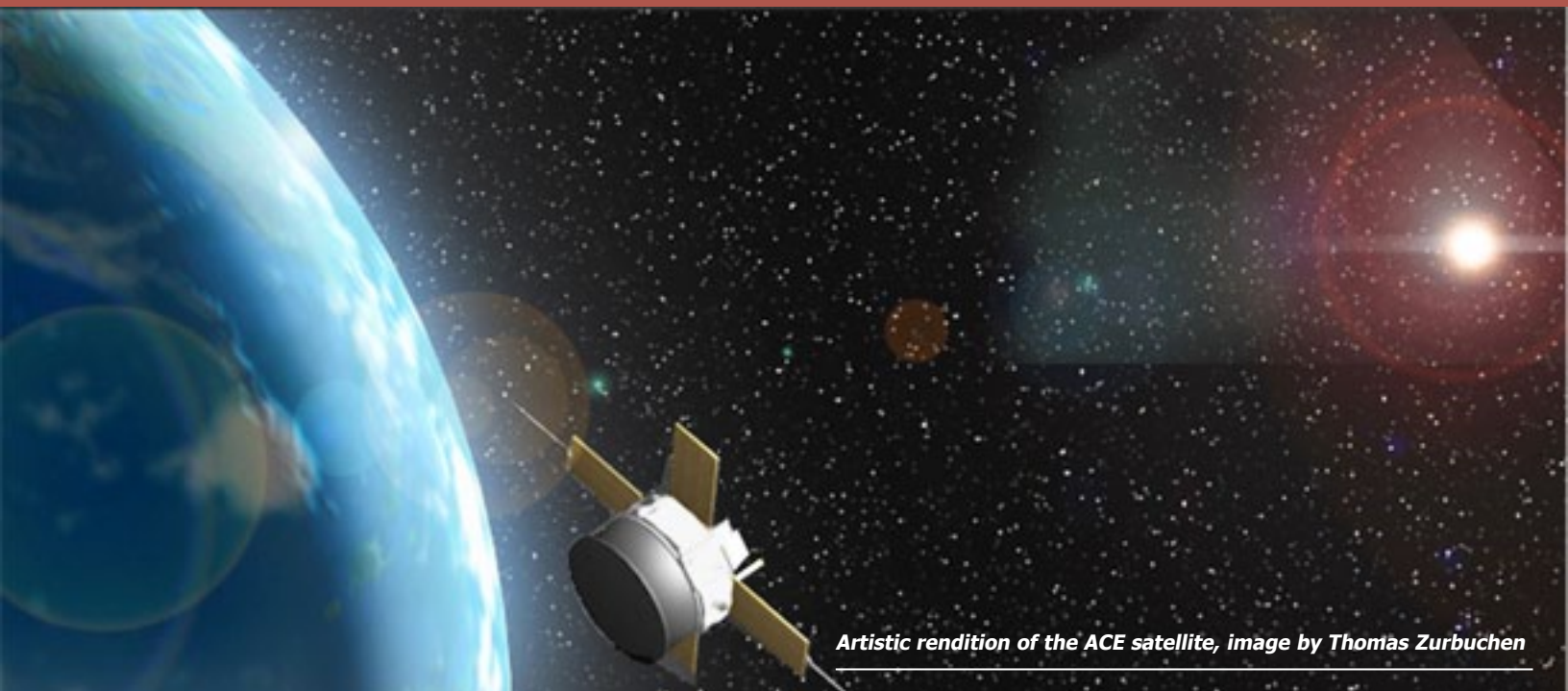
Artistic rendition of the ACE satellite, image by Thomas Zurbuchen

8. Risks—Astronomical events could disrupt satellite communications. Internet blogs by users reported that the solar storms had knocked out the LightSquared and *Spaceway 3* satellites for a time. **Boeing** confirmed this incident in private discussions. Clearly, energetic particle bursts from the sun are causing anomalies on satellites, but there is very little public information that has been released by the operators. The sun spot cycle is expected to peak in 2013, but strong flares and particle storms are common after the peak, as well. The world's only solar storm warning satellite, *ACE*, is now 12 years past its design life and its replacement is years away from deployment.

9. Financial Easing—Export financing is a robust approach for many operators. In 2009, **Coface** agreed to guarantee loans for construction of the Globalstar 2 satellites. This was followed by a similar guarantee for Iridium NEXT. Both of these systems were unable to obtain financing from conventional sources. Subsequently, even the well-established, credit worthy operators recognized that **Export Credit Agency** (**ECA**) financing resulted in lower interest rate loans and many applied for these loans to finance satellite procurements. The U.S. **Ex-Im Bank** has also been quite active and expects its facility to continue to grow because it has been profitable for the country.

10. Transition—Hybrid networks are changing the role of satellites. Many of the questions and issues at the conference were the same as in the past, but some of the answers are changing. Seven years ago there was no interest in using anything but satellites for the distribution of video media content. Today, there is interest in considering substitution of fiber in some cases. Hybrid solutions are being developed for VSAT networks as well. Direct broadcasting is not likely to go away, but attitudes and decisions are changing.

Another hot topic is the desire of many in the satellite industry to eliminate or roll back ITAR controls. Operators, in particular, would like to be able to take advantage of launching their product on inexpensive Chinese rockets, but as of this writing, such isn't on the pad.

About the author
Roger Rusch is the president of TelAstra, Inc. a consulting firm that counsels investors in satellite communications. He has 50 years experience in the industry and maintains extensive databases of satellite contracts, performance, and metrics. You can request a free set of complete notes from the Satellite 2012 conference by contacting *RogerRusch@telastra.com*

Uplink

A New Power For Business Growth

The HX System from Hughes is designed and optimized for small to medium-size networks, and employs the key features needed for a wide range of applications, such as Internet access, IP trunking, cellular backhaul, *Virtual Network Operator* (VNO) hosting, and *communications on-the-move* (COTM). A key feature of the HX System is the ability to cost-effectively scale to large networks, providing operators with an effective platform on which to start small and grow as their business grows.

Star/Mesh   Comms On-The-Move
Advanced Bandwidth Management
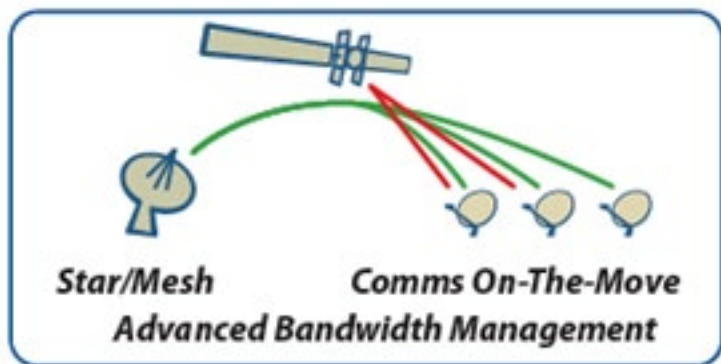
An Overview

HX System 4.0 brings a host of technology enhancements that enable higher performance, higher efficiency, and a number of significant new features, further reinforcing it as the leading choice of satellite platform for small- to medium-sized networks serving specialty markets.

Availability of the new HX routers is immediate; software and features will be released later in 2012.

New HX Broadband Satellite Routers

With HX System 4.0, Hughes introduces two new HX broadband satellite routers as well as a major enhancement to the HX2x0 series.

- HX50L is a replacement for the very popular HX50 and provides two key features: LDPC coding on the return channel (see below for the benefits of LDPC); and dual IPv6/IPv4 operation (see below for a description).

- HX9 0 is an all new HX satellite router designed with the high-thoughput performance of its HN System counter-part, the HN9400 and is ideal for nextgeneration Ka-band satellite systems.

- HX2x0 series has undergone a performance boost that doubles throughput performance and is available via a software download to previously installed units. In addition, the HX200 now supports LDPC on the return channel (up to 2 Msps). The chart in *Table 1* (*on the next page*) compares the functionality of the powerful family of HX broadband satellite terminals.

Efficiency Improvement

Low Density Parity Check (LDPC) coding has long been recognized as one of the most efficient coding techniques and enables modem performance close to theoretical optimum. LDPC was designed by Hughes and incorporated into the IPoS/ DVB-S2 standard in 2006. With HX System 4.0, LDPC coding is implemented on the return channel of HX routers for rates up to 2 Msps.

Using short-block, low latency LDPC codes in the return or inbound direction, Hughes is able to achieve an 8–12 percent bandwidth efficiency increase over existing Turbo Coded inbound systems as illustrated in *Figure 1* (*on the next page*). Multiple LDPC block sizes are supported to maintain the high efficiency associated with variable burst size. Together with adaptive coding, which enables burst-by-burst changes of the FEC rate, the Hughes adaptive LDPC always optimizes the return link for the link conditions. The Hughes adaptive coding implementation typically provides about 20 percent improvement on the throughput of the return link as compared with a fixed coding rate that must accommodate rain fade. When coupled with the 8–12 percent gain provided by the sophisticated LDPC coding, a total of 28–32 percent overall improvement in bandwidth efficiency may be achieved over Turbo Coded systems.

To increase efficiency for the forward channel, Hughes has implemented an advanced and efficient method of encapsulation of IP traffic on the forward link. The Generic Stream Encapsulation (GSE) (ETSI TS 102 606) was designed by the IPDVB working group to optimize bandwidth efficiency for user IP traffic by encapsulating IP datagram and other network protocol packets directly over DVB-S2 generic streams.

The HX System 4.0 implementation of GSE reduces encapsulation overhead and provides improvement in bandwidth efficiency of ~4–14 percent (depending on the distribution of user IP packet sizes) compared with multiprotocol encapsulation (MPE) over MPEG-TS. A comparison of bandwidth efficiency for the two encapsulation methods is shown in *Figure 2*.

In HX System 4.0, bandwidth assignment efficiency is further increased through the implementation of the Hughes On- Demand Streaming (ODS) feature. Previously available only on the HN platform, the ODS is a powerful QoS/ToS-based, performance-enhancing feature that dynamically assigns Constant Bit Rate (CBR) transport services per application session. On-Demand Streaming enhances the performance of VoIP and video applications that are based on Session Initiated Protocol (SIP)

	HX50L	HX90	HX200	HX260	HX280
2 LAN Ports	✓	✓	✓	✓	✓
Max Return Channel Rate (Mbps)	3.6	3.6	9.6	9.6	9.6
LDPC with 9/10 Return Channel	✓	✓	✓	✓	✓
IPv6 Ready	✓	✓	✓	✓	✓
Mobility Features			✓	✓	✓
C-Band	✓		✓	✓	✓
Ku-Band	✓	✓	✓	✓	✓
Ka-Band		✓	✓	✓	✓
X-Band			✓	✓	✓
PPS Rate	2500	2500	5000	5000	5000
Simultaneous TCP Sessions	256	500	500	500	500
Forward UDP Throughput	20 Mbps	45 Mbps	45 Mbps	45 Mbps	45 Mbps
Forward TCP Throughput	8 Mbps	15 Mbps	15 Mbps	15 Mbps	15 Mbps
L-Band Interface to Linear Radio			✓	✓	✓
Mesh				✓	✓
FIPS 140-2 Level 2 (AES 256)					✓
Pending WGS Certification					✓

Table 1. HX Satellite Router Comparison Matrix

and H.323 standards, as well as latency sensitive data traffic. With ODS, the HX System 4.0 can transparently recognize SIP calls and allocate high-quality CBR bandwidth for the duration of the call. Once the call is complete, the bandwidth is deallocated so that it is available for other applications.

IPv6/IPv4 Dual Operation
The world supply of available IPv4 address blocks is quickly evaporating. IPv6, the version of Internet Protocol to succeed IPv4, is designed to enable virtually infinitely more IP addresses for the world's rapidly expanding population of IP addressable devices. IPv6 enables more than 3.4 undecillion (or 3.4 x 1038) IP addresses, enough addresses to enable connectivity to virtually any device. Supporting IPv6 is critical to the success of any telecom operator and HX System 4.0 provides a clear migration path with simultaneous operation of support IPv4 and IPv6.

HX System 4.0 employs a dual stack architecture for IPv4 and IPv6 traffic, maintaining an independent protocol stack for each Internet Protocol version. This enables simultaneous support of both IPv4 and IPv6 devices on the same Ethernet segment at either the remote or gateway portion of the HX System 4.0.

The full IPv6 functionality will be available in Q3 of 2012; the HX50L, HX90, and all of the HX2x0 satellite routers are "IPv6 ready." A simple software download to these devices will enable the dual stack IPv4/IPv6 functionality. Note that certain hub components may need to be upgraded.
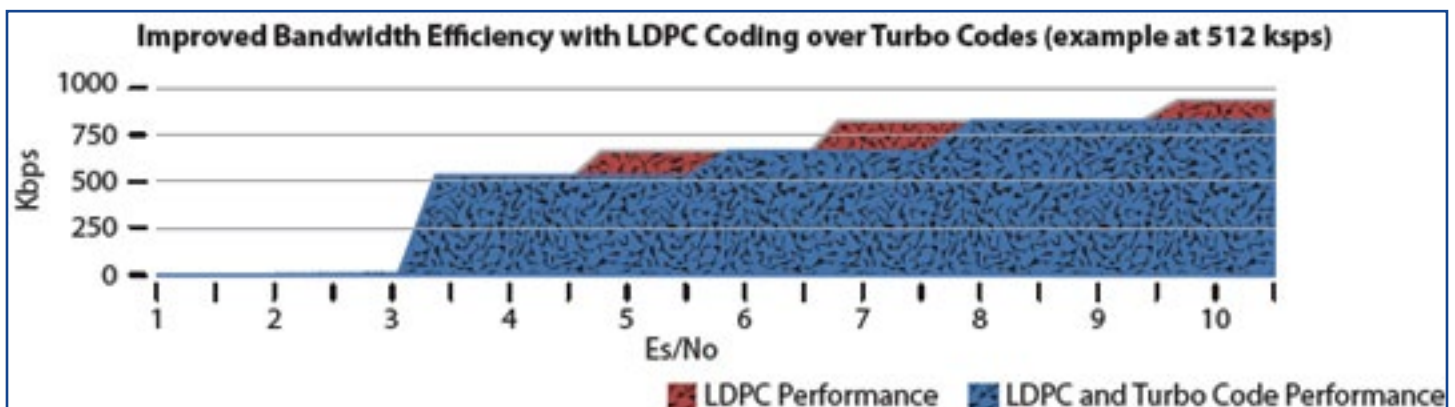

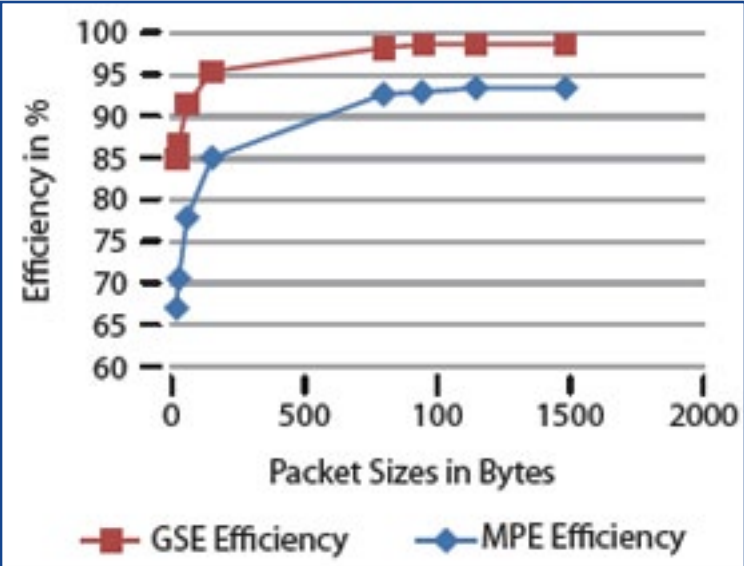*Figure 1. LDPC vs. Turbo Return Link Efficiency*

Figure 2. GSE vs MPE Efficiency

HX System 4.0 for Cellular Backhaul

Included within HX System 4.0 is a set of features that significantly strengthens support of cellular backhaul and any other latency sensitive real-time applications. HX System 4.0 incorporates a fast packet processing queue especially designed for real-time applications to achieve lower overall latency. For the return channel, the "just in time" burst feature ensures that data packets are transmitted at the earliest possible opportunity. An integrated jitter buffer enables an operator to configure the desired jitter performance. With these features, the HX System 4.0 is able to deliver roundtrip latency performance of 600 to 650 ms (depending on the jitter setting) with one-way jitter performance of 20 ms achieveable.

Enhanced VNO Capabilities

As part of HX System 4.0, the HX ExpertNMS™ (Network Management System) has been upgraded to provide enhanced management capabilities for Virtual Network Operators (VNOs). This new capability, which allows a VNO to monitor and control elements within their VNO domain, enables operators to
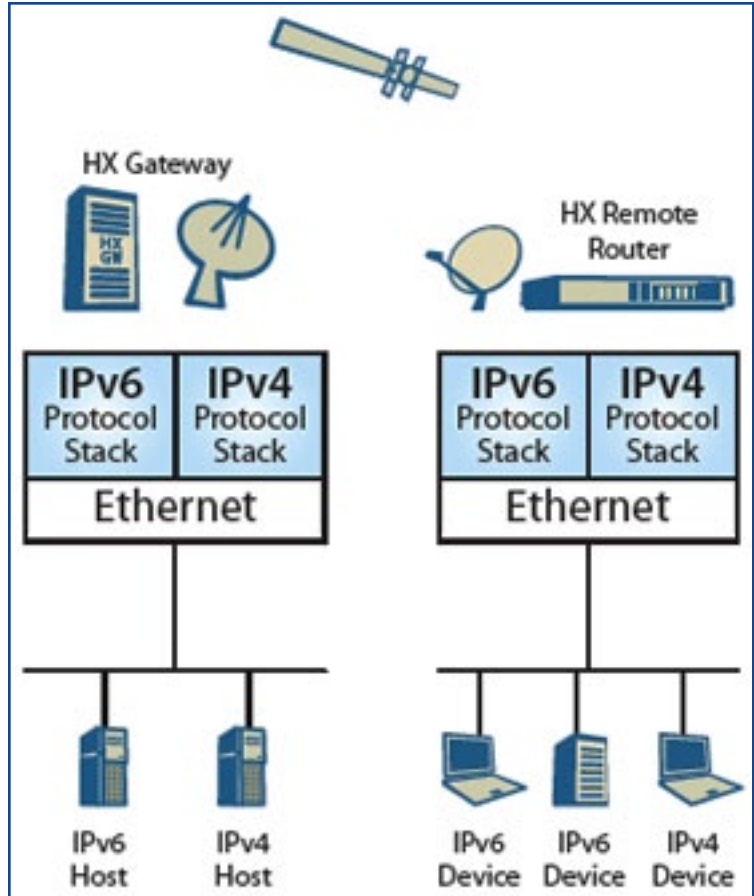

Figure 3. Dual Stack IPv6/IPv4

effectively partition their network and provide complete control to the private users of these partitions. Figure 4 illustrates some of the new HX ExpertNMS capabilities.

Enhanced Mobility Features

HX System 4.0 includes several new features that further enhance performance of Communications-On-The-Move (COTM), applications. Broadening the range of remote COTM

Symbol Rate	Spreading Factor	FEC - Turbo Code Rate
256 ksps	2	1/2, 2/3, and 4/5
256 ksps	4	1/2, 2/3, and 4/5
256 ksps	8	1/2
512 ksps	2	1/2, 2/3, and 4/5
512 ksps	4	1/2, 2/3, and 4/5
1024 ksps	2	1/2, 2/3, and 4/5
2048 ksps	2	1/2

Table 2. Return Channel Spreading Rates

Element Manager for VNO components and ability to:

1) Create profiles
2) Create service plans
3) Create VSATs

Bandwidth Dashboard for VNO components and ability to:

1) Configure IP throughput
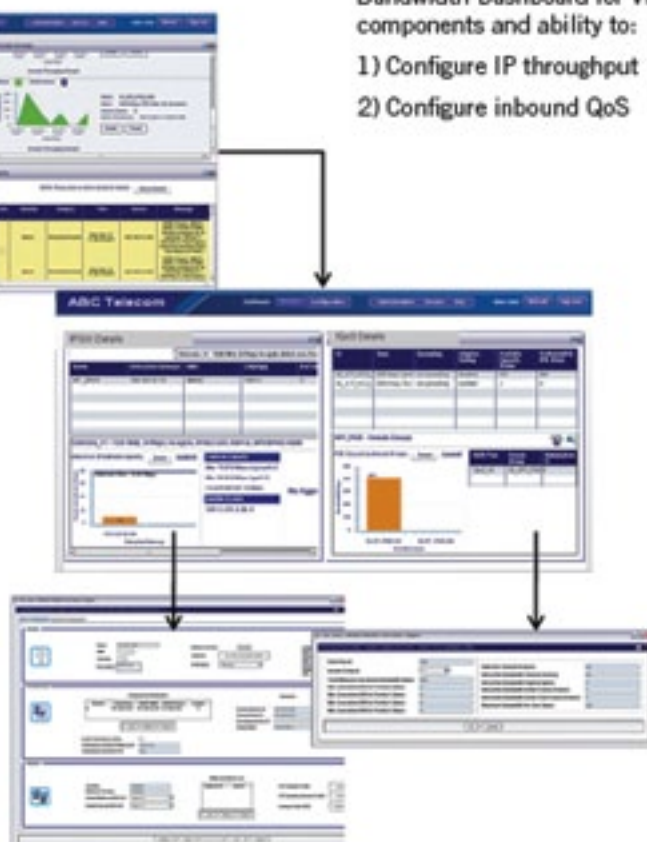2) Configure inbound QoS

Figure 4. VNO HX ExpertNMS View

antennas supported, HX System 4.0 introduces return channel spreading of 8:1 in addition to the previously supported spreading rates of 2:1 and 4:1. This capability enables the implementation of return channels on very small antennas, a critical requirement for a number of mobile applications including video streaming from unmanned airborne vehicles. Return channel spreading allows the mobile antenna to conform to applicable international regulations regarding adjacent satellite interference. Table 2 illustrates the spreading options available for the return channel.

Automatic Beam Switching (ABS)

HX System 4.0 provides an automatic mechanism for remote terminals to determine the appropriate time to point to a different satellite and commence communications automatically over the new satellite path. This feature is critical for any mobile terminal travelling across wide geographic expanses including aircraft and ocean-going vessels. With the ABS feature, the remote makes the handover decision based on an embedded algorithm that uses the latitude and longitude of the remote.

Enhanced Doppler Compensation

With very high-speed mobile terminals, such as onboard jet airliners, the Doppler effect must be compensated so that the return channel demodulation at the Gateway can maintain signal lock. The enhanced performance of the HX200 satellite router performs this Doppler compensation itself thereby eliminating the need for external Doppler compensation.

Wideband Global SATCOM Support

The Wideband Global SATCOM (WGS) system is an important broadband satellite system used by defense and military agencies. With HX System 4.0, Hughes is introducing full support for the WGS system, once certified, thereby enabling it to be used over the WGS around the world.

Editor's Note

HUGHES and HX ExpertNMS are trademarks of Hughes Network Systems, LLC. All other trademarks are the property of their respective owners.

Event

Offering Global Satellite Players Vast Opportunities For Asian Expansion

The Asia-Pacific region is earmarked for significant growth—2012 will see many of the world's largest satellite companies, including GlobeCast, Inmarsat Global, Intelsat, MEASAT Satellite Systems, Newtec and Thaicom amongst others, assembling at CommunicAsia and BroadcastAsia, Asia's largest ICT and media communications event. As the Asian satellite market continues to grow, these industry players are using the event as a strategic platform to address the critical issues surrounding Asia's marketplace, while accentuating their presence in the region.

With more than 85 percent of exhibition space already acquired by exhibitors, CommunicAsia and BroadcastAsia—held from June 19th to 22nd, 2012, at the prestigious Marina Bay Sands and award-winning Suntec Singapore respectively—promises to deliver a host of networking and learning opportunities for business players who hail from across the globe.
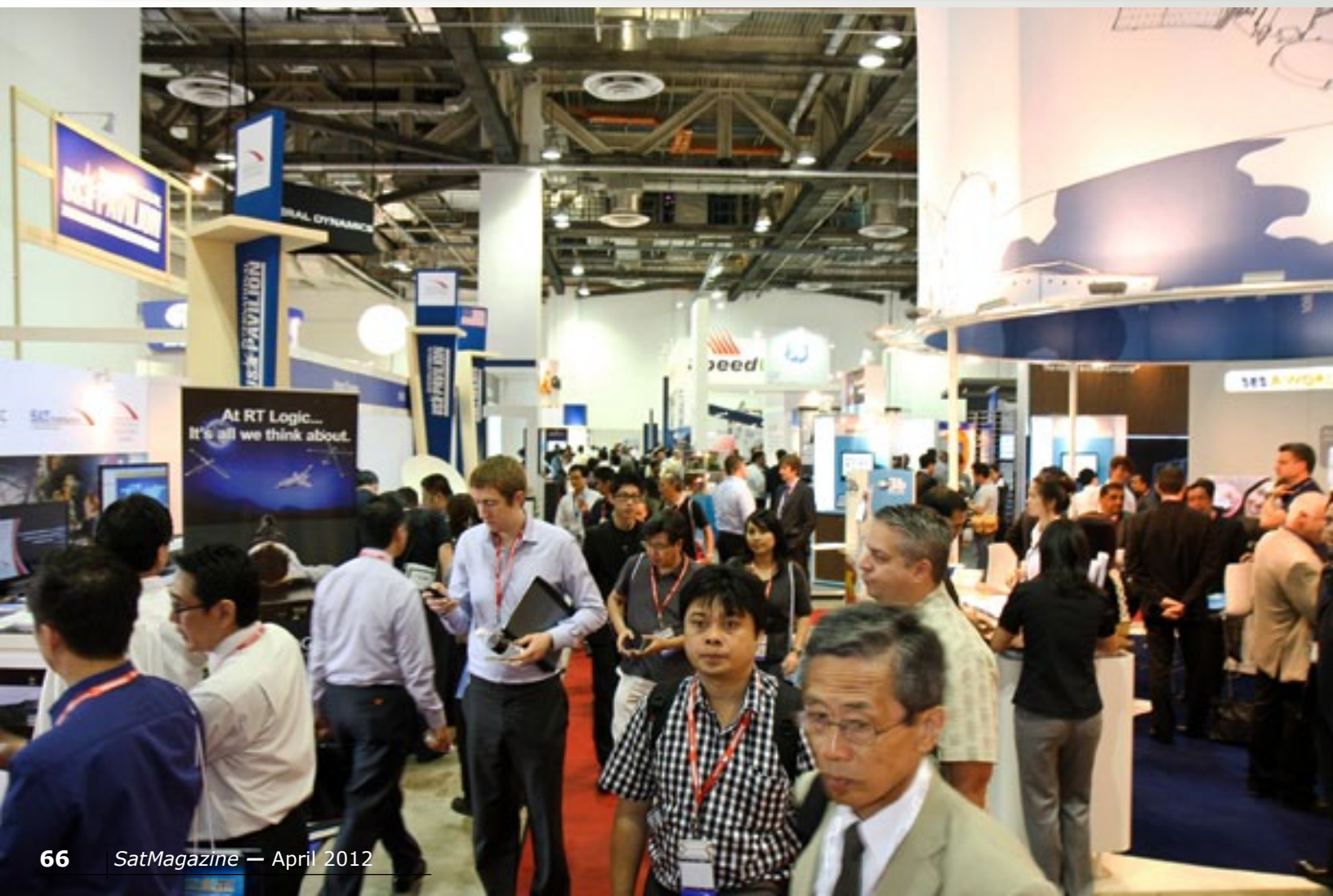
The Growing Asian Satellite Industry

Technological developments have transformed the satellite industry from what was previously confined to serving defence and communication needs, to now possessing the ability to deliver home entertainment in the form of digital broadcasting. It has evolved from just providing bandwidth and enabling content delivery to now include data and video delivery solutions that encompass Internet, VoIP, and mobile communications.

According to many Asian satellite providers, the Asian satellite industry will continue to experience future growth opportunities. With almost 3.8 billion people, Asia accounts for more than 60 percent of the world's population. This, combined with strong growth in subscription numbers to *Direct-To-Home/Direct Broadcast Satellite* (**DTH/DBS**) services and advanced services such as HDTV and 3DTV, are fuelling the demand for satellite services in this region of the world.

Furthermore, the huge popularity of television as an economical form of entertainment has helped payTV operators maintain revenue streams and offers promising prospects for satellite players. In fact, with 10,000 channels and 365 million subscribers, Asia's payTV industry is booming and looks positive for the future—according to **Media Partners Asia**, a Hong Kong-based research consultancy, Asian payTV subscriptions will rise to 570 million by 2012, which will still only be 62 percent of homes with TVs.

Interestingly, China is Asia's biggest potential market for satellite services and equipment. Its population of 104 million and an economy that is one of the fastest growing in the world pushes it ahead of other countries as far as service acquisition is concerned.

Mr. *Drew Brandy*, Vice President, Industry, at **Inmarsat Global**, said, "Asia-Pacific is a very important market for us, particularly as it looks set to experience further growth in satellite. As such, CommunicAsia and BroadcastAsia are a key event in our calendar. It explores the future of satellite while providing fantastic networking opportunities and enabling us to showcase our latest innovations."

While rapidly urbanizing cities represent a large proportion of the emerging markets in Asia, connecting rural communities that are beyond the reach of telecommunications infrastructures are becoming equally important for growth. Consumer broadband satellite growth is being boosted by continued rural broadband rollouts and the demand for Internet services in *Small Office/Home Office* (**SOHO**) businesses.

Within the government sector, satellite's critical role in enabling safe and effective communications in disaster recovery, military operations and offshore setups also continue to be growth areas for the Asia-Pacific region. Accounting for two thirds of the overall number of spacecrafts launched, this sector will continue to remain a driver for satellite.

Providing The Right Platform

CommunicAsia and **BroadcastAsia** are the only truly international shows in Asia where business professionals in the satellite industry can meet to discuss and explore the evolving marketplace. In fact, the 2012 events already have the support and endorsement from more than 20 leading trade associations, including *Asia-Pacific Satellite Communications Council* (**APSCC**), *Asia-Pacific Broadcasting Union* (**ABU**), *Asia-Pacific Telecommunity* (**APT**) and the *Singapore Infocomm Technology Federation* (**SiTF**).

Satellite communications provider **Newtec** has been involved with CommunicAsia for many years. Mr. *Serge Van Herck*, CEO of Newtec, says the event has played a major role in the company's expansion in Asia. "CommunicAsia represents a good investment for us each year. All of the key industry players attend the conference and each year the ROI proves it to be an extremely worthwhile venture, both for making deals with new and existing customers, and raising the company profile.

"This year we will be launching a series of products into the Asian market, including the world's fastest transmission technology. What started out as a simple test of a number of Newtec's recently released and upcoming technologies ended up in a quite exceptional report. During the actual test, an Intelsat 72 MHz Ku-band transponder was saturated using Newtec's latest modem technology and a mere 4.5m antenna. The result was a staggering 372 Mbps. Amazingly that did not include the use of the upcoming modulation and coding DVB-S2 extensions that Newtec's 200-head engineering team is working on. We are looking forward to showing these at CommunicAsia."

By bridging the wide spectrum of satellite technologies and applications to present operators with new and innovative ways to deliver data, video and voice content, CommunicAsia2012, together with BroadcastAsia2012, is well placed to play a pivotal role in accelerating the growth of Asia's satellite industry.

For show updates on CommunicAsia2012 and BroadcastAsia2012, please visit the following channels:

- Official CommunicAsia2012, BroadcastAsia2012 and EnterpriseIT2012 websites—see links below

- **Twitter**: @CommunicAsia and @BroadcastAsia

- **Facebook**: *http://www.facebook.com/CommunicAsia* and *http://www.facebook.com/pages/BroadcastAsia/163768382664*

- **LinkedIn**: CommunicAsia and BroadcastAsia

Shows at a glance

CommunicAsia2012/EnterpriseIT2012
Date: June 19-22, 2012
Venue: Basement 2, Levels 1, 3, 4 and 5
Marina Bay Sands, Singapore
Opening Hours
     June 19-21: 10:30 a.m. - 6:00 p.m.
     June 22: 10:30 a.m. - 4:00 p.m.
Admission: Business and trade professionals only
Registration: *http://www.communicasia.com*

BroadcastAsia2012
Date: June 19-22, 2012
Venue: Levels 3 and 4, Suntec, Singapore
Opening Hours
     June 19-21: 10:30 a.m. - 6:00 p.m.
     June 22: 10:30 a.m. - 4:00 p.m.
Admission: Business and trade professionals only
Registration: *http://www.broadcast-asia.com*

Insight

A Pervasive Global Force... Maritime SATCOM

By Jim Dodez, Vice President, Marketing and Strategic Planning, KVH Industries, Inc.

The maritime market is a pervasive global force, consisting of six major segments—shipping, offshore oil and gas, commercial fishing, passenger vessels, government and military vessels, and yachts. There are more than 250,000 vessels in the maritime market that are good future prospects for broadband communications and they are enjoying an increasing range of options (and prices) for bringing this critical benefit onboard.

The demand for broadband at sea is really no different than the demand for broadband on shore. The difficulty has always been that the cost of data communication at sea has been prohibitively expensive, causing mariners to avoid purchasing systems or to minimize their use. However, modern communication technologies like VSAT are now providing affordable broadband connections at sea, and ship owners and ship management companies are seizing the opportunity to harness the productivity of onboard networks to improve efficiency and drive profitability.

The maritime applications for broadband network connectivity are many and include critical concerns like reducing fuel consumption and greenhouse gas emissions through better weather and route planning data, remotely monitoring onboard systems and providing access to shore-based experts to assist with repairs, improving crew morale by providing VoIP calling and internet café services, and other programs to increase collaboration between ships and shore-based offices. Nearly all operations conducted on the water can be managed more efficiently when they are connected to a company's business network.

For example, real-time navigation information and weather reports can help a vessel captain select more efficient routes, resulting in shorter voyages and significantly less fuel consumption. Administrative tasks can be handled from centralized locations as opposed to being performed by personnel on board the vessel. Maintenance and support services for onboard equipment or IT systems can be provided remotely from centralized groups of specialized staff working with onboard technicians. If there is a breakdown, video conferencing can be used to enable the onboard technician to show the problem to an onshore expert, offering the possibility of remote diagnostics and assuring that the appropriate repair parts are available when the ship reaches port. Hundreds of different aspects of a vessel's performance can be monitored remotely and optimized for improved performance, again resulting in greater fuel efficiency and reduced emissions.

Security managers can monitor the real-time positions of the vessels in their fleets, communicate with government forces deployed to protect commercial ships in volatile regions, and review planned routes to provide input on hazardous areas with

recent reports of pirate or terrorist activity. Finally, requirements of maritime labor conventions for improving the communications and entertainment services offered to crew members can be delivered over broadband networks for a fraction of the cost of older solutions.

Applications of particular importance are those that support regulatory compliance (electronic filing of paperwork for programs like ECDIS), remote monitoring of engines and other systems, as well as IT systems, and affordable, always-on connectivity to support business efficiency, including sending and receiving large files. Maritime broadband solutions such as **KVH**'s *mini-VSAT Broadband*(sm) service can be easily integrated with a ship operator's corporate IT structure to support these functions. Many mariners also utilize a broadband connection to support recruiting and crew retention efforts, because offering a connection to home is crucial for attracting and maintaining the best crew members. This kind of connection can be provided easily and at a very low cost with a compact antenna, so this essential benefit can be provided without risk to the ship's bottom line.

Historically, the satellite communication solutions available have been impractical, due to hardware size, airtime cost, or both, for a large number of commercial mariners. The popular Inmarsat service was globally available and offered small, affordable hardware, but the service was limited to 432 Kbps, and it was very expensive. Maritime VSAT (Very Small Aperture Terminal) responded with a service designed for use on land to provide fast, low-cost broadband connectivity at sea. Unfortunately, the equipment needed to deliver the VSAT service was very large and prohibitively expensive.

In addition, the maritime VSAT market is highly fragmented, with more than 75 providers offering service via a variety of hardware solutions. With low barriers for entry for "virtual network operators", many of these service providers migrate between the lowest-cost services available, with little to no incentive to invest in network infrastructure or commercial-grade hardware development.

Companies like KVH Industries are working to make their solutions even more valuable to mariners. For example, in the past year, KVH has added satellite coverage, upgraded the mini-VSAT Broadband network infrastructure to facilitate better management of available bandwidth, and introduced versatile new products at both the entry level and the high end of the maritime communications market. This kind of constant innovation by hardware and service providers ensures continuing value for maritime broadband users.

When you look at the maritime communications market, the differentiating advantages are the size and cost of the hardware, the reliability, speed, and cost of the airtime, and whether or not the service covers the regions were vessels travel.

While relatively compact hardware is becoming more readily available, the challenge of choosing a service that covers all the areas where a ship may travel remains for many mariners. Dual-antenna solutions, combining a VSAT system with an older Inmarsat system and connecting them via a middleware solution, are one way to ensure coverage. The combination system can utilize the less expensive VSAT service throughout its coverage area, switching automatically to the more expensive Inmarsat system only when travelling in remote areas where a VSAT signal is unavailable. Sophisticated software can help control costs by blocking access to non-essential functions (like crew e-mail, for example) while using the more expensive service.

A unique alternate choice recently became available, with an innovative update to KVH's mini-VSAT Broadband network and the introduction of its 1m *TracPhone® V11* antenna. KVH was able to add a C-band overlay to the existing Ku-band network, which gives the TracPhone V11 near-global coverage (75 degrees North to 70 degrees South latitude) in one dome, and on one airtime rate plan. This service, available now, offers coverage similar to that of Ka-band networks that are expected to come online in the next few years.

In the coming months and years, the maritime satellite communications industry will have access to great innovation, just as it has in preceding years. We can expect to see live service from Ka-band satellites currently being launched sometime in 2012. While capacity on these satellites is very high, most early solutions will offer a combination of new Ka-band services and established Ku-band services, ensuring reliability as the new services are adopted and put into use in real-world applications.

We will also see development of value-added services for existing solutions. Least-cost routing, roaming crew accounts, additional security features and integration with critical onboard applications are all in development with the major service providers. These benefits are designed to help mariners get even more out of the solutions they already have, and will support the increasing demand for maritime broadband. The world is getting smaller, and as it does, connectivity will only become more important, especially for the maritime industry.

About the author

Jim Dodez has served as KVH's vice president of marketing and strategic planning since March 2007. He joined KVH in 1986, and over the past 20+ years has held the positions of marketing director, vice president of marketing and reseller sales, and vice president of marketing. Prior to joining the company, Mr. Dodez was the marketing director at Magratten Wooley, Inc., where he managed KVH's account from 1983 to 1986. Mr. Dodez received a bachelor's degree in business with an emphasis in marketing from Miami University.

Case Work

Solomons' Solutions

By Katia Gryadunova, Pactel International Pty Ltd.

Founded in 2003, Pactel International provides enhanced satellite communications solutions for a variety of markets throughout the Asia-Pacific region. One of Pactel's key advantages lies in its ability to leverage supplier relationships to create reliable, cost-efficient networks for remote sites and rural locations across Australia, Indonesia and Pacific Islands.

In 2010, Pactel International partnered up with Satellite Solutions Ltd.—a major VSAT network installer in the Pacific region to provide a high-grade telecommunication system to 17 Government locations in the Solomon Islands.

Founded in 2003, Pactel International provides enhanced satellite communications solutions for a variety of markets throughout the Asia-Pacific region. One of Pactel's key advantages rests with its ability to leverage supplier relationships to create reliable, cost-efficient networks for remote sites and rural locations across Australia, Indonesia and Pacific Islands.

In 2010, Pactel International partnered up with Satellite Solutions Ltd., a major VSAT network installer in the Pacific region, to provide a high-grade telecommunication system to 17 Government locations in the Solomon Islands.
This partnership allowed Pactel to supply a continuous, high quality of service to their customers by upgrading their on-the-ground technology, resulting in ruggedized and longer-lasting equipment at a lower cost.

Project Summary

In October 2010, Pactel International was appointed by SPC to provide the aforementioned VSAT communications system for the Solomon Islands' Government. Also known as **SIG PACRICS**, this ongoing project incorporates collaboration between six SIG Ministries. The aim is to install a provincial government network, which will then lay a foundation for efficient e-government communication throughout the provinces.

The project was deployed through SPC's regional *Pacific Rural Internet Connectivity System* (**PACRICS**) program, funded by the **Global Health Fund**, **MHMS**, **MPGIS**, **MAL**, **MEDCOM** and **RSIPF**.

Spread over two phases, the SIG PACRICS project involves installing VSAT terminals at provincial and rural locations where terrestrial communication is not possible. The new satellite system must be shared between 54 offices across PG, health, agriculture, DM, ICTSU and RSIPF ministries.

Solution

Together with Satellite Solutions, Pactel International developed a sustainable, satellite communications system deployed in the required locations and shared between the various SIG offices. Each office is now equipped with a small VSAT antenna, fully ruggedized to cope with the extreme weather conditions of the Pacific region.

Using its industry-leading expertise in application management and QoS, Pactel international has applied quality of service technology to filter bandwidth-consuming protocols and to ensure a higher priority to mission-critical services, such as e-Learning and online data management applications.

In addition, the system provides user management control that requires users to enter their user name and password to gain Internet access. User management control feature also allows access to Pactel's customer web portal, where network administrators can monitor individual sites on a continuous basis. The result is a more efficient, reliable, and predictable system for delivering industry-specific solutions over the network.

Results

With 300 public officers now having access to a reliable broadband connection, the Pactel-Satellite Solutions partnership has resulted in improving efficiency of the Solomon Islands' provincial government and effectiveness of its service delivery:

- E-Literacy training has empowered Government officers in their professional duties and development
- Improved reporting and information management of health services
- Improved agriculture outreach services
- Strengthened policing and law and order services
- More reliable disaster management services
- Improved communications between central government and 54 provincial offices.

Satellite Solutions' expertise assisted in installing the hardware, which is designed to survive in remote locations under harsh weather conditions. The new technology delivers reliable, weather proof, and cost-efficient communications, empowering any user to deliver their services at the highest quality.

"Supplier relationships are vital when it comes to providing sustainable solutions for our customers", said *Andrew Taylor*, CEO at Pactel International. "We congratulate Satellite Solutions on the work done throughout the project; the support and the quality of installations on site, which has allowed Pactel to supply quality services to SPC at highly competitive rates", Taylor added.

Mining Projects

To date, Pactel is leveraging its partnership with Satellite Solutions to supply enhanced telecommunications solutions to the mining sector in the Pacific region, as well. For Pactel, Satellite Solutions' expertise offers fresh potential to design, install, and support reliable VSAT-based communication systems.

World-renowned exploration companies such as **Pacific Porphyry**, **Newmont** and **Axiom** now have access to a reliable communication system, which provides voice and data services, enabling any company to seamlessly run industry-specific applications.

"All of these projects would not have been possible without the help of Pactel from top to bottom (including Management, Technicians, Purchasing, Administration, Finance, Warehousing and Shipping Staff, etc...). On all the jobs...each one is unique to us here," said *Geoff Allan*, Operations manager at Satellite Solutions.

About Satellite Solutions

Founded in 1995, Satellite Solutions provides high-grade digital satellite services for a variety of customers in the Pacific Islands. The Company's particular specialty is in installing VSAT broadband technology, and providing reliable VOIP, MATV and FFA networks.

About Pactel International

Pactel International delivers high quality, fully customized, VSAT, ToIP (Telephony over IP) and GSM solutions to the Asia-Pacific region. The Company's solutions are implemented to match clients' specific telecommunications requirements, from point-to-point links through to fully managed network connections.

Focus

Game-Changing Trend Drivers For The Cruise Industry

By Brent Horwitz, Sr. Vice President + General Manager, Cruise + Ferry Services, MTN Satellite Communications

Traditionally, cruising was all about "getting away." Today, it's still about getting away while staying connected. Does that sound paradoxical? Well, it is. And therein lies the challenge for communication companies serving cruise operators.

With this in mind, I've staked out the following trends that are driving communications, not just satellite communications, for the cruise industry in 2012 – and beyond. Without these essentials, cruise lines will find themselves falling far short of travelers' expectations, creating a significant competitive disadvantage:

Content is king. It's not enough to establish the connection. Cruise lines are asking for content in order to meet the needs of a new kind of customer – the Digital Natives – that are demanding more and more content onboard. Because this is quickly shifting the market towards a gigabyte and terabyte world, providers must constantly be looking to add additional content to meet the demands of our cruise customers' international passengers and crew, but more importantly how to deliver it without impacting the customer experience or cost.

At MTN, for example, we offer eight channels of television content globally, and a special events channel to broadcast live programming (including NFL football games, the World Cup and Premier League Soccer). In addition to that, cruise customers can integrate additional video and audio content such as shore excursions, ship and port information, and onboard vendor advertising for a comprehensive and customized line-up. And getting content to passengers and crew isn't just limited to cabins. The industry is adapting to passengers' expectations – for example, streaming broadcast quality video to their laptop or other mobile devices so that they can access news and entertainment information anywhere and anytime during their voyage. Needless to say, content is how you keep customers happy.

This future for content is to strategically leverage both satellite and terrestrial wireless networks for further content delivery and "connections."

Ubiquitous Wi-Fi. The rising sale of smartphones and tablets over the past few years has been a major contributor to the exponential increase in broadband demand. As indicated, passengers climb onboard thinking that they'll be able to boot up their mobile devices and log in anywhere: from the cabins to the fitness center to the pool lounges to the decks. Let's not forget about the crew either, which also depends upon Wi-Fi to relay messages from often isolated places, like the engine room.

The newer ships are designed with this in mind and we are seeing our partners taking advantage of the opportunity to re-engineer/retrofit their ships to meet this need. Because these ships have been around a while, the wealth of potential blocks such as steel bulkheads weighs even more prominently as a challenge. Let's face it: This is an imperfect science and each project presents its own individual puzzle to figure out. What's key is that this is now acknowledged as a priority.

It's all about bandwidth. This is the biggest driver for now and the indefinite future. Cruise lines are faced with the challenge of delivering more to passengers and crew, but making sure it comes at a return on investment that delivers to the overall business.

Just check out the wealth of cruises specializing in booking business conferences as an affordable and adventurous alternative to the standard hotel or convention center setting. Sure, people still want to get away. But they want, and sometimes need, to stay connected while at sea.

Thus, the demand for bandwidth. Traditionally, a land-based resort will hold an inherent edge over ships in supplying Wi-Fi to guests, given the pure logistics. In the recent past, vessels often just supplied fixed stations in Internet cafes, and that was that. But the mobile revolution has forced a transformation. A rapidly growing segment of travelers refuse to set sail if they can't replicate the same user experience they enjoy at home.

This requires a greater investment in bandwidth to raise the bar for speed and overall user-interaction quality. But available budgeting remains a concern and the bandwidth crunch is prompting satellite companies to look for efficient, affordable and long-term ways to increase their network coverage in various markets.

As network and bandwidth demands are increasing, and costs and margins are being squeezed, the industry must focus on maximizing overall throughput in the interest of affordability without compromising customer service or a reliable connection. That's why we're advancing the way customers purchase and utilize bandwidth around the world; from the pipe to the solutions that will be optimized for the new gigabyte model with MTN's Next Generation Network. The goal is to solve the capacity, price and performance constrains the industry is facing today, across market segments, delivering the highest quality of products and services customers want.

This can be a game-changer for our industry where the ultimate goal is to give passengers and crew what they want, when they want it – and in this instance, its impeccable communications.

About the author
Brent Horwitz is Senior Vice President and General Manager, Cruise & Ferry Services, MTN Satellite Communications.