

Worldwide Satellite Magazine

December 2009

SatMagazine

*Year
In
Review.*

A stylized globe is centered in the background, showing the Americas. It is overlaid with a grid of white lines representing satellite orbits or a global network. The background is a deep blue with a subtle pattern of white lines.

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BEAM: editors

Welcome to the annual **YEAR IN REVIEW** issue of **SatMagazine**. The companies who participate in this annual edition provide readers with their particular takes on their challenges and successes encountered during 2009 and, in some cases, offer us a preview of 2010 as far as their intents and purposes are concerned.

Yes, the offerings presented herein are of a most positive nature. This is a company's chance to enlighten and inform others as to the highlights of their past year's activities. What we have noticed, and appreciate, in this industry is the resilience of our counterparts. When challenges come in the form of a difficult economy, you have been quite innovative at solutions — that is admirable!

Some companies prefer to submit their YEAR IN REVIEW material in a question and answer format, others in a narrative form, and still others use bullet points and a presentation format. We do our best to ensure all materials are true to their original form we recognize each submission as an important messenger for each represented Company. These are the words of those who lead the included Companies, whether off-the-cuff or massaged by a firm's marketing and public relations professionals. We believe our readers understand the method of delivery as being true to form for each YEAR IN REVIEW entry. To ensure a method of control for these entries, the YEAR IN REVIEW profiles are offered in alphabetical order.

There are a variety of lengths involved with the YEAR IN REVIEW offerings. Such is not indicative of our personal likes or dislikes of any company. The material, in many cases, had to be severely edited to meet editorial space requirements. In some cases, the articles required additional content generation to fill their page. All of the articles are direct from the companies involved and reflect their pride of accomplishment and, in many cases, a peek forward to 2010. The graphics within a company article, whether a photo, logo, or other element, are hot links directly to that company's site, which we hope is a convenience for readers wishing additional information about what has been read.

Success?

As we close out 2009 and prepare to continue our professional lives in 2010, we feel this is an appropriate time to discuss our view of what we engage in — our attitudes and our ethics — to continue to drive the SATCOM industry.

What makes a company successful? Publications, no matter their form, are a channel for subject-matter experts' views and an interesting receptacle for content of relevance to the industry to be addressed — editors play the important role of content aggregation and rely upon those who know, rather than as those who bestow.

Inasmuch as editors cannot know everything about any industry, especially the breadth and scope of SATCOM and all of its vagaries, those with experience working within professional worlds can recognize a few factors that do, indeed, help make a company successful. These are our personal judgements and are based upon years and years of observation and discussion and are served up as simply an adjunct to a reader's own views and experiences. As the environments surrounding an individual's

BEAM: editors

life, family, friends and associates are of an extremely personal nature, the following notes relate only to our experiences in the workaday world.

In Appreciation of Lessons Learned

There are many who have more than we have... and there are many more who have less. We are thankful for the present state of affairs that allows us to be gainfully employed.

In our past, we have had occasion to experience the frustrations of being in a less than positive environment, yet we have always taken away something that is useful later in a different situation. For those lessons learned, we are grateful. Professional growth is personal growth that results in the delight and satisfaction of a job well done, whether we actually received that pat on the back, or not.

The Resiliency of the Spirit

Within the global satellite and associated industries, we have witnessed a year of change and successes, the greatest being the ability to continue the drive forward in spite of economic doldrums. The movement of the

markets, of monetary systems, of poor political decisions, whether to the left or the right, in various countries, has remained but a backdrop to an industry that has the ability to complete missions of (literally!) a higher note.

From the commercial to the military sides of the industry, advances far outweigh the

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HAPPY NEW YEAR

disappointments, and nothing is perfect, perfection being a state of grace few businesses — or individuals — can attain without stressing the positives.

What we do possess is a continuing and stable industry that affords millions of talented individuals employment, the opportunity to truly make a difference in the lives of our citizens, and a sustainable pride derived from success. We remind ourselves that the positive perspective is definitely the most productive and rewarding.

A Job Well Done

As we continue to work harder and complete more than is expected of ourselves — we have found the delight of accomplishment, especially when finished with good grace and above expectation, is a sure reward. Feeding one's soul is as necessary as feeding one's stomach, and with the former, you will never want — you will eventually be recognized by others as having a work ethic and professional demeanor worthy of attainment by anyone.

It's important to be pleased with the opportunities given you to prove your better works by making certain your life is filled with happiness and the knowledge of a job well done, especially when you have completed a project you never thought possible to finish.

Some Business Matters...

We'd also like to bring to your attention some of the policies we operate within at SatNews Publishers regarding news items and articles.

- » We do reserve the right to edit all submitted materials to meet our content guidelines, as well as for grammar and spelling consistencies.
- » Articles may be moved to an alternative issue to accommodate publication space requirements.
- » Submission of content does not constitute acceptance of said material by SatNews Publishers.
- » Edited materials may, or may not, be returned to the author and/or Company for review prior to publication.
- » The views expressed in our various publications do not necessarily reflect the views or opinions of SatNews Publishers.

Don't forget... if you **TWITTER**, *SatNews* daily offers tweeks from **SatBoy**. Whenever news is being published at the SatNews website, rest assured a brief is also being placed on TWITTER to help speed your knowledge of what's cooking in SATCOM, MILSATCOM and SatBroadcasting. We hope you find this service worthwhile.

Following these editorial comments, we have assembled a list of the most viewed SATCOM news stories from *SatNews* for the past year. These are the articles that generated the most reader views on our news website.

The number of "views" are collected and a tally generated as to which news stories attracted the most attention. Many of these stories were pre-cursors of cool and awesome events, from satellite launches to teleports, antennas to UAVs, and much more.

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As is the case with most of the content within these pages, a graphic will usually be a hot link to a website URL that will offer additional information regarding the subject matter at hand. Simply click on the graphic and you'll be moved as swiftly (as your connection) to the target page and further details.

This is especially helpful when reading through an article and you wish more technical details or contact information, reading about a trade show for which you wish to register, or an advertisement that has generated your interest and you would like to know more about that particular product.

Some have asked why we do not (currently) offer audio or video content — as an international publication group, many of our readers are located in areas of the world where broadband connections are rather immature. To burden thousands of readers with extremely slow loading pages does not further the cause of information dissemination, especially if those good folk get tired of waiting for that particular page to load. We are always examining and testing a

variety of audio and video codecs that enable smoother and high-quality data compression — we may be engaged in such activities in the not-too-distant future.

SatNews Publishers wishes a most prosperous and personally fulfilling year to all — enjoy the successes of our industry!



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Here's Looking @ Earth... Not Crop Circles... Lake Circles

Late in April 2009, astronauts aboard the International Space Station observed a strange circular area of thinned ice in the southern end of Lake Baikal in southern Siberia.



Siberia is remote and cold; ice cover can persist into June. The upper image, a detailed astronaut photograph, shows a circle of thin ice (dark in color, with a diameter of about 4.4 kilometers); this is the focal point for ice break up in the very southern end of the lake. A sequence of MODIS images indicates that the feature was first visible on April 5, 2009. Baikal contained another, very similar circle near the center of the lake above a submarine ridge that bisects the lake (ice circles are indicated by arrows in the lower MODIS image from April 20). Both circles were visible through April 20,

2009. Clouds cover the center of the lake until April 24, at which point the circular patch of thin ice was becoming a hole of open water. Similar circular ice patterns — although not nearly as distinct — have been documented in the same central area of the lake in April 1994 (during the STS-59 Shuttle mission) and in 1985 (during the STS-51B Shuttle mission). (Photo: NASA)

AT&T CruiseCast: No More Backseat Drivers

Now when you rent a car from the Avis Budget Group, there will be fewer back seat critics of the driver, as the passengers will be entertained with AT&T CruiseCast(SM), a new satellite television service that delivers popular news, family, sports, comedy and music channels while traveling. The Avis Budget Group and RaySat Broadcasting Corp. are teaming up to make this mission possible beginning in the second quarter of 2009 customers can rent AT&T CruiseCast at select locations for \$8.95 per day or \$62.65 per week. The unit uses a receiver and compact, low-profile external antenna to provide 22 popular satellite television channels and 20 satellite radio channels to a rear seat entertainment unit. (Photo: Search-Autoparts.com)



AT&T CruiseCast uses video-buffering technology to automatically store up to three minutes of content so that viewers can continually watch programs even if there

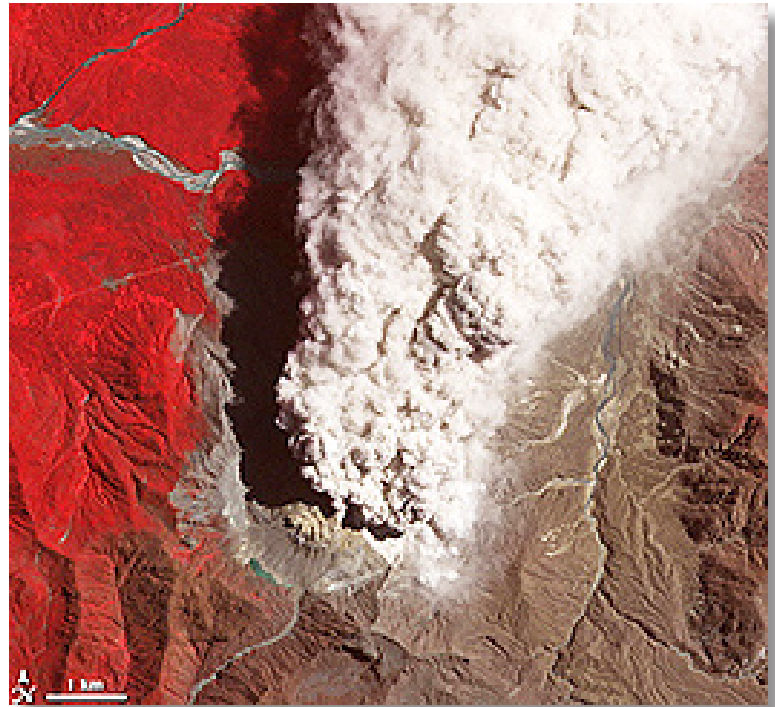
*Top News***BEAMS** *Of '09*

are obstructions such as an overpass, a tall building or trees. The channel line-up includes the Disney Channel, Disney XD, Discovery Kids, Animal Planet, Nickelodeon, Cartoon Network Mobile, USA, COMEDY CENTRAL, MSNBC, CNN Mobile Live and CNBC.

Chaitén's Caldera Chugging Chunks

Chile's Chaitén Volcano had been dormant for more than 9,000 years when it erupted in May 2008. In the months that followed, the volcano remained active, releasing plumes of steam and volcanic ash, coating local vegetation, clogging waterways, and inundating the nearby town of the same name.

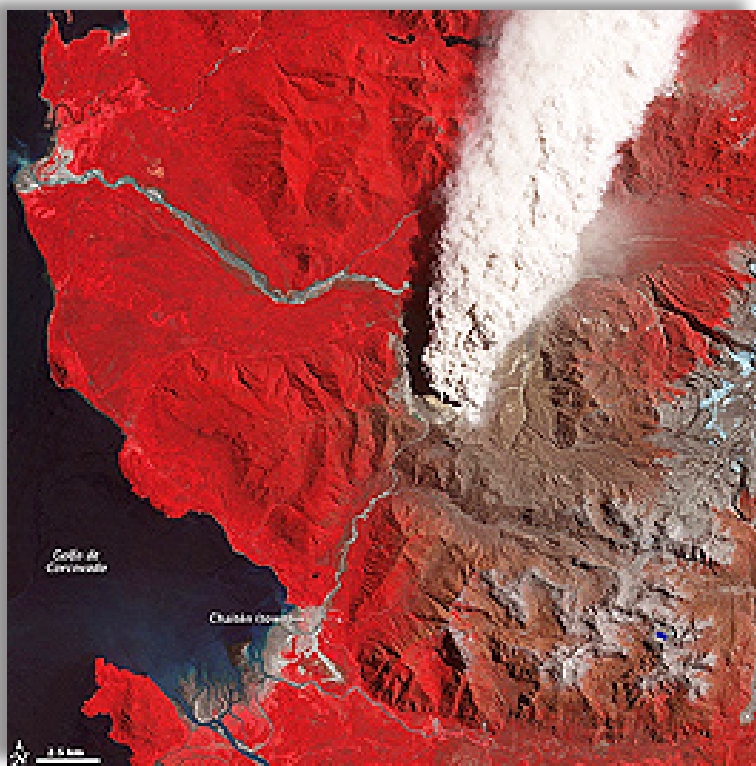
On January 19, 2009, an explosive dome collapse occurred at the volcano, according to a bulletin from the Volcanism Blog. A thick plume of ash and steam blew from the



volcano's summit approximately 70 kilometers (38 nautical miles) to the north-northeast, according to the U.S. Air Force Weather

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Agency. On January 19, 2009, the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) on NASA's Terra satellite captured an image of Chaitén Volcano. Two versions of the image appear here: a close-up view of the caldera (previous page) and a view of the surrounding area (below). These false-color images include visible and infrared light. Vegetation is red, bare (possibly ash-covered) ground is brown, and water is deep blue. The plume from the volcano appears off-white, and it is thick enough to completely hide the land surface below.



South and southeast of the volcano, the land surface varies in color from gray to brown, with only isolated patches of red. Close to the volcano, the darker brown colors probably indicate areas coated with volcanic ash or places where the vegetation was killed by earlier ash falls. Farther to the east and south, however, the light gray-brown color probably indicates naturally bare, alpine areas. Glaciers (light blue patches) are scattered among the valleys at the right side of the wide-area image. The meandering waterway between the volcanic summit and the coastal town of Chaitén is Río Blanco, and this river carried numerous lahars—volcanic mudflows—into

the town after the May 2008 eruption. Despite repeated inundations, the town's grid-like layout remains visible. (*Images: NASA image created by Jesse Allen, using data provided courtesy of NASA/GSFC/METI/ERSDAC/JAROS, and U.S./Japan ASTER Science Team.*)

Top Secret In Space Covert Inspection of Crippled Defense Military Satellite

In a top secret operation, the U.S. Defense Department is conducting the first deep space inspection of a crippled U.S. military spacecraft. To do this, it is using sensors on two covert inspection satellites that have been prowling geosynchronous orbit for nearly three years. (*An artist's concept shows a DSP satellite deployed in space. Credit: Northrop Grumman*)



The failed satellite being examined is the \$400 million U.S. Air Force/Northrop Grumman Defense Support Program DSP 23 missile warning satellite. It died in 2008 after being launched successfully from Cape Canaveral in November 2007 on the first operational Delta 4-Heavy booster.

Since the U.S. is now demonstrating the ability to do such up close rendezvous and inspection of American spacecraft in geosynchronous orbit, it means USAF now has at least a “call up capability” to do the same to non-

*Top News***BEAMS** of '09

U.S. spacecraft like those from Russia and China. The operation, at nearly 25,000 miles altitude, reveals a major new U.S. military space capability, says John Pike who heads GlobalSecurity.Org, a military think tank. "There is not much we do in space any more that is really new, but this is really new," Pike tells Spaceflightnow.com. Although being used in this operation to obtain data on a failed U.S. spacecraft, such inspections of especially potential enemy spacecraft, is something the Pentagon has wanted to do since the start of the space age, Pike says.

DSP sat preflight The Orbital Sciences and Lockheed Martin "Mitex" inspection spacecraft involved are part of a classified Defense Advanced Research Projects Agency (DARPA) technology development program. When initially launched on a Delta 2 from Cape Canaveral in 2006, the project involved maneuvering around and inspecting each other at geosynchronous

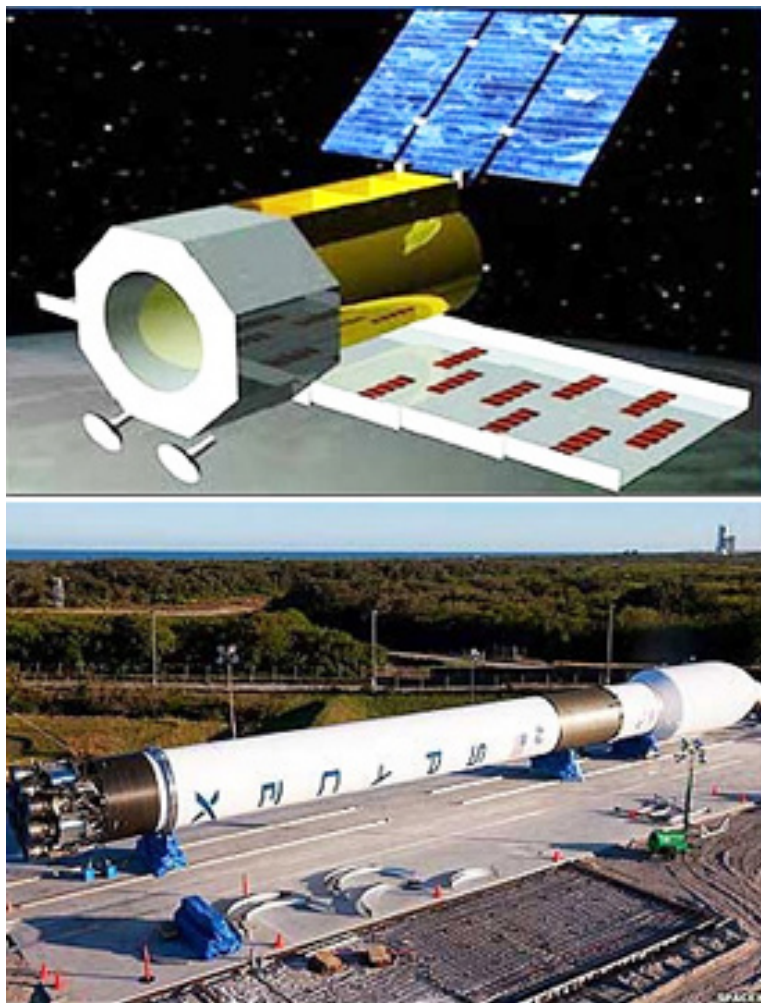
altitude. But there is no unclassified data to indicate whether the two spacecraft may have secretly paid visits to one or more non-U.S. spacecraft in the geosynchronous arc that circles the Earth at about 22,300 miles altitude, much like the Capital Beltway circles Washington, D.C. A U.S. Defense Dept. analyst speaking on deep background says although a visit to a non-U.S. satellite is doubtful, the demonstration will cause concern, especially among Chinese government military analysts in Beijing. He said they will see the capability as a new U.S. intelligence tool that could theoretically also enable a sneak anti-satellite attack in geosynchronous orbit.

[Full Story...](#)

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Falcon 9 Flight For Twin SAOCOMs

SAOCOM 1A satellite (Argentina) Space Exploration Technologies (SpaceX) has signed an agreement with CONAE, Argentina's National Commission on Space Activity, for two launches aboard SpaceX's Falcon 9 medium-to-heavy lift vehicle.



Falcon 9 launch vehicle (SpaceX) The flights will send the SAOCOM 1A (SAR Observation & Communications Satellite) and 1B Earth observation satellites into sun-synchronous orbits, where they will provide imagery for natural resources monitoring, as well as emergency and disaster management. These identical SAOCOM satellites each carry an L-band Synthetic Aperture Radar (SAR) instrument. Among other civil applications, the main purpose of the constellation is the measurement of the soil moisture over the Pampa Húmeda in Argentina. The two SAOCOM satellites will join four X-band SAR COSMO-

SkyMed satellites from the Italian Space Agency (ASI), creating the Italian-Argentine System of Satellites for Emergency Management (SIASGE) constellation. The first three of the ASI satellites were launched in 2007 and 2008 with the fourth expected to fly in 2010.

For Being 1st, Awards at the 25th National Space Symposium

At the 25th National Space Symposium in Colorado Springs, Colorado, China's Shenzhou 7 Manned Space Flight Team, which packed a number of "firsts" for the Chinese space program into a single mission, will receive the 2009 Space Achievement Award. This honor will take place during the opening ceremony of the National Space Symposium.



A delegation from China led by Dr. Zhou Jianping, chief designer of the China Manned Space Program, and including Taikonaut Zhai Zhigang will accept the award. In addition, Dr. Zhou will participate in the symposium's International Space Agencies Look to The Next Space Age panel discussion on April 2 where he will discuss China's current and future plans for manned space flight.

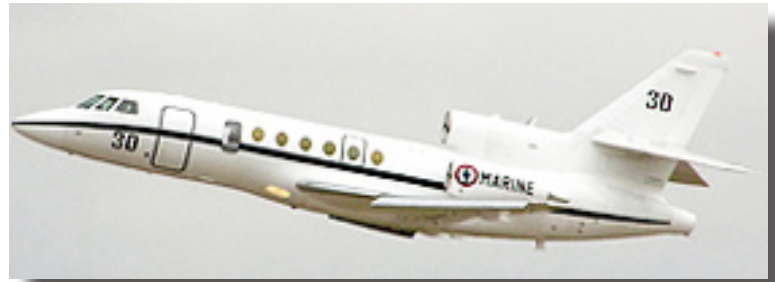
Launched September 25, 2008, Shenzhou 7 was China's third manned mission and first three-man mission. Taikonaut Zhai performed a 20-minute spacewalk, making China only the third nation to independently carry out a spacewalk. The crew conducted a number of experiments, including releasing a miniaturized satellite that took photos and videos near the spacecraft, maneuvered to about 120 miles

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away and then returned to orbit the spacecraft after the return module had separated and re-entered the atmosphere. A virtual image of an astronaut spacewalking outside the Shenzhou VII spaceship. (Photo: Chinadaily.com)
The Space Achievement Award is presented annually to an individual or organization for significant contributions in advancing the exploration, development, or use of space.

Vizada + French Ship Surveillance Activities

Dassault Falcom 50M aircraft Global satellite communications provider Vizada has partnered with IT and telecoms provider Eclipse to supply the French Navy with a complete package of aero mobile equipment and solutions from EMS Satcom. The upgrade will give France's fleet of Dassault Falcon 50M and Dassault Atlantique



2 aircraft broadband connectivity to enable fast delivery of images and other information while the aircraft survey the country's Atlantic and Mediterranean coastlines.

Vizada says successful tests of SwiftBroadband have been performed, meeting the French Navy's demand for increased bandwidth as well as high quality voice communications. Inmarsat connectivity has supported French naval surveillance aircraft for a number of years. During flight trials over the Mediterranean in

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2004, two bonded Swift 64 ISDN channels were used to send encrypted still pictures and video to the ground at 128 kbps. Eclipse was subsequently selected to supply a complete package of equipment, airtime and support and selected Vizada as partner for the deal. Part of this original deal with the French Navy was Eclipse's offer of an automatic upgrade to SwiftBroadband when the service became commercially available.

Coming Soon... A Better Look At U.S.A.F. Satellites

A research associate at the U.S. Air Force Academy's Laser and Optics Research Center in Colorado Springs, Colorado, is developing a new capability that will allow satellites to be seen and see clearer.

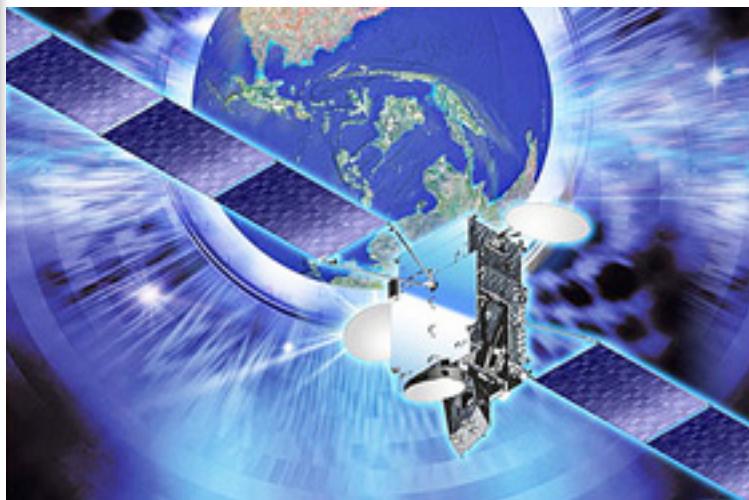


USAF satellite observation technology Dr. Geoff Andersen developed the process, called holographic adaptive optics, that uses sensors and lenses that can correct for disturbances in the atmosphere. Atmospheric disturbances can interfere with ground-based optical telescope's abilities to clearly see satellites orbiting the earth. Dr. Andersen's process uses adaptive technology to compensate for this interference. "Think of it like wearing a pair of glasses," Dr. Anderson said. "When someone has poor eyesight, the prescription compensates for this and makes his or her eyesight better. This process is similar. It uses adaptive optics so telescopes can see into space better."

This is important to the Air Force as it will allow the service to better see its satellites. For instance, if a satellite stops communicating with personnel on the ground, they can view it on a telescope to determine what caused it to go off the grid. Air Force officials have been using various forms of technology to view its satellites for several decades, but the equipment used to perform this is expensive, computer intensive, and large in size. This new system, which Dr. Andersen has the patent for, uses holograms and is condensed into a device the size of a standard DVD player. This makes it cheaper and opens the door to new possibilities. "We could place one of these devices on a satellite and then the satellite would be able to see down to earth with a crystal image," Dr. Andersen said.

The Rescue Of Palapa D...

When the Palapa D satellite failed to achieve its correct orbit, the problem was blamed on the failure of the 3rd stage of the Chinese Chang Zheng-3B launch vehicle. Just as in the movies, the cavalry came to the rescue! Thales, the satellite's manufacturer, captured the spacecraft, all due to some ingenious engineers at the Company.



Palapa D has been sent toward its designated 113 degrees East position. Considering the news blackout in China following the dismal launch results, the fact that Thales Alenia Space could alter what would have been a disastrous occurrence for Indosat is a superb accomplishment.

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Obama Inaugural Captured By GeoEye-1 From Height Of 423 Miles

GeoEye-1 capture of inaugural GeoEye-1 collected an image over the United States Capitol and the Inauguration of President Barack Obama. The image, taken from 423 miles in space, is

about four miles per second. GeoEye-1 is able to discern objects on the ground as small as 0.41-meter, or about 16 inches in size, which represents an object about the size of home plate on a baseball diamond. However, due to current U.S. licensing restrictions, the imagery is re-sampled to half-meter ground resolution. *(Photo credit: GeoEye Satellite Image)*

the world's highest resolution, color satellite image of the Inaugural celebration.

The image, taken through high, wispy white clouds over Washington D.C., shows the monuments along the National Mall and masses of people between the Capitol and the Lincoln Memorial. Among the many interesting features in the image are the clusters of people gathered around large jumbotron screens. The image was taken by GeoEye's newest satellite, GeoEye-1, as it moved from north to south along the eastern seaboard of the United States traveling at 17,000 mph, or

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Anomaly Annihilates ASTRA-5A's Mission

SES ASTRA's satellite ASTRA-5A, the former SIRIUS-2, operating at 31.5 degrees East, experienced a technical anomaly that has culminated in the end of the spacecraft's mission.



SES ASTRA immediately informed affected customers and switched a substantial part of the traffic to another ASTRA satellite at the 23.5 degrees East orbital position. The service for the German cable operators through their company KDL is among the transferred services. With this transfer, the economic impact of the incident on SES in 2009 will not be material. The teams of the Swedish Space Corporation (SSC), the company that technically operates ASTRA-5A, and the satellite's manufacturer, Thales Alenia Space, are now working closely on de-orbiting the satellite. Together with SES, they are also investigating the root cause of the incident. ASTRA-5A was positioned at the orbital position 31.5 degrees East and launched as SIRIUS-2 in November 1997 to the 5 degrees East position. SES ASTRA will shortly take the necessary decisions to maintain and develop the 31.5 degrees East orbital position in the changed fleet deployment scenario.

Raytheon Delivers the Super Bowl To Troops

Super Bowl Sunday, some treat it like a holiday, but when you are serving in the U.S. military it's not much of a holiday — until now due to the efforts of Raytheon [NYSE: RTN]. Whether

stationed in a hostile area overseas in the mountains of Afghanistan, on warships in the middle of the Sea of Japan, or in submarines more than 800 feet below the surface, defense technology company Raytheon partnered with the U.S. Air Force to make it possible for troops everywhere to watch the Super Bowl. Soldiers with the 3rd Brigade Combat Team, 4th Infantry Division, Multi-National Division — Baghdad, watch Super Bowl XLII on a large projector screen during a party at the Striker Dining Facility here Feb. 4. Food, decorations and party favors were provided through the combined efforts of the DFAC workers and the 64th Brigade Support Battalion, 3rd Brigade Combat Team, 4th Inf. Div. family readiness group. (U.S. Army photo by Pfc. April Campbell, 3rd BCT PAO, 4th Inf. Div., MND-B)



For the more than 350,000 troops deployed worldwide, getting to watch the game is a huge morale boost, and for a few hours on Super Bowl Sunday troops get to feel a little closer to home. But, for about 50,000 of the soldiers stationed in the world's most remote locations, it is only made possible by the use of the Global Broadcast Service. This is the same satellite communications system that pumps live images from Predator and Warrior unmanned aerial vehicles from the battlefield to America's commanders and warfighters!

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ICO's IOT In Good Stead... GBBF Going Good...

ICO Global Communications (Holdings) Limited (ICO) (NASDAQ: ICOG) has revealed that ICO G1 satellite In Orbit Testing (IOT), and testing of the innovative Ground Based Beam Forming (GBBF) system for the ICO Space Segment, are both now complete. The company's subsidiary, ICO Satellite Services G.P., has accepted the Space Segment from Space Systems/Loral. Launched from Cape Canaveral, Florida on April 14, 2008, ICO G1 is the world's first satellite to use a two-way GBBF system.



Delivered and integrated at ICO's gateway in North Las Vegas, GBBF delivers unprecedented flexibility to provide nexgen mobile satellite services. Alpha trials featuring ICO's satellite-terrestrial network are underway in Las Vegas, Nevada and Raleigh-Durham, North Carolina.

Designed and built by Space Systems/Loral (SS/L), a subsidiary of Loral Space & Communications (NASDAQ: LORL), ICO G1 has 250 fully configurable transmit and receive beams. SS/L is the first company to successfully develop a two-way GBBF system, and a patent is pending for the company's invention of the technology. With GBBF, spot beams can be added, removed, or reconfigured to enable a satellite to operate from different orbital locations and to adapt to changes in traffic patterns or to provide new applications. With

beam forming performed on the ground, the cost and time to deliver a highly flexible satellite are significantly reduced. The satellite employs a large 12 meter mesh antenna reflector, which is essential for delivering services to small mobile and portable devices. Hughes Network Systems, LLC (Hughes) (NASDAQ: HUGH) developed and implemented the high-speed signal conditioning and processing ground equipment that enables GBBF.

NOAA-19 Into Orbit To Examine Earth

A new NOAA polar-orbiting environmental satellite was launched from Vandenberg Air Force Base in California on February 6th and is now circling the globe every 102 minutes, taking images and measurements to support NOAA's efforts to forecast and monitor the environment. NOAA-19 joins NOAA-18 and one European environmental satellite already in polar orbit.

NOAA-19 carries seven scientific instruments, including two search and rescue instruments and a data recording system. Unique with this satellite is a new data collection system that will relay meteorological, oceanographic data — even track migration patterns of wildlife — to help researchers improve their study of Earth's environment. (Photo: launch of NOAA's new polar-orbiting satellite, courtesy NOAA/NASA)



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Latest Satellite Collision Anticipated... But Urgency to Communicate Difficult

Satellites provide fast technology and faster communications — except when one agency needs to communicate to another of the potential collision, such as occurred this last week. The collision this week involving an active U.S. commercial Iridium satellite and an inactive Russian Cosmos 2251 satellite in low Earth orbit has demonstrated an urgent need to establish a civil space traffic control system.

“Unfortunately, it appears that there was data warning about the possibility of this collision beforehand,” noted Brian Weeden, Technical Consultant for Secure World Foundation. “However, it must be stressed that close approaches between satellites somewhere in Earth orbit occurs on almost a weekly basis... and until this event, have never before resulted in an actual collision.” Weeden noted that in every case it is impossible to give a definite answer on whether or not two objects will actually collide, only probabilities and potential risks.

According to information from the U.S. Air Force’s Space Surveillance Network, over 500 pieces from the Cosmos satellite and 194 pieces from the Iridium satellite were now being tracked in two separate debris clouds. While investigations are underway regarding the events leading up to the collision of the two spacecraft, with details still forthcoming in the days ahead — the implications of the incident are in need of immediate discussion. The collision of the two spacecraft on February 10 is being addressed in Vienna with SWF’s Weeden highlighting the incident during his presentation to the COPUOS Subcommittee as an example of the need for a civil space situational awareness system.

New Teleport Sees Western Hemisphere

Global Data Systems Teleport in LA Global Data Systems, Inc. commissioned a state-of-the-art VSAT (very small aperture terminal) satellite teleport at the Louisiana Immersive

Technologies Enterprise (LITE) facility in Lafayette, Louisiana.



From this teleport, GDS can “see” the Western hemisphere (North and South America and Western Africa). This allows GDS to provide completely managed remote office communications and data to anywhere, anytime. This managed service not only replicates the conveniences of interoffice functionality but also integrates into a robust business continuance and disaster recovery solution. This wireless solution is not subject to the issues copper and fiber distribution plants have with telephone pole damage, water intrusion, or breakage during digging. The carrier-class 7.3 meter satellite dish will stay on the air with sustained winds of 150 miles per hour and survive at winds over 200 miles per hour. For further redundancy, the Lafayette teleport is mirrored in Riverside, California with auto-failover. Additional teleport build out is planned in 2009 with a similar design and mirroring in the Northeastern United States. This capital investment in Lafayette will produce 51 high-tech jobs, many of which will be fed by the University of Louisiana, Lafayette. *(Photo courtesy of Courtney Plaeger)*

Satellite Or Warhead? SpySats Capture North Korean Rocket Payload

The nose cone of a long-range North Korean rocket rest on its launch pad was imaged by spy satellites. This EO photo, from DigitalGlobe, is a 2-foot high resolution, natural color, QuickBird satellite image that shows the Musudan Ri missile launch facility in North Korea. This site was known as Taepo-dong.

The satellite is believed by many to be a cover for a test of the rocket itself, which, in theory, could target Alaska. A South Korean

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government source told the Yonhap news agency, based in Seoul, the spy satellites captured the upper part of the North Korean rocket when the vehicle's coverings had been removed at the launch pad. There is some debate as to whether or not the payload is a satellite or a warhead.



Possibly in exchange for nuclear expertise, there are believed to be 15 Iranian missile experts in North Korea assisting in the launch preparations. These include experts from Shahid Hemmat Industrial Group, the Iranian rocket and satellite manufacturer. Japan has stated they will destroy any rocket that is heading for their country and the U.S. has also indicated such will be the fate of the rocket if determined to be a ballistic missile. South Korea, the U.S. and Japan have all warned the North Korean government that the rocket launch is in violation of a UN Security Council resolution that bans that country from engaging in any ballistic missile testing.

Malaysian Built Satellite Heads To Marshall Islands For Launch

Malaysia shipped their new RazakSAT satellite from the Royal Malaysian Air Force Subang airfield last Saturday to Kwajalein Island in the Republic of Marshall Islands, where the satellite will be launched.

The images from RazakSAT, Malaysia's first home-grown remote sensing satellite, will be available for purchase from the Malaysian Remote Sensing Agency later this year. RazakSAT is a mini class satellite weighing in at 180 kg and will be the first remote sensing satellite in the world to orbit the equator. RazakSAT will be able to revisit the same location four to six times a day and has a 2.5m resolution and was built by Malaysian scientists and engineers. Two other small satellites, CubeSAT and InnoSAT, weighing less than 10kg each, were also attached to the body of RazakSAT.

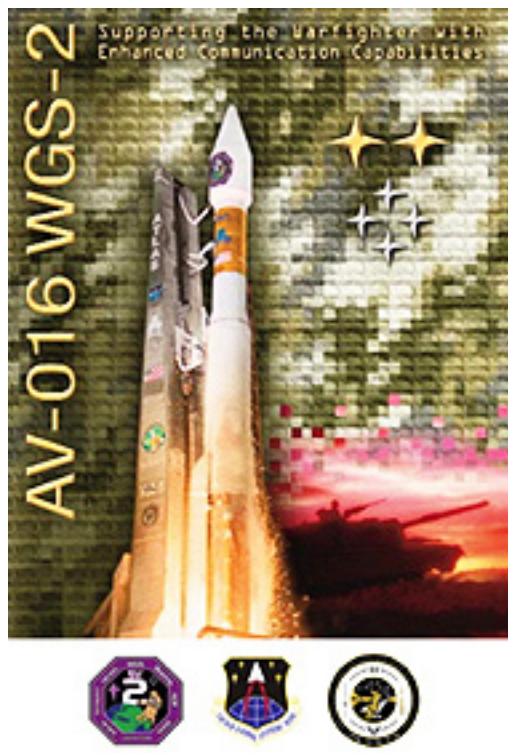


CubeSAT was developed by Astronautic Technology (M) Sdn Bhd, while InnoSAT was developed by Universiti Sains Malaysia, Universiti Teknologi Malaysia and Universiti Malaysia Perlis. They will be used to take images for R&D purposes. With RazakSAT, Malaysia now has its own satellite to monitor security in the country, natural resources, and maritime activity. (Source: *TheStar Online*, Yeng Ai Chun)

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ULA and USAF Launch WGS-2

United Launch Alliance and the U.S. Air Force Space Command's Space and Missile Systems Center (USAF/SMC) achieved a launch of the WGS-2 mission, which marks the 15th Atlas V launch and the third launch of an Atlas V 421 configuration.



Atlas V WGS 2 WGS-2 joins the service's first WGS satellite, which also launched on an Atlas V October 10, 2007. A United Launch Alliance Atlas V rocket carrying the U.S. Air Force's second Wideband Global SATCOM (WGS) satellite

lifted off from Space Launch Complex-41 at Cape Canaveral Air Force Station, Florida, at 8:31 p.m. EDT April 3rd. After a 31-minute flight, WGS-2 was placed successfully in orbit where it will provide enhanced communication abilities to our troops in the field. *(Photo by Pat Corkery, United Launch Alliance.)*

The WGS-2 mission is the second installment of the Wideband Global SATCOM (WGS) system. The WGS satellites are an important element of a new high-capacity satellite communications system; providing enhanced communications capabilities to our troops in the field for the next decade and beyond. WGS enables more robust and flexible execution of Command and Control, Communications Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR), as well as battle management and combat support information functions. WGS-2 augments the existing

service available through the UHF F/O and WGS SV-1 satellites by providing additional information broadcast capabilities.

Talented Trio Will Pack A Launch Wallop

An Air Force Minotaur 1 rocket carrying the Air Force Research Laboratory's TacSat-3 satellite and two secondary payloads, NASA's PharmaSat microsatellite and NASA's CubeSat Technology Demonstration experiments, is scheduled to launch from NASA's Wallops Flight Facility, Virginia, on the evening of May 5th during a launch window beginning at 8:00 p.m. EDT.



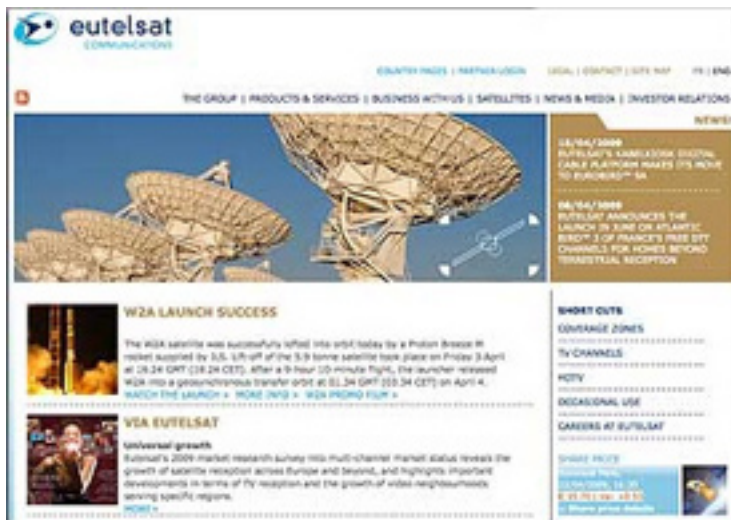
The TacSat-3 launch will be the third Minotaur vehicle launched from the Mid-Atlantic Regional Spaceport's launch pad 0B on the southern end of Wallops Island, Wallops Flight Facility. Air Force Space Command's Space and Missile Systems Center's Space Development and Test Wing at Kirtland AFB, New Mexico, has overall management of the mission. Contracted by the Space Development and Test Wing through Orbital Sciences Corporation's Launch Systems Group, the Minotaur I is a 69-foot high, five-foot wide, four-stage vehicle using residual Minuteman II first and second stages in combination with the upper two stages shared with Orbital's Pegasus XL and Taurus XL commercial space launch vehicles. In addition to the Air Force's SDTW and AFRL, other mission participants include NASA and the

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Hawk Institute in Pocomoke City, Maryland. Col. Scott Handy, the Mission Director, said, "We are excited about this mission because it will demonstrate our capability to launch new satellites quickly and cost effectively. SDTW, along with Air Force Research Laboratory, are leading the TacSat-3 joint development, launch and operations teams." (Image: TacSat-3 satellite, artist concept, SMC)

Free HD From FRANSAT Finds ATLANTIC BIRD 3 Highly Beamable

Upcoming is the launch of France's free Digital Terrestrial Television (DTT) channels on Eutelsat Communication's ATLANTIC BIRD 3 satellite. This new service, named FRANSAT, will be available starting in June. Eutelsat's 5 degrees



West neighborhood, occupied by ATLANTIC BIRD 3, has operated as a compliment to France's terrestrial broadcasting network for more than 20 years — programming is delivered directly by satellite to homes that are located beyond terrestrial reception. This transition to digital is part of the Digital France 2012 Plan and in conjunction with the new broadcasting law of March 5th, 2009. The latter is designed to offer a solution to homes in areas with poor terrestrial reception for access to DTT channels, without incurring the extra cost of adjusting their existing satellite dish installation. France's free analog channels will remain available via ATLANTIC BIRD 3. In addition to the 18 SD DTT channels, FRANSAT will offer four free DTT

channels broadcast in HD — TF1 HD, France 2 HD, Arte HD and M6 HD.

Telstar 11N Satellite Access By C2C Immediately Successful

Independent Dutch telecom provider Carrier to Carrier Telecom B.V. (C2C) has successfully uplinked on the new Telstar 11N satellite, managing the uplink almost immediately upon the satellite's release for operations.



With satellite capacity in short supply, C2C now offers its clients the opportunity for extensive growth and brings into play new, high power network possibilities for the European, North American, Caribbean, and Sub-Saharan African markets. C2C has built infrastructure to specifically access the Telstar 11N satellite via a new 6.3m Vertex antenna from the Company's teleport on the Netherlands. C2C infrastructure includes access to a redundant SDH fibre ring, redundant Carrier Ethernet or Gig Ethernet fiber, as well as telehouse infrastructure and connections to large Internet access providers based in Amsterdam. The Telstar 11N satellite was successfully launched on February 27th and, on April 1st, Telesat, the Telstar owner, announced the satellite was ready for commercial services and C2C immediately initiated operations.

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Royal Australian Navy To Obtain Dual Antenna Systems

Overwatch Tactical Operations logo The Communication Systems business of Overwatch Tactical Operations, an operating unit of Textron Systems, a Textron company (NYSE: TXT), has been awarded a follow-on contract by Astrium Limited to build 10 additional X/Ka shipboard antennas for the Royal Australian Navy (RAN), with options for two more.

This third contract is in addition to the 15 antenna systems that have been delivered by Overwatch Tactical Operations and are in service with the RAN. This order will enable the Advanced SATCOM Terrestrial Infrastructure System (ASTIS) prime contractor to supply three new RAN air warfare destroyers (AWD) and two new amphibious ships (LHD) with dual antenna systems capable of simultaneous dual band satellite communications. Supporting shipboard-based communication needs for the RAN, the antenna and feed uses Overwatch Tactical Operations' patented multiband feed technology. Multiband antenna systems, specifically simultaneous multiband, allow one antenna to perform the duties once required of multiple antenna terminals. In a shipboard environment, combining two frequency bands into one antenna saves limited deck space and increases operational flexibility to match the capabilities of the satellite being used. For the RAN, an Optus satellite provides transmit and receive capability in both X- and Ka-band, simultaneously. In the future, Australia has signed on for the sixth Wideband Global SATCOM (WGS) satellite as a joint effort with the U.S and will use it for X/Ka services.

Winning Contract GOES-(R) to Lockheed Martin x2

GOES-R satellite Great news for Lockheed Martin Space Systems Co., especially when the current economy needs a thyroid check. NOAA and NASA officials announced Lockheed Martin Space Systems Co. has been selected to build two satellites for NOAA's

next generation geostationary satellite series, GOES-R. The new series, poised to begin launching in 2015, will double the clarity of today's satellite imagery and provide more than 20 times the information. (Image credit: Lockheed Martin)



A previous contract award was re-evaluated by NASA and, as a result of that process, a series of corrective actions were implemented. Following that re-evaluation Lockheed Martin Space Systems was selected as the contractor. The basic contract is for two satellites with options for two additional satellites. The total estimated value of the basic contract, including the options, is \$1.09 billion. Officials said a separate contract to build the GOES-R ground system will be announced later this year.

GOES-R will improve the monitoring of sea-surface temperatures and provide more data to NOAA's hurricane forecasters, giving them sharper images of storms every 30 seconds, instead of every 7.5 minutes which the current geostationary satellites provide. GOES-R will feature the first-ever, space-based detection system for lightning activity over land and water. The new satellites also are expected to bring other key benefits, including data that will improve warnings for heat stress and bolster forecasts for unhealthy air quality, and advanced solar-monitoring instruments for space weather forecasts and warnings of solar storms.

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Oui! Orbit Strikes Up the Band (Ku- and C-) For The French Navy

Orbit Technology Group. announced the award of an order, in excess of \$4 million, by the French Navy via DCNS, in which Orbit will supply the French Navy with Ku-Band (brand name OrSat) and C-Band Marine Satellite Communication systems. Orbit's systems will provide the French Navy with continuous, high speed, two-way connectivity for reliable reception and transmission of voice, data and Internet connection, in harsh environmental conditions. The French Navy has selected Orbit for its extensive and proven experience in the field of satellite communications, its unique and advanced technologies, and its systems' ability to provide continuous connectivity.



Using an exclusive modular mechanical design that is extremely compact and highly efficient, the systems provide high bandwidth always on connectivity. Constituting an out-and-out revolution in high

stability marine communications, OrSat boasts no keyholes for continuous zenith-horizon communications. With built-in GPS and RF packages, OrSat requires no system balancing and is exceptionally easy to install, operate and maintain. OrSat's unique status having Eutelsat, Intelsat and Anatel type approvals, coupled with its field proven record, sets OrSat apart as an off-the-shelf system, ready-to-operate in Global-Ku voyages.

PDR Perfection For Lockheed Martin's GPS IIIA

The Global Positioning Systems Wing has successfully completed the Preliminary Design Review (PDR) for the GPS IIIA Spacecraft Program. This development and production contract consists of design and development of the first two space vehicles (SV-1 and SV-2), options for as many as 10 additional production vehicles, and a Capability Insertion Program that matures technology for future increments. This GPS IIIA Spacecraft PDR follows successful completion of 69 subsystem and element PDRs. It is a significant milestone for the Lockheed Martin, ITT, General Dynamics, and Infinity Systems team, just one year after contract award. The GPS IIIA satellite development is currently on-cost, on-schedule, and meeting or exceeding all technical requirements.



GPS III is a major flagship acquisition program for the Air Force. This low-risk, high-confidence program re-established a sharp focus on systems engineering, spacecraft quality and mission success, and active engagement by the Air Force team. The Joint Requirements Oversight Committee (JROC) agreed to split the program into three increments to reduce risk and ensure on-time

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delivery of critical initial capabilities to our warfighters. The GPS IIIA program delivers all baseline signals delivered on current on-orbit GPS IIRM satellites, plus enhanced earth coverage M-Code signal power, an L5 civil signal, and a new L1C civil signal compatible with the European Galileo program. GPS IIIA also provides a graceful growth path to GPS IIIB and GPS IIIC capabilities.

IndoStar II/ProtoStar II Catch A Breeze

Edging ever closer to the launch date of May 16 at Baikonur Cosmodrome, Kazakhstan, Launch Pad 39, the IndoStar II/ ProtoStar II communications satellite, manufactured by the Boeing Company is scheduled to lift off on a Proton M/Breeze M at 06:57 Baikonur; May 16: 00:57 GMT; May 15: 20:57 EDT. The launch customer is ProtoStar Ltd. of Bermuda in Partnership with PT MNC Indovision of Indonesia.

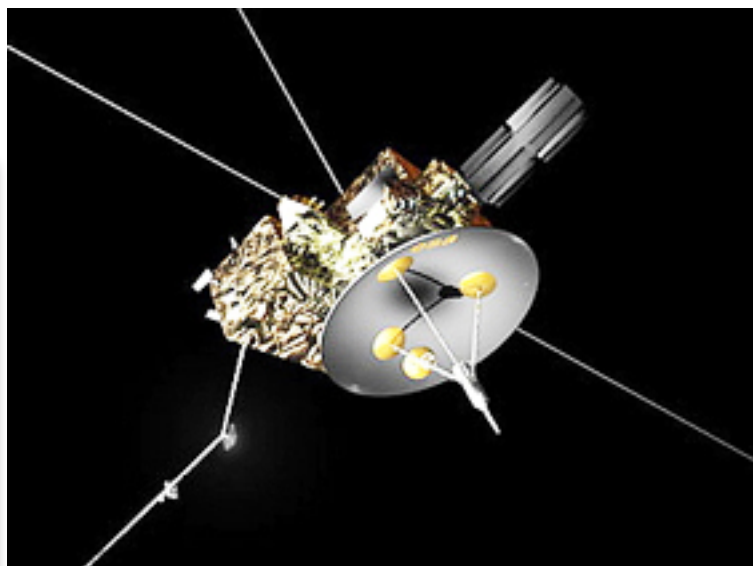


After standalone tests finished, the IndoStar II/ ProtoStar II spacecraft (SC) was mounted and clamped onto the payload adapter (PLA). The SC and the PLA stack were then mated to the Breeze M the next day, forming the orbital unit (OU). Testing and battery charging completed during the night, tilting of the OU subsequently followed. After encapsulation was completed earlier this week mission teams signed the payload fairing in accordance with tradition. Shortly, the ascent unit will be transferred to Hall 111 for integration with the Proton M launcher. The IndoStar II/ProtoStar II satellite is the second satellite in ProtoStar's evolving constellation. The satellite will replace the

existing Chakarawarta 1 and will bring high-power S-band and Ku-band capacity over Indonesia, India, the Philippines and Taiwan. The satellite's S-band transponders will be supporting the Direct-to-Home (DTH) television services of Indovision, Indonesia's largest DTH operator. The satellite will also be providing large block capacity to support new high definition television services as well as other multi-media, broadband services across the region.

Ulysses Historic Space Mission Ends

Upon receipt of the last command from Earth, the transmitter on Ulysses will switch off on June 30th, bringing one of the most successful and longest missions in spaceflight history to an end.



After 18.6 years in space and defying several earlier expectations of its demise, the joint ESA/ NASA solar orbiter Ulysses will achieve 'end of mission' on that date. No further contact with Ulysses is planned. Ulysses is the first spacecraft to survey the environment in space above and below the poles of the Sun in the four dimensions of space and time. Among many other ground-breaking results, the hugely successful mission showed that the Sun's magnetic field is carried into the Solar System in a more complicated manner than previously believed. Particles expelled by the Sun from low latitudes can climb up to high latitudes and

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vice versa, even unexpectedly finding their way down to planets. The shut-down of the satellite is a joint decision of the two agencies and comes a year after the mission was expected to end. A year ago, the satellite's power supply had weakened to the point that it was thought the low temperatures would cause the fuel lines to freeze up, rendering Ulysses uncontrollable. Final mission operations will be conducted from the Ulysses Mission Support Area (MSA) located at NASA's Jet Propulsion Laboratory in California, U.S.A.

Seriously, SIRIUS Satellite Launch

The SIRIUS FM-5 satellite will supplement the existing fleet of SIRIUS satellites with a high-power geostationary satellite that enhances the listening experience. The Proton launch vehicle, using a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the SIRIUS FM-5 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the ascent unit (Breeze M upper stage and the SIRIUS FM-5 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the ascent unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit and finally to a geo-transfer orbit. Separation of the SIRIUS FM-5 satellite

is scheduled to occur approximately 9 hours, 14 minutes after liftoff. Launch is scheduled for 3:10 PM EDT US 29 June 2009.

SIRIUS XM Radio Inc., is an America's satellite radio company that delivers

commercial-free music channels, premier sports, news, talk, entertainment, traffic and weather to millions of subscribers. This supplement ensures SIRIUS XM's array of audio and data services have strong reception by cars and mobile devices, improves the signal delivery to homes, and bolsters the continuity of service for years to come.

New Round Of Financing Sallies Forth For SpaceX

Steve Jurvetson and his DFJ partners have agreed to lead a major investment in space transportation provider SpaceX, PE Week (peHUB's sister publication) has learned — the round could be worth upwards of \$60 million, and would include existing SpaceX backer Founders Fund. According to peHUB, Jurvetson declined to discuss the specifics of SpaceX's financing. Regulatory filings show the company had raised \$15 million toward a proposed \$60 million round as recently as March. Jurvetson says that the round has either closed already or will close within the next 14 days. Executives at SpaceX were not available for comment.

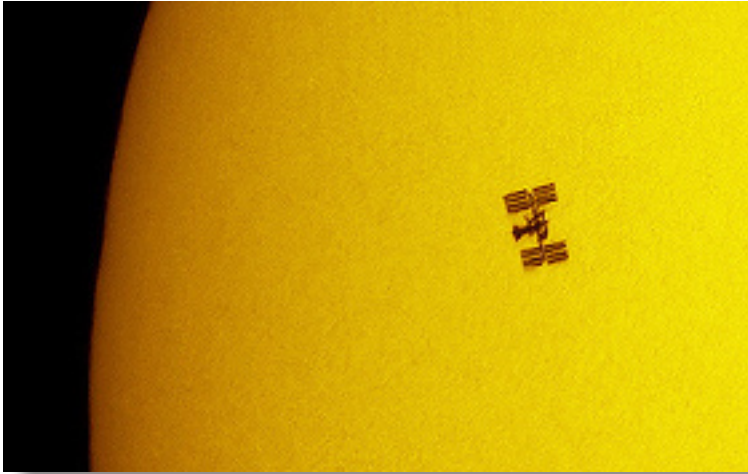
The Hawthorne, California-based company has raised \$112 million in funding since 2002, according to regulatory filings. Most of that financing has come directly from SpaceX CEO Elon Musk, who holds the title of CEO, CTO and founder of the company. Musk was an early investor in Tesla Motors, where he currently serves as CEO, and he was an early investor in PayPal, whose co-founders launched the Founders Fund. SpaceX is profitable, despite having only successfully launched one rocket into orbit, says Jurvetson. Customers pay the company for rocket missions 24 months before liftoff. The prices of the operations are based on the weight of the shipments sent into orbit. The company has four flights scheduled for 2009, including launches for Malaysian satellite maker ATSB and U.K.-based satellite broadband provider Avanti Communications. SpaceX has seven launches planned for 2010.



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Stupendous Sun Transit Photo Of The ISS + Endeavour

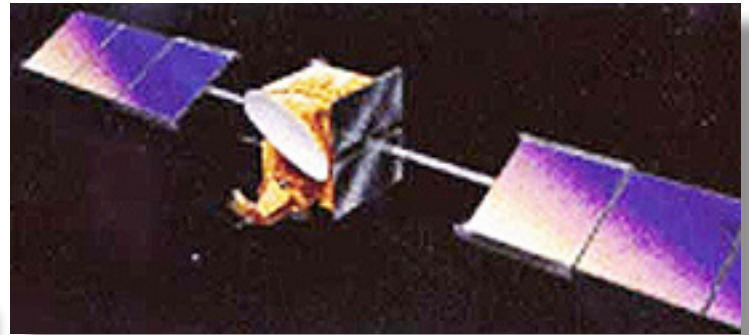
This is certainly one of the most incredible space photos ever realized... this photo was making the rounds internally at NASA, and was then sent "outside" the agency.



This quality of photo is the norm for such pros as Thierry Legault is an engineer who lives near Paris and information has been received from inside NASA that he did, indeed, shoot this incredible shot of the International Space Station and Endeavour crossing the sun. If you would like to view more of Mr. Legault's superb astrophotography, visit his website by selecting the fantastic photo above.

Koreasat-2 Going... Going... Gone To Asia Broadcast Satellite

KT Corporation and Asia Broadcast Satellite (ABS) announced that they have signed an agreement for the sale and purchase of the Koreasat-2 satellite. The closing of the sale will occur upon the issuance of the necessary U.S. governmental approvals. The Koreasat-2 satellite is a Lockheed Martin G3000 spacecraft launched in January of 1996. The satellite has a Ku-band payload with 16 x 36MHz FSS Ku-band transponders and 6 x 27MHz DBS Ku-band transponders. As a result of the transaction, the Koreasat-2 will be renamed as ABS-1A. ABS plans to relocate ABS-1A (Koreasat-2) to the 75 degrees East orbital



location to be co-located with ABS-1, until the launch of its recently announced expansion satellite, ABS-2, which is scheduled for launch early 2012. The ABS-1A (Koreasat-2) satellite has fuel for a minimum of 2 to 5 years of inclined orbit operations and will provide valuable high powered Ku-band capacity for satellite telecommunications and broadcast services to ABS' customers in the Middle East region. ABS has contracted KT Corporation to provide the satellite operations and Telemetry, Tracking and Control (TT&C) services for the ABS-1A (Koreasat-2) satellite.

Globalstar Celebrates Second Generation As Thales Alenia Smiles

In these financially challenging times, it's good to learn that Thales Alenia Space welcomes the announcement by Globalstar, Inc. that it has received complete financing for its second-generation satellite constellation. As prime contractor on this program, Thales Alenia Space had adjusted its satellite production rate to enable its customer to finalize negotiations with its consortium of banks. Just as importantly, Thales Alenia Space had also supported the company's application to receive a guarantee from the trade-credit insurance company Coface. Based on this major milestone, the parties signed an amendment to the initial contract, specifying in particular the adjusted conditions for production and the new satellite delivery timetable, enabling launches to start in 2010.

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Optus D3 Launch Advances Sat Services For Australia + New Zealand

Optus' latest state-of-the-art satellite, Optus D3, was successfully propelled into orbit following an impressive lift-off from French Guiana on August 22nd. Paul O'Sullivan, Optus Chief Executive said, "What an exciting day for Australia. This morning we witnessed the spectacular rocket launch of Optus' newest satellite, Optus D3. Optus launched



Australia's first satellite almost 25 years ago and we continue to fly the country's satellite fleet today. As the only Australian telco to own and operate satellites, Optus is the leading provider of satellite services across Australia and New Zealand. Satellite makes sense for the nation. Optus satellite reaches all corners of the country delivering subscription television, free-to-air TV, voice, Internet and radio services making it an important source of news and entertainment for the entire population. The Optus D3 satellite will expand Optus' satellite fleet capacity, provide an in-orbit redundancy capability and marks the first use of the Broadcast Satellite Service (BSS) spectrum in Australia. The BSS band will allow Optus' broadcast customers to increase their delivery of the nexgen of digital and high definition television to the home. The Optus D3 Satellite will increase Optus' total satellite capacity, support existing customers including FOXTEL and Sky New Zealand and enable the development of new business opportunities for broadcast television and the DTH market.

Chapter 11 Filing By ProtoStar

ProtoStar logo ProtoStar Limited has filed for bankruptcy protection, which will also include the Company's five affiliates. Protostar is seeking buyers for their two satellites, all via an auction that will be supervised by the bankruptcy court. Protostar's lenders will provide debtor-in-possession (DIP) financing, which will allow the firm to continue their operations while going through the bankruptcy process. The Bermuda-based Company was initiated in 2005, with the objective of launching and operating geostationary satellites for DTH satTV and broadband services lease by Asian providers. This case is In re: ProtoStar Satellite Systems Inc, U.S. Bankruptcy COurt, District of Delaware (Delaware), No. 09-12658. There are currently 22 employees, with the Company's Chapter 11 listed assets and liabilities ranging in value from \$100 million to \$500 million.

GPS Sats Are Going To Be Going, Going, Gone – IIR-M Final Flight

The U.S. Air Force is scheduled to launch the last in the series of eight modernized Global Positioning System (GPS) IIR-M satellite aboard the last Air Force procured United Launch Alliance Delta II rocket August 17 from Cape Canaveral Air Force Station, Florida.

Lockheed Martin's GPS IIR-M satellite The launch window opens at 6:35 a.m. EDT, and will remain open for 14 minutes. Built by Lockheed Martin, the satellite offers features to include improved accuracy, enhanced encryption, anti-jamming capabilities and a second civil signal to provide dual frequency capability and improve resistance



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to interference. "The GPS IIR/IIR-M satellites are the cornerstone of the GPS constellation, their performance has been exceptional and we expect them to be operational well into the future," said Col. Dave Madden, Commander, Space and Missile Systems Center's Global Positioning Systems Wing. Lockheed Martin and the Delta II program have played an imperative role ensuring users worldwide continue to receive improved GPS services. The GPS constellation has the most satellites and the greatest capability ever. Currently, there are 30 operational satellites broadcasting worldwide, every day, 24 hours a day, 7 days a week, 365 days a year. The Air Force remains committed to providing uninterrupted positioning, navigation, and timing service to users around the globe. The Air Force Space Command's Space and Missile Systems Center, located at Los Angeles Air Force Base, Calif., is the U.S. Air Force's center of acquisition excellence for acquiring and developing military space systems including six wings and three groups responsible for GPS, military satellite communications, defense meteorological satellites, space launch and range systems, satellite control network, space based infrared systems, intercontinental ballistic missile systems and space situational awareness capabilities.

It's a First! Swiss Satellite In Space — This Cube Isn't Cheese

It's official — The date of the first ever SwissCube satellite launch is planned for next Wednesday September 23 according to the Indian Space Research Organization (ISRO); liftoff is expected at 8:23 a.m., Swiss time. A celebration at Ecole Polytechnique Fédérale de Lausanne will include all institutions, private partners, students and researchers who collaborated to make this "Swiss first" happen. Switzerland's first satellite, named SwissCube, will travel on the PSLV (C14 mission) from Satish Dhawan Center near Chennai. This picosatellite (10x10x10 cm³, 1 kg) has been developed at the Ecole Polytechnique Fédérale de Lausanne (EPFL) in Switzerland in collaboration with several other Swiss engineering schools, universities and private industry; the University of Neuchâtel and five universities of applied sciences



in western and German-speaking Switzerland. RUAG Space provided extensive support to the students during the construction of the satellite. About 200 students participated in the elaboration, fabrication and tests of the satellite.

The SwissCube has been designed mostly in the framework of undergraduate semester and master projects. Students learned systems engineering and concurrent design, and have been responsible for delivering on time and on budget complex sub-systems whose correct operation is essential to the success of the mission. During its development, several new technologies could be investigated, tested and for the ones ready, integrated in the flight satellite. As main sponsor of the SwissCube project, RUAG Space not only supported the construction of the satellite financially, their experts at Switzerland's space company also provided the young engineers with advice and hands-on assistance during the project. RUAG engineers advised the students among other things on the design of the satellite structure and the electronics for the flight control system (avionics). Numerous tests were also conducted on the satellite at RUAG's Emmen and Nyon sites.

Empowering EMCORE

The Solar Photovoltaics Division of EMCORE Corp., a provider of compound semiconductor-based components, subsystems, and systems for the fiber-optic and solar power markets, has entered into an agreement with Northrop Grumman Aerospace Systems Sector. According to the long-term supply agreement, EMCORE engineers will manufacture and deliver high-efficiency, multi-junction solar cells for Northrop

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Grumman's satellite programs. EMCORE solar cells will help provide power for Northrop Grumman's space-based global climate monitoring capabilities and other satellite missions. The period of performance for the supply agreement is 2009 through 2012, with a potential value of more than \$17 million. The production of the solar cells will take place at EMCORE's manufacturing facilities located in Albuquerque, New Mexico, USA.

The COMSAT Secret Is Out Of The Bag — PAN Power For U.S.

A nexgen (and secret) satellite, designed and built by Lockheed Martin [NYSE: LMT] for the U.S. government, is performing as required following its successful launch from Cape Canaveral on September 8th aboard a United Launch Alliance Atlas V launch vehicle, with the Lockheed Martin team successfully completing a series of key activities toward delivering the spacecraft for customer use.



The program, designated PAN, was awarded to Lockheed Martin in October of 2006. It consists of a novel and robust turnkey commercial-based satellite, ground and launch system solution developed to meet the government's

future needs. The PAN satellite is based on Lockheed Martin's configure-to-order A2100 spacecraft series and leverages mature commercial space technologies and unique Lockheed Martin processes that enabled delivery of a high-quality, low-cost solution with reduced cycle times for the government customer.

India's Seven Satellites Successfully Soar Into Space

On August 29, India aborted an \$82 million mission to map the surface of the moon after losing contact with its unmanned Chandrayaan I craft. They have now turned the negative into a positive and more than made up for this by launching seven satellites from a single rocket, demonstrating its growing skills in multi-satellite launches. Last year, India put 10 satellites in space in a single launch. Photo courtesy of Voice of America: India's Polar



Satellite Launch Vehicle (PSLV) takes off from the space center in Sriharikota, India, September 23 2009. Within a space of 20 minutes, an Indian rocket placed one big satellite and six small ones into space from the Sriharikota space center in eastern India. The big remote-sensing satellite will map fishing zones around India, measure ocean surfaces and wind speeds and track monsoons and cyclones.

DigitalGlobe Sees A New and Improved World(View-2) Successful Launch!

Delayed by a second stage battery check, the launch of WorldView-2 occurred at 11.52 a.m. PDT at Vandenberg AFB, California, making DigitalGlobe the only commercial world-imagery provider with high-resolution, eight-band multispectral capability. United Launch Alliance provided the launch services for this mission on behalf of Boeing Launch Services. Delta II rockets previously launched both the Quickbird-2 mission in October 2001 and the WorldView-1 mission in September 2007 for DigitalGlobe. The additional multispectral band capability of WorldView-2 is expected to enable higher levels of feature identification and extraction and more accurately reflect the world's natural color, with the potential

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to benefit many applications, including environmental monitoring, change detection, and defense and intelligence.



WorldView2 takeoff photo on left: Vandenberg AFB, Calif. (Oct. 8, 2009) – A United Launch Alliance Delta II rocket, on behalf of Boeing Launch Services, blasts off from Space Launch Complex-2 with the DigitalGlobe WorldView-2 spacecraft at 11:51 a.m.

PDT today. The Delta II successfully deployed WorldView-2 into a sun-synchronous orbit where the spacecraft will perform its mission of collecting high resolution commercial digital Earth imagery from space. (Photo by Bill Hartenstein, The Boeing Company)

DigitalGlobe is a global provider of commercial, high-resolution, world imagery products and services. Sourced from their own advanced satellite constellation, DigitalGlobe's imagery solutions support a wide variety of uses from mapping and analysis to navigation technology. With advanced collection sources, a comprehensive ImageLibrary and a range of online and offline products and services, clients are able to access and integrate imagery seamlessly into business operations and applications. With a mission life of 7.25 years, and operating at an altitude of 770 km, the WorldView-2 system is expected to bring agility, capacity, accuracy and spectral diversity to commercial earth imaging.

Ka-OTM SATCOM Specs Released By EMS Solutions

EM Solutions announces preliminary specifications for a Ka-band On-The-Move Satellite Communications System being developed under Round 12 of Australia's Defence Capability & Technology Demonstrator (CTD) Program. The CTD offers the ADF an opportunity to investigate and demonstrate a Mounted Battle Command On-The-Move satellite communications system at Ka-band, suitable for operation with the Wideband Global Satcom (WGS) System, and examine its potential as a key system supporting the ADF's Network Centric Warfare strategy.

Acquiring Minds Want To Know... ViaSat + WildBlue Communications

ViaSat + WildBlue logos ViaSat Inc. (Nasdaq: VSAT) has signed a definitive agreement to acquire privately-held WildBlue Communications Inc., the premier Ka-band satellite broadband service provider, in a cash and stock transaction valued at \$568 million. The combination sets the stage for accelerated growth and expansion of the WildBlue broadband service using ViaSat nexgen net technology, which features the high-capacity ViaSat-1 satellite scheduled to launch in early 2011.

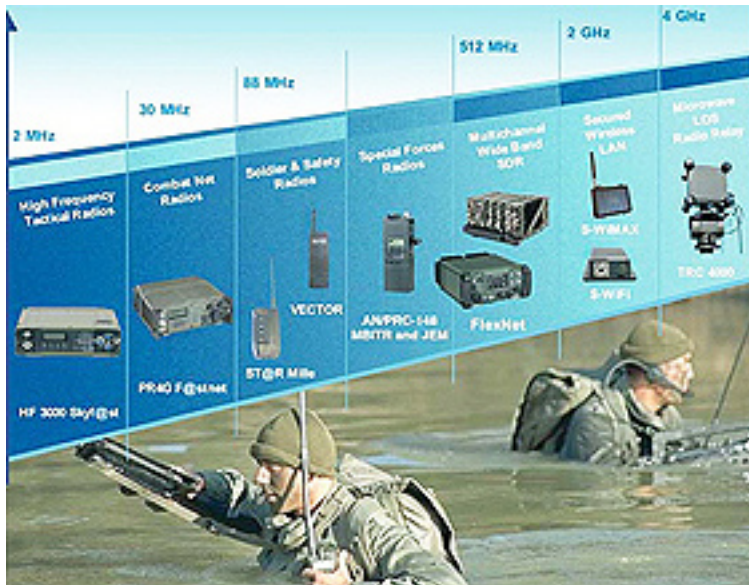


In acquiring WildBlue, ViaSat gains one of the most successful and fastest growing wholesale and retail broadband service providers in the United States. In less than five years, WildBlue has become one of the top twenty broadband U.S. ISPs with more than 400,000 customers (as measured by total subscribers according to data compiled by Leitchman Research and ISP Planet). WildBlue pioneered the use of "unprocessed" Ka-band spot beam technology to increase capacity and lower bandwidth costs, portending the value potential for the technology innovations ViaSat-1 will make possible.

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SATCOM On The Move Aided + Abetted By Thales Group For France

The French Defense Procurement Agency has contracted Thales Group to develop a program to equip armored vehicles with a mobile satellite communication system. The SATCOM On-The-Move (SOTM) program gives mobile units a permanent tactical link on the battlefield, even without conventional radio links, Thales announced.



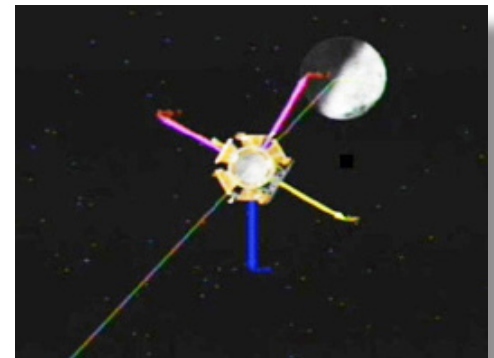
The program, dubbed VENUS, makes it possible for vehicles in the field to connect to a secure link for simultaneous voice and data transmission. It uses a conventional antenna, modem and transmission network adapted for mobile operations. "Nowadays, On-The-Move satellite communication is essential on the theaters of operation," said Jean-Michel Lagarde, Thales's Director of Network Infrastructure, Satcom & Security activities. Thales said the system provides a guaranteed command link, meeting the requirements of mobile land units on the battlefield. First deliveries of the system are scheduled for 2010.

A Downright Smashing Day For NASA + The Moon

The LCROSS Centaur and Spacecraft impacted the moon at approximately 4:30 a.m. PDT. LCROSS Centaur Separation occurred at 9:50

p.m. EDT (6:50 p.m. PDT), October 8. After separation, the spacecraft performed a 180 degree pitch maneuver (turning around) to reorient the LCROSS science payload towards the receding Centaur. The twin impacts on the moon's surface occurred early Friday in a search for water ice. Scientists will now analyze data from the spacecraft's instruments to assess whether water ice is present. The satellite traveled 5.6 million miles during an historic 113-day mission that ended in the Cabeus crater, a permanently shadowed region near the moon's south pole. The spacecraft was launched June 18th as a companion mission to the Lunar Reconnaissance Orbiter from NASA's Kennedy Space Center in Florida.

Moving at a speed of more than 1.5 miles per second, the Centaur hit the lunar surface shortly after 4:31 a.m. October 9th, creating an impact that instruments aboard LCROSS observed for approximately four minutes. LCROSS then impacted the surface at approximately 4:36 a.m.



Boeing Wants The Navy To Find That Sub

The Boeing Company [NYSE: BA] received a US\$275,000 contract last September from the U.S. Naval Air Warfare Center Aircraft Division (NAWCAD) for a study of the magnetic noise associated with the heavy-fuel propulsion system on Boeing's MagEagle Compressed Carriage (MECC) Unmanned Aerial System (UAS). The MECC, designed and built to be magnetically quiet, is a special-mission variant of the company's ScanEagle Compressed Carriage UAS.

"MECC's mission is to help locate, track and attack submarines," said Ron Perkins, director of Advanced Unmanned Airborne Systems for

Top NewsBEAMS Of '09



Boeing Phantom Works. "This contract is a crucial first step to

identify risks associated with a UAS equipped with a magnetic anomaly detector system." Boeing envisions MECC as an extension of the manned P-8A aircraft's combat systems capability, providing P-8A crews with additional validation and supporting the P-8A in simultaneously conducting both low and high altitude anti-surface warfare, anti-submarine warfare and command-and-control intelligence, surveillance and reconnaissance missions. Boeing will start testing the MECC sensor system, vehicle integration and magnetic noise reduction in 2010. (Image: ScanEagle Compressed Carriage UAS—Boeing)

Asia Broadcast Satellite To Acquire Mabuhay Satellite Corp. + Agila-2 Satellite

Mabuhay Satellite Corporation (MSC) and Asia Broadcast Satellite (ABS) have signed an agreement for the sale and purchase of the business of MSC. The closing of the transaction will occur upon the issuance of the necessary regulatory U.S. governmental approvals. Agila-2 satellite (ABS) MSC's Agila-2 satellite is a Space Systems/Loral FS-1300 spacecraft that was launched in Aug 1997. The satellite has a payload consisting of 24 Standard C- and 6 Extended C-band transponders covering Asia from India to Philippines, Japan to Indonesia, and a C-band spot beam over Hawaii to provide connectivity to the USA. The satellite also has 24 Ku-band transponders covering the Philippines, Coastal China, Taiwan, and Hong Kong, providing capacity for TV distribution, DTH and VSAT services. The MSC Subic Space Center is a state-of-the-art satellite communications facility in the Philippines providing full satellite operations, payload and client monitoring, tracking, telemetry and control services,

and a full Network Operations Center (NOC) managed 24/7 by highly trained professionals. Mabuhay Satellite Corporation (MSC) was the first Philippine entity to own and operate a communications satellite.

Intelsat Garners ProtoStar 1 For US\$210 Million

ProtoStar 1 (I-25) satellite Intelsat, Ltd. is the successful bidder in the October 29th public auction for the ProtoStar 1 satellite, with a \$210 million, all cash offer, that out muscled the offer from Eutelsat. Upon conclusion of the transaction, the satellite will be re-named Intelsat 25 and will join Intelsat's global fleet, serving with the company's other assets in the Atlantic Ocean region. The satellite, built by Space Systems Loral, has 22 Ku- and 38 C-band transponders. Upon its launch in July 2008, the satellite was expected to have a 16-year life span. The transaction is subject to certain regulatory and bankruptcy court approvals. Intelsat expects to close the transaction within the next 30 days.

ULA Launches SS/L Produced IS-14 For Intelsat — Solar Arrays Deployed

Space Systems/Loral (SS/L), a subsidiary of Loral Space & Communications (Nasdaq:LORL), announced the satellite the Company built for Intelsat is performing post-launch maneuvers according to plan. The satellite deployed its solar arrays as planned early this morning, following its successful launch aboard an Atlas V rocket from Cape Canaveral, Florida. Tomorrow (November 24), the satellite is scheduled to begin firing its main thruster in order to start maneuvering into geosynchronous orbit.

Also announcing the launch success is United Launch Alliance — the Company has now deployed its fourth commercial mission of 2009 as an Atlas V rocket successfully launched the Intelsat 14 (IS-14) commercial telecommunications satellite at 1:55 a.m. EST, November 13th. Blasting off from Space Launch Complex-41 at Cape Canaveral, Florida, the launch was provided on

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behalf of Lockheed Martin Commercial Launch Services, which procured the Atlas V for this mission. Previous ULA commercial launches this year included the Delta IV GOES-O launch for NASA/NOAA on June 27, the Atlas V PAN mission on September 8th, and the Delta II WorldView-2 mission October 8th.

IS-14, to be located at 315 degrees East, will provide high-powered communication services through its C- and Ku-band, serving Intelsat network and government customers throughout the Americas, Europe and Africa. IS-14 will replace Intelsat's IS-1R satellite, once it enters service. The spacecraft also carries a hosted payload for the Internet Router in Space, or IRIS program, for CISCO, which expands on SS/L's experience integrating hosted payloads on commercial satellites. The payload, on the Intelsat 14 satellite, is a demonstration of Internet Routing in Space (IRIS) for the U.S. military, which is expected to open up a number of commercial and military opportunities to improve communications connectivity around the globe. The spacecraft also carries a hosted payload for the Internet Router in Space, or IRIS program, for Cisco.

Iridium Is NEXT To Host Multi-Agencies' Payloads

Iridium NEXT Iridium Communications Inc.'s [Nasdaq:IRDM] results indicate success in

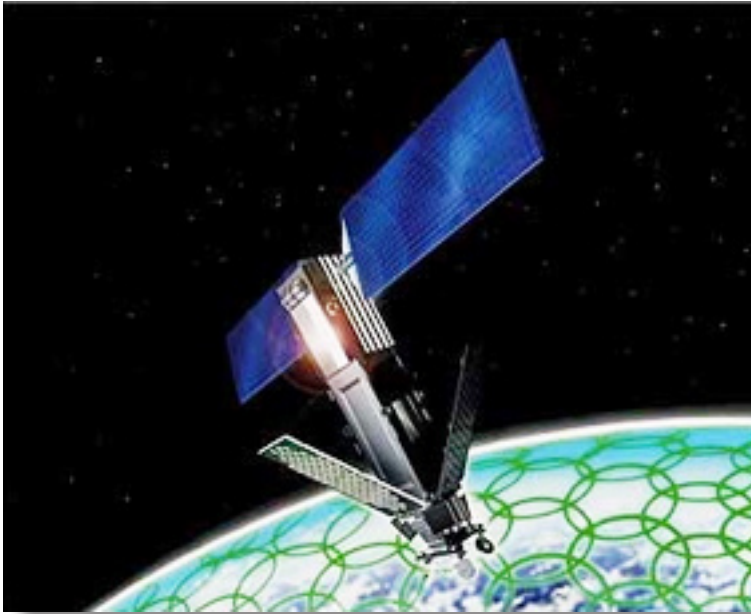
numerous technical studies while working with independent technology partners, that demonstrate the feasibility of hosting Earth observation and remote sensing payloads on its planned/proposed next-generation satellite constellation, Iridium NEXT.

"Independent, detailed technical studies led by Iridium for the Group on Earth Observations (GEO) have confirmed that Iridium's planned next-generation constellation of 66 low-earth orbiting (LEO) cross-linked satellites can provide a unique and unprecedented capability for a wide range of remote sensing missions for monitoring global climate data and other environmental data," said Dr. Jose Achache, director of GEO, an intergovernmental organization based in Geneva, Switzerland. "GEO is creating a framework for governments and industry to explore how new data-providing sources, such as Iridium NEXT, can support the Global Earth Observation System of Systems (GEOSS) by delivering required water and climate observations."

"The earth observation community has a unique window of opportunity, starting now, to augment our ability to capture Earth climate, weather and environmental data through hosted payloads on Iridium NEXT," said Achache. "It's important to act quickly to ensure the secondary payloads can be included on the Iridium NEXT satellites, which will be launched between 2014 and 2016."

In addition to the GEO studies, Iridium has completed several technical studies for U.S.-based space agencies examining specific hosted payload possibilities with Iridium NEXT. These include Global Positioning System radio occultation (GPSRO) to measure global atmospheric temperature and humidity profiles; broadband radiometers for measuring the earth's radiation budget; solar total and spectral irradiance measurements; radar altimetry to detect sea surface and ice heights; multi-spectral imagers for ocean and land color, deforestation and desertification; and to validate the feasibility of commercial monitoring of ozone levels in the earth's atmosphere.

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The U.S. Department of Defense (DoD) is also investigating the feasibility of hosted payloads on the Iridium NEXT constellation to support requirements for space situational awareness.

Lockheed Martin and Thales Alenia Space are competing to become the prime contractor for Iridium NEXT and both companies are designing hosted payloads accommodation in their proposed Iridium NEXT satellite design. Iridium plans to announce its Iridium NEXT prime contractor selection in the coming months . . . stay tuned.

SES WORLD SKIES Orders Four To Go From Astrium

Astrium, a wholly-owned subsidiary of EADS (Euronext Paris: EAD) has announced SES has ordered four multi-mission satellites from them, to provide replacement as well as incremental capacity for its SES ASTRA and SES WORLD SKIES divisions. The new satellites, to be designated ASTRA 2E, ASTRA 2F, ASTRA 2G, and ASTRA 5B, will allow the release of the existing satellites at two orbital positions (28.2 and 31.5 degrees East) and add new capacity as well as fleet deployment flexibility for the SES group over the coming years. The satellites are scheduled for launch in several steps between 2012 and 2014. The design life

of each satellite is 15 years. Three of the new spacecraft, ASTRA 2E, ASTRA 2F and ASTRA 2G, will serve to deliver nexgen broadcast, VSAT and broadband services in Europe and Africa, and will carry Ku- and Ka-band payloads at 28.2 degrees East.



The four new satellites will be built on a Eurostar E3000 platform, the latest version of Astrium's Eurostar series which has proven to be highly reliable in commercial service. A total of 60 Eurostar satellites have been ordered to date. SES has already ordered three Eurostar E3000s: ASTRA 1M, which entered into service one year ago; ASTRA 3B, ready for launch early next year; and ASTRA 1N, which was ordered last year and is currently under construction.

The satellites' Ku-band capacity will allow SES ASTRA to enhance and secure its existing offering to major DTH markets in the U.K. and Ireland. With a Ku-band payload specifically designed to meet the requirements of some of Europe's largest DTH broadcasters, the satellites will have spot beam and pan-European beam switching capabilities to accommodate both pay-TV and free-to-air broadcasters, and to provide these customers with increased functionality.

BEAM: Bettinger

More than a year ago, iDirect and Panasonic Avionics partnered to deliver a new, in-flight broadband system. We checked in with David Bettinger, iDirect's Chief Technology Officer and Senior Vice President of Engineering, to learn the latest information more regarding their joint efforts.

SatMagazine (SM)

It's been a year since iDirect and Panasonic Avionics announced they will team to deliver a new in-flight broadband system. What has happened since?

David Bettinger

Over the past several months, we have finished integrating all the technology and testing the system. The results have been excellent and enabled Panasonic to make the service commercially available. Now Panasonic has signed its first major contract with Lufthansa. Using the Panasonic eXConnect system, Lufthansa will offer satellite-based broadband Internet access on flights between the U.S. and Europe in the coming months.

SM

Why will in-flight broadband succeed this time?

David Bettinger

Connexion was certainly a pioneering system, and Boeing got many things right. But demand did not materialize fast enough to offset the high operating costs. In recent years, however, the satellite communications industry has worked hard to address this issue, and we have seen several breakthroughs. One key development belongs to iDirect. In our work for military, first-responder and maritime customers, our engineering team has created a more efficient mobile waveform based on a technology called Direct Sequence Spread Spectrum.

Let me explain the problem we solved. To support mobile broadband, you need an ultra-small, low-profile antenna. These antennas have a smaller aperture and require increased transmission power to sustain a satellite link while they are moving at high speeds. Without getting into the complex technical details, iDirect found a way to diffuse the transmission of satellite bandwidth while maintaining a high data rate. This dramatically conserves satellite space segment and lowers bandwidth costs for airlines.

This was a major improvement, but there are others. Today, antennas are up 75 percent lighter. The onboard electronic systems are also lighter and more compact. And these systems are more functional. For example, Panasonic eXConnect can support applications beyond Wifi Internet access. These include live television



BEAM: Bettinger

programming and premium entertainment content which enables airlines to garner additional pay-per-use revenues and advertising opportunities.

And in the case of Panasonic, they are doing one other thing differently. Rather than leasing the capacity from an entire satellite transponder and carrying a bandwidth supply that is larger than current demand, they are leasing only a portion of a transponder's capacity. iDirect's technology then enables Panasonic to distribute this capacity over a shared network to meet the real-time needs of its airline customers and increase capacity when demand grows.

SM

How does Panasonic eXConnect compare to other systems on the market?

David Bettinger

While satellite-based systems have advanced, we've also seen the emergence of a new technology model for in-flight broadband — the use of land-based cell towers to establish and maintain connectivity. This model is being used primarily for domestic flights. As these flights are typically short, passengers

have less incentive to pay the subscription fee, which can make early adoption come slowly.

In contrast to this model, Panasonic is targeting its service to international carriers that are installing the system on airplanes used for long haul flights. When a passenger is on a plane for stretches of more than six hours, they are more

BEAM: Bettinger

likely to take advantage of an in-flight broadband service.

That was certainly true of Connexion. While U.S.-based carriers dropped the program, demand remained healthy among international carriers in Europe. In fact, Lufthansa was the launch customer for Boeing's program. The new offering, FlyNet, is a reintroduction of its original service. We believe demand for Internet access on long haul flights will be strong. And with recent technology improvements delivering a much greater return on investment, airlines will be able to make a stronger business case for offering the service.

SM

How does iDirect technology play a role?

David Bettinger

Panasonic is licensing iDirect's satellite IP router technology as a core component of the eXConnect in-flight satellite transmission platform. Overall, we believe iDirect is the best solution to help airlines lower the cost of providing in-flight broadband and support a broad portfolio of revenue-generating services.

Let me illustrate this by spotlighting some of the platform's key features. I already mentioned our mobile waveform. Another key feature is Automatic Beam Switching. One of the challenges of

providing satellite-based broadband on long haul flights is that airplanes may need to connect to more than one satellite beam. iDirect's Automatic Beam Switching technology enables the Panasonic system to automatically transfer connectivity from one satellite to the next as an aircraft travels across multiple footprints.

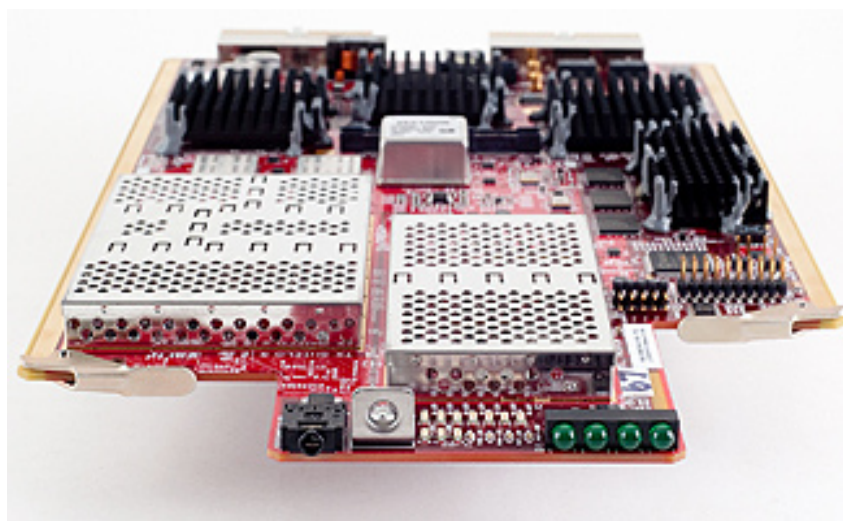
Another key technology is iDirect's proprietary Group Quality of Service feature. This enables Panasonic to allocate satellite bandwidth broadly and economically across its active customers while ensuring that Service Level Agreements are always protected. Bandwidth priorities can even be set at the application level. So, for example, an airline can establish committed information rates for key applications and then allocate surplus capacity, when it is available, for other purposes.

SM

OK, David — what's next?

David Bettinger

We believe in-flight broadband is going to take off this time. We have a next-generation satellite solution which airlines can leverage to improve the travel experience for their customers and grow their revenues smartly.



In-Flight Satellite Connectivity... Are We There Yet?

by NSR

When discussing the Ku-band commercial airline broadband access market, the image that comes to mind is that of a famous animation movie where a donkey travels to a faraway land constantly asking the ogre driving the carriage: "Are we there yet?" Today, the answer would be, "Just about there," to which the donkey's reply would be, "Ahhh! Finally."

This is also the feeling of the market, after almost three years of travelling since the first Ku-band broadband Internet service in the sky, **Connexion-by-Boeing** (CbB), was shut down.

Germany's **Lufthansa** airline announced in mid-October that it is revving up the engines and readying for take-off with its broadband service with the help of in-flight entertainment specialist **Panasonic Aviation Corporation** (ex-**Matsushita**) with, guess what? The old CbB antennas still on the roof of many of its passenger aircraft! Lufthansa will eventually outfit the airplanes with the **EMS Technologies' Aura** systems (which are a variant of **Starling's** Ku-band **Mi-Jet** system) to the tune of US\$60 million on about 120 airframes. But for the time being, and to minimize initial capital investment, they are launching the service on 70 airplanes that have the old hardware still glued to the back of its wide-bodies.

What does all this mean for the whole commercial passenger airline market?

For starters, it means happy ex-CbB customers will long for a (long) flight on Lufthansa. Truly appreciated when it was available, CbB was dismissed for its cost, not its quality. Second, it is an opportunity for the company to differentiate itself in the highly competitive regular airline market by signing-up new clients to the megabits per second (Mbps) connectivity service while at cruising altitude. But more importantly for the whole sector, it means that other airlines will surely follow (**Twitter**?) the new service while it's flying medium-haul and especially long oceanic routes to learn if it's worthwhile picking up one of these new systems for a couple of hundred thousand dollars each.

The re-launch will also help get key questions answered for the service such as: Is there a real need for passengers to log-on to the Internet while on a red-eye from North America to Europe or Asia? At what time and over which regions will users try to connect? Is a flat fee for the flight or a per hour metered service better? Will users get annoyed by the latency inherent to the satellite? These and many other parameters still need to be completely understood from an operational point-of-view and will refine future customers' models.

In this market, we may first see a play developing mostly over ocean regions and for long hauls, which can assure continuity of service once over open waters. But the three to four hour flights on continental routes could also be very lucrative for satellite as equipment prices have dropped considerably, and weight is less than ever before; consider Starling's Mi-Jet is 110 lb., while CbB was reported to weight 600 lb. and can be fitted on top of planes in hours rather than days or weeks. What remains to be seen is the price of service that airlines will charge compared to the ill-fated \$30 per flight passengers paid for CbB.

InSight: NSR

There is already a certain level of confidence in the patterns that users will follow, but the actual day-to-day operations of the system will reveal the newest trends in passenger communications habits, be it in business or economy class.

And new habits there will be. As much as today's kids travel by car while looking at a screen and not the scenery, some air passengers have stopped looking out the window at vast expanses of land or sea to look at a screen. Part of this reasoning is due to the fact since the CbB days, things have changed, and the use of broadband access is no longer the privy of laptop owners.

Many people forget that user habits have changed thanks to the tremendous success of new form factors in mobile connectivity with the advent of notebooks, personal digital assistants (PDAs), Smartphones (and other iPhone-like devices). And the killer applications sustaining all these devices, namely email and short message system (SMS) as well as a multitude of short-sentences narrowband communications tools, have exploded in the land of multimedia applications. To add more fuel to the capacity constraint debate, video is all the rage in mobility applications, and it is easier than ever to shoot videos and upload them. How much longer will there be a resistance to deny passengers what they are getting on the ground?

During its recent webinar on "**The Coming MSS Capacity Surge: Where is the Demand**", NSR indicated that one of the key opportunities to fill up new satellites is in airborne services. Indeed, MSS operators have reported double-digit growth in airborne services over the past twelve months, and key airlines such as British Airways are launching L-band services on transatlantic routes.

Furthermore, the top MSS operators will be capable of delivering broadband speeds to airframes in the kilobits (if not megabits) per second in the coming decade, and we expect the migration to these services to occur (and be pushed by operators). Installing broadband systems before they leave the factory may also make sense.

The flight blog **RWG** recently said that the rumor mill is running high with talk that Boeing is asking for quotes from equipment providers for in-flight connectivity for its newest addition, the **Boeing-787**. With the downturn experienced in the other commercial market, business jets, this would be a boon to any of the manufacturers that are touting their wares in this highly-competitive market.

The Bottom Line

All in all, the buzz around Ku-band for commercial passenger aircraft has never been so high since the demise of Connexion-by-Boeing, but competition from other systems is also at an all-time high. Broadband services, although still a very emergent market, promise to beat narrowband revenues in the mid- to long-term due to passenger thirst for laptop connectivity at DSL and above speeds. If the timing of the Lufthansa deal is an indication, airlines have a stronger desire than ever to offer more services to their clients while in-flight, and it could signal the arrival of Ku-band at its destination.



InSight: Forrester

Ondas Media's Plans Emerge

by Chris Forrester, Editorial Director, RapidNews

Ondas Media, the would-be European pay-radio service, has signed up the U.K.'s Jazz FM to its planned service. Ondas Media's strategic plans are also rapidly firming up. In November Ondas, complete with some of its key automobile, broadcast and technology partners, participate in financial road shows in Munich and Paris. "I am stunned at the level of support, and interest being shown," said Dave Krueger, CEO at Ondas Media. That enthusiasm extends to Ondas' car manufacturing partners who are stressing to investors their views of the importance of the Ondas plan. "It's a common message and that it is time to get started," said Krueger.



The pressure on timing could also be down to a little outfit called **Liberty Global**, and its strong position of influence over **Sirius Satellite Radio** in the U.S., and now control over the assets of Chapter 11 business **Worldspace** and its pair of orbiting satellites. October saw Liberty pick up Worldspace's financial obligations and it is likely to have complete control by the New Year of 2010. Quite what will happen thereafter to Worldspace's assets is anyone's guess, but a fresh investor can only mean a re-think as far as Worldspace is concerned.



Meanwhile, the **Jazz FM** deal includes a cooperation agreement where Jazz FM and Ondas will create additional specialist radio channels, "as well as working together in relation to sample radio programming content for Ondas' test and demonstration projects in Munich and Paris in 2010." Krueger, speaking exclusively to us, said the fact that Jazz FM's signals already go out digitally on DAB frequencies in the U.K. helps.

Krueger said Jazz FM's content will be added to other programming that is already testing through the Internet, and ready for more widespread testing in other certain markets, and this activity is firmly scheduled for expansion in 2010. While Ondas is still targeting 2012 for a full service launch, Krueger said that some of its auto partners will be installing test radios in cars next year, and picking up signals from satellite as well as terrestrial repeaters.

The satellite capacity had hoped to be from Solaris Mobile (the joint-venture between Astra and Eutelsat), but that satellite's deployment hit a technical anomaly earlier this year that is still the subject of various insurance claims. Krueger says that Ondas is looking at a couple of alternate broadcasting methods currently.

"Hopefully we will be on the air for demonstration purposes around the middle of next year." Krueger said it will probably be about 10-20 channels of programming. "We could be looking at an accelerated introduction of some services, perhaps in 2011, because we have so much coming together," he added.

InSight: Forrester



They have created our reference design."

The situation with **Solaris Mobile** rather muddies the water as far as Ondas is concerned. The operator made an insurance claim on the S-band payload on July 1, based on the problems caused reportedly by the non-nominal deployment of the giant Harris-supplied reflector. The problem is that at least a portion of the reflector is working.

However, the dilemma still to be resolved is the extent the Solaris Mobile project can access the **Eutelsat**-based reflector (on Eutelsat's **W2A** craft).

"It is a very safe assumption to make that each of our car customers are now procuring our radios to put into their future models. Some of the time lines are inevitably different, but Q3-Q4 2012 is one of the more aggressive schedules already in place [by one car-maker]

The volumes are large, and much larger than we had originally envisioned when we originally signed the agreements," added *Krueger*, who explained that Ondas now has "more than a dozen radio manufactures, including high-end units, which are bidding for hundreds of thousands of radios a year.

The process is somewhat complex to manage, but we are helped by having **Delphi** as a key partner and they already have the lion's share of the U.S. satellite radio market, so they're a wonderful partner to have on board.

It is understood that Ondas hopes to access at least some of this capacity, despite the challenges, in order to provide some demonstration, and non-commercial, services. However, first the insurance claim has to be sorted out. SES and Eutelsat have a couple of options open to them (other than abandoning the project), which includes another so-called 'piggy back' mission repeating the Eutelsat W2A scheme. Option #2 is to build a dedicated S-band satellite, which might be a favoured option given the possibility of Ondas as a key 'anchor tenant'.

Back in May 2009, as expected, the European Union issued a pair of S-band pan-European operating licences to **Inmarsat Ventures** and **Solaris Mobile** covering a total of 60MHz of spectrum (30MHz for each operator).

InSight: Forrester

But the Jazz FM deal is music to *Krueger's* ears. "Jazz FM has half a million U.K. listeners," confirms *Krueger*. "Crucially, Jazz FM is mainly available on DAB radio, so we know that the listeners interested in this music genre are discriminating, demand superb quality, and have already purchased a DAB radio to ensure they can listen to their preferred content. Therefore, this affluent and discerning demographic is a hugely attractive proposition for pay radio."

"If Jazz FM is as popular in the 27 countries in Europe as it is in the U.K., this partnership could potentially result in several million subscribers," says *Richard Wheatly*, Chief Executive, Jazz FM. "Ondas Media's research has already confirmed that there is a significant interest in Jazz throughout Europe and our offering is an excellent example of content which can be

commercialized on a mainstream basis. We are excited to partner with Ondas Media to expand our market significantly, allowing new listeners to enjoy Jazz FM's high-quality content, in a superb digital quality format wherever they live, work or travel in Europe.

About the author

London-based Chris Forrester is a well-known entertainment and broadcasting journalist. He reports on all aspects of the TV industry with special emphasis on content, the business of film, television and emerging technologies. This includes interactive multi-media and the growing importance of web-streamed and digitized content over all delivery platforms including cable, satellite and digital terrestrial TV as well as cellular and 3G mobile. Chris has been investigating, researching and reporting on the so-called 'broadband explosion' for 25 years.



InSight: Gottlieb

Must Win Markets For Maritime VSAT Vendors....

by Alan Gottlieb, Gottlieb International Group

In the Maritime VSAT market, the two most attractive segments are Containerships and Tankers. Both classes of vessels owners see significant value in fixed priced Broadband, and together they represent a potential market of over 14,000 vessels. In fact, other than Bulk Carriers, they are the only segments where high concentrations of vessels can be found under single owners or managers.

Individual Tanker and Containership companies can own or control hundreds of ships, and even the small and mid-size firms have fleets large enough to justify the complex and extended consultative sales process required to consummate a sale. Without reasonable success in these two critical markets, it will be difficult for any VSAT vendor to achieve the critical mass of customers required quickly enough to support the high fixed capital cost of market entry. Hence, competition is intense and an understanding of the needs of these prospective buyers is critical to sales success.

At **Gottlieb International Group**, we have met with dozens of Tanker and Containership operators around the world, and here are what we believe to be the most important elements to winning a sale.

Justify The Investment

Contrary to the popular belief that vessel owners are spending thousands of dollars per/month on **Inmarsat**, the truth is that most are currently spending US\$1,000 or less. Due to the high cost of charged "by-the-byte" Inmarsat, use has been limited to the most critical types of communication. Therefore, in reality, acquiring a VSAT service represents a substantial increase in costs, not a reduction in cost as may outside the industry may believe.

A key element of the selling process is to demonstrate to the prospective buyer how the investment in VSAT can be justified. To accomplish this, vendors must be prepared to offer a comprehensive economic analysis of how VSAT can improve operational efficiency and lower costs. Suffice it to say that, due to the industry downturn, Crew Welfare is no longer **the** critical purchase motivator.

Offer A Robust Commercial Class Platform

The ideal VSAT platform must be sufficiently robust to permit expansion of the corporate network to all of the Company's vessels in a fleet. The vendor should be able to provide guaranteed bandwidth — or *Committed Information Rate* (CIR) — sufficient to support a VPN, two to three voice channels, remote PC maintenance, and any other time sensitive applications the user must run, no matter the location where the ship travels.

To determine how much bandwidth is needed, the network can be modeled in a laboratory environment. **YR20** (www.YR20.com) is one such firm specializing in such analyses. Typically, to deliver CIR at a commercial level, an **iDirect** or **Vipersat** hub is required as well as a **SeaTel** 1 meter antenna.

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While the iDirect platform produces a relatively high level of quality of service in an environment where sporadic use allows for sharing of bandwidth resource, in environments where many heavy users tend to transmit time sensitive data (*i.e.*, voice) simultaneously, the Vipersat SCPC capability makes it worthy of serious consideration. Generally, the addition of an Inmarsat or OpenPort back up solution completes the preferred infrastructure for trans-oceanic vessels.

Establish The Network

Given the size and global distribution of the customer base, direct sales by themselves are unlikely to be effective, especially true when dealing with far flung markets.

Based on past experience, we believe that the best approach to use is a combination of distributors and direct selling. Careful selection of distributors is vital and we prefer small, highly motivated firms to the larger firms handling dozens, or even hundreds of, products or services.

Under an ideal scenario, day to day contacts are handled by the local distributor and supplemented

by sales calls in which both regional management and distributor salespeople share responsibility for success and participate in appropriate incentives.

Avoid Restrictive Policies

Major fleet owners with robust commercial demands are becoming increasingly wary of *Fair Access Policies* that give the vendor the discretionary

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authority to degrade service in cases where “large files,” web conferencing, or other bandwidth intensive applications burden the network. While restrictions on such activities as downloading movies, streaming, or *Skype* use are reasonable, limits of other activities can be serious barriers to the sale.

Differentiate Your Service

Shipping companies are seeking more than bandwidth and hardware. Sales strategies that focus on price alone, while typical in the VSAT industry, are not likely to succeed in the commercial shipping markets.

Above all, differentiation can be achieved through a thoughtful consultative selling process in which the vendor provides assistance and consultation on all issues relating to use of VSAT aboard the vessel including bandwidth management, control of access and network security.

A Single Point Of Contact

The shipping community tends to avoid vendors who are only willing to take on the responsibility of their own hardware and the associated bandwidth. IT managers desire a solution that includes bandwidth, hardware, bandwidth management software and any other value added service, all managed through one point of contact. The ultimate nightmare for shipping IT management is to be bounced between software and hardware providers with each leveling responsibility for a system failure on the other.

Provide Remote Capabilities

Given the fact that maritime VSAT systems are dependent on several network elements, the potential for system failure always exists — most vessels operate in a trans-oceanic environment and critical systems may go down far from shore. Consequently, inclusion of a remote maintenance capability, or “back door” to the system, is a crucial requirement.

Essentially, vendors need to be able to access the hardware and software infrastructure aboard the vessel if the VSAT system fails and reboot the system or a system element if a crash occurs, typically through a backup L-band satellite system such as Inmarsat. A clever product, developed by **Uplogix** (www.uplogix.com) of Austin, Texas facilitates not only this sort of remote access but performs automatic maintenance as well.

The Uplogix *Automated Remote Management Platform* not only allows remote access via an L-band backup system, but also performs continuous “health checks” on system components by “pinging” each element of the VSAT system on a regular and frequent basis. If a network element is found to be unresponsive, the Appliance automatically reboots it. If, on re-boot, the element is still down, the element can be accessed via the L-band and the necessary link and remote maintenance performed.

Customer Network Visualization

Providing the customer with the ability to continuously monitor available bandwidth and *Quality of Service* (QOS) via a web portal can be a powerful sales incentive.

To provide this functionality, several of the major VSAT vendors offer **Parallel SatManage** (<http://www.satmanage.com>) under their own brand name. Using *SatManage*, customers can graphically visualize connectivity to every vessel on

their network over any period in time thereby confirming contracted performance levels. In addition to confirming bandwidth availability, the software provides valuable diagnostic tools to identify specific types of usage aboard the vessel.

While lack of available bandwidth may result in a downgrade of performance, abuse of available bandwidth can generate

a similar downgrade in performance. As *SatManage* can identify and track the types of usage, it can be invaluable in identifying and curtailing abuses.

Hence, the provision of this sort of application can provide assurance to the customer that the vendor is providing the level of service specified under contract.

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In Conclusion

Containerships and Tankers are the only sectors of the maritime industry where ownership of vessels is highly concentrated and who have also demonstrated the most interest in fixed priced VSAT services.

To be successful, maritime VSAT providers must win a significant share of these markets. To do so, they will need appropriate packages of bandwidth; hardware and value added services along with the consultative input designed to support a complete solution. Ultimately, vendors successful in Containership and Tanker markets will have the economies of scale necessary to penetrate large but less concentrated markets such as fishing and leisure.

About the author

Mr. Gottlieb is CEO of Gottlieb International Group. His firm, Gottlieb International Group Inc., specializes in market research, business development and sales of satellite and wireless communication technologies to the Maritime Industry. His firm has performed major research and sales projects in European Tanker and Containership markets and maintains an extensive network of contacts among ship owners and managers as well as software and hardware suppliers.

Major consulting clients have included KVH Industries, Intelsat, Inmarsat, Verestar, Globecom Systems, Sonic Telecom, Frontier Technology, and THISS Technologies, (Singapore) and numerous Private Equity firms.

He served as Vice President of Sales for Audiovox Communications, Director of Sales for Southeast Asia for COMSAT and Aether Systems, and Corporate Market Research Manager for a Division of Baker International (now Baker-Hughes). Mr. Gottlieb has been responsible for initiating and managing successful market entries into Southeast Asia and the South Pacific Markets and assisting satellite related companies with diversification into new market niches and geographies.

He holds a Masters Degree in International Business from Thunderbird Graduate School and a B.A. from Stetson University. He has published numerous articles in Sat News and is a frequent speaker at Offshore Communications, ISCe, the Washington Satellite Exhibition, and other industry events. He can be reached at +1-703-622-8520. Website: www.gottliebinternationalgroup.com



InSight: Heyman

2009 — In Space

by Jos Heyman, Tiros Space Information

During 2009 (up to the time of writing in mid-November), 59 launches placed a total of 104 satellites in orbit. It is expected that during the last weeks of the year, another 11 launches will take place, boosting the satellites by an additional 11 in number. These satellites were for the following purposes:

Objective	Launched	To be launched	Total
Scientific and technology	39	2	41
Crewed (incl. support)	13	3	16
Interplanetary	1		1
Earth observation	13		12
Communications	28	4	32
Navigational	6		6
Misc. military	5	2	7
Total	104	11	115

Table 1: Satellite Types Launch In 2009

Year	Launches	Satellites
2000	82	117
2001	58	83
2002	62	90
2003	61	90
2004	53	73
2005	52	73
2006	63	94
2007	65	115
2008	67	105

Table 2: Annual Launches + Satellites, 2000-2008

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This will bring the number of spacecraft launched since 1957 to 6,206, with 63 countries or international agencies being responsible for the satellites. The latest country that joined the 'space club' was Switzerland with the launch of the **SwissCube** satellite on September 23rd, 2009.

Iran joined the select number of countries that launched their own satellite when on April 25, 2009, a **Safir** launch vehicle placed the **Semnan** technology satellite in orbit.

North Korea tried to do the same on April 5, 2009. Although North Korea asserted that this was a communications satellite that was placed into a 490 x 1426 km orbit, transmitting the favourite songs of *Kim Jung-il*, the general belief is that, in absence of verifiable tracking data, the launch was a failure and the stages of the rocket fell into the Pacific Ocean. The efforts of Iran and North Korea caused concerns in western circles.

The United States's *Space Shuttle* fleet completed a further four (plus one in late November) flights, all of which were in support of the operations of the *International Space Station*. Another five flights remain to be conducted in 2010 before the orbiters are retired.

The chosen launch vehicle to replace the Space Shuttle made its first test flight on October 2009. The objective of the **Ares 1-X** flight was to simulate the launch vehicle's first stage burnout and separation from the dummy upper stage. The launch vehicle was powered by only four segments of the first stage, with the fifth segment being replaced by an inactive segment.

The vehicle also carried mock-ups of the upper stage and the **Orion** crew module (Orion Boilerplate-1) and launch abort system. The vehicle reached an altitude of 46 km and no hardware was placed in orbit — the solid rocket motor separated



Cutaway image of Orion crew module, courtesy of NASA

and was later recovered from the Atlantic Ocean. The simulated upper stage and Orion's crew module and launch abort system were not recovered. The **Ares** launch vehicle will be developed into the **Ares V** launch vehicle, with a first flight scheduled for 2013.

During the year, the International Space Station will have provided docking space for five Space Shuttle missions, as related above, four **Soyuz** TMA missions and six **Progress** cargo transfer spacecraft.

In addition the first Japanese **HTV** cargo spacecraft was docked at the space station for some time.



The Progress cargo spacecraft

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The year also saw the addition of another component to the Japanese **Kobe** facility and a new Russian docking port named **Poisk** or **MRM-2**.

At the end of the year, the permanent configuration of the space station complex will consist of the **Zarya** module, the **Unity** module, the **Zvezda** module, the **Destiny** module, the **Harmony** module, the **Columbus** module and the **Kobe** module.

The docking ports of the space station are identified as the *Zvezda* rear port, *Zarya* nadir port, the *PMA-2* docking port, the *PMA-3* docking port, the *Pirs* nadir port and the new *Poisk* port.

A further docking port, named **Dawn**, is scheduled for launch in 2010, while the **Tranquility** module as well as the **Cupola** observation module are scheduled for launch in 2010.

The International Space Station is now in a configuration that can support a crew of six. Currently, the space station is commanded by **European Space Agency** (ESA) astronaut *De Winne*, the first time an ESA astronaut held this position. During the year, two so-called 'space tourists' visited the space station.

During 2009, astronauts and cosmonauts completed 159 hours of EVA time in support of the space station. Another 39 hours are expected to be made before the end of the year. This will bring the total EVA time spent on the space station to about 1632 hours.

Discussions are currently going on concerning the closing of the International

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Japanese Kibo contribution to the ISS

Space Station. The United States is planning to start de-orbiting the space station in 2016 as there is no long term funding for its operation beyond 2015. In the meantime, Russia announced that it has plans to 'recycle' its modules for use in a post-ISS program that has not yet been defined, but may involve a new orbital outpost that could serve in space missions heading to the Moon and Mars. The European Space Agency and Japan are seeking an operational program beyond 2015 so they can make more use of their facilities on the station.

One of the more interesting spacecraft during the past year was the **Lunar Reconnaissance Orbiter (LRO)** to



The International Space Station... photo by the STS-119 Shuttle Crew, NASA



obtain the measurements necessary to characterize future robotic and human landing sites on the Moon. A suite of seven instruments identified potential lunar resources and made observations of the lunar radiation environment relevant to human biological responses.

After having been launched on June 18, 2009, and placed in a transfer orbit by the launcher, LRO arrived at the moon on June 23, 2009, and was placed into an initial polar orbit of 220 x 3100 km. By August 3, 2009, using four burns of the on-board engine, the spacecraft reached an orbit of 47 x 53 km.

Accompanying the LRO were the separate **Lunar Crater Observation and Sensing Satellite (LCROSS)**, as well as the launch vehicle's upper stage, designed to impact on the south pole of the moon in the hope of finding evidence of water. The impacts took place on October 9, 2009, and the upper stage was impacted first. The resulting plume was observed by LCROSS. LCROSS itself impacted on the moon just a few minutes later. The impact location was an eternally dark depression on the south pole of the Moon, named *Cabeus*.

Finally, the *Augustine Panel* assessing U.S. manned space flight, presented five options to President Obama. The options vary, depending on the retirement date of the Space Shuttle, the International

Space Station, as well as the development of the heavy launch vehicle needed to get spacecraft to the Moon as well as the launch vehicle needed to move crews into low-Earth orbit. Option 1 is essentially the Bush administration's **Constellation** program.

The Panel noted that, whichever option is ultimately selected, "Human exploration beyond low-Earth orbit is not viable under the FY 2010 budget guideline," and suggested funding increases at a minimum of about US\$3 billion a year by fiscal 2014 and then growing with inflation at 2.4 percent per year. All Options indicate a return to the Moon by mid 2020.

The Panel also noted that...

- *The project gap between the end of shuttle operations and the debut of a new spacecraft to replace it, will stretch at least seven years.*
- *Commercial services to deliver crew to low-Earth orbit are within reach and a new competition with adequate incentives, should be open to all U.S. aerospace companies. This would allow NASA to concentrate on human exploration beyond low-Earth orbit based on the continued development of the current or modified Orion spacecraft.*
- *Mars remains the "ultimate destination" for human exploration of the inner solar system.*

About the author

Jos Heyman is the Managing Director of Tيروس Space Information, a Western Australian consultancy specializing in the dissemination of information on the scientific exploration and commercial application of space for use by educational as well as commercial organisations. An accountant by profession, Jos is the editor of the **TSI News Bulletin** and is also a regular contributor to the British Interplanetary Society's Spaceflight journal.



InSight: Euroconsult

Still A Good Year...

by Pacôme Revillon, CEO, Euroconsult

2009 was marked by the deepest economic crisis of the last decade, with its roots in the financial and early phase of the real estate crisis in 2007 and 2008. While a number of observers note signs of recovery, the economy remains fragile and uncertainty persists.

In general, the satellite sector has held up well during this difficult economic time. This is particularly true for satellite operators and manufacturers, although the impact on service providers requires a more detailed review. Satellite systems operators of all types (FSS, MSS, EO) posted revenue growth on a consolidated basis, with that growth rates tending toward the higher end of averages of the current decade. A number of operators were confronted with capacity limitations which constrained their short term growth (as opposed to a lack of demand).

Still, the satellite sector has so far benefited from relatively long business cycles and from multi-year contracts signed by most of their customers securing short term revenues. Over time, the current crisis should have a noticeable impact on certain customer segments, and could result in a decline in industry growth rates, at least in the short term.

A Few Companies Affected...

In the course of the year, a few companies in the satellite sector filed for bankruptcy — including operators **Protostar** and **ICO North America** (now **DBSD North America**), as well as launch service provider **Sea Launch**. While the economic and financial crisis is

not the only reason for their downfall, it has certainly significantly complicated their ability to find financing. Even before the crisis exploded, all three companies were all in relatively fragile situations due to various technical, regulatory or commercial factors.

The SATCOM Market Is Strong — However...

Satellite operators (on a consolidated basis) are likely looking at another



Satellite antenna farm photo courtesy of Satcom Services

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strong year in 2009. While complete data on capacity usage is not yet available, the four leading operators' revenues — which represent close to 70 percent of the total industry — underscore the resilience of the satellite business model. For the first nine months of 2009, **SES** and **Intelsat** posted revenue growth of 5 percent and 8 percent respectively, while **Telesat** posted revenue growth of 17 percent. **Eutelsat** also confirmed these strong results, with 11 percent growth for the first quarter of its fiscal year 2009-2010. While less data is available for national operators, current information (including the number of satellites under procurement) tends to confirm this trend.

The sector's resistance to the crisis can be explained by the fact that their core

customers, mainly pay-TV broadcasters and telecom operators, are not affected by the crisis as much as at the end of the Internet bubble in the early 2000s. Subscriptions to pay-TV services for example are projected to grow by 14 percent in 2009 — lower than in 2008, but still positive growth at a time when many sectors are struggling. Emerging countries are a major driving force in this growth. This growth is backed by increasing capacity demand and prices that are stable or increasing, thanks to high fill rates worldwide, estimated to exceed last year's 74 percent. Intelsat's fill rate of 85 percent in the third quarter of 2009 is a good illustration of this.

In general, despite the tight credit markets, financing was still largely

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available for larger FSS operators and for those with a robust business outlook. However, for small- and medium sized operators, it is much harder to raise funds for new satellite projects through debt financing, as lenders have become generally more risk averse and thus have tightened up their requirements. A number of satellite operators have secured satellite financing, though there has clearly been a move away from exotic and innovative funding toward more traditional project financing, often with the support of export credit financing agencies (e.g., **COFACE** and **ExIm Bank**).

Meanwhile, M&A activity partly resumed in the second half of 2009. The main event was the agreement for **Viasat** to acquire **WildBlue**. Other smaller transactions at the satellite or company level also took place, including auctions for the **Protostar** satellites (with the second one planned for December) and the acquisition of **Mabuhay** by **ABS**.

The MSS market globally maintains its growth and secures fresh financing. MSS operators have posted a relatively good consolidated performance for 2009 so far. The market leader **Inmarsat**, for example, posted revenue growth of 8.3 percent for the first nine months of 2009 — including 8.7 percent growth in the third quarter alone.

Nevertheless, tough economic conditions have still impacted some operators' performance. For instance, while reporting growth in service revenues, **Iridium** reported a sharp drop in satellite equipment sales in the third quarter of this year. The M2M system operator **Orbcomm** also reported a weakened performance in the same period, primarily due to a 89 percent decline in subscriber equipment sales for the third quarter of 2009 compared to the same quarter in 2008.

Despite the challenging market environment, two MSS operators have raised significant funds in the last few months. **Globalstar** has achieved full funding in 2009 with the support of the French export credit agency Coface. The closing of the transaction between **GHL Acquisition** and Iridium brought a first round of financing to the company, with further funds expected for the **NEXT Constellation** program.

In order to stabilize business performance, MSS operators have been actively promoting new products and services to generate more revenues from anchor customers and attract new customers. In the handheld sector, operators have turned their focus to military and professional users whose communications usage has been only moderately impacted by the crisis.

In September 2009, **Thuraya** released a new handset, **Thuraya XT** — which has a more industrial design — is promoted as the toughest satellite phone in the world. **Iridium** continues to market its new **9555** handset to professional users, and Inmarsat plans on releasing a new satellite phone service next year.

In the M2M sector, **Globalstar** released a new generation consumer satellite communication terminal, **SPOT 2.0**, in July 2009. The company is pushing this one way communication device hard, and has now about 10,000 distribution points.

MSS broadband solutions are still driving a significant part of growth, especially as the volume of data transmitted is growing steadily. Inmarsat stands out as the current market leader in that segment.

The EO Satellite Market...

Earth observation data sales will surpass the US\$1 billion mark for the first time in 2009 as demand for commercial high resolution data continues to grow. Despite

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reaching this record level, there remains a reliance on government customers particularly for defense and security purposes. Thus, leading commercial operators and data distributors must each look to expand their client base and service offerings in order to grow market share and mitigate against any major policy shifts.

In reality this means operators such as **DigitalGlobe**,

GeoEye and **SPOT Image** have

sought to develop their international distribution networks in order to meet prospective clients locally. These leading providers are also growing activities in order to best position themselves to supply complete geospatial services, including incorporating aerial data and/or distribution of data from third parties and also increasing their portfolios of value-adding products. With 260 Earth observation satellites forecast to be launched over the coming decade and increasing competition anticipated from both commercial operators and government programs seeking to commercialize data, this expansion of services is deemed necessary as competition in the market place increases — and the

sector continues to mature.

DigitalGlobe's successful IPO confirms investor interest in the sector. **Astrium Services'** acquisition of SPOT Image and the subsequent teaming of the company with **Infoterra**, creating the **SPOT Infoterra** group, will provide both optical and radar high resolution data solutions. New satellite ventures have also been

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WorldView-2 satellite (image: DigitalGlobe)

realized, with DigitalGlobe and GeoEye successfully launching capacity with **WorldView-2** and **GeoEye-1**, respectively, and Astrium Services confirming it will proceed with **SPOT-6** and **SPOT-7**.

The Manufacturing + Launch Market...

The year 2009 will, again, be a good year for GEO ComSat manufacturers, with 21 to 25 orders expected by the close of this year, depending if **SES'** four satellite order is awarded before year's end. This is the fifth consecutive year of satellite orders exceeding 20 units, which is a record in the industry's historical cycle.

Orders for 2009 are still dominated by replacement and expansion of in-orbit capacity with no new entrants. With the exception of two satellites to be provided by **ISS** of Russia, all other orders are for high performance satellites, either high power (e.g., **IS-19** and **20** for **Intelsat**), multiband (e.g., **Express-AM 5** and **6** for **RSCC**, **ABS-2**) or multispot beam (**Jupiter** for **HNS**).

Interesting changes are occurring on both the supply and demand sides, with new GEO ComSat satellite integration capabilities emerging

in several countries (Canada, Argentine, Brazil) and more governments backing projects for domestic ComSat systems (Pakistan, Angola, Laos, Columbia, Bolivia, Sri Lanka). The European, Chinese and Russian satellite industries take advantage of this market opening by providing bundled

solutions (satellite and launch service, as in the case of **Telkom 3** or **Paksat**), or critical subsystems and parts (the case of **Arsat**).

On the launch side of the industry, a total of 30 satellites should be launched into GTO by year-end 2009, of which three quarters will be commercial comsat. The commercial launch industry has met high demand with seven single launches of **Proton** and four dual launches of **Ariane 5** handling most of the activity for the year.

Challenges – 2010

Despite strong industry performance this year, 2009 has revealed that the satellite sector is solid, due in part to its longer



GeoEye-1 satellite (image: GeoEye)

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business cycles compared to other sectors. Growth in satellite applications in emerging regions, as well as innovation at the service level both in satellite broadcasting and telecoms, will also support future growth.

Still, the current crisis could begin to impact demand for satellite services and capacity, especially if there is not a significant recovery next year. At the same time, the end of large orders for replacement communication satellites could begin to impact that level of the value chain. The industry can be legitimately very satisfied with its global performance this year, but must also begin preparing for 2010.

Pacôme has contributed to numerous consulting assignments in the satellite broadcasting and communications markets for international companies including satellite operators, satellite TV platforms, TV channels, media groups, manufacturers, investment banks, private equity funds and public institutions.



Data and figures from:

- **16th Satellite Communications & Broadcasting Market Survey – Forecasts to 2018**
- **2nd Mobile Satellite Communications Markets Survey - Prospects to 2018**
- **2nd Satellite-based Earth Observation - Market Prospects to 2018**
- **12th Satellite to be Built & Launched by 2018 – World Market Survey**

About the author

Pacôme Revillon spent several years as analyst and consultant at Euroconsult before accepting his current position as the Company's CEO, with a specialization in satellite communications, TV broadcasting and financial analysis.

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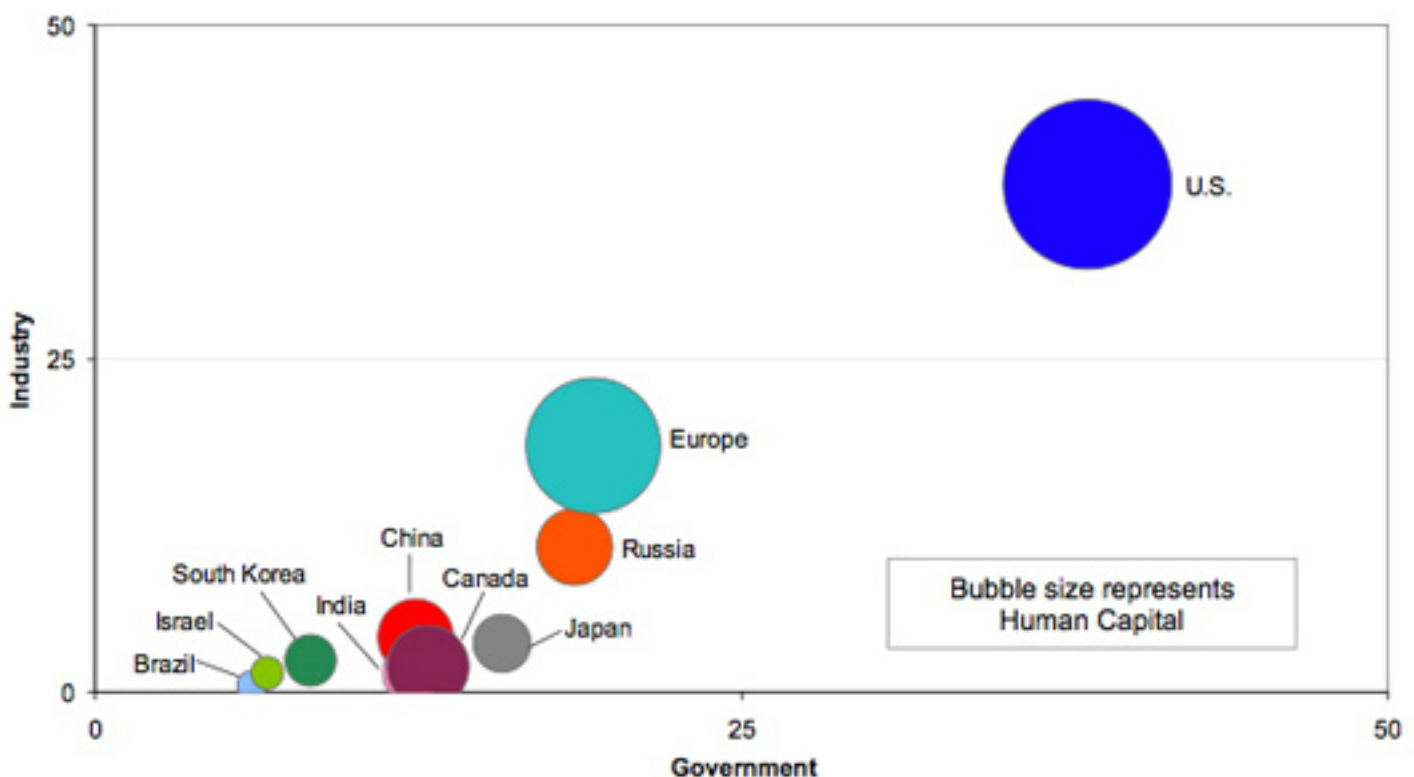
The Space Competitiveness Index—Update

by Futron

Global space activity drives a substantial economic engine, fosters national pride, and enhances military power. Some nations invest in space for the domestic and international respect associated with their technological advances and satellite launches. Others focus more on the economic, commercial and social benefits derived from communications services, imagery, and applied sciences. Militaries have also long realized the force multiplication effect of space assets, including secure communications, reconnaissance, location and navigation services, force tracking, and the remote coordination and operation of war-fighting assets.

Yet increasingly, military space is both dependent on and interwoven with civilian and commercial operations, human capital and expertise, space systems and assets, and infrastructure—adding a new layer of complexity to governmental decision-making, national industrial policy, and the participation of the private sector within the space sector. So, while nations invest in space targeting different outcomes, the overall importance of space competitiveness is linked to national pride, economic strength, and national security.

Figure 1: 2009 Space Competitiveness Index Country Comparisons



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Together, the civilian, military, and commercial space sectors focus the broader space discourse around questions about space competitiveness such as the relative competitive position of traditional space leaders; the role of emerging space powers; and the aims of newer or smaller space participants. The ***Futron Space Competitiveness Index (SCI)*** top-level findings follow — for a copy of this highly informative report, [*select this direct link to the appropriate Futron webpage.*](#)

- » The United States (U.S.) remains the current leader in space competitiveness, but its relative position has declined marginally based on increased activity by other space-faring nations.

- » The U.S. still leads in each of the major categories: government, human capital, and industry, however, its comparative advantage is narrowing across all categories.
- » European competitiveness remained roughly unchanged, with improvement in government metrics tied to updated policy and successful exploration programs, but offset by lower industry metrics.
- » Russia also demonstrated improvements in government metrics, alongside relatively lower human capital and industry metrics.
- » Japan posted major gains between the 2008 and 2009 SCI metric evaluations, due to substantial

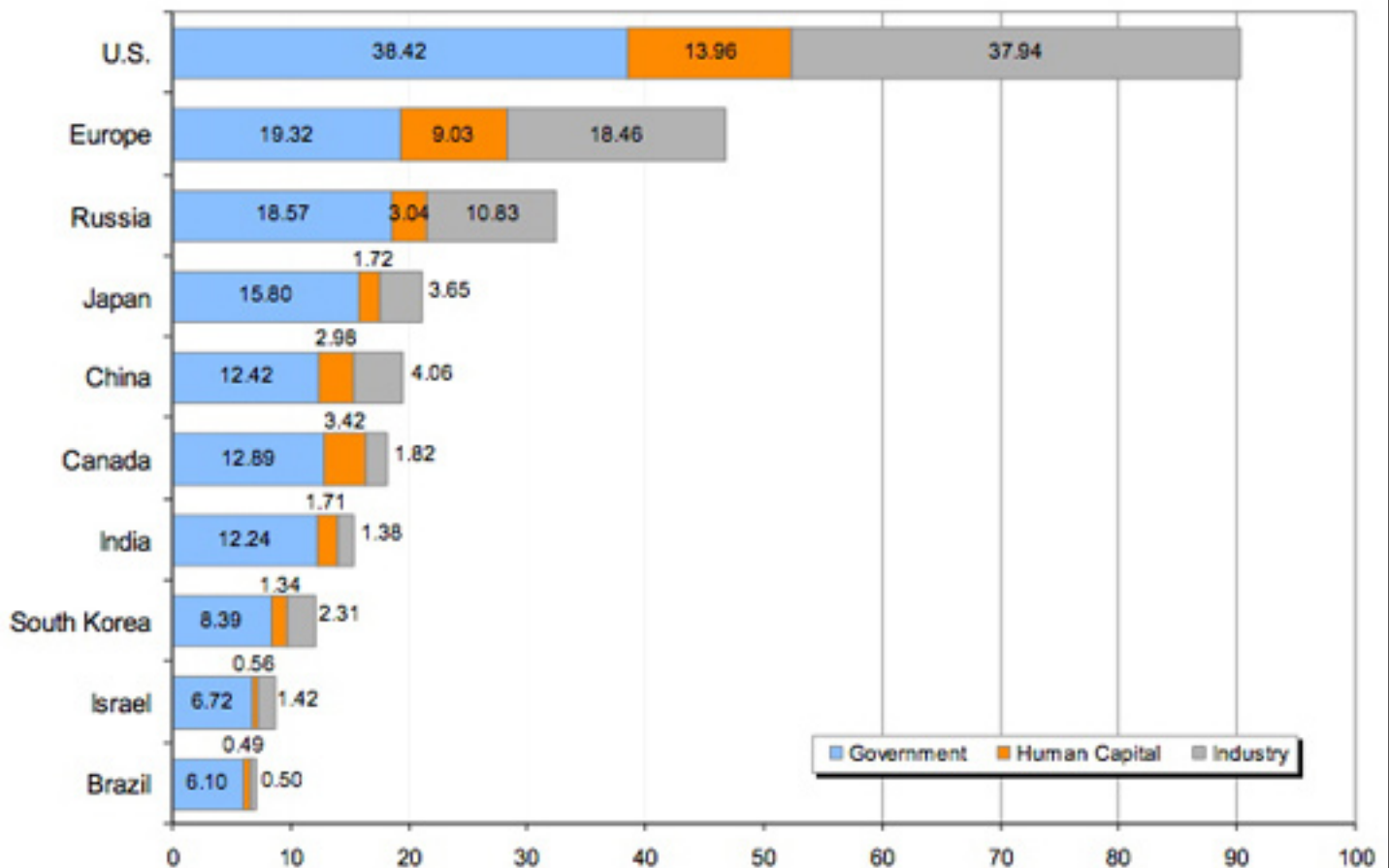
InSight: Futron

changes in its space strategy as well as its new space law. This resulted in the country jumping from the seventh position in the 2008 SCI to the fourth position in the 2009 SCI.

- » China posted gains of nearly 10 percent in SCI points overall, fueled by government activity and metrics, but fell behind Japan in its overall ranking. The transparency of the Chinese environment remains a hurdle for the country, which publicly seeks greater international cooperation and commercial activity.
- » Canada jumped nearly 10 percent in its overall SCI points, based on government metrics around both civilian and military space policy, along with a commitment to increase overall funding on space programs.

- » India had a strong year of space activity, registering double-digit improvements in government metric scores, but lagged in industry scoring.
- » Russia continues to be the most prolific nation in space launch activity, reinforcing its resurgence via strategic investments in launch platforms and infrastructure.
- » There has been a codification of Europe-wide space institutions—both civilian and military—and Europe continues to enhance its joint policy, multinational corporations, and other market structures.
- » India is poised to be a major collaborative player, and is a global leader in remote sensing.

Figure 2: 2009 Space Competitiveness Index: Total Aggregate Scores by Country



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- » South Korea continues to invest in its nascent space program, highlighted by its first astronaut and the inauguration of its first spaceport, which mark major steps forward.
- » Israel continues to be a leader in space technology but has limited commercial scale.
- » Brazil has seen its position decline relative to other leading space nations, and lacks a clear strategy and commitment to invest in space activities.

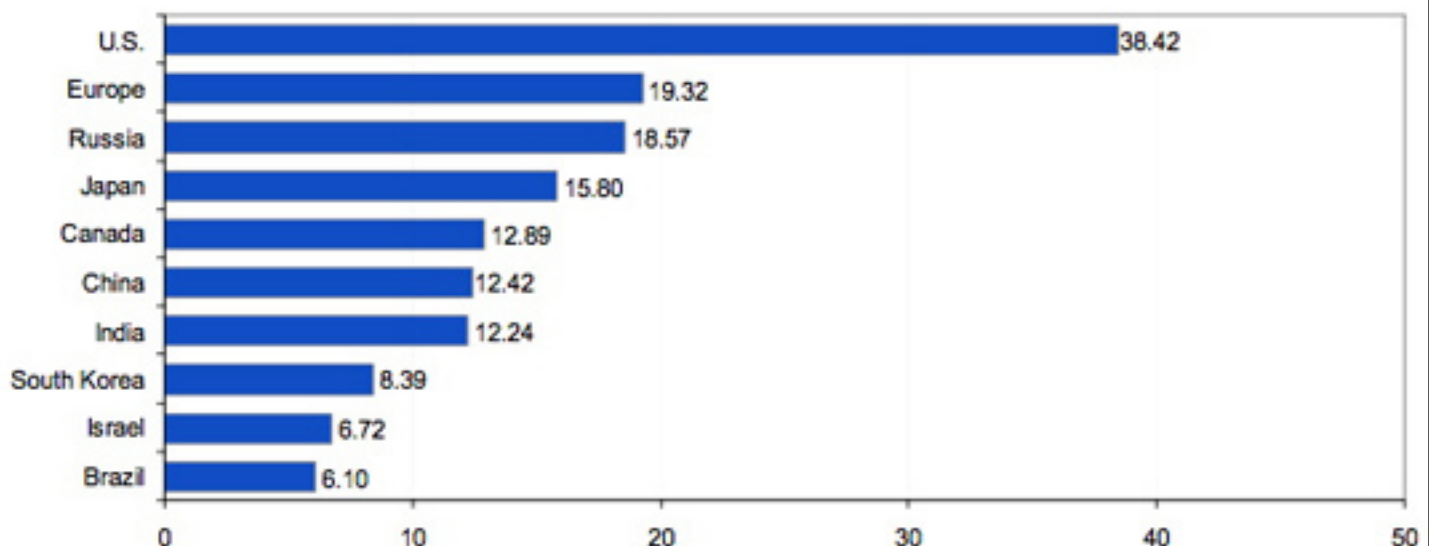
The Government Dimension

- » Transparency regarding space strategy, policy, and spending remains a significant issue with some countries, particularly in connection with military space activity. This reduces the ability of commercial space actors to optimize investment and participation in the industry.
- » The U.S. has a robust government policymaking structure with detailed strategies for military, civilian, and commercial applications—but the

complexity of the system, a lack of a unifying executive structure for decision-making, and the ongoing issue of export controls have a negative impact on overall competitiveness.

- » The U.S. spends more money than any other nation on space. Its substantial military investment offers technology advantages, but may also obscure narrowing technological advantages in the civil space arena.
- » European governments, through the European Union (EU) and the European Space Agency (ESA), have integrated their policymaking structures and are increasing spending, particularly within the civilian and commercial spheres.
- » Japan's recent updates to its space law and policy signal renewed government attention to the strategic, economic and social benefits of space activity. This renewed focus on the country's space ambitions also highlights and leverages Japan's advanced technological capabilities.

Figure 3: 2009 Space Competitiveness Index: Government Scores by Country



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The Human Capital Dimension

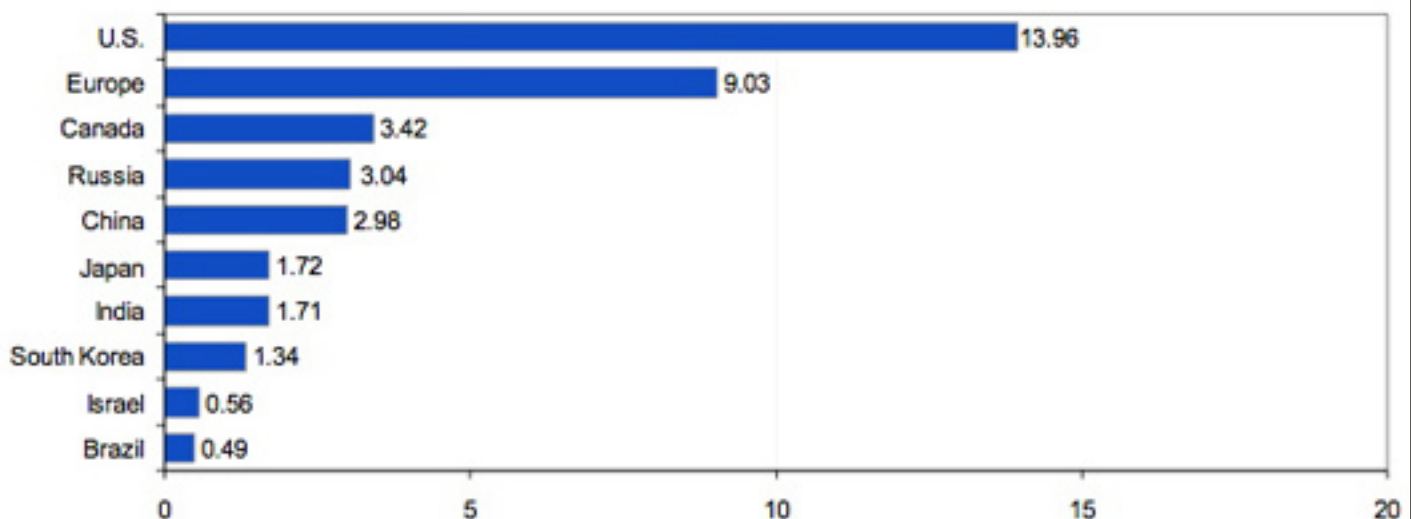
- » Significant concern persists globally within industry and government regarding the development of adequate human resources supporting the space sector, particularly technically skilled personnel such as engineers. This is especially true among current space leaders, such as the U.S.—where an estimated 60 percent of non-citizen engineers return to their home countries after earning degrees.
- » Data regarding human resources within the space industry is sparse, and lacks consistency across countries. However, the 2009 SCI has added a metric for space law training capacity.
- » Usage of, and reliance on, space-enabled services is skewed towards larger, advanced economies, particularly with the introduction of new satellite services such as navigation and end-user Internet access.
- » Canada ranks well in human capital indicators due to its strong academic network and large number of university aerospace programs and civilian research centers.

- » Civil society interest and support is widespread, with a significant number of organizations throughout Asia, Canada, Europe, and the U.S., many of which have international partners.

The Industry Dimension

- » Satellite communications is the one market segment that is predominantly in the hands of the private sector.
- » Significant commercial interest persists regarding remote sensing and informatics applications, as well as a rapidly growing downstream market based on the U.S.-operated Global Positioning (GPS) system.
- » Despite its export control burdens, the U.S. commercial space industry remains the leader, with continued high revenues and financial activity.
- » European commercial competitiveness remained largely unchanged between 2008 and 2009, providing a statistical counterpoint to perceptions that the European market has gained dramatically from efforts to develop alternatives to satellites and equipment now controlled by U.S. export regulations.

Figure 4: 2009 Space Competitiveness Index: Human Capital Scores by Country



InSight: Futron

- » Despite the relatively high overall position of Russia and China, the government sector continues to direct their national space industries—and national competitiveness is hindered by low levels of commercial activity.
- » China has outlined a strategic objective to stimulate commercial space activity, but the legal and regulatory structure to support this goal remains unformed.
- » Israeli space activities remain dominated by state-owned companies, but there are increased commercial relationships with Europe and Asia, as well as a number of smaller component manufacturers and entrepreneurs seeking venture capital. Israel is also strong in the ground systems and telecom sectors.

technology maturity and risk level at the level of a national space enterprise. In order to do so the following actions will be considered:

- » Refinement of the metrics in both the Space Technology Capability Base index and the Space Technology Achievement component.

The data included in this segmentation analysis represents only a snapshot of currently demonstrated capabilities at the time of writing.

In future editions of this study Futron hopes to enhance the sophistication of the **Space Technology Capability Base Segment Analysis** by developing it into an assessment of space

InSight: Futron

- » Expansion of technology areas is included in the Space Technology Achievement component, notably: space associated ground equipment and facilities (tracking stations, spacecraft processing and integration, etc); robotics; space related component manufacturing and spacecraft command and control.
- » Investigation of the mapping of technology emphasis areas to national requirements, as expressed in policies and programs.
- » Review of weighting used. The question of weighting of indicators in science and technology capacity or capability assessments is one of debate in the available literature. Futron will continue to review the literature on the subject to identify potential improvements to the weighting scheme used in this segment.

About Futron

Futron Corporation is a premier provider of decision management solutions that improve outcomes for our clients by enhancing their ability to make complex choices. Our proprietary analytic models, methodologies, and data repositories transform information into intelligence. Our multidisciplinary, world-class team offers comprehensive knowledge of the aerospace, satellite, and telecommunications industries, with deep experience in statistical analysis, competitive assessments, forecasting, and strategy. Founded in 1986, Futron has a staff of some 100 experts, including policy analysts, management leaders, economists, regulatory specialists, and engineers. Futron is headquartered in Bethesda, Maryland with offices in Houston, Texas and Hampton, Virginia.



Futron would like to thank the validators of this study for providing invaluable insight into this assessment. Lastly, Futron would appreciate the opportunity for feedback on our effort as well as industry experts and organizations interested in partnering in this initiative going forward.

InSight: World Teleport Assoc.

The Changing Dynamics Of The Teleport Industry

by Robert Bell

It used to be video distribution that pretty much ruled the teleport industry. But over the last few years, niche markets and value-added services have changed the landscape, and with it, expectations for this US\$13 Billion sector of the global satellite communications marketplace.

Who Are The Top Operators

Every year, the **World Teleport Association** surveys teleport operators around the world on their revenues, revenue growth, facilities, services, and business results. From this information, **WTA** publishes rankings for the **Global Top 20** (companies by revenue, including independents, carriers and technology companies), the **Independent Top 20** (companies by revenue excluding satellite and fiber carriers), and the **Fast 20** (based on year-over-year revenue growth, including independents, carriers and technology companies). The rankings are announced in November and are followed by the annual Inside the Top Operators research report. The **Inside the Top**

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Operators of 2008, published on November 4, 2009, tells a story of strong growth and fundamental shifts. While the rankings include different

companies in different years, more than 20 companies have submitted data consistently for three years running, providing a solid look into the teleport sector. With US\$8.5 billion in revenue, these companies racked up combined revenue growth of 42 percent from 2006 to 2008.

What Can We Learn From Them?

Teleport operators have learned the fine art of balancing the multifaceted strategies of specialization and diversification. Specialization in one or two services brings benefits including in-depth knowledge of customer needs, the ability to invest in technology

*The World Teleport Association is the only trade association that focuses on the business of satellite communications from the ground up. The WTA Web site contains key resources to help teleport operators and the companies that do business with teleports. Research reports such as the recently published *Inside the Top Operators of 2008* are available free on the Web site to WTA members and sold via the online store to non-members. You'll also find the listing of the 2009 Top Operators and a comprehensive online directory that lists teleport operators, carriers, technology providers, consultants, and a broad range of business services. New to the Web site is a page dedicated to the pursuit of going green. Visit www.worldteleport.org to learn more.*

appropriate to those needs, and a high degree of expertise. The Top Operators survey asked respondents to identify services on which they earned at least 50 percent of revenues. One-third of respondents cited broadcast video, while 27 percent identified enterprise networking and 13 percent cited enterprise video. Mobility applications – not including mobile backhaul – have gone from effectively zero a few years ago to be the dominant revenue source for 7 percent of respondents.

Specialization, however, also carries the risk of having too many financial eggs in one basket. When asked to identify services from which their companies generated at least 25 percent of revenues, respondents put enterprise networking at the top of the list, followed by broadcast video, civilian government applications, Internet backbone and VoIP, and military government applications. Through diversification, operators are mitigating this risk and hedging against the major dynamics that continue to transform the markets they serve.

Anyone who's talked to teleport operators over the last few years, might have gotten the impression that diversification was leading them out of satellite to fiber transmission. More than one large operator even stopped using the word "teleport" in marketing materials in favor of "access points" or "nodes" – the language of fiber rather than satellite carriers. At first glance, it would appear that satellite transmission was going out of favor – and fast – driven by the much lower price point of fiber for point-to-point transmission.

The data, however, shows that the **Top Operators** increased the percentage of revenue coming from within their own walls – that is, from teleport, value-added and other services they provide – and decreased the percentage of revenue earned from transmission. Surprisingly,

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it was the share of fiber revenues that plummeted the most (more than 70 percent from 2005 to 2008), while the share of satellite revenues declined only 20 percent.

What the results reveal is that the teleport sector is experiencing continued diversification out of being just a “pipe” for the transmission of video, data and voice, into services that employ their own resources to generate revenue. And satellite turned out to be the best transmission technology for the purpose.

Pricing data from the survey backs that line of thinking. From 2005 to 2008, teleport operators were successful at gradually increasing the prices they charged for teleport and value-added services.

Is the Future Green?

Also spiraling upward, surprising as this may be, are energy costs. For example, a mid-size teleport may spend as much as US\$1 million on energy costs each year. A recent benchmarking survey of three teleports in the U.S. revealed that it's possible to save 20 to 40 percent in a facility's power bills, a US\$200 to US\$400K annual savings per facility.

By conducting an energy audit and implementing short-term changes at minimal cost, teleports can identify both low-cost, short-term opportunities to shrink energy use a bit, and higher-cost but much more powerful strategies to sharply reduce consumption. And by reducing consumption, teleport operators are making significant inroads into reducing carbon emissions and ensuring a sustainable world.

InSight: World Teleport Assoc.

Resources, however, are already being stretched thin in most organizations these days and the idea of tackling such a drastic undertaking can easily scare off even the most intrigued and well-meaning management team. The good news, is that addressing the teleports' current energy use and planning for changes does not have to be done in one fell swoop. A phased approach can produce quick energy cost savings:

- **Phase 1: Perform an energy/business continuity audit and implement quick fixes.** The benchmarking survey revealed some quick ways to achieve savings of 20-40 percent.
- **Phase 2: Implementing low-cost, short-term strategies such as educating employees on their role in energy costs, changing light bulbs, installing automated thermostats, and updating or upgrading insulation provide instant rewards.**
- **Phase 3: Plan capital investment and aging facility replacement to optimize energy needs.** New servers, for example, use far less electricity. Modular generators are far less expensive and by splitting the teleports load across multiple modular generators, each generator can be optimized in terms of load and energy efficiency.
- **Phase 4: The move to energy independence.** Capital investment in renewable, sustainable options could result in additional savings of 30-40 percent.
- **Phase 5: Follow the money.** Opportunities to develop and exploit new revenue streams will naturally flow from enhanced, smart infrastructure at teleports.
- **The majority of teleports were built in the late 1980s and early 1990s and are prime candidates for energy "facelifts."** The five phases, along with an Energy Audit Checklist can help teleports move into a green, energy-efficient future.

Recognizing Excellence

In March, WTA announced the recipients of its **Teleport Awards for Excellence**. The awards program highlights companies and individuals who have dramatically demonstrated excellence in the field of teleport operations, development and technology. To date, awards have been presented in four categories:

- **Independent Teleport Operator of the Year:** Awarded to an outstanding operator of a commercial communications hub that uses a combination of satellite, fiber, and terrestrial wireless to provide value-added services to customers in broadcasting, enterprise, carrier or government markets.
- **Corporate Teleport Operator of the Year:** Awarded to a company that operates teleports primarily for its own use, rather than to serve external customers, in order to better manage the organization or deliver services or products. WTA invites its members to nominate customers whose facilities, operations and technology represent a high standard of excellence.
- **Teleport Executive of the Year:** Awarded to an individual for demonstrated entrepreneurship, leadership and innovation in the development or operation of a teleport-based business.
- **Teleport Technology of the Year:** Awarded to an organization whose technology has contributed to the business and operational success of teleports through lower costs, increased efficiency, new capabilities or access to new markets.

For 2010, WTA is launching an additional new category — **Green Teleport of the Year**. The award will be presented to a teleport operator (independent or carrier-owned) that provides a high standard of excellence in energy management, in order to lower costs, improve efficiency and reduce the carbon footprint of its operation. The award will also honor teleport operators for business innovation that contributes to reduction in carbon emissions in collaboration with customers, institutions or the public sector.

Nominations are being accepted for the 2010 Awards with a deadline for submission of January 15, 2010. More information on each category as well as nomination forms can be found on the WTA Web site at www.worldteleport.org.

About the author

Robert Bell is Executive Director of the World Teleport Association, which represents the world's most innovative teleport operators, carriers and technology providers in 20 nations. He can be reached at RBELL@WORLDTELEPORT.ORG.



InSight: World Teleport Assoc.

In My View: Radford

SATCOM Chronicles—Technology Evolution — by Tony Radford

Since the dawn of mankind, innovative thinking has been the precursor of technology, a reality that has weathered the test of time. And as technology evolves, every good idea or innovation is superseded by the next resulting in an eternal refinement, or “techno-evolution.”

As an example, take one of the world’s earliest inventions — rolling logs gave some wise-minded Neanderthal the idea to carve a wheel from stone. Though the introduction of this revolutionary new idea delivered huge benefits, there was room for improvement from the start. They were too heavy to ship and if they broke, they couldn’t be repaired. Refinements in “wheel technology” lead to a wood-based variant (much lighter and easier to carve) and eventually, someone figured out how to vulcanize rubber (I don’t even know what that means!) and presto — the tire was born! So, there you have it — the techno-evolution of the wheel.

Now let’s refer to the ancient SATCOM scroll and travel way back to the beginnings of our industry. Sure, we’re just talking about the 60s, but for us old veterans, SATCOM chronology is expressed in dog-years, as it seems like a long, long time ago.

When the challenge of launching an RF signal from Earth to an orbiting circa 1960s vintage satellite presented itself, the first SATCOM high power amplifier (HPA) was introduced. In its infancy, the amplifier was built around a relatively frail tube that had to be carefully packaged in a big metal can, kept away from magnets and certainly not dropped — “Hey, they’re still that way!”

Once installed, it had to be hit with enough voltage to defibrillate a Sasquatch and had to be powered up and down with care to prevent permanent damage. However, like the VHS tape, vinyl LP and Thigh-Master, time initiates change. And though tube-based amplifiers served their purpose for many years, they could never escape the inevitable day that superior technology would take the torch and continue the race. As is always the case in techno-evolution, someone will invariably create a better mousetrap — a slicker widget that resolves problems inherent in the previous technology and better meets the demands of a continuously changing industry.

Back to the ancient scroll and fast forward a couple of decades, or for us SATCOM veterans, a century (after being adjusted with the dog-year chronology converter). Developments in Gallium Arsenide transistor technology projected a glimmering light out on the horizon. A light that would one day manifest itself in the form of an answer to the industry’s cries, for more robust architecture, higher MTBFs and easier maintainability.



In My View: Radford

And so was born the *solid state power amplifier*, or **SSPA**, an acronym forever burned into the chronicles of the scroll. As is typically the case for new innovations, take-up was gradual in the beginning. After years of being the technology de jour, the industry had become complacent and accepting of the limitations placed upon them by the tube amplifiers.

Though reluctant at first, they began to notice, evaluate and eventually replace the legacy amplifiers with new transistor-based products. Soon, like the hordes of Arctic lemming stampeding their way to the seaside cliffs of Norway, the industry embarked on what can only be described as a mass migration to this new and exciting technology.

SSPA technology can no longer be described as particularly “new”. After many years of deployments into harsh environments, and abusive applications, SSPAs have proven themselves to be worthy of the high expectations placed upon them by Earth station operators world wide. As the primal laws of survival would dictate, every fading technology will seek to reinvent itself in hopes of reversing the direction of techno-evolution.

Steroid shots in the form of enhanced linearity and suppressed collectors were injected in a futile attempt to rejuvenate dying demand. And for a fleeting moment, technology pioneers romanced by the reflection of days gone by – like going to drive-in movies, watching first run episodes of the Lone Ranger and monitoring the body current of a bank of Klystrons — could not escape the lure of tiny, powerful RF modules, switch-less redundancy, cold standby and “Look Ma — no RF inhibits!”

As techno-evolution would have it, new developments in transistor technology have already opened the door for a new wave of features that are sure to further the divide between the old and new. SSPAs, with architectures based on the latest Gallium Nitride transistor technology, will be hitting the market

in the coming weeks. They promise to give operators a new solution for generating hundreds of watts in very small packages for applications where nothing else will do.

Not to take away from the fact that tube amplifiers are the legacy of the industry, they deserve the respect of having kept things going until innovations in technology would once again raise the bar.

There is no doubt that tube-based amplifiers will continue to enjoy a place in the industry, though they will likely continue to cast a shrinking shadow. After all, people still have VCRs, though content is limited to; exercise videos and tapes purchased at your local Love Shack. Audio purists still collect LPs and you can even find a slightly used Thigh-Master if you scout your neighborhood yard sales. Perhaps the tube engineers will discover another technology break through that reverses the rules of techno-evolution and allows them to regain the throne as the HPA technology of choice — and if you believe that, you probably believe in mermaids.

More Radford ruminations [at this link](#).



In My View: Landefeld

The Ultimate Broadband Stimulus Solution

by Gordon Landefeld

Several weeks after I helped submit a proposal for the first funding round for the American Recovery and Reinvestment Act (ARRA) Broadband Stimulus, a moderator on a SATCOM webinar for which I was a panel participant asked me to respond to a statement from a state legislator that SATCOM was not the way to go in disseminating broadband to the unserved and underserved areas of the nation.



... I took a deep breath ...

This is a common theme. SATCOM has been around long enough to have evolved through several iterations and to have grown a very large user base. The majority of users become familiar with the idiosyncrasies of the consumer products, and those who learn more than the rest adjust their service or change vendors to obtain the plan that meets their needs.

The politicians don't hear the success stories. They hear the complaints, mostly from residential customers, that largely result from a SATCOM firm promising an utopian vision, but delivering a product that that's useful only when you *don't need it*. We saw this in the housing industry. Mortgage lenders ignored good customer service by promising one thing and delivering another. Call it the glossy brochure — promise the stars, and deliver whatever.

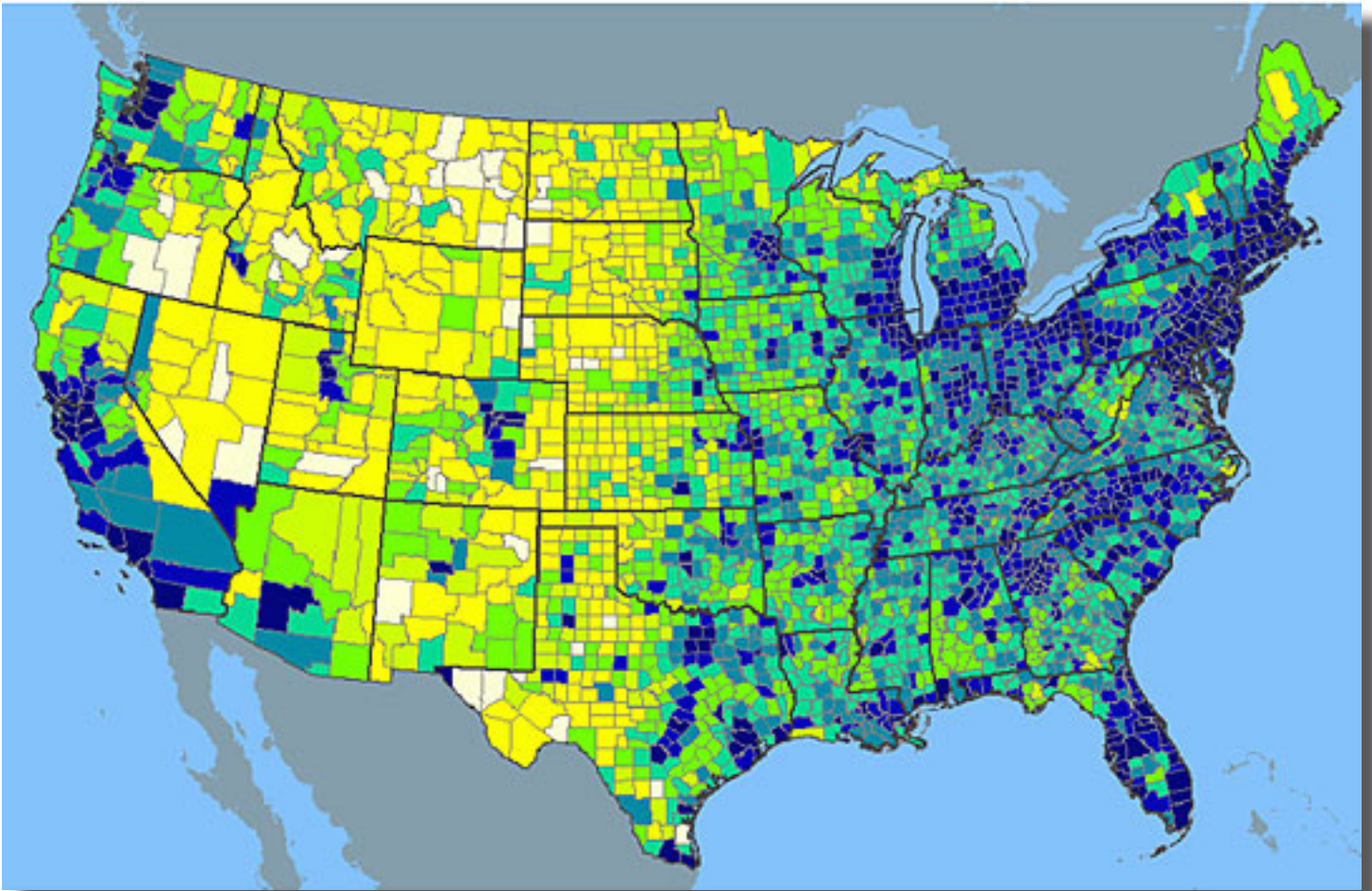
Back when **Skycasters** was started in 2001, we understood clearly the markets we wanted to serve, and the quality of the product that we wanted to deliver. We wanted to deliver true broadband quality — the quality of service that would allow businesses to operate in areas underserved by traditional terrestrial connections.

We quickly saw how residential plans worked — or rather didn't work — for business. Residential plans have high contention rates, no minimum bandwidth, power too low to punch through a cloud, and latency that renders voice over IP useless. As a result, these residential plans are inadequate for business use. Following the needs of our customers, we decided to deliver on the promises of the glossy brochure.

I give the SATCOM industry the same charge I gave to the webinar participants: educate our leaders and communities about satellite technologies today that can be the broadband technologies the country needs. Our nation faces a critical debate on how best to connect the least connected. The SATCOM industry needs to step up and lead the campaign to jumpstart our fellow citizens' entrepreneurial zeal.

The sheer scale of our country is key to the debate. I can't help but laugh when I see the USA ranked in a broadband comparison with other countries. Japan's average broadband is 12 times faster than ours, but their population density is 10 times the population of the U.S. Twenty percent of Americans are rural, but 98 percent of the U.S.'s land mass is rural. We have 60 million people spread across 3.7 million rural square miles. Is it

In My View: Landefeld



U.S. Population Distribution (courtesy U.S. Census)

any wonder that a small wealthy nation's fiber penetration is higher? I'd like to see a comparison between Japan and just our urban population.

The tipping point will be how quickly a broadband solution can be widely disseminated, the degree to which that solution is able to be switched easily with future technologies, and whether that technology can help sustain the community from the first day, and years beyond the funding period. Let's look at several potential solutions.

Fiber optic is the big pipe solution. At gigabit speeds, what's not to like? Fiber delivers everything at high speed and volume. The major intercity connections are fiber, and it's available to the HQs of all the Fortune 500, and many of their employees. But is it available to everyone

in metropolitan areas, let alone in the surrounding countryside? No, it is not. Which is why cable and satellite TV retain high popularity. Copper is king, and one-way satellite is a good second.

The major stumbling blocks for fiber are time and money. Laying fiber is similar to other terrestrial solutions. It can be strung on poles, which is faster, but vulnerable to harm. It can be buried in several different ways, the less vulnerable methods being the most expensive, due to depth and concrete conduit. The cost of laying fiber ranges from thousands of dollars per mile to many tens of thousands, depending on method and terrain. Add up the miles, pretty soon you're talking real money.

Let's suppose that fiber is the only technology chosen for the broadband stimulus. We'll string it on poles at

In My View: Landefeld

US\$10,000 per mile, regardless of mountains, plains or cities. And suppose we only run the fiber along the 200,000 miles of highway the *Federal Highway Administration* says are major truck routes (just two percent of the 8 million miles of paved roadway). And say that the 10 percent of the roads that are urban highways already have fiber. So you're talking less than two billion dollars to string that fiber.

This is just laying fiber along major transportation routes. Not to the homes, businesses and schools where it's useful.

Now look back at that 8 million mile figure. To get fiber to every household, you'd be looking at some large percentage of that. Using an average cost of US\$10,000 per mile, the cost to string fiber balloons to US\$80 billion. And that doesn't include the cost of making 125 million splices to connect all the homes.

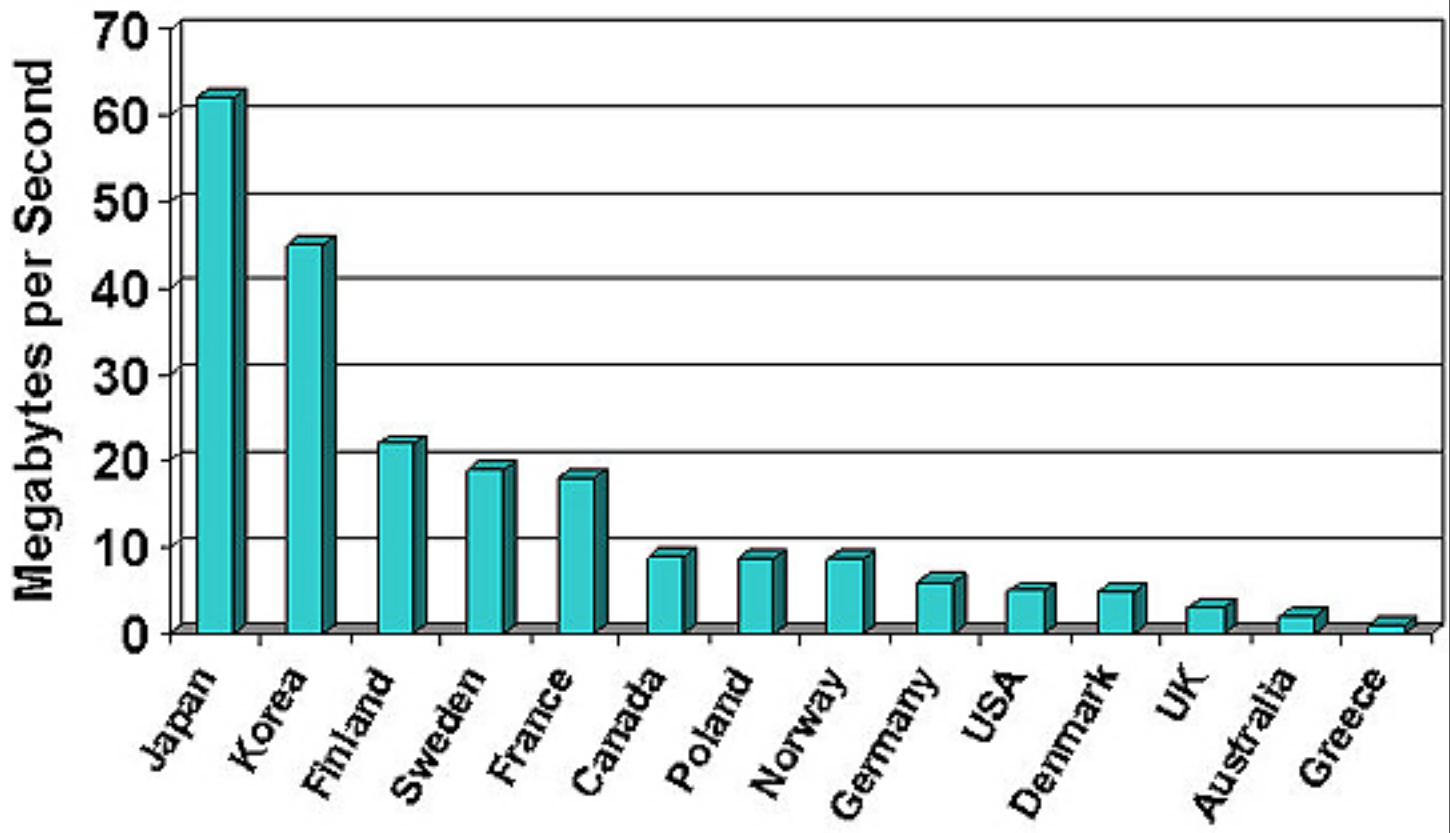
The second factor that makes fiber a questionable solution is time. Laying fiber across the nation, to all unserved and underserved homes, would take many years.

So, what do we do? Well, even though it's expensive, fiber does have its place. We spend a billion or two stringing fiber

to key places, such as every educational institution within reach of the major fiber highways. Copper and various wireless technologies are also pretty good solutions for broadband last mile. Copper was the first technology to make distant communications possible, and it remains the most frequently used technology for the last mile.

In My View: Landefeld

Small Wealthy Nations Achieve Higher Fiber Penetration



Time is short. An economic stimulus means you get help today to create growth tomorrow. You can't wait five years for that stimulus effect. We need it now.

Microwave point to point (PTP) communications was the state of the art transcontinental telephone technology for several decades. It's part of several **ARRA** applications and is a technology deployed across the country for middle mile links. But at what cost? Were we to price each tower at US\$250,000, supplying PTP links at the practical limit of every 40 miles, which requires flat terrain, PTP runs US\$6,250 per mile. PTP microwave is still a very expensive way to implement widespread broadband with lower speeds than fiber can provide.

So, what of satellite? Satellite would be the middle mile sweet spot due to what's in geosynchronous orbit.

Crucial to the military and television for decades, satellite's ubiquity is its biggest competitive advantage.

However, installing satellite dishes at every point of use across the nation would have several problems, including type, installation and service costs. Of residential and commercial grades, the residential is the only grade known to most people. Residential grade two-way satellite was devised on the premise that it shouldn't cost much more than satellite TV. The resulting cost structure means that the antenna is too small, the transmitter, receiver and modem are anemic, and the service is over promised and under delivered. High latency and subscription rates aggravate users as much as the lack of minimum speeds. Where residential grade fails in level of service, commercial grade satellite is overkill. We need a middle ground.

In My View: Landefeld

We need a solution that's fast, recyclable, and sustainable. In conversations with a prospective community partner which has close to 200,000 people spread out over 24 thousand square miles, we needed a solution that could be deployed rapidly, cover vast amounts of territory, without breaking the bank. We needed a best-of-breed hybrid solution.

We're all familiar with **Wi-Fi** solutions at coffee shops and airport terminals. Wi-Fi has long been heralded as the solution to replace copper or fiber everywhere. But Wi-Fi technology creates hotspots that are relatively small, so still requires a lot of copper or fiber to connect the hotspots.

Along comes **WiMAX**. Similar to Wi-Fi, but with a longer range (three to eight miles), and higher speeds (70 megabit), it's a recent development. When Skycasters considered how to help the community with their ARRA application, we thought why not service each of the

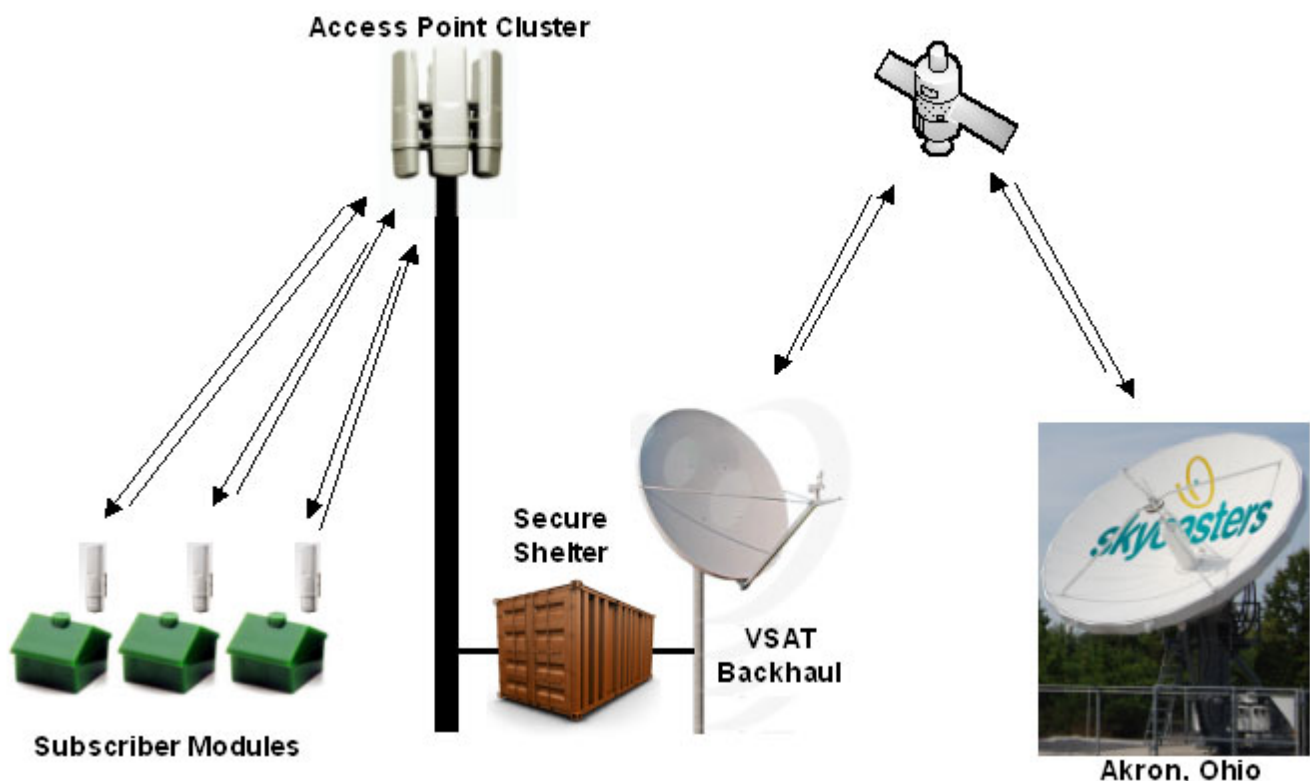
110 towns in this community with a series of WiMAX towers, each backhauled with a satellite dish?

This would be a fast solution, because once we had the site approvals and funding, we could erect a tower and dish, and install user modules all around town, in less than 90 days.

It would also be a recyclable solution. When fiber becomes available in the town, it can be connected directly to the WiMAX tower to provide the backhaul. When that occurs, these towers retain the last mile advantage. At the moment of the fiber connection, the satellite dish stands down, but remains connected as a backup solution to the terrestrial connection.

This solution enhances the community's sustainability with revenue generating opportunities. The community could realize a percentage of the monthly subscriber revenue to either support a local service

Skycasters Satellite Backhauled Point to Multipoint



In My View: Landefeld

team, or as credits to offset use by emergency services or schools.

Members of the community would also have access to both consumer and business grade plans. Consumer grade means you pay less to get less, but it's necessary to provide an entry option. Commercial grade means users get guaranteed minimum bandwidth. So like Skycasters' normal satellite customers, the residents of unserved or underserved communities can reasonably expect that making a phone call or sending an email will work the first, second and hundredth time. When consumers have access to the ability to upgrade from a residential grade to a commercial grade, the adoption rate of the higher grade will be high.

Our industry wants to provide stimulus to the U.S. via broadband Internet. SATCOM used to be the expensive option. Not now. Advances in both the satellites themselves and in data compression have made satellite broadband the Internet solution to beat. Satellite is more than primary connectivity. It's commercial grade equipment and service plans, and it's WiMAX backhaul.

Educating federal, state and local decision makers across the United States will make the difference between stimulating growth now, and prolonging the recession.

About the author

Gordon Landefeld, Skycasters' Marketing Analyst, oversees press releases and web site updates, provides process improvement and information technology support, and business and market research support. Prior to joining Skycasters, Gordon held marketing IT positions at Parker Hannifin Corporation, in Cleveland, Ohio, providing database and presentations support for marketing and sales teams. Gordon lives in the Akron, Ohio, area where Skycasters is headquartered.

About Skycasters

Skycasters is the leader in broadband satellite Internet solutions for businesses that need more than traditional terrestrial landlines. Everything in Skycasters' infrastructure, including teleports, hubs, and the network operating center, is business-grade and company-owned. Even the equipment at your community or business location is business-grade, and designed to meet the unique challenges of your industry, no matter how rugged the conditions. Skycasters' 24/7 tech support and customer service in-house experts can resolve any issue that may arise.



SatBroadcasting: IDC

DSNG For Asian Indoor Games 2009 (Vietnam)

by International Datacasting

IDC's Tiernan products will be used by the Vietnam Telecom International (VTI) DSNG project for the upgrading and expansion of DSNG, which will be used for Asian Indoor Games in the fall of 2009. The advanced, compact DSNG allows simultaneous HD & SD transmission while having lighter weight and less equipment. The win resulted from a well designed solution with strategic planning from Tiernan and strong local presence and technical competence of OSB. The project involves several parts of the DSNG such as high power amplifiers, encoders and decoder.

VTI's subsidiary **ITC-1** needed to upgrade and expand their DSNG for the **Asian Indoor Games 2009**. "The biggest challenge of the project was to provide a flexible system that would allow VTI to serve different broadcast customers that may be using different format / technologies for their transmissions. This requirement was key



Asian Indoor Games Opening Ceremony

SatBroadcasting: IDC



in VTI's decision to look for a compact solution that would provide maximum flexibility for a variety of transmission needs such as MPEG2, MPEG4, SD, HD, DVB-S, DVB-S2..." said *Christopher Hu*, IDC's Regional Sales Manager.

With the solution, ITC-1 will be able to provide MPEG2 HD + MPEG2 SD simultaneously, or MPEG4 HD + MPEG2 SD simultaneously, using an extremely compact DSNG setup. The compact DSNG allows VTI to provide a DSNG that is smaller in size, lighter, and able to support HD and SD video contributions. The HD and SD videos can be transmitted singularly or simultaneously, thanks to the built-in multiplexer. Both HD and SD

programs can be from the identical or two different video sources. The built-in video confidence monitor allows the operator



Antenna setup

SatBroadcasting: IDC



to monitor the video quality without the requirement of an extra TV monitor.

The Asian Indoor Games were held in Vietnam from October 30th through November 8th with more than 40 nations participating in 242 events in 26 Sports. Both Tiernan and OSB sent engineers who completed the installations and equipment testing to ensure the system was in top notch condition and ready for the opening ceremony.

"We are pleased that ITC-1 selected Tiernan solution from International

Datacasting for their DSNG upgrading and expansion," said *Ron Clifton*, IDC President and CEO.

"It has been a great pleasure to work with Tiernan in designing the solution for this project. The technical knowhow and flexible product range are important resources to our engineering design team," said *Nguyen Hong Son*, President and CEO of OSB.



SatBroadcasting: IDC



IPTV distribution and other content distribution applications. IDC is headquartered in Ottawa, Canada, operates in Europe through its wholly owned subsidiary PROline B.V. in Arnhem, the Netherlands and in the U.S. through its Tiernan operations in San Diego, California. The Company is international in scope with installations in over 100 countries worldwide, has regional sales and service offices in the U.K., Australia, Singapore and China as well as an established international network of value-added partners and distributors.

About OSB

OSB Investment and Technology Joint Stock Company (OSB JC) operates in the key areas of satellite



and wireless communication, information technology and investment in Vietnam.

About International Datacasting Corporation

International Datacasting Corporation (TSX:IDC) is a global leader in providing IP-based datacasting solutions for the distribution of broadband multimedia content. IDC has a broad portfolio of advanced technology products marketed under the names SuperFlex, Datacast XD, Tiernan and PROline for implementing a wide range of satellite and other broadband content contribution and distribution networks. IDC's products are in demand for radio and television broadcast networks, distance learning, digital satellite news gathering and sport contribution, digital signage, digital cinema,

About VTI and ITC-1

Vietnam Telecom International (VTI) was founded on March 31, 1990 as a subsidiary under Vietnam Posts and Telecommunications Group. One of the main functions of VTI is to provide international telecommunication services. International Telecom Center No. 1 (ITC-1) is a subsidiary of VTI in Hanoi.



SatBroadcasting: Baudry

MSS/ATC Networks In Europe — Their Potential?

by Maxine Baudry

Satellite operators are preparing the massive development of mobile TV and mobile broadband services.

The award of two pan-European licences is expected to spur the development of mobile TV services, as well as mobile telephony and broadband solutions in Europe. In fact, mobile satellite operators are, similar to their terrestrial counterparts, preparing the expected boom of mobile Internet and mobile TV applications.

While the mobile Internet is capitalizing on the buzz surrounding ICT, which is often fuelled by the stakeholders themselves (operators, equipment manufacturers and mobile handset makers), consumer take-up remains nascent.

However, take-up is progressing steadily, with the number of mobile Internet users in the United States jumping from 58 million in January 2008 to 104.8 million in January 2009, and mobile customers are tending to incorporate this technology into their daily habits: those who log onto the web every day now account for 22.4 percent of total users, compared to 10.8 percent one year earlier.

Around the world, and especially in developed countries, the fact that users are replacing their existing handsets with smartphones is helping to spur mobile Internet take-up. According to **Cisco**, a smartphone generates more IP traffic than 30 standard mobile phones, while a PC card generates more traffic than 450 standard cellular phones.

According to a report published in June 2009, hits on websites coming from mobile handsets (phones, smartphones, *iPod Touch*...) increased fivefold in a single year. This growth was driven in large part by the use of *iPhones*: visits from iPhones rose by a factor of eight in one year. Hits from *Blackberrys* are also up, increasing five times over the course of a year. Blackberrys account for 7 percent of hits from mobiles and the iPhone for 44 percent.

According to Cisco, IP traffic generated by the mobile Internet will likely increase substantially

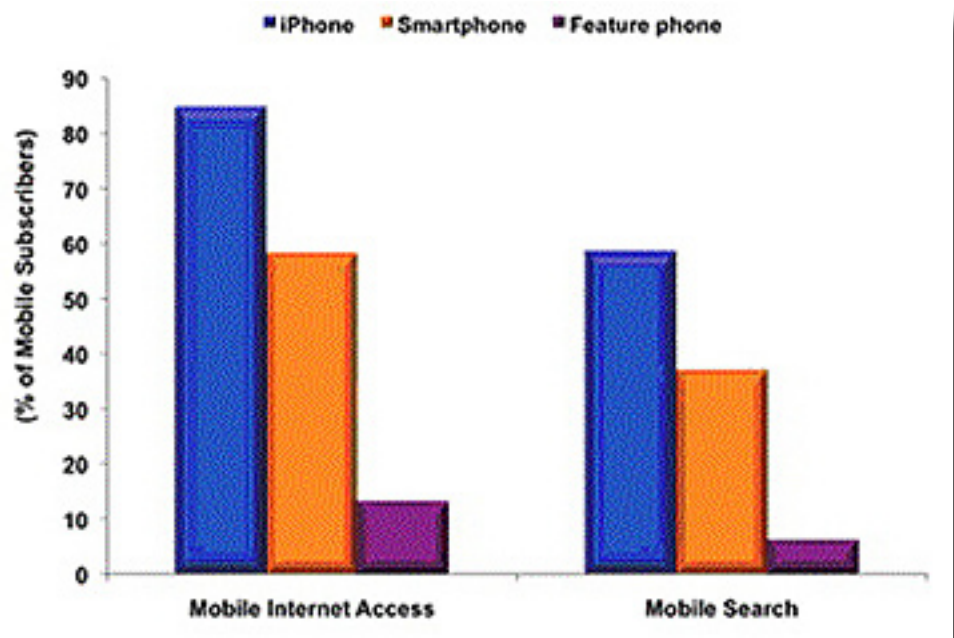


Figure 1: Comparative application use by iPhone and smartphone users versus standard mobile handset users, in 2008.

Source : ComScore 2008

SatBroadcasting: Baudry

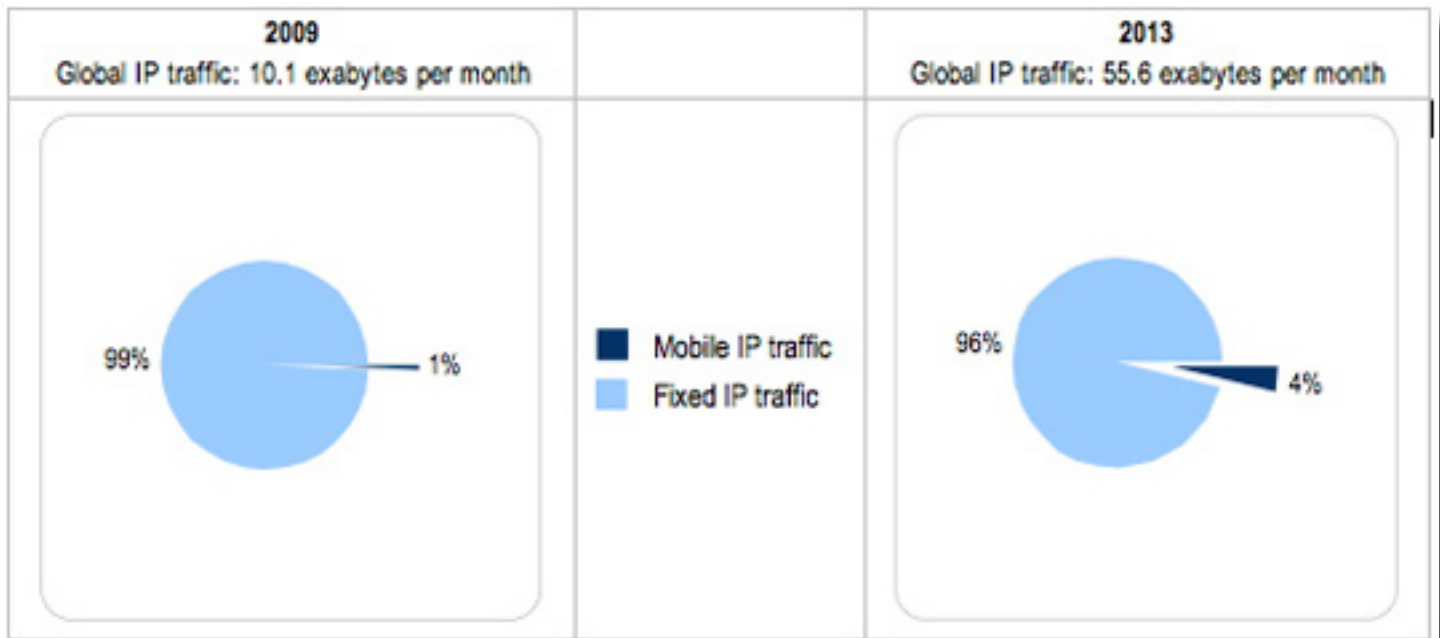
between now and 2013, to reach over 2 exabytes (10¹⁸ bytes) a month. The growth of the number of 3G/LTE PC cards in use (which are expected to generate over 80 percent of mobile IP traffic in 2013) along with the mass consumption of video by travelling users (expected 131 percent annual growth in 2009-2013) explains this rise in IP traffic come from the mobile Internet.

Cisco estimates that video will account for 64 percent of mobile IP traffic in 2013, predicting a sizeable upswing in 2011-2012 which coincides with the commercial launch of 4G worldwide.

Modern Times Group, which also plan on introducing additional pay-TV channels.

In the Netherlands, the firm **Mobiele TV Nederland** was awarded a DAB and DMB licence in February 2009, and is preparing to roll out a DMB-based mobile TV service that will compete directly with incumbent **KPN's** DVB solution. Mobiele TV Nederland is joint-venture between network operators **Media&Broadcasting** (a TDF subsidiary) and **Mobiles Fernsehen Deutschland**.

Despite there being a number of uncertainties on both the technological and economic front, and in terms of regulation,



Mobile IP traffic as a percentage of total IP traffic in 2009 and 2013.

Source: CISCO

At the same time, mobile TV is being developed worldwide, and notably in Europe. In Norway, a mobile TV service based on the DMB standard was launched in May of this year. It is a free-to-air offer that includes 6 TV channels and 15 digital radio stations. Baptized **MiniTV**, the service is distributed in the greater Oslo region by a consortium of three Norwegian broadcasters: public broadcaster **NRK** and two commercial companies, **TV2** and

mobile TV is being tested widely in Europe. In some cases, consumer offers using the DVB-H are already available, in most cases spurred by a global sporting event.

Mobile TV was launched in Italy, for instance, in 2006 just before the World Cup in Germany, while Austria and Switzerland, which were the host countries for the European football championships in 2008, rolled out their offers just before the event began.

SatBroadcasting: Baudry

In Italy, Switzerland and the Netherlands, mobile TV services have been launched at mobile telephony operators' initiative. The rate of coverage for the services depends on the operator's network, while the packages on offer and prices charge vary from operator to operator. Customers do have to pay for the services, which are generally composed of a basic offer that can be upgraded to a premium package that includes specialty channels, adult programming, sports (game highlights, weekly programmes, live matches) and on-demand content. Depending on the type of programme, pricing will be per-day, per-week or per month.

In Austria, the regulator awarded a broadcast mobile television licence to French network operator TDF's Hungarian subsidiary, **Media Broadcast**, which then established agreements with mobile operators **Orange**, **A1** and **3**, all of which also distribute an offer.

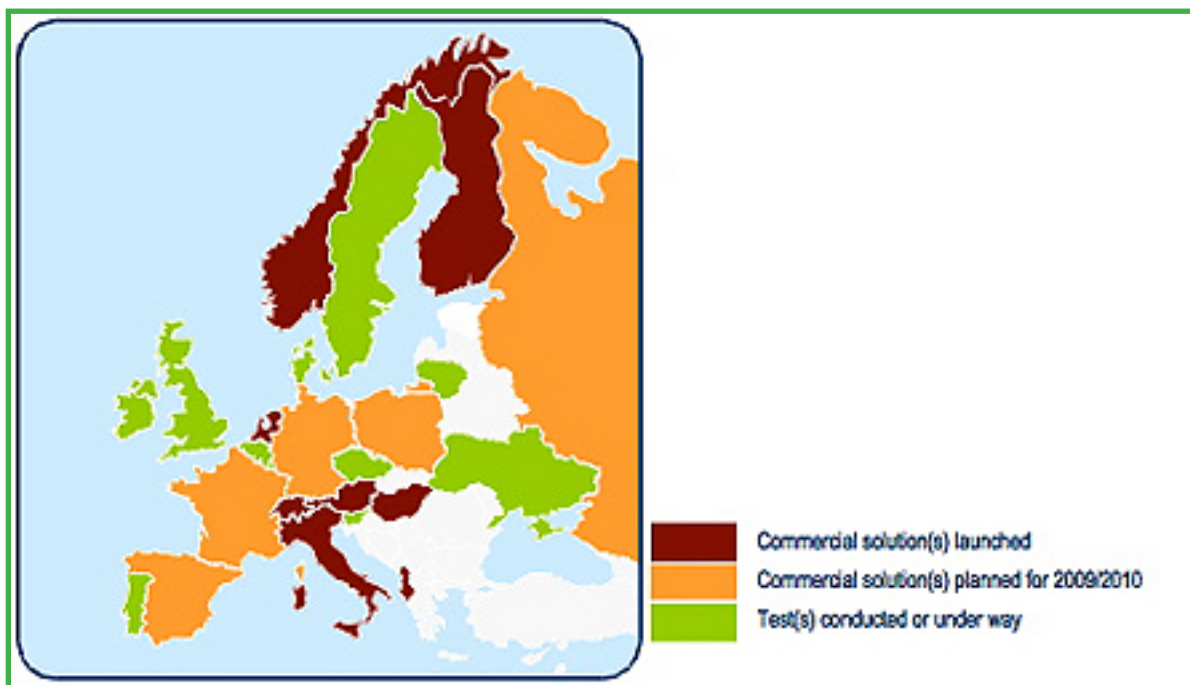
In Finland and Hungary, DVB-H services were deployed by network operators **Digita** and **Antenna Hungaria**, which led to the launch of free-to-air services offering an

only small selection of channels. Elsewhere in Europe, trials have been completed in different parts of the country on a system using the DVB-H standard, or are still underway. (See Figure 3 on the next page...)

Are MSS/ATC Systems Rivals Or Complementary To Terrestrial Technologies?

Based on **IDATE's** findings, it is clear that a terrestrial system will never cover 100

SatBroadcasting: Baudry



Status of mobile broadcast TV services around Europe as of mid-2009.

Source: IDATE, based on European Commission data

percent of the population. As a result, and given the vast European plan to reduce the digital divide, satellite technology will likely continue to play a central role in helping to connect the last remaining users who are currently cut off from the digital world. It appears obvious that in the data transmission and mobile telephony segments, satellite is not positioned as a competitor to terrestrial networks, but rather as a complement.

Regarding mobile TV, DVB-SH appears to us as both a complement and competitor for DVB-H, since business models that were recently tested in France and Italy proved that DVB-SH is very competitive in terms of rollout costs, even in highly urban areas, which is just one more element in its favor.

In April 2009, the **Mobile TV Forum** commissioned **Siradel**, a firm that specializes in wireless network coverage optimization, to produce a report that compares a DVB-H personal mobile TV

network rollout in the UHF band and a DVB-SH network rollout in the UHF band. The report provides a theoretical but realistic dimensioning of a mobile TV network to be able to calculate the amount of equipment and sites needed to cover the following areas: Paris and its immediate vicinity and the metropolitan areas of Lyon and Bordeaux — these latter two cities having been chosen for their different topographical features: hilly for Lyon and flat for Bordeaux. The simulation also set the goal of providing good quality reception indoors in close to 100 percent of the target coverage area.

A first scenario involved the deployment of a DVB-H network in the UHF band, taking working hypotheses “as close as possible” to those used by TDF. A second scenario involved the rollout of a DVB-SH network, applying the same interference restrictions.

The results of the theoretical dimensioning revealed that, to achieve relatively equal coverage of the population in a given area, DVB-SH in UHF requires around 30 percent

SatBroadcasting: Baudry

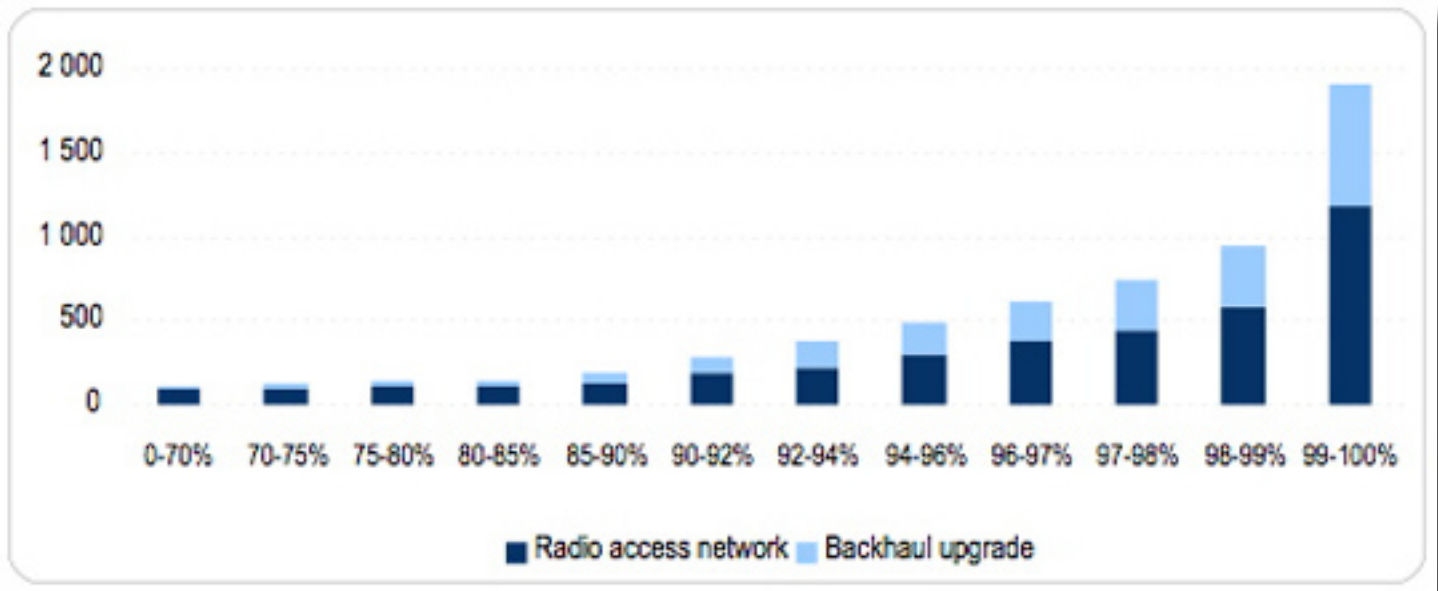


Figure 4: Variation in the average investment needed per subscriber for the construction of a UMTS/HSPA wireless access network in the 2100 MHz core band in FRANCE, depending on the percentage of the population covered

(Average CAPEX per subscriber, in EUR / Slice of population coverage)

Source: IDATE, mobile network rollout cost model

fewer transmission sites, and using it to roll out a mobile TV network would be around 30 percent cheaper.

Worth noting is that a second report produced by Siradel in September 2009 concerning Paris and its immediate vicinity

revealed that a DVB-SH system in the S-band (and not UHF) would require around 35 percent fewer terrestrial repeaters than DVB-SH in the UHF band. This means that using DVB-SH in the S-band would require 50 percent fewer transmitters to cover Paris and its

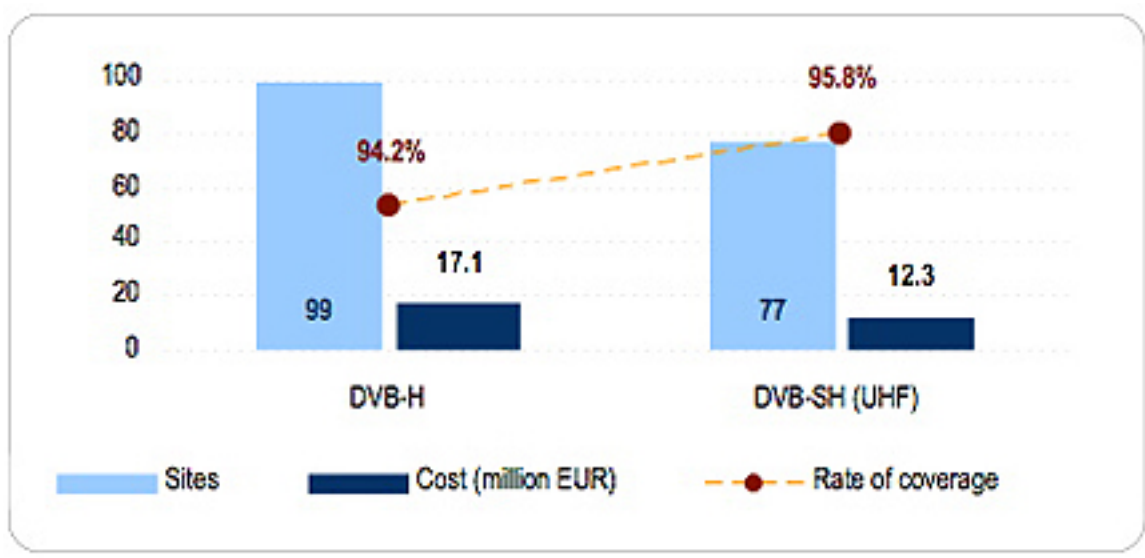


Figure 5: Cost of deploying a personal mobile TV network in Paris and its immediate vicinity.

Source: Siradel, Report on personal mobile TV coverage, April 2009

SatBroadcasting: Baudry

immediate vicinity (10 percent of the French population), compared to DVB-H.

The cost of deploying DVB-SH in the S-band would be 60 percent lower than DVB-SH in UHF, and 70 percent less than a DVB-H rollout.

Beware of DVB-T!

The lack of hybrid T-DMB/S-DMB devices when the satellite-based mobile TV service was launched in Asia was widely viewed as a major reason for the tepid reception these offers got, especially in Japan.

In Europe, the players appear to have taken that lesson on-board, and have been working over the past several years to form partnerships with key chipset and device manufacturers.

Whereas DVB-H/DVB-SH hybridization is a necessity, the arrival on the market of DVB-T chipsets could be a serious threat for the subscription-based mobile TV model.

In 2008, devices equipped with a DVB-T chip, and so capable of receiving free-to-air digital terrestrial TV channels, came on the market.

In Germany, operators **T-Mobile** and **O2** began marketing cellular phones equipped with a DVB-T chipset in May 2008. As part of a two-year subscription billed at 39.95 euros a month, **Vodafone** was selling an **LG** brand phone that could receive the DVB-T signal for 99.90 euros and the **GSmart T600** handset for 289.90 euros.

In Austria, the **LG HB620T** phone is marketed by mobile operator **A1**, and allows users to receive the six national free-to-air channels, **ORF1**, **ORF2**, **ORF Sport +**, **ATV**, **Puls4** and **3Sat**, as well as local DTT channels when travelling abroad.

Even if DVB-T does not offer the same viewing quality as DVB-H (especially because of the lesser reception quality when on the move), a great many consumers could be satisfied with it — wanting only to watch free-to-air DTT channels on their mobile phone for a few minutes, from time to time. Users' tolerance of a low quality service will be higher as the service is free.

What happened in Japan and South Korea proved the threat posed by a free service, particularly if the terrestrial service has the huge advantage of being able to pick up major channels that are already popular with viewers.

Authors note: Created in 2004, the goal of the Mobile TV Forum is to promote mobile TV broadcasting. It has some 40 member companies that include mobile telephony operators, TV networks, terrestrial and satellite broadcasters, device manufacturers, networks, software makers, content providers and audience measurement agencies.

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.

Prior to 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. He can be reached at m.baudry@idate.fr



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ABS-Asia Broadcast Satellite

Asia Broadcast Satellite (ABS) is one of the youngest and fastest growing satellite operators in the world. Since its inception in late 2006, ABS has been able to achieve 10 consecutive quarters of over 20 percent Quarter-on-Quarter compounded growth. In just over 2 years of operations, ABS has been able to achieve 99 percent fill rate on ABS-1, with over 40 customers across 20 different countries and currently broadcasts over 100 TV channels.

We have increased our revenues eightfold since the acquisition of the former LMI company. From our orbital position at 75 degrees East, we can access four-fifths of the world's population so we feel that we provide significant value to our customers and we foresee solid future growth through the acquisition of other satellite assets.

ABS is working on securing financing for **ABS-2** through the **US Exim Bank** and is targeting for completion by the end of the year. ABS-2 will be co-located at the **75 degrees East** location with **ABS-1** and will be manufactured by

Space Systems Loral scheduled to launch in 2012. This new satellite will offer more than 78 active transponders (composed of C-, Ku- and Ka-bands), with dedicated Ku-band beams over SE Asia, India-ME, Russia, Middle East, North Africa, and Southern Africa, with significant power enabling DTH services in these markets.

ABS-2 also acts as an in-orbit spare and back up for ABS-1 so we are able to provide our customers with guaranteed redundancy and a much higher quality of service. The sophisticated design of the ABS-2 spacecraft will also provide added flexibility by allowing us to switch capacity on a transponder-by-transponder basis between the individual beams into high demand areas where our customers may need additional capacity. ABS has already signed prelaunch lease contracts with customers valued in excess \$300 million of revenue backlog. Over the next 12 months, we are aiming to get the satellite 75 percent full, prior to launch.

Beyond completely selling out all of the capacity on ABS-1 and finalizing the completion of the ABS-2 procurement process, ABS is poised to sustain its successful revenue growth through its investment and launch of new Value Added Services platforms, not only on ABS-1, but also through partnerships with third-party satellite operators. ABS has made more than US\$5M investments in teleport facilities for video and data distribution services; we have invested in various VSAT and MCPC platforms in both our Germany and Hong Kong facilities using MPEG-2/DVB-S as well as MPEG-4/DVB-S2 for standard and high definition video distribution, and Mobile Video distribution service.

During the past year, ABS has made some strategic partnerships and M&A activities which have dramatically expanded our business, both in scope and scale.

ABS-Asia Broadcast Satellite

Earlier this year, ABS acquired **Koreasat 2** which was renamed to **ABS-1A** as part of its fleet expansion. The ABS-1A satellite provides valuable high-powered Ku-band capacity for satellite telecommunications and broadcast services to ABS' customers in the Middle East region and will allow us to continue growing our revenues during the ABS-2 construction.

The recent acquisition of the **Mabuhay Satellite Corporation** (MSC) was another significant deal for ABS' aggressive growth plans. The procurement of MSC comprises the entirety of Mabuhay's assets, including the **Agila 2** satellite, the *Subic Ground Control* center and a full Network Operations center. It represents a doubling of the in-orbit capacity that we have in our fleet with now over 100 transponders. We will increase our revenues and EBITDA by around 60 percent. That is without increasing the utilization rate on Agila-2 or getting better transponder yields. In effect, we may be able to double our revenues once we make better use of our capacity.

Also, Mabuhay's advanced ground segment is a valuable asset to ABS as we do not own any TT&C facilities. The Subic center gives ABS much greater control of its own satellite assets; **ABS-1**, **ABS-1A**, **Agila 2** and **ABS-2**. Over the long term, this will provide significant savings and resources for our future operations.

Back in September, **GT Satellite Systems S.A. (GTSS)** and ABS signed a long term, multiple transponder deal, which will provide GTSS with expansion capacity on the new ABS-2 satellite that is scheduled to be launched in 2012. As part of the multi-year contract, GTSS will significantly expand its existing capacity on ABS-1 by leasing multiple Ku-band transponders on the powerful **ABS-2 Russia/CIS Beam** for further expansion of its TV distribution services from the most popular CATV channels location in Russia, and its newly launched **Raduga TV** DTH platform.

ABS-2 will be co-located with ABS-1 at **75 degrees East**. ABS-2 will offer nearly 14 KW of payload power and as many as 78 active C-, Ku- and Ka-band transponders across 8 different beams. The satellite is designed for 15 years of operational life. The ABS-2 spacecraft will be manufactured by **Space Systems/Loral** and launched via **Arianespace**.



ABS-1 and ABS-1A satellites

ABS is constantly looking for opportunities for developing new orbital locations and looking at ways to expand our business into other industries that are complimentary with satellite infrastructure. We are confident that we will reach our goal to have at least four satellites in orbit within the next 5 years.



Advantech

As a leading Canadian company, we position ourselves amongst the top solutions providers worldwide, this international focus, allows us to meet industry trends and upcoming challenges with carefully implemented strategies that secure our place in the market.

During 2009, the economic slowdown was noticed and a shift in priorities was put into action. Our main concerns being customer satisfaction and our ability to continue to bring them cutting edge and cost effective products, we turned inwards for inspiration and decided to carefully review our internal processes, which resulted in a series of improvements and additional benefits that will be passed on to our clients. In terms of products, this year we released the 3rd generation DVB-RCS which provides three different platforms bringing to our clients growth and flexibility through out the product line.

In terms of sales, being an international company, we leverage our presence abroad as market fluctuations arise, presently; demand from BRIC (Brazil, Russia, India and China) countries continues to rise. One of our wins this year came from Latin America, where we were awarded a \$14M project for a major telecommunications operator, consisting of a fully integrated satellite gateway communications system to be provided and installed for the existing satellite network at the customer's teleport. The award also includes 3,200 remote VSAT stations, designed to transmit Internet, voice, video, data, videoconferencing and television services.

In North America, we were selected by the U.S. Army as the key technology for critical deployments in Afghanistan. In Europe, we signed an agreement with **Arqiva**, the U.K.'s provider of infrastructure for the television industry, in which we will supply DVB-S2 modulators and demodulators to be used in the Digital Switch Over(DSO) project in the United Kingdom. In terms of equipment, we remain leaders in IP encapsulators and ACM controllers, compact BUCs and the supercompact 8-16W Ku Band BUC.

We are very optimistic regarding the upcoming year, we believe the effects of the economic crisis will not be as challenging as in 2009, therefore, we expect to see customers having easier access to capital and being less hesitant to spend. To meet our clients demands we will continue to provide cutting edge, cost effective solutions, taking a targeted approach towards telecommunications providers and the MILSATCOM market. Our continued commitment to improvements of satellite access schemes and broadening our waveform capabilities are positioning us to be a key provider of satellite communications equipment into both the commercial and military markets. Our commitment to open standards and willingness to partner is our key to addressing a much larger market share than we have pursued to date.

We also expect to leverage the benefits of a renewed approach to marketing, which will be manifested in upcoming improvements to our website and an increased participation at key trade shows worldwide.



Bridge Technologies

Like nearly everyone, I suspect, I've been trying to work out what the financial crisis of 2008 really means in terms of day to day impact on jobs, markets, investment and life in general. And so far, it's been a fairly surprising story, at least from our perspective.

At the start of the period, **Bridge Technologies** had a very full order book, with a huge increase in customer demand...and at the end of this year, we're in exactly the same situation: huge demand, our best-ever yearly performance, and ever-increasing orders. So was Bridge Technologies completely unaffected by the crunch? Well, not quite. Wind the clock back eight or nine months and we were certainly concerned, because many the projects we had lined up with our partners and customers were suddenly on hold. Nobody wanted to press the button on new investment until they had been able to evaluate the new financial landscape. We couldn't tell at the time how long this freeze would last. By April, the momentum seemed to have gathered again, not a single project was cancelled or put on hold, and we've been exceptionally busy since then.

In this respect I think our sector of the industry has been much luckier than some others. In part, this is due to the unstoppable logic behind the development of DigitalTV over IP, which ensures that the sector keeps moving forward. Some of the more traditional broadcast production areas, where the investment decisions are about equipment such as cameras, switchers and routers, have not been not so fortunate, but we are hoping it's just a matter of time before they too return to normal.

But the *DigitalTV over IP* market as a whole is gathering momentum now as operators reach milestones in their installed base. It takes a long time to build the infrastructure to deliver to millions of homes and to reach the kind of scale that creates its own momentum. Many operators are now in that position, and consequently they are experiencing a 'hockey-stick' curve in the subscriber sign-up. This creates a real acceleration in the necessity for investment, and of course in revenue. We see this with all the international players, with customer numbers ramping up by hundreds of thousands quite rapidly.

For Bridge Technologies, two of our biggest milestones this year have been the inclusion of the satellite DVB-S/S2 interface in the **VideoBridge** system. This gives the system all the interfaces — satellite, DTV, Digital Cable, and IP — needed to provide a true end-to-end capability. Together with the launch of our **microVB™** in-home analysis device, that gives us the true ability to correlate all the technologies from satellite to set-top box (STB) and quickly isolate faults wherever they occur in the transmission chain.

A couple of large-scale system installations stand out for us this year too. **Virgin Media** is undertaking a very ambitious infrastructure project — the biggest Digital Cable initiative this year in Europe — and deploying an end-to-end Bridge Technologies system, taking in DVBT, DVB-S, DVB-C and IP, for its headend and all 54 regional centres. In the Netherlands and also large, the project with Ziggo, the country's largest cable provider, will also see a full deployment of VideoBridge monitoring from end-to-end. Whatever the impact of the crunch so far, it's been a great year for the company.

Colem-Spice

2009 has been an exciting and interesting year for Colem with a number of important changes taking place, as well as the introduction of several new products and technologies. Perhaps the most noteworthy was the launch of Colem-Spice at IBC in September.

Colem and **Spice Design** have long been business partners carrying out control center and automation projects together for satellite operators and broadcasters alike, including **Eutelsat, Eumetsat, Inmarsat, NewSkies** and **SES World Skies**. Consolidating the innovation skills of both companies, a joint partnership Colem-Spice was launched at **IBC 2009**, Amsterdam. This announcement formalised that relationship and also saw the extension of its services into the fields of IP, Workflow, and Asset Management, thanks to the introduction of two new team members, *Rob Kernot* formally of **Thomson Reuters** and *Paul Coxhead* from **BT**. The overall objective of Colem-Spice is to provide efficient and professional control room and operations facilities for the demands of 24/7 working.

Other news this year included the launch of Colem's *USB/Wireless Intelligent Button Control*, which was showcased by the company at **Satellite 09** and **NAB**. The control has been designed to simplify any SNG or Flyaway operation, featuring a very easy-to-use two, three, or four buttons in a rugged surround — perfect for military satellite operations. Despite its basic appearance, it is fully interactive and allows complex operation of fully automated systems. In April, Colem announced its work with **VISLINK**, with continued development of control and monitoring systems for the LINK wireless camera systems used for special events and city centre OB broadcast. A number of Link cell sites have been automated using a control system from Colem, including VRT, DR, RAIITV and SNG in the UK.

IBC was a big event for Colem this year, largely due to the new venture, Colem-Spice, and the major new product launch, **MediaNetSched**. This product is an effective media, bandwidth, and capacity management system, easily configured to simplify any operation. This package makes it possible to browse, edit, and move media directly at source, from systems such as SNG/Flyaway, Wireless Camera operations and broadcast centers. MediaNetSched was, in fact, included in two IBC product launches: **nova-trak** from **Novella SatComs**, an ACU with embedded tracking receiver; and **Holkirk's CF100**, super light, X- or Ku-band SNG Flyaway Terminal.

The other big event was the **SUIRG** led forum held at **Intelsat**, Washington DC, formalizing the *Carrier ID* initiative: the transmission of uplink ID and GPS location data. Colem-Spice was invited to participate as a speaker at the event, which was designed to drive the definition and acceptance of a common industry model for Carrier ID within both satellite Encoders and Modems alike.

Expect to hear a lot more from Colem-Spice in 2010. We will continue our strategy with the assistance of the UKTI to exhibit at Satellite and Broadcast trade shows, particularly **CabSat** — Dubai, Satellite show — Washington, **Broadcast Asia** — Singapore and **IBC** — Amsterdam to develop new client contacts and business.

Comtech AeroAstro

For more than 20 years, Comtech AeroAstro (CAA) has remained diligent in its conviction that small satellites and related technologies can provide significant capability for effectively achieving military, civil and commercial space mission goals. Increasing trends are away from reliance on large space systems, total risk avoidance, and long mission life as these systems are costly and require long development timeframes — during which technologies become outdated even before they are launched. It is now evident CAA's patience is paying off and that the time of high-utility smaller space systems has truly arrived.

A wholly owned subsidiary of **Comtech Telecommunications Corporation**, CAA is led by President *Paul Lithgow*, a 30-year aerospace veteran who led CAA through acquisition and transformation while maintaining CAA's heritage as a premier small satellite, component and mission payload provider. Under Mr. Lithgow, innovation and entrepreneurship continue to thrive, but with increased emphasis on expanding CAA's customer base, satisfying government space systems requirements and increasing mission-level capability. In 2009, CAA reorganized into two business areas: the *Space Systems Group* and the newly formed *Space Products Group*. These organizations are focused on demonstrating the high value capabilities of small satellite systems and technologies.

Examples of this are CAA's **STPSat-1** and **-2** programs. Developed for the *DoD Space Test Program*, these satellites are designed to capitalize on excess mass and volume margin as secondary missions on **Atlas V** and **Delta IV Evolved Expendable Launch Vehicles (EELVs)**, instead of requiring their own expensive launch vehicle. CAA developed and supported the launch of the STPSat-1 in March 2007 on an Atlas V. This satellite, designed for a one-year mission life, was decommissioned in October 2009 after successfully providing more than 2-1/2 years of valuable mission data. The initial program manager for STPSat-1, Ms. *Pat Remias*, is now Senior VP & GM for CAA's Space Systems Group. Under her leadership in this role, CAA also delivered the first STP *Standard Interface Vehicle (SIV)* satellite bus in December 2008; that mission, STPSat-2, is awaiting launch in 2010. Once proven, the STP-SIV bus will become a workhorse platform for hosting a variety of missions and payloads to a wide range of low Earth orbits.

Comtech AeroAstro

CAA is currently under contract to develop a microsatellite bus (<200kg) for the U.S. Navy's *Joint Milliarcsecond Pathfinder Survey (JMAPS)* program to provide highly accurate star position data for military and civil applications. Similar in size to the STPSat-1 and -2 vehicles, this satellite bus, called the **Astro 200AS**, has better pointing accuracy than vehicles in the commercial imagery business at a fraction of the cost. This capability enables a range of new high-value mission and sensor options on an affordable platform that can be rapidly developed and deployed.

Realizing that achieving high utility small satellites with large payload mass fractions requires smaller spacecraft components and subsystems, CAA established the Space Products Group (SPG) led by VP & GM Mr. *Stanley O. Kennedy, Jr.* SPG's charter is to provide lightweight, low power, and low cost products and payloads, including star trackers, miniature imagers, sun sensors, and radios to the growing small satellite community as well as newly emerging market areas not requiring 10 years of on-orbit mission life (e.g., launch vehicles, unmanned lunar missions, and human spaceflight systems). CAA is also expanding its expertise into unique mission areas, including payload and sensor development that support national security needs in ISR, space situational awareness and special communications. Recognizing the importance of this, in 2009 CAA invested in significant upgrades to our tools and facilities to assure we are better equipped to support the broad national security space customer community.

Building on these successes and advancements, CAA is looking to the future. Specifically, the goals of *Operationally Responsive Space (ORS)* fit ideally with CAA's commitment to the value of smaller, rapidly developed systems to accomplish critical missions. CAA has been operating in this area since ORS's inception, developing a detailed preliminary design for a *Modular Multi-mission Space Vehicle (MMSV)* for ORS in early 2009. This design was further refined and led to an award in September 2009 for a 5-year IDIQ contract from **AFRL** for *Advanced Plug-and-Play (PnP)* development. CAA has been an advocate for spacecraft PnP since 2001 and believes it to be an enabling technology for spacecraft that can be configured and launched in less than seven days — a key goal for successful responsive space operations. CAA sees the technology as an enabler for a new way to develop spacecraft of all size classes, big and small, by shortening schedules and reducing costs without compromising delivered performance.

Is there a limit to how small a high-performance satellite can be? Recently CAA unveiled its Coral CubeSat; this satellite, which is the size of a loaf of bread, can be deployed as a secondary payload from almost any launch vehicle. Universities and other organizations, such as **NASA Ames Research Center**, have already demonstrated the utility of these satellites. CAA's **Coral** satellite provides very high performance for a variety of mission sets in a very small, compact, low cost package. This spacecraft uses miniaturized but sophisticated components (many developed by CAA) and broadens opportunities for serious experimenters to quickly and affordably test their mission and payload ideas in space. With advancements in miniaturization of electrical and mechanical systems, very capable yet very small space systems are not only possible, but already proving their worth — a conviction CAA has held all along



Defense Information Systems Agency

As we start to make our way out of 2009 into 2010, the importance of information dominance rears itself as a leading force for success in communication initiatives, from national leadership to warfighters in the field. The luxury of continuous access to information we normally enjoy at our jobs, in our homes, and on our phones isn't shared by those who need it the most — our warfighters. They don't have a choice in going somewhere else for mission-critical information; they only get what they get. This begs the question — can they access mission information anytime, anywhere in order to do their jobs?

The **Defense Information Systems Agency (DISA)** is working to make that happen. Bruce Bennett, the DISA Program Executive Officer for Satellite Communications, Teleport, and Services (**PEO-STC**) has taken on the task of working on SATCOM tactical gateways to help warfighters. "We have to be able to support warfighters wherever they are, regardless of what communication infrastructure they're using," said Bennett.

The **Global Information Grid (GIG)** is our overarching backbone for delivering information anywhere in the world and it is primarily terrestrially based — running across fiber, electrical, or Ethernet paths. Currently, DISA deployed the *GIG Bandwidth Expansion Program*, which involved a large investment in diverse fiber throughout the world. The struggle has been getting fiber everywhere the Warfighter is deployed.

"It is very difficult to get fiber someplace that has no viable commercial infrastructure," said Bennett, "these holes mainly affect deployed forces in the developing nations of the world, in the middle of the ocean, or those in motion. So to overcome those holes,



Defense Information Systems Agency



**Bruce Bennett, Director,
Satellite Communications,
Teleport and Services**

we need to incorporate radio frequency (RF). They need more bandwidth, lower latency, and they need it now to do their jobs." To combat this bandwidth issue, PEO-STS has worked extensively with satellite gateways in efforts to move away from telephony-based satellite transport to an Internet protocol (IP) based network. This could increase efficiency by over 50 percent and allow for more efficient bandwidth usage and better coverage; it would be cheaper, smaller, and more diverse.

During 2010, PEO-STS plans to roll out the **Joint Internet Protocol Modem**. While it will be open-standards and modeled after a commercial-off-the-shelf product, the JIPM will be structured for the high levels of traffic security needed by the Defense Department. The idea is to create a virtual network for everyone on the other side of



a satellite transponder, so they can receive data, regardless of the number of users serviced by that transponder. By creating virtual networks, users could share resources and achieve that higher efficiency.

PEO-STS efforts are now focused on the Secretary of Defense's overall initiative regarding *everything over Internet protocol (EOIP)*, which then fits into DISA's *Strategic Campaign Plan*. In fact, PEO-STS initiatives revolve around one of the key tenets in the campaign plan — creating more cost effective networks and cutting down the extemporaneous networks that don't benefit the warfighter. With these changes, our Soldiers, Sailors, Airmen, Marines and Coast Guard will be able to accomplish their missions while deployed in the field just as if they were sitting at a desk back at home station.



Expand Networks

Over the last 24 months, we've talked about WAN Optimization moving from a nice-to-have to a must-have technology. However, 2009 was the year that *Advanced WAN Optimization* really embedded itself as a critical technology for satellite communications.

By taking satellite optimization beyond the traditional latency mitigation of **PEPs**, the integrated technologies of **Expand's *Advanced WAN Optimization*** is providing four to ten times the capacity on a satellite link. Due to this enhanced visibility and control on the network, we've witnessed continued take-up of the technology by large-scale international organizations this year and the trend is set to continue.

One such organization that stands out is **Tearfund**, who works in 60 developing countries. With so many staff working in the field where fixed IT infrastructure is not available, satellite communication links are imperative to the work that is carried out by the Company. This year, Expand has been deployed in Tearfund's key global locations, immediately compressing and accelerating traffic across the satellite links. With regional hub sites experiencing great improvements in network throughput, we are now moving forward with plans to optimize satellite links at all Tearfund's front-line sites across the globe.

The most notable advancement of 2009, however, is the big leap forward by service providers looking to optimize their offerings to better manage the flow of traffic over satellite links. Using optimization technology as a value-add service they can pass onto their customers, supplying improved levels of services at reduced network costs is a trend that is accelerating at pace.

As an example, we recently completed a project this year with **IPSTAR, Thaicom**. This alliance has seen the world's largest and most advanced commercial satellite system provide accelerated IP services with our optimization technology. The WAN optimization technology is helping to maximize their existing broadband service to ensure fast, resilient and cost-effective satellite communications for IPSTAR's corporate customers.

This year, Expand launched new product innovations that provide further flexible deployment options that have been particularly compelling to Satellite providers. Including virtual appliances running on commodity hardware, and client software for individual workstations, Expand is now able to provide an efficient optimization capability for each and every environment.

The *Virtual Accelerator* was a major reason **Clear Channel Satellite** selected **Expand Networks** technology to enhance its managed satellite service. Deployed within existing virtualized IT infrastructure at the datacenter and run on Clear Channel Satellite's existing server platforms, the Virtual Accelerator eradicated additional IT cost and complexity. Furthermore, the Virtual Accelerator allows Clear Channel Satellite to easily scale its services on-demand by simply adding additional instances of the Virtual Accelerator onto the existing server platform at the datacenter, while offering flexible deployment options of physical or

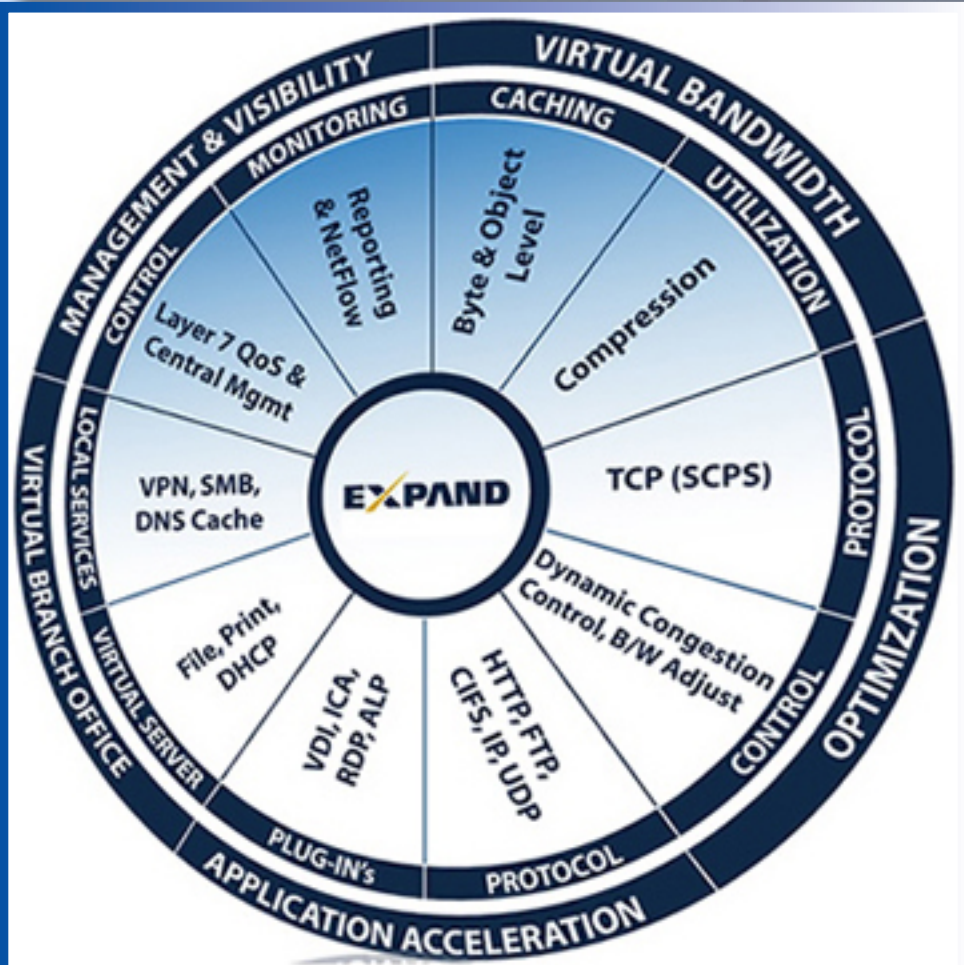
Expand Networks

virtual appliances at the remote sites.

We've seen that in these environments, the Virtual Accelerator improves responsiveness of applications to the end-user and delivers increased WAN capacity for applications as the mobile client software brings increased performance to the end users mobile node, providing application level acceleration, peer to peer QoS, while also delivering efficient TCP optimization at the network edge.

Regardless of the type of organization — from charity, military, service provider and everything in between — the understanding that Advanced WAN Optimization technology can overcome the inherent challenges of application delays and connectivity problems on satellite networks has become widespread.

For us, the stand out trend for 2009 is that WAN optimization is adding clear value to satellite managed services. By increasing service levels, managed service providers are helping all organizations to increase efficiency while reducing complexity now and into the future, without the need for large upfront investment. This is definitely something to watch for 2010.



Expand acknowledges the changing requirements in the Application Acceleration market. As organizations struggle to meet global business challenges while consolidating IT data and applications they create a proximity gap between users and resources. Expand's "Virtual Proximity" experience delivers performance and productivity by putting your users in proximity of your data and applications. No longer will point solutions delivering just QoS or Compression meet the real needs of IT organizations. The mandate is changing from WAN management to high performance application delivery; a change brought about with the requirement to link business productivity to application performance.

Gilat Satellite Networks

As a leading provider of products and services for satellite-based communications networks, Gilat Satellite Networks Ltd. (Nasdaq: GILT) continued to work hard in 2009 as we enabled communications networks across the globe. From Latin, North and South America to all of Asia, Africa and the Mediterranean, Gilat supplied service providers, operators, enterprises and governments with solutions to meet their growing needs for broadband data and telecommunications projects.

Among the most active sectors were enterprises such as financial institutions, oil & gas, transportation, and corporate environments, and we view these as exciting markets. During 2009, we also supplied solutions to players in the international defense industry including military and domestic security institutions.



This year, we continued to see a need for inclusive or integrated projects, one that has enabled us to prepare and package turnkey projects around the world. Rather than adding expertise or technical equipment, we are now more often being called upon, and fulfill, complete ventures integrating our VSAT technologies with other various components to create full-solutions meeting a wider range of functions.

The major projects we are delivering this year continued to be based on our **SkyEdge II** platform, a multi-service platform enabling the delivery of high-quality voice, broadband data and video services for diverse environments. SkyEdge II is a standards-based system using DVB-S2 and DVB-RCS. With better efficiencies and full adaptivity for both inbound and outbound channels, it provides higher performance that serves the growing requirements of end-users.

We also introduced **NetEdge**, a new, high-performance satellite communications platform specifically designed to meet the requirements of multi-star private networks for corporations and for cellular backhaul applications. As a dedicated solution for multi-star networks, NetEdge addresses two common challenges; the lack of a terrestrial connection between corporate headquarters and satellite hubs and the need for single-hop connectivity between offices as well as single hop connectivity to the Internet. This new product creates new revenue opportunities for service providers by extending satellite-based services to private customers and multi-tier corporations.

During the past year, we closed and implemented a number of exciting projects, especially in the Latin and Central American markets. For children and educators, our satellite-based communications expertise is laying the framework for improved education across several countries including Brazil, Argentina, and Panama. There we are enabling the creation of new and improved educational opportunities with broadband Internet communications. We believe that our projects are helping bridge the digital divide and providing new hope to those nations' educational systems.

Gilat Satellite Networks

We also forged more inroads into the Americas during the year, with deals in Brazil and Peru as well as updating our agreements with the Colombian government. In Brazil, we are supplying a secure enterprise solution for broadband communications to more than 1,000 **Sicredi** bank branches around the country. In Peru, the country's national bank, **Banco de la Nación** and other enterprise customers, are benefiting from enhanced voice and data networking services from our solutions. This includes high-speed connectivity for high throughput for file transfer, transactional service applications such as ATMs and voice quality IP telephony.

In the second half of the year, we announced more deals in Asia and the Pacific confirming the need for our solutions among governments, enterprises and industries in these regions.

From the Pacific's Papua New Guinea to Asia's mainland in China, to Thailand in the South East, through Central Asia's Kazakhstan, we implemented a wide range of projects to bring broadband Internet and satellite-based telephony to citizens in this wide region.

In Papua New Guinea, we are providing a broadband satellite communications network covering hundreds of sites. We are enabling the local telecom supplier, **Telikom PNG** to provide telephony and deliver broadband Internet services to remote areas as well as serving the financial services sector's interactive data communications requirements. In Thailand, Gilat is supplying a full VSAT turnkey solution for rural telephony and broadband Internet services. Both of these projects, covering hundred of sites, are creating new opportunities for local residents and empowering their communications.

China's Xianjiang region in the country's northwest received a big step forward with a cellular backhaul solution to enhance GSM mobile connectivity, especially in regions where until now it had not been economically feasible. Gilat's systems are enabling China Unicom to provide high quality mobile voice and data services similar to those already offered in China's developed and urban areas.

In Central Asia's Kazakhstan, we implemented two very different deals that both go far in enhancing the penetration of satellite-based communications throughout the area. We completed an exciting implementation of satellite broadband Internet for Kazakhstan's national railroad by creating a full VSAT-based solution to bring broadband Internet to its passengers on its *Almaty-Astana* route, some 1,300 km long. We also integrated our cellular backhaul solutions to enhance mobile connectivity in some of Kazakhstan's most remote regions where harsh weather is the norm.



GlobeCast Australia

GlobeCast Australia is reflecting proudly on 2009 — and moving confidently in to 2010 — after a year of significant technical expansion to meet the needs of new clients and provide new services for reliable global delivery. The company continued to deliver the hourly requirements of some of the biggest broadcasters in the world and to service some of the biggest annual events globally. As a result, several major announcements about the company's key projects for 2010 are pending over the next few months.

In 2009, both the Teleport and Master Control received major enhancements and re-designs. Partly to cope with ever increasing business expansion, and partly to offer even higher levels of service to valued clients. The Master Control is increasing in size by 100 percent to ensure **GlobeCast Australia** continues to "reach the world" for its clients. Rapid growth in global demand for high-end content distribution has seen GlobeCast Australia quadruple its annual bookings volume for occasional use services, in addition to its growth in full time services. GlobeCast Australia uses its global fibre network — complemented with owned and operated satellite space — and is the provider of choice to deliver content to and from broadcasters throughout Australia, New Zealand, and the Pacific Islands.

Big Events

The company cemented its reputation as a global sports distributor with the biggest events beaming in and out of the Southern Hemisphere in 2009. To name just a few: **Wimbledon** for **Fiji TV** and **TVNZ**, **Le Tour De France** for **SBS** and the **Ashes** in HD for SBS with unilateral coverage for **FOX Sports**. There were several months of **Rugby Internationals** as well for **BskyB**, **J Sport**, **FOX Sports** and **Sky New Zealand**, some in HD. Plus, various northern hemisphere sports including **U.S. Golf**, **NASCAR** and baseball live in HD for **Network Ten's ONE HD** channel and **Moto Cross** in HD for FOX Sports and TVNZ.

The company played an integral role in covering the Australian bushfire disaster for broadcasters on every continent and delivered coverage of the Samoan tsunami and the Indonesian earthquake. From the reality of life to reality television, and GlobeCast Australia is repeating its global distribution of *I'm A Celebrity*, *Get Me Out of Here* for **Granada** to broadcasters including **NBC** and **ITV** — GlobeCast Australia engineers were also in Costa Rica for the show, as well. This ability to "take Australia to the world" was also evidenced with **Tourism Queensland's Best Job in the World** promotion, with more than 100 unilateral live crosses and tape feeds over three days to more than 20 countries, using GlobeCast Australia's DSNG, satellite and fibre capabilities.

GlobeCast Australia

Tech Expansion

From its newly expanded Sydney based Teleport, GlobeCast Australia offers total broadcast solutions to global customers including backhaul, uplink, downlink, encoding, multiplexing, encryption, time-delay, local play-out and insertion, 24/7 monitoring, IP monitoring, transcoding to 3G phones and SMS Services. The facility draws together an international fibre and satellite network that offers attractive solutions with downlinks on **AsiaSat, Intelsat, Thaicom** and **New Skies** satellites.

The master control and teleport upgrade increased power on uplinks and increased rack space and floor space — by double — and monitoring screens were tripled. This technical network supports the company's occasional use and Direct to Home services — of which there are more than 120 — and its event coverage is delivered via Australia's largest DSNG fleet of 10 vehicles and flyaways. The teleport now offers 13 satellite dishes, ranging from 4.5m to smaller 2.0m antenna, five of which are uplinkable to both domestic and international destinations as far afield as Cyprus in the Mediterranean and Los Angeles. This broadcast center upgrade comes after five years of general growth and innovation, which saw the company conduct 2004's entire level of business in just the first five months of 2009.

New Services + Clients

The company launched **GlobeCam** in early 2009, providing miniature camera technology for live onboard coverage of various sports including V8 Supercars across Australasia and the Middle East, World Games Parachuting in Taiwan, Macau Grand Prix cars and bikes, Cycling and Horse Racing. Also expanded in 2009 were live broadcasts to cinemas nationally and overseas — the innovative transmissions involved GlobeCast Australia equipping more than 50 Cinemas with 1.5m **Johnsa** antennae to receive various broadcasts live on to their big screens. GlobeCast is also distributing international brand channels such as Cartoon Network, Sky News Australia, Fox Sports, CNN and BBC in to the New Media smaller screen environments. 3G, IPTV, and simultaneous broadband streaming, are an integral part of reaching audiences in 2009.

Inventive use of satellites for major tourism promotions, annual general meetings, corporate dinners on live hook up, and prize draws are all part of a growing transmission demand drawing new clients to GlobeCast Australia. Business TV satellite transmissions nationally and internationally for major clients were successfully delivered by GlobeCast Australia in 2009 across the southern and northern hemispheres. The company now works with all four of Australia's Big Four Banks and covers Annual General Meetings for blue chip clients including BHP, Westpac and Lihir Gold. In 2009, more companies were choosing these technical solutions as a cheaper and highly effective alternative to road shows or national conferences, supplementing broadcast with streaming and interactive meetings.

In a major global event, GlobeCast Australia beamed HD coverage of surgeries from Germany, Saudi Arabia, India, Malaysia, South Korea and Japan to a three day convention in Cairns. All feeds were successfully monitored by GlobeCast Australia's 24/7/365 Master Control and Teleport, which supports the company's broadcast and corporate clients around the clock.

In 2009, the GlobeCast Australia Broadcast Centre moved more than one million hours of content for various clients: channels, networks, platforms, sports bodies, production companies, corporate clients and organisations — and the team is ready for one million-plus hours in 2010!





GMV, one of the world's leading suppliers of satellite ground systems headquartered in Madrid with an American subsidiary in Rockville, Maryland, continued to experience strong growth and play a major part in the success of satellite missions around the world in 2009. GMV saw an 18 percent increase in overall revenue, up to \$128 million for business conducted in 2008. Space and defense is the largest business area in the company and produced revenue of \$94 million U.S. dollars.

Founded in 1984, GMV specializes in the supply, development and integration of engineering systems for the aerospace, defense, security, healthcare, transportation, telecommunications and IT sectors. GMV has been providing satellite ground systems to satellite manufacturers, commercial operators, integrators, and Space Institutions around the world for more than 25 years.

GMV's customers in space and defense include Space agencies in North America, Europe and Asia, eight of the 10 largest commercial GEO satellite operators in the world, as well as many of the medium and smaller-sized operators across the globe. In 2009, 14 satellites were launched with GMV systems. There are currently more than 150 satellites being operated with GMV systems from seven continents and 25 countries around the world.

Despite the difficult global economic situation, GMV was able to surpass the leadership's growth goals for 2008.

In the United States, GMV provided its Mission Planning & Scheduling system, **FlexPlan**, for **NASA's Lunar Reconnaissance Orbiter**. In South America, GMV and **StarOne** partnered to upgrade the **Brasilsat Satellite Control Facility**, which includes the Satellite Control Centre system, hifly, and the Flight Dynamics System, **focus**. In Europe, GMV was commissioned by the **European Space Agency (ESA)** to build a prototype of an all-terrain, rover-type Space vehicle to explore the surface of Mars and the Moon. GMV also recently launched **atlas GMV®** — a new software solution that enables the use of **Blackberry® Smartphone** to access open source email based on **Linux**.

GMV's groundbreaking work around the world has enabled it to increase its presence in other countries, forging ahead in its goal of worldwide expansion. In 2009, GMV set-up new subsidiaries in Poland and Germany as well as offices in Malaysia and the Korean Republic. GMV's success also was recognized by several organizations in 2009.

For the first time, *Space News* ranked GMV among the top 50 space manufacturing and services companies in the world, based on GMV's space related revenue in 2008. GMV also was the grand prize winner of the **2009 European Satellite Navigation Competition Award**. The company's **Osmógrafo®** system rose to the top of 300 high-technology projects submitted for review from 30 different countries competing in this year's competition. GMV's Osmógrafo® was honored for its innovative technology that allows search and rescue teams to better track the work of sniffer dogs, therefore reducing the loss of life and improving recovery of buried victims during disasters.



Gottlieb International

It was rough sailing for the world's shipping industry in 2009. With the collapse of world trade and the delivery of large numbers of new ships, freight rates fell to record lows and only recently is there evidence of a nascent recovery. Despite the crisis, adoption of VSAT continues at a steady and sustained pace.

Many major suppliers are reporting new VSAT contracts. Among others, **MTN** has announced a major sale to **Teekay Tankers**. **Marlink** has installed 2.4-meter systems on several **Tsakos Navigation Tankers**; **KVH** reports a major installation of its Mini 7 Broadband aboard **Clipper** vessels; the **Speedcast/Eutelsat** partnership now has 8 VSATs installed on **Maersk** ships, and **Stratos** has announced a major contract with **Stolt-Nielsen**. **Ship Equip**, a market

leader, reported an increase of 38 per cent in revenue versus the same period last year — customers are currently averaging about 20 Gigabytes of data and voice traffic per month, doubling their VSAT use in 2008. As demand for data rises among major fleet owners, **Inmarsat** struggles to land **Fleet Broadband** customers, offering prices far below those originally intended. Major vessel owners report offers as low as \$2,000 per-month for two GB of data — apparently many of the 3200 installations reportedly sold by Inmarsat have been due to price concessions.

In the Containership sector, principal justifications for VSAT are focused on management of IT infrastructure and Crew Welfare, which is no longer a leading driver of VSAT adoption. Despite the downturn, many of the largest Containership operators have already conducted trials. **Rickmers** and **Peter Doehle**, who together manage or own nearly 300 vessels, can be expected to undertake installation of VSAT as soon as freight rates rise to acceptable levels. While overbuilding of vessels was extreme in the Containership sector, Oil and Chemical Tanker owners were more conservative in new vessels orders. These vessels operate under very strict environmental and operational guidelines and must continuously gather, transmit, and analyze data to demonstrate regulatory compliance. How well they comply is a key factor in their ability to secure charter contracts.

While major Tanker and Containership owners are installing or seriously considering VSAT, leisure oriented segments present varying prospects. In the Mega Yacht segment, sales have been impacted by the economic downturn. Some new build orders have been canceled, forcing a number of French and Italian ship yards to seek government help and lay off workers. This segment is now recovering — the number of vessels can be expected to increase about ten per-cent per/year from a 2008 base level of 4,000 vessels. The potential for VSAT in the general yacht and pleasure boat market remains grim.

Given the recession and the protracted sales cycles in the commercial shipping industry — up to two years with major fleet owners, VSAT providers have the opportunity to work with major fleet owners, established relationships and run trials. Assuming an end to the recession and a resumption of economic growth, VSAT service vendors can expect a wave of adoption as the shipping industry returns to profitability.

GTX Corporation

GPS “People Tracking” continues to garner both increased opportunity and adoption worldwide — PLS technology has been the focus of our business for the past seven years. GTX Corp., a leader in Personal Location Services, develops and license’s 2-way GPS people finding technologies which seamlessly integrate with consumer products and enterprise applications. GTX Corp uses the latest miniaturized, low power consumption hardware technology in its GPS and cellular location devices and provides a fully customizable back-end portal enabling subscribers to use real time tracking to obtain the whereabouts of people, pets, or valued assets. Through its miniaturized transceiver module, wireless connectivity gateway, smart phone Apps, customizable middleware, and viewing portal, GTX Corp offers a complete end to end solution.

GTX Corp considers Latin America a most important and growing market and is engaging customers through partnerships, bi-lingual sales, and technical support staff, along with localized software translated into Spanish for the region. The Company expects to see significant growth in 2010 as they increase the number of products, and by increasing marketing efforts.

The rising need for personal location services in the region is influenced by several factors, among them — Personal and asset security concerns affecting a greater portion of the population — Families caring for loved ones and the elderly or memory impaired members — Corporations needing to manage worker productivity and logistics — Government agencies, law enforcement, and military personnel monitoring.

Licensees of GTX Corp technology can customize the PLS menu of real time, bi-directional GPS data communications options, which affords customers the most locally appropriate application package. GTX Corp is currently selling smart phone apps in more than **55 countries** as well as PLS through hardware devices and platform licensing in the U.S., Mexico, Guatemala, Israel, and Nepal. While there are a number of developers working in the location based services space, GTX Corp is unique in its ability to integrate customizable form factors with dedicated functionality and personalized interfaces to offer consumers and businesses localized applications that harness the full spectrum of GPS enabled Personal Location Services.

Founded in 2002 and based in Los Angeles, California, the company has evolved from its early beginnings of putting a micro GPS device in a shoe — **the smart shoe** — to provide caregivers of those afflicted with Alzheimer’s full GPS people tracking capabilities, for which the company has already received six broad patents for the application as well as a partnership with **Aetrex Worldwide**, who is developing the retail shoe product for delivery to the market in Q1 of 2010. GTX Corp continues to pave the way with innovative geo specific and proximity alerting applications. The company believes in a strong intellectual property strategy and, to date, has an extensive portfolio of patents, patents pending, registered trade marks, copyrights and dedicated URL’s.



Hughes Corporation

Despite the challenging economic environment of 2009, I'm happy to report that the Hughes business model has proven to be steadfast. We've achieved three more quarters of positive results following a successful 2008, when we crossed US\$1 billion in revenues and achieved a healthy EBITDA of US\$155 million, making it 13 successive quarters of meeting or exceeding our stated goals since going public in 2006. So what's driving our success?

Innovation of broadband satellite technologies and products continues as our core strength, but it's the thriving service business globally that's fueling our growth. In 2009, recurring service revenue from an expanding base of repeat customers in North America, Europe, India, and Brazil exceeded our product revenues and is growing at a faster rate.

Consumer Growth Leads

In North America, our **HughesNet®** consumer business continues to lead the way, with impressive yearly growth of 19 percent in services revenue, and now with a total subscriber base of more than 490,000 in number. Our strategy of pursuing the estimated 10 million households and 3.5 million small businesses unserved by terrestrial broadband technologies is paying off and validates the high priority people place on broadband. The positive effect of operating our own **SPACEWAY® 3** satellite, which we launched in April 2008, continues to show on our bottom line results. We are also rapidly expanding service offerings that exploit its high capacity, onboard switching and bandwidth-on-demand capabilities. For example, we now offer consumers high speed satellite Internet plans available in North America — up to 5Mbps.

Enterprise Managed Services

Though not growing as fast as consumer, the enterprise business remains strong globally, particularly managed services. More and more major corporations are entrusting Hughes to manage all of their network facilities, including terrestrial DSL, fibre, and wireless, with turnkey contracts backed by high quality service level commitments. A good example is **BP Corporation Inc.**, which signed an extension for *HughesNet Managed Network Services*, connecting BP's retail locations in the United States and in the United Kingdom, Spain, the Netherlands, Austria, Luxembourg, Switzerland, and Germany. The five-year extension is for more than 16,000 current retail locations, including implementation of new sites as they come on line. Hughes now has over 200,000 sites under managed service contracts globally with major corporations, the largest customer being **GTECH**, the world's leading lottery gaming company. Plus, U.K.-based **Avanti Communications Group plc** signed a multi-year framework agreement in October valued at US\$24 million, whereby **Hughes Europe** will supply eight gateways and 50,000 customer premise terminals to operate over **HYLAS**, Europe's first dedicated, high-throughput Ka-band broadband satellite to be launched in 2010. In addition, Hughes agreed to acquire capacity on the HYLAS satellite to expand its managed services offering to major European corporations.

Closing the Digital Divide

Internationally, Hughes is continuing to help close the digital divide and bring broadband

Hughes Corporation

to rural communities on every continent, with notable wins in Brazil, India, Spain and Mexico. In India, a successful public-private partnership continues to expand distance learning and e-governance programs to thousands of rural locations. Earlier this year, the rapid implementation of a Hughes satellite-based network enabled Telefonica to provide a high quality and cost-effective communications service to meet its Universal Service Obligation under Spanish law. Our Brazilian operating company, **Hughes do Brasil**, was selected for the **WISE** (*World Innovation Summit for Education*) **Award** for a distance learning project developed for the Education Department of the State of Amazonas, which provides interactive distance learning over satellite to more than 20,000 students in 700 classrooms across 300 schools in the State of Amazonas.

Emergency Preparedness for Governments and Business

Emergency preparedness networks are being recognized universally as imperatives for business and government organizations alike. When a disaster strikes and ground networks are most vulnerable to be knocked out, robust and expedited broadband connectivity via satellite is essential to keep operations alive and to coordinate rapid decision-making. Examples in the U.S. that use the high-speed, bandwidth-on-demand capabilities of SPACEWAY 3 are the *Inter-Government Crisis Network*, which instantly connects different federal, state and local agencies in an emergency, and America's *Emergency Network (AEN)*, which is a Florida-based service that disseminates real-time evacuation and safety-related information to residents in the face of hurricanes. Our recently introduced HughesNet Emergency Business Internet service plan provides any enterprise or government agency with robust and affordable satellite backup connectivity, featuring download speeds of up to 5 Mbps and uploads speeds of up to 1 Mbps.

Next Generation Developments

Hughes recognizes that technology yardsticks keep moving each year, and investment in new technologies, products and services is critical to our continued success. This year we took a quantum step beyond incrementally advancing our broadband network components, products and systems to meet the ever-increasing future demand for more speed and more services. In June we initiated development of **Jupiter™**, our next generation, high-throughput, Ka-band satellite system. Planned for launch in 2012, Jupiter will have over 100Gbps capacity, 10 times that of SPACEWAY 3, and 100 times that of conventional Ku-band satellites, and will use an enhanced version of the **IPoS** standard, the world's leading broadband satellite standard approved by **ETSI**, **TIA** and **ITU** standards organizations. Soon thereafter, we signed an agreement valued at more than US\$100 million with **Barrett Xplore Inc.**, Canada's largest rural broadband provider, under which they committed to acquire and operate over 10 Gbps of capacity on Jupiter. Barrett Xplore is already providing service in Canada over our SPACEWAY 3 satellite.

From technologies, to products, to services, Hughes is all about broadband. As the results of 2009 continued to show, innovation and diversity is what sets us apart from the competition and keeps us strong in both good times and bad — and indeed is what drives our business success.



iDirect

For many years, the satellite industry has faced the challenge of transitioning from providing a niche technology to a community engaging in a broader, more pivotal role in global communications. Fortunately, we have closed much of the gap today:

- *Satellite-powered in flight broadband is being embraced by major airlines and is making headlines in thousands of media outlets worldwide from The Wall Street Journal to the BBC.*
- *VSAT broadband is quickly becoming the new standard for maritime communications. This year, we saw a rush of maritime companies moving to VSAT to improve core operations and boost crew welfare.*
- *Satellite networks are proving to be a cost-effective, reliable way for mobile service providers to expand their networks into rural areas, where more than 2 billion people worldwide still need to connect to the global telecommunications grid.*
- *DVB-S2 efficiencies are allowing service providers to expand their opportunities and grow their revenues. In many parts of the world, this is spurring social and economic developments as more businesses, government agencies and educational institutions are benefitting from access to satellite broadband.*

Given these successes, we can all relax for a while and soak it in, right? Hardly. We're making progress on the satellite industry's overall value proposition and increasing demand. However, success creates a fresh set of challenges. For the last 12 months, the **iDirect** team has addressed critical aspects of the industry and have enjoyed several significant victories.

Extending Next-Generation Bandwidth Efficiencies

One of the most significant breakthroughs in advancing satellite IP communications was the recent introduction of the next-generation DVB-S2 standard. This is changing the economics of satellite capacity distribution and is providing new growth opportunities for the industry. This past year, many of our partners migrated to iDirect's **Evolution** DVB-S2/ACM platform. With Evolution deployments gaining critical mass, this year we also expanded our Evolution product line with several advances in performance, efficiency and flexibility.

The centerpiece was the new **Evolution X5 Satellite Router**, engineered to help service providers support bandwidth-intensive applications and greater traffic volumes, key to meeting increased customer demand across a wide range of growing vertical markets. The **iDX 2.0** release featured a new inbound coding technology called **2D 16-State FEC coding**, which delivers improved efficiencies over *Turbo Product Coding (TPC)* and provides existing customers with a 10-20 percent increase in inbound IP throughput without sacrificing link performance. Another iDX 2.0 achievement was integrating iDirect's *Group Quality of Service* technology with *Adaptive Coding and Modulation*, allowing service providers to create more flexible service offerings to help customers address adverse weather conditions.

Reducing The Cost + Complexity Of Managing Remote Networks

The challenge of remote system failure was addressed with the introduction of the **iDirect Remote Management Solution**. Through a partnership with **Uplogix**, iDirect is helping to reduce onsite network maintenance costs and strengthens service reliability.

iDirect

The solution uses an Uplogix appliance installed at a remote site to integrate and control the various devices that are part of a remote network. Through a serial connection, the Uplogix appliance constantly collects and analyzes hundreds of performance variables and can automatically resolve about 70 percent of issues that cause network downtime. When a network technician is required, the **Uplogix Control Center** device located in the NOC provides direct, centralized access to network devices.

Using VSAT For Cost-Effective Satellite Backhaul

iDirect took a major step in helping mobile operators gain rural subscribers and grow revenues beyond core markets in 2009. **Ericsson** announced a new product for GSM operators: the **MiniSite**, which integrates an Ericsson GSM base station with an iDirect satellite remote into a single weather proof enclosure. The MiniSite is designed for small- to medium-sized sites (up to 4 TRX) and can be powered by a number of methods, including AC, solar or wind. The solution has been environmentally tested for extreme temperatures and is ideal in areas where terrestrial connectivity is prohibitively expensive or difficult to obtain.

Making SATCOM More Portable For Military Applications

iDirect unveiled the **e850mp**, a small form-factor satellite router half the size of current product standards, which features iDirect's full suite of mobility and advanced platform features and supports military-grade security specifications. When combined with a bi-directional antenna, the e850mp extends high-speed data, voice and video connectivity to a wide range of mobile solutions. These include high portable "man-pack" satellite communications systems that enable soldiers in the field to communicate with base command. They also include applications for medium- and small-size aircraft, cargo planes, UAVs, deep water fleets, manned and unmanned submersible vehicles, Coast Guard shallow water fleets, and emergency response vehicles.

Flight Broadband Takes Off

iDirect and **Panasonic Avionics** teamed to develop the **eXconnect** in-flight broadband system for airlines. Panasonic leveraged the iDirect platform: DVB-S2/ACM efficiency gains, our spread spectrum mobile waveform that greatly reduces bandwidth transmission cost, *Automatic Beam Switching* to support seamless coverage on long haul flights, and *Group Quality of Service* to ensure network applications can be reliably prioritized and supported. Panasonic has already announced an agreement with **Lufthansa** to offer broadband connectivity and other in-flight services 50+ long haul aircraft.

What's Next?

We are preparing new features that will allow our satellite routers to automatically switch between **TDMA** and **SCPC** modes as network traffic demands change and support adaptive TDMA on the inbound channel. Our goal is to understand how end user demands are changing. Our team focuses on making satellite connectivity more efficient, reliable, and cost-effective for service providers, while developing specialized features to meet the needs of specific industries. We'll strengthen our global partners' current operations, preparing them for future opportunities and ensuring they continue to gain value from their investment in the iDirect platform.

Integral Systems

2009 was a year of challenge and change, a year where the satellite industry, both commercial and government sectors, recognized the rules were changing and we had to do more... with less. 2009 was also a year where successful partnerships and collaboration delivered remarkable results.

For 27 years, **Integral Systems** has set an exemplary standard of performance and collaboration with our customers and our business partners. Together with our five wholly owned subsidiaries — **RT Logic, Newpoint Technologies, SAT Corporation, Lumistar** and **Integral Systems Europe** — we are providing a COTS-based approach to product development and systems engineering. Our deep industry expertise in command & control, signal processing, network management, geolocation, interference detection and monitoring and secure communications is meeting the needs of customers globally on-schedule and within budget.

Despite the market challenges of the past year, we are pleased to have our program teams highlighted for their customer-focused work in several areas. This includes recognition as the **2009 U.S. Small Business Administration Region III Prime Contractor of the Year** for our efforts on *Command Control and System Consolidated (CCS-C)* with the U.S. Air Force and by our partner, **Northrop Grumman Corporation**, as a **2009 World Class Team Supplier Award** winner for **GPS OCX Phase A** support.

2009 was highlighted by a number of key events. In February, we closed our most recent technology acquisition, **satID**, which reflects our view that solutions need to be built from the ground up with customer input. Working together, we have been successful in providing solutions that allow our customers to optimize and expand their operations with little to no increase in staff. In March, we formally announced our strategic partnership with **Analytical Graphics, Inc. (AGI)**, a producer of COTS software for analysis of space, defense, and intelligence assets. This alliance builds upon prior collaboration and allows us to leverage AGI and Integral Systems' commercial-based products to provide entirely new levels of *space situational awareness (SSA)* capability.

We recently announced the opening of the new **Integral Systems Europe** — United Kingdom facility. This new facility provides *Earth Station Integrated Solutions (ESIS)*, turnkey ground systems solutions for all types of satellites systems from design and engineering, installation design, integration and testing, in-service maintenance support, to on-site field service, all provided by our own in-house resources. Whether it is Satellite Control provided by **EPOCH IPS** from **Integral Systems**, Network Management and Monitor and Control (M&C) from **Newpoint Technologies**, Carrier Monitoring and an Earth Terminal developed by **SAT Corporation**, and Interference Geolocation from **RT Logic**, we can uniquely provide the highly experienced team to design and implement the optimal mix of COTS equipment and custom-designed engineered products.

Integral Systems

The 2010 Theme

The year ahead will be both exciting and daunting — demand for, and access to, content and information is increasing dramatically. Yet, the ability to provide access is constrained. To successfully meet those needs, industry will need to adapt to changing realities and provide solutions that are open, flexible and cost effective. It will take long term planning and vision to succeed.

As an industry, we must look to develop creative solutions to the challenges ahead. One possible solution is to partner with the international community to build a network of satellites that essentially act as an Internet in space. The new system could increase available bandwidth by dynamically shifting content feeds from overburdened satellites to underutilized satellites within the network. We must also develop innovative ways to control access and transmit data, while also addressing the challenges of protecting information. At Integral Systems, we already have technologies that can monitor and protect these kinds of satellite data links.

Adding capability to support increased demand for satellite communications brings with it an entirely new set of challenges, requiring more visibility and most importantly, the ability to react. Every satellite launch and new transponder made operational increases the likelihood of interference. Signal interference can result in lost bandwidth, degraded *Quality of Service (QoS)*, loss of revenue and, potentially, even the loss of life. Today's economic environment simply does not allow for any missed opportunities for revenue generation or inefficiencies in operations. By developing the industry's most integrated interference detection and geolocation products — **satID**, **Sigmon®**, **Monics®** and **SAT-DSA™** — Integral Systems helps maintain and improve QoS, revenue...and mission success.

Looking ahead, to remain in a leadership role whether satellite operator, ground segment provider, or content provider, we must have a laser-like focus on our business model and a customer-centric view of business practices to deliver premium services and new capabilities more efficiently and cost-effectively.

At Integral Systems, we will continue to develop commercially-based products that are open and flexible, incorporating both new technologies and the ability to integrate with legacy systems that are required to provide longevity and return on investment. We continue to consider new business models and service offerings for our customers. In particular, we see an opportunity to extend the benefits of our product lines via a managed service offering. This model could develop opportunities for satellite operators and others to extend their capabilities, increase operating visibility and control over their systems and networks without the kinds of significant investments in hardware and personnel typically required.

We see the challenges and the opportunities in the year ahead for our customers and remain committed to delivering the industry's most comprehensive and economical solutions based on a shared mission to help our customers succeed.



Iridium Communications

I think I can safely say that 2009 has been a landmark year for Iridium. In September, Iridium went public and is now listed on the NASDAQ under the ticker symbol IRDM. Our transaction brought in significant capital and created a strong foundation for developing our next-generation satellite constellation, Iridium NEXT. It also aligned us with an excellent new investor and sponsor, with executives from Greenhill & Co., Inc. significantly contributing to the success of our business today.

Despite the difficult economy, we continued to demonstrate impressive growth. We rolled out new products and services for our commercial customers and we initiated significant new programs with U.S. Department of Defense (DoD) customers. We secured our license to sell Iridium products and services in Mexico and pursued other licensing initiatives that will open further potentially enormous geographic markets. Our data business continued to outpace all others, as our service partners developed and deployed an amazing array of new products and capabilities built for *machine-to-machine* (**M2M**) applications. And, finally, we continued to make progress regarding our next-generation satellite program, Iridium NEXT.

Each quarter in 2009 brought new subscribers. Following Q1 of 2009, we announced 328,000 subscribers, and then 347,000 subscribers following Q2 of 2009. During Q3 of 2009, our subscriber base grew to approximately 359,000 — 16.1 percent above the total at the end of the Q3 of 2008. In addition, following 2009's Q3, our revenues from commercial services rose 23 percent over the same period last year.

Early this year, we completed beta testing and moved into full commercialization of our ***Iridium OpenPort®*** high-bandwidth product for the maritime industry. Iridium OpenPort offers a combination of global coverage, multiple independent phone circuits, scalable data to 128 kbps, lower capital acquisition costs, and affordable service plans. The product has been well received in the maritime market, meeting the increasing demand for cost-effective, high-bandwidth, ship-to-shore satellite connections for ship operators, commercial fishing fleets, and even private yachts. As of this writing, we have just activated our 1,000th Iridium OpenPort terminal.

In 2009, we also brought our new ***Iridium 9555*** satellite handset into full production. Introduced in late 2008, the Iridium 9555 provides a number of enhancements over the *Iridium 9505A*, including a space-saving, internally retractable antenna; large illuminated weather-resistant keyboard; SMS with predictive text entry capability; integrated speakerphone; and a built-in mini-USB port for data. The Iridium 9555 is 30 percent smaller and 27 percent lighter than the previous Iridium 9505A model. While equipment sales have been affected by the weak global economy, the Iridium 9555 puts us in an excellent position to capture market share as the economy rebounds.

In June, the **U.S. Navy Surface Warfare Center Dahlgren Division** awarded Iridium a development contract for *Phase 2* of the *Distributed Tactical Communications System (DTCS)*. Also known as ***Netted Iridium***, DTCS leverages Iridium's constellation of cross-linked, low-Earth orbit satellites to enable over-the-horizon, beyond-line-of-sight,

Iridium Communications

push-to-talk radio nets for warfighters on the move in mountainous terrain. The DTCS program started in 2006 as an industry-funded *Cooperative Research and Development Agreement (CRADA)* with the **U.S. Marine Corps Warfighting Lab** in Quantico, Virginia. About 100 prototype DTCS transceivers have been tested and deployed with U.S. forces in Afghanistan and Iraq. Under the Phase 2 contract, Iridium is working with **Boeing** to upgrade Iridium's satellite software and ground infrastructure to support more than 2,000 user nets with an expanded range out to 250 miles. In November, the DoD awarded a contract to Iridium's partner, **ITT NexGen**, to produce and deliver 1,450 DTCS handsets by March 2010.

In 2009, Iridium pursued licensing initiatives that will open significant markets in Russia and Mexico. In Mexico, we formed a private company called **Iridium Comunicaciones de Mexico S.A.P.I. de C.V.**, which is a joint venture between Iridium and **Spacenet Communications Services de Mexico S.A. de C.V.**, through which we officially began offering Iridium products and services in Mexico. In Russia, we formed a new company called **OOO Iridium Communications** in May and we have applied for a frequency and operating license to provide *mobile satellite services (MSS)* there. We are working to activate and upgrade the Russian gateway, which is owned and operated by **Krunichev State Research and Production Space Center**. Pending completion of the gateway and licensing efforts, we hope to launch service in Russia next year.

In Q3 of 2009, our M2M subscriber base grew by 45.2 percent and our data service revenues grew by 48.3 percent over the same period last year. Our value-added service partners continue to amaze us with a range of applications that leverage our global, low-latency data connections, enabling operations in areas beyond the reach of terrestrial wireless networks. We are still in the early days of the *telematics revolution* and we expect to see strong continued growth in this sector, driven by burgeoning demand for tracking, monitoring and controlling remote assets on a global scale. Late this year, Iridium joined with a number of other MSS industry companies to form the **ProTECTS Alliance** (*Promotion of Two-way Emergency Communication and Tracking Systems*). The main goal of this initiative is to work collaboratively with the public-safety community, industry groups, trade associations, NGOs and government regulatory bodies to create standards based on duplex data links to foster the orderly growth of the emerging market for satellite personal location, tracking, messaging and distress alerting products.

Finally, let me turn my attention to **Iridium NEXT**, our next-generation satellite constellation, which we expect to launch in late 2014. We have been working closely with two companies — Lockheed Martin and Thales Alenia Space — who are competing to become the prime contractor for Iridium NEXT — we have been enormously impressed with the engineering talent and innovative thinking shown by both teams and will make our decision and award a contract in the coming months.

As we close out a successful 2009, we look toward an exciting 2010. Our robust and resilient satellite network and strong operation results, combined with our strong balance sheet, put Iridium in an enviable position in the MSS sector. Our public listing gives us an excellent platform from which to embark on financing, building and launching Iridium NEXT. Our focus for 2010 will be growing and servicing our subscriber base, growing our revenue stream and moving into full development of Iridium NEXT.

ITT Space Systems Division

ITT Space Systems Division, headquartered in Rochester, New York, provides innovative remote sensing and GPS navigation solutions. For more than 50 years, we have helped our customers visualize and understand critical events happening on Earth, in the air, or in space in time to take effective action.

ITT Space Systems' solutions span from image and data collection through processing and dissemination. Key applications include intelligence, surveillance and reconnaissance; high-resolution commercial imaging; Earth and space science; climate and environmental monitoring; GPS navigation solutions; image and data processing and dissemination; and space control and missile defense. ITT was involved with the first commercial imaging systems and continues to lead the way today with systems flying on **WorldView-1** and **-2**, and **GeoEye-1** high resolution commercial remote satellites. These systems are producing the most advanced imaging available for use by government and commercial enterprises like Google Earth. In addition to the planned **GeoEye-2** satellite, this advanced, proven technology is scalable to offer warfighters a future constellation of operationally responsive, smaller and very affordable, tactical imaging satellites.

This year also marked the launch of the **GPS IIR-21(M)**, the last in a series of eight modernized GPS IIR satellites, providing precise three-dimensional position, time, and velocity information. Building on the successful IIR-M series, ITT is developing next-generation GPS III technology, with a first launch scheduled for 2014. Increased power to resist jamming and faster clock update rates will help ensure mission success on the battlefield. Moreover, enhanced GPS performance is becoming increasingly important for civil applications, such as the **FAA's Automatic Dependent Surveillance-Broadcast** satellite-based air traffic control system, whose ground implementation was awarded to ITT in 2007. The company is also working on GPS next generation *ground control segment* (**OCX**) opportunities.

In meteorological payloads, 2009 saw the launch of the **NOAA-N Prime** weather satellite, featuring three sounding instruments; among them is ITT's *High Resolution Infrared Radiation Sounder* (**HIRS/4**). The HIRS/4 is used to obtain measurements determining ocean surface temperatures, total atmospheric ozone levels, cloud height and coverage, and surface radiance. The satellite also boasts two radiometers including ITT's *Advanced Very High Resolution Radiometer* (**AVHRR/3**), recognized as the operational imager for global weather data. The AVHRR/3 is a six multi-spectral channel radiometer, up from a four-channel in its original form. The additional channels have contributed to improvements in performance and operational capabilities, as well as improved spectral performance such as low light energy detection, snow/ice discrimination and global vegetation index.

Midyear, ITT announced it has successfully completed building the prototype model of the *Advanced Baseline Imager* (**ABI**) for the **Geostationary Operational**

ITT Space Systems Division

Environmental Satellite-R (GOES-R) program, a major milestone as the GOES-R program progresses toward an expected launch in 2015. The ABI instrument represents the first significant increase in technology and capability for the GOES satellites since 1994. ABI will monitor three times the number of atmospheric conditions currently measured and will provide enhanced images down to 0.5 kilometers. ABI can also make its severe weather data and images available to forecasters every 30 seconds rather than the current rate of 7.5 minutes and full Earth images in five minutes rather than the current rate of 30 minutes. Another major improvement will allow **NOAA** for the first time to zoom in to track a specific storm while still collecting data and images from across the country. These advancements will provide more accurate and localized forecasts, thereby improving predictions of a storm's development, path and intensity, saving lives in the process.

For more than 40 years, ITT has supplied multi-spectral imagers and sounders to the nation's civil and military weather forecasting services. ITT systems are deployed as operational assets, providing 24/7 coverage from geostationary and low earth orbit. This heritage makes ITT uniquely positioned to help meet the growing need for even more advanced climate and environmental monitoring solutions. ITT was selected by NASA to help design, develop, and test a set of instruments to measure carbon dioxide (CO₂) from air and space in support of NASA's *Active Sensing of CO₂ Emissions over Nights, Days and Season (ASCENDS)* mission, which is expected to launch in 2015. In a 2007 survey by the **National Academy of Sciences**, **ASCENDS** was identified as being crucial to quantifying global distributions of land and ocean sources and sinks of CO₂, which provides the scientific basis for future projections of carbon dioxide in climate models.

In space science, ITT celebrated the tenth anniversary of the launch of the **Chandra X-Ray Observatory**, designed to detect X-ray emission from very hot regions of the universe such as exploded stars, clusters of galaxies, and matter around black holes. ITT was contracted to build the X-ray telescope for the satellite that consisted of a *High Resolution Mirror Assembly (HRMA)* and an *Optical Bench Assembly (OBA)*. The HRMA consisted of four mirror sets that were co-aligned to produce a telescope showing 50 times more detail than any previous X-ray telescope. The OBA, which supports the two-ton HRMA at the fore end, remains the largest composite structure ever flown by NASA.

Looking ahead, ITT continues work on the **James Webb Space Telescope**, scheduled for launch in 2014. The company is responsible for integrating components made by various team members to form the optical telescope element, as well as subsequent cryogenic testing of the telescope and *Science Instrument Module*. ITT delivered the mounted *Focal Plane Assembly* on the *Near-Infrared Spectrograph* detector to measure the redshift, metallicity and star information rate in first light galaxies. In addition to superior image and data collection capabilities, **ITT Space Systems Division** provides solutions that help analysts process and disseminate images and data quicker than ever before and often through constrained bandwidths. In 2009, ITT announced its *Image Access Solutions (IAS)* was transmitting detailed satellite imagery to ships in the Arctic Ocean to help them study and/or avoid ice in near real time. This year also marked the launch of **ENVI 4.7** and **ENVI EX** for the *geographic information systems (GIS)* professionals by **ITT Visual Information Solutions**. These latest versions of ENVI combine powerful analysis tools and seamless integration with ESRI's leading GIS platform, **ArcGIS**, to streamline workflows and allow users to easily extract important information from imagery.



KVH Industries

KVH Industries' TracPhone V7 satellite communications system and mini-VSAT Broadband network recently exceeded two years of service and boasts more than 500 units sold, with valuable new features and service regions ensuring viability for years to come — that represents almost 10 percent of the installed base of maritime VSAT systems as estimated in the "2008 Maritime VSAT Markets Report" published by COMSYS.

Two years ago, the **mini-VSAT Broadbandsm** network became the preferred day-to-day communications solution for vessels worldwide. Introduced in late 2007, **KVH's** mini-VSAT Broadband network and **TracPhone® V7** hardware offered mariners a fully integrated hardware, network, and service solution — the first to offer a 24-inch VSAT antenna and **ViaSat's** patented **ArcLight®** spread spectrum technology. mini-VSAT Broadband operates using the KVH TracPhone V7 antenna, which is 85 percent smaller by volume and 75 percent lighter than those employed in 1-meter VSAT equipment — the TracPhone V7 is only 24" (60 cm) in diameter and weighs 60 lbs (27 kg) as compared to the 40" (1 m) or larger traditional VSAT antennas that weigh 250-400 lbs (115-180 kg). As a result, the compact TracPhone V7 reduces the cost for hardware and installation, often by more than 50 percent — and, there is no compromise in performance. KVH and ViaSat are offering voice service and Internet access as fast as 512 Kbps (upload) and 2 Mbps (download) at fixed monthly rates to mariners as well as network coverage to the **ViaSat Yondersm** mobile broadband service, and others who want to stay connected with high-speed mobile networking.

For many vessel operators, the KVH solution is an option for new vessels as well as a replacement for existing solutions. A vital factor in the growth of demand and continued enthusiasm among mariners have been KVH's aggressive efforts to roll out the mini-VSAT Broadband network to ensure boaters would have the coverage where needed. At the start of 2009, the network was operational in a limited number of regions: North America and the Caribbean, the North Atlantic, and Europe. In January, KVH announced mini-VSAT Broadband coverage in the Pacific Ocean region, starting off the year with coverage for Alaska, the west coasts of Canada and the United States, Hawaii, and part of Asia. Over the course of the year, mini-VSAT Broadband went live in the Persian Gulf, Asia-Pacific waters, Australia, New Zealand, and a further expansion within the Atlantic. Africa and the Indian Ocean are also under contract and expected to offer live service this year.

The network is now supported by seven secure Earth stations around the globe, together with seven of the world's most powerful communications satellites. With this coverage, mariners can enjoy mini-VSAT Broadband service in every key maritime region in the world, with the exception of South America, where service is currently in development and expected to go live early in 2010. Shifting among each of these coverage regions and the associated satellites is a simple affair, as the network was designed from

KVH Industries

the start to offer seamless regional roaming. As a result, mariners using mini-VSAT Broadband no longer need to swap out antenna hardware or make configuration changes to the modem and control systems. Instead, it is a fully automatic process.

During 2009, KVH also took steps to assist mariners who had already made an investment in other communications technology, such as **Inmarsat's** L-band systems, which offer global coverage but also carry a higher airtime usage cost. By pairing mini-VSAT Broadband with an existing service such as **Inmarsat Fleet** or **FleetBroadband**, mariners enjoy greater flexibility and affordability with mini-VSAT Broadband as the day-to-day communications system and Inmarsat as the supplemental system to ensure that communications are never lost, even outside the mini-VSAT Broadband coverage area. KVH now support several options for hybrid satellite communications solutions including the *LiveWire Service Selector* and other "middleware" solutions, such as **Dualog** and **Virtek**, which can be set to use the mini-VSAT Broadband service by default and switch to another service only when the vessel travels outside the mini-VSAT Broadband coverage area.

Compatibility with these software solutions was one of KVH's major developments in 2009, especially when paired with the new hardware lease with bundled airtime options. Introduced in early 2009, the program helps spread the cost of the TracPhone V7 hardware out over the course of the airtime agreement during which time the airtime cost savings enjoyed often more than cover the cost of the hardware lease itself. These options are quickly gaining popularity among commercial mariners who want to make use of the systems they already have while adding mini-VSAT Broadband in a budget-friendly manner.

While the mini-VSAT Broadband network offers a powerful and affordable "pipe" for data, 2009 also saw KVH continue to develop new options for the mini-VSAT Broadband service to increase the versatility of the system and meet the growing needs of mariners. In June, KVH launched its new cost-saving crew calling solution. This option makes it easy for fleet owners to manage crew members' network use separately from the ship's day-to-day business with several options designed to minimize time spent managing the crew calling program. In October, KVH announced that it is collaborating with **On-Waves Ehf** to develop an affordable picocell solution that will allow crew members, passengers, and onboard contractors to use their own GSM cell phones onboard ships via the mini-VSAT Broadband network.

As the demand for maritime broadband grows, KVH will continue to add valuable new functionality to the mini-VSAT Broadband network, allowing mariners to do more, in more places, with less time and money. This is great for commercial operators and yacht owners, as new cost-saving measures and convenient features will make their vessels more productive.



In the field, however, it seems that this is already the case. As Captain *Bryant* of the **American No. 1** explained, "The TracPhone V7 and mini-VSAT Broadband are changing the entire way we do business!"

Article written by Nicole Chevrette, a member of the KVH Industries Marketing Communications team.



Lockheed Martin Commercial Space Systems

As the convergence of military and commercial space continues, Lockheed Martin remains poised to leverage existing strengths in both the military and commercial satellite sectors to meet current and future customer needs. Lockheed Martin Commercial Space Systems (LMCSS) continues to focus on superior design, system engineering, integration and test as its pathway to mission success.

On August 21, 2009, the high-power hybrid satellite **JCSAT-12** was launched successfully from *Kourou*, French Guiana, the 38th **Lockheed Martin**-built **A2100** spacecraft and the fifth delivered to **SKY Perfect JSAT Corporation** of Japan. Delivered to the launch site in just 22-½ months, JCSAT-12 consists of 30 active Ku-band transponders and 12 active C-band transponders, providing broadcast and broadband services to Japan, Oceania, the Asia-Pacific region and Hawaii. JCSAT-12 is designed for a minimum service life of 15 years and will serve as a back up satellite

for other SKY Perfect JSAT satellites.

The **Lockheed Martin A2100** geosynchronous spacecraft series is designed to meet a wide variety of telecommunications needs including Ka-band broadband and broadcast services, fixed satellite services in C-band and Ku-band, high-power direct broadcast services using the Ku-band frequency spectrum and mobile satellite services using UHF, L-band, and S-band payloads. The A2100's modular design features a reduction in parts, simplified construction, increased on-orbit reliability and reduced weight and cost. A hallmark of **LMCSS**, the A2100 has been the consistent commercial product of choice for reliability, performance, and credible cost and delivery schedules.

LMCSS strongly values its commitment to its customers — **VINASAT-1**, the first spacecraft procured for the nation of Vietnam, continues to perform well on-orbit. The satellite, launched in 2008, provides state-of-the-art radio, television and telephone communications to all corners of the country, enabling Vietnamese citizens to use multiple services such as mobile broadcasting, DTH television, video conferencing and data transmission. VINASAT-1 is also improving the nation's communication networks infrastructure by removing dependence on ground networks and allowing 100 percent of Vietnam's rural communities to be equipped with telephones and televisions.

Looking to 2010, Lockheed Martin is committed to operational excellence by delivering high-performing, highly capable space systems while pursuing cost reduction initiatives, improving competitiveness and generating better value for its customers. On the horizon is **BSAT-3b**, a satellite that will provide HD direct broadcast services throughout Japan following its scheduled launch in 2010 aboard an **Arianespace** launch vehicle. BSAT-3b is the second consecutive satellite order **B-SAT Corporation** has awarded to Lockheed Martin. Lockheed Martin successfully delivered **BSAT-3a** in August 2007. The LMCSS formula of improved operational efficiencies, combined with the reliable A2100 satellite series, a solid backlog and an impressive record of mission success, will position Lockheed Martin as a flexible and adaptable player to changing industry demands now and in the future.

Marlink

Despite the global economic downturn causing a difficult year in the communications industry, Marlink has succeeded in attracting a high level of activity in the face of financial restraints. This has resulted in the company maintaining its leading position in the marine satellite communications market despite the maritime industry focus on reductions in expenditure. While shipping companies have been forced to review their costs, satellite communications have become increasingly critical for business efficiency, as well as attracting and retaining skilled crew. Due to lower capital investment, we have received stronger demand for MSS on-demand services such as Inmarsat FleetBroadband and Iridium Openport, which have benefited from this trend.

VSAT is an attractive solution for maritime businesses implementing stricter financial planning and it is my belief that demand for VSAT services will continue to rise. VSAT provides high quality, reliable connectivity at a fixed monthly cost, offering customers with high bandwidth requirements, exceptional value. Customers also benefit from the predictability of knowing exactly what their costs will be, enabling them to plan and manage satellite communications expenditure effectively.

Going into 2010, new developments in the market will add to the attractiveness of VSAT. The introduction of shared bandwidth services has helped to make VSAT systems more affordable for moderate communications users. Customers are able to lease equipment directly through **Marlink**, which eliminates the need for high capital investments in equipment, so coupled with the shared bandwidth a VSAT service is more accessible to a wider market of maritime businesses. The option to lease equipment will also be made available for Inmarsat FleetBroadband services to support the maritime industry during difficult times.

Marlink's strategy during 2010 will remain similar to that of 2009, with ongoing focus on providing high quality, reliable and cost-effective satellite communication solutions. As part of this commitment, we will expand our **FleetBroadband** offering to include more attractive bundles and Value Added services. We will also continue to expand Ku-band coverage so that by the end of Q1 of next year, we will be offering Ku-band coverage on a global scale, to all major shipping regions of the world. Smaller and easier to install, our Ku-band antennas have lower installation and service costs than high-end C-band antennas and are proven as a cost-effective solution for customers that do not require the exceptional bandwidth and capabilities that our C-band solutions provide.

To ensure we provide service of the highest quality, Marlink has customer service centres operating in major regions throughout the world. This level of local presence means that we are able to offer faster, more effective and locally focused levels of service intervention and customer support whenever required. In addition, we employ experienced and skilled engineers who are available all year round, ensuring that we provide reliable

communications, any time, any place.



MITEQ / MCL



Howard Hausman,
President



The past year started out with much uncertainty; the words heard were that capital investment was gone. With that sort of thinking — valid or not — the question posed for any CEO is... exactly what direction does one steer the company? At MITEQ, we believe in our products, we believe our industry has value to the public, and we believe the demand — even if it temporarily slowed — will start to improve.

There are opportunities in all economies, but not necessarily in all markets. **MITEQ**, an acronym for (M)icrowave (I)nformation (T)ransmission (EQ)uipment, is a diverse microwave engineering and manufacturing company. We operate 15 different departments in Hauppauge, New York, plus **MCL Inc.**, a high power amplifier company in Bolingbrook, Illinois. Each company is a world class supplier of microwave components and technologies for SATCOM, RADAR, missile guidance, reconnaissance systems, and commercial avionics systems. Our depth of products for the satellite communications include Low Noise and High Power Microwave Amplifiers, Up- and Downlink Frequency

Converters, Test Translators, Beacon Receivers and virtually every microwave component between the modem and the antenna.

MITEQ's plan for 2009 was to stick to the basics, reinforce our product lines, continue to provide value for our customers, all the while developing the technology that currently is, and will be, in demand. To strengthen our operation, we organized our manufacturing, realigned our products, reinforced our program management, and focused our engineering. These were not small tasks, but we accomplished all while we maintained our shipments. We experienced a small increase over last year and significantly increased our backlog. We also added numerous new products for the SATCOM market as well as added many new microwave products to support our military and space systems customers. Overall, 2009 was a good year for MITEQ. A few of the new SATCOM products introduced or upgraded by MITEQ in 2009 were:

- **A new Beacon Receiver, used to track orbiting satellites**
- **An upgraded satellite receiver originally built for the INMARSAT satellite system and currently being used in other applications, such as correcting satellite Doppler shifts and extending the life of wobbling orbiting satellites**
- **New and upgraded block up- and downconverters, enabling cost effective multicarrier satellite transmission**
- **An upgraded uplink power controller (still in engineering), correcting satellite signal levels affected by adverse weather conditions**

Throughout 2010, MITEQ expects to continue introducing new microwave products, improving our current product offerings, and combining these products to offer our customer a total integrated microwave solution. MITEQ's high quality, innovative engineering, and customer service have enabled the company to weather a year of uncertainty in our industry. By holding steady to our principles and working with our customers, 2010 is expected to be a growth year for MITEQ.

Newtec



Serge Van Herck, CEO

In what has been a challenging year for broadcasters, operators and service providers, demand for satellite based services has remained high even as operators look to improve their bottom line. Satellite service providers, broadcasters, telcos and ISPs are facing the need to diversify their service offering, delivering content to consumers via a range of platforms from IP to mobile.

Thanks to our technological innovations, **Newtec** has strengthened its leadership position in the broadcast and IP markets as market leaders when it comes to TV and IP applications over satellite. **FlexACM®** helped Newtec penetrate the IP trunking market as well as winning us a **WTA Technology of the Year Award**. In the broadcasting world, we scooped the **Innovation Award** with **ASBU & Arabsat** for **MENOS** at this year's **IBC**. Newtec also strengthened its position as European market leader in the Internet consumer business with 65.000 **Sat3Play®** terminals shipped through offerings by **SES Astra** and expansion into Africa, while our new modulation and coding technology 4CPM enabled us to start accessing the business market. Thanks to our customers providing us with more business, we have been able to increase our revenues to end our fiscal year with a revenue increase of about 15 percent, breaking the barrier of 50 million Euros, even in this tough economic climate.

In 2009, Newtec launched a highly advanced modulation and coding scheme called **4CPM**. The coding scheme increases the speed and bandwidth efficiency of the return link of the Newtec Sat3Play® system. The development of this new modulation scheme started back in 2006, and was developed by Newtec in cooperation with the France's *Ecole Nationale Supérieure des Telecommunications (ENST)* and the Italian universities of Parma and Bologna. **TurboConcept**, Newtec's subsidiary in Brest (France), designed and implemented the core 4CPM algorithms. 4CPM enables return rates of 1Mbps and higher making the terminal a perfect fit for the consumer as well as the professional markets.

IP over satellite networks based on **Elevation** equipment can start as basic IP trunking networks and easily be upgraded at a later stage with the *Variable Coding and Modulation (VCM)* technology to save more on bandwidth. The additional data throughput made available by using FlexACM technology can be used to increase the data throughput of the network or to add more remote sites to the network within the same satellite capacity. It's even possible to provide fixed speed services to the end users, while still enjoying all the advantages FlexACM offers.

In the MENA region, **Horizon Satellite Services** in the UAE successfully upgraded its link facilities with Newtec's redundant FlexACM solution, which connects several sites in the Middle East with uplink in Europe. In the broadcasting world, independent Iraqi satellite TV station **Alsumaria TV** invested in Newtec's IP over satellite solution as part of its migration towards tapeless news production. In Africa, a leading satellite communications company providing carrier and business network solutions is using our IP Elevation equipment with FlexACM in multiple IP trunking networks to increase the bandwidth efficiency of its intercontinental data links between Europe and Africa, increasing the bandwidth by 50 to 100 percent.

Newtec

In Latin America, Alcatel-Lucent selected Newtec's high-speed IP modems and active L-band combiners to provide high-speed IP backhaul over satellite for one of Brazil's major telecom operators. Newtec's equipment is also being used in difficult and demanding locations: live satellite broadcasting from a ship close to 90 degrees North, with wind speeds of up to 250 km/hr and freezing temperatures of -40°C, requires extremely reliable equipment. **Thuraya Telecommunications Company** has selected Newtec's **TelliNet** solution as part of its ongoing efforts to enhance the performance of its **ThurayaIP** broadband offering. Thanks to the TelliNet upgrade, Thuraya is able to offer its customers an increase in speed when web surfing and a 50 percent reduction in data download times.

To facilitate the migration towards IP, Newtec developed **DualFlow**, an innovative option available on all **Azimuth** broadcast products. This option provides support for the IP-based workflows of today and tomorrow for DSNG, contribution, and distribution services. **Qualcomm** subsidiary **FLO TV** has selected Newtec's multistream technology and products for an upgrade of its mobile TV content distribution network. Newtec is FLO TV's main supplier of *Multistream Satellite Receivers*, with multiple **ASI** and **GbE** interfaces, installed in all the company's terrestrial UHF transmitter towers. The GbE interface delivers true IP connectivity to the transmitter sites for future applications, such as the distribution of IP services and IP networking applications. As well as robust coding and modulation, the receiver offers operators the flexibility to match QoS to the type of content being delivered via the VCM (*Variable Coding and Modulation*) functionality.

Newtec, with its partner **Lumina Broadcast Systems Australia**, won a contract from **GlobeCast Australia** to design and deliver Newtec's **AZ110 Modulators**, and **AZ750 Combining Upconverters** to create a flexible and cost effective uplink system. The project enables GlobeCast Australia's Sydney broadcast operations to offer new services to clients that are uplinking and downlinking HD program content. The installation is part of a massive upgrade of the GlobeCast Australia master control and teleport, to cope with current and future demand. As a result, GlobeCast Australia's MC has doubled in capacity. The Newtec systems installed at GlobeCast Australia allow the service provider to ensure interference free combining of multiple carriers, low losses and minimal spectral regrowth.

Mobision launched the Middle East's first commercial mobile TV service delivering more than 20 of the region's most popular TV channels to subscribers in four cities in Iraq. With the help of Newtec's **Horizon HZ420** equipment, signals broadcast via satellite are converted into DVB-H, which are then transmitted using medium and high power terrestrial transmitters.

2010 is set to be another exciting year for Newtec as the number of TV channels, satellite broadband consumers and the IP traffic worldwide are expected to experience continued growth. Broadcasters look forward to drive increasing end-to-end efficiency across their infrastructure. As switchovers occur from analog to digital, terrestrial TV and Mobile TV are expected to experience further growth, as well. The technology FlexACM is bringing to the IP world, and the increasing need of countries to close the digital divide, combined with the availability of Ka-band satellites, will see further potential for double digit growth in the coming year. I am, therefore, convinced that 2010 will be another year of exciting growth for Newtec.





Bob Chewter, CEO

This past year, NSSL turned 40. An impressive age for any company, but particularly for one that exists in the fast moving and ever changing world of satellite communications. And, quite fittingly, I can honestly say that since our inception in 1969, NSSL has never had a more exciting year. We have not only survived the economic down turn, but we have thrived. In 2009, NSSL achieved Distribution Partner status for BGAN, FleetBroadband, and GSPS with Inmarsat, picked up an industry award, launched a new service across Africa and the South Atlantic, formed a new partnership with Telemar Scandinavia and continued to support the British Forces in a variety of inspiring and challenging expeditions.

The year got off to a flying start when we announced a joint partnership with **Telemar Scandinavia** for Maritime Broadband Services. From February, **NSSL's Cruise IP** and Telemar Scandinavia's **Seacall** services both began using the same high-quality broadband platform. Our two companies also jointly launched a new DVB hub at the *Nittedal Land Earth Station (LES)* in Norway and integrated it into our existing DVB-S2 networks, extending coverage for NSSL and Telemar Scandinavia maritime and land customers. By accomplishing this, NSSL and Telemar Scandinavia now offer extensive Ku-band maritime broadband coverage areas, with services across the Pacific, Mediterranean, Caribbean, all of Europe and the Middle East.

In March, we celebrated confirmation that NSSL had been granted the much coveted status of *Distribution Partner* by **Inmarsat** for its **BGAN** and **FleetBroadband** services after a thorough review of our capabilities and business plans, Inmarsat appointed us as a Distribution Partner. Having an increasingly direct relationship with Inmarsat has meant that NSSL is able to respond more rapidly to changing customer requirements. We have been able to introduce greater creativity and flexibility, offering customers a variety of tailored airtime pricing packages. On the technical front, having a direct connection into the Inmarsat network at our Point-of-Presence (POP) in London, U.K., allows us to bring a range of Value Added Services to market, as well as bespoke solutions specifically designed around the customer's application and networking requirements.

What made the announcement particularly unique was that it covered Inmarsat's BGAN (492/492kbps land mobile broadband) and FleetBroadband (432/432kbps maritime broadband) services. When coupled with NSSL's Tier-1 distribution status for BGAN and FleetBroadband hardware and world-class customer support, maintenance and integration services, NSSL customers are now able to enjoy true end-to-end service on land and at sea.

In May, NSSL began offering organisations that operate across Africa greater choice when it comes to keeping in touch. Those organisations that wanted faster and more robust broadband connectivity were able to benefit from a substantially quicker 3MB (and then later 4MB) connection. This represented a massive increase in speed in comparison to other communication solutions and at a far more accessible price. All of this was possible thanks to the launch of the new **T11** satellite.

NSSL



Improved broadband access will help to solve some of the issues that have prevented organisations that operate in Africa from fully enjoying the benefits of rapid and reliable communications. As a new provider in the region, NSSL is now able to act as a convenient one-stop-shop for all SATCOM needs. We provide upfront consultancy on the most suitable equipment, and can then provide that equipment from a broad selection of different types and models. NSSL then manages the service contract and provides ongoing maintenance support.

In October we launched a new *Crew Card* offering on FleetBroadband. This new offering has been designed to boost crew morale by offering crew members, stationed for long periods of time across the globe, a more affordable and reliable method of contacting loved ones.

At the end of October we were delighted, once again, to be selected as a Distribution Partner for Inmarsat for the new **Global Satellite Phone Services (GSPS)**. The appointment started immediately and next year (Q2 2010), the first product to be introduced will be the **IsatPhone Pro**, a global handheld service.

In November, NSSL celebrated the successful completion of the **KC09** expedition. More than 80 **Royal Marine** and **Royal Navy** personnel returned home after undertaking a truly inspiring expedition to *Khumbu*, the mountain range in the *Everest* region in the Himalaya. The team made use of the latest in satellite communications technology from NSSL, allowing them to stay in contact with friends and family and with the base camp. They also used the equipment to update the expedition website with diary entries and videos and, should the need have arisen, to call in emergency support.

KC09 was the inaugural expedition of **Project FORTITUDE**, an initiative to further enduring rehabilitation opportunities for the men and women of the Royal Marines, Sailors and Soldiers who have been injured on operations and who have suffered visible wounds as well as those who bear the less visible wounds of psychological injury. The aim was to enhance the support to individuals and their dependants during the rehabilitation phase from point of injury until re-integration within the Royal Marines/Royal Navy, or integration into civilian employment, care, or retirement. Opportunity, Challenge, Focus, and Belonging were the cornerstones of the expedition. The Khumbu Challenge team was comprised of five teams totalling 86 personnel.

What better way to wrap up the year than to receive an important award! At the *Inmarsat Global Partner Conference* in Berlin, NSSL was recognised for *The Greatest Contribution to BGAN Growth 2009*.

What a year! And 2010 is set to be, if anything, even more exciting.



Independent advice



O3b Networks

O3b Networks Limited, the developer of a new global, high-speed, satellite Internet network for telecommunications operators and ISPs will be ending 2009, its second full year in existence, on a positive note and with a great deal of excitement as the company looks forward to a pivotal year in 2010.

O3b Networks, funded by **SES, Google Inc., Liberty Global, Inc., HSBC Principal Investments** and **Northbridge Venture Partners**, is making rapid strides in its deployment of the world's first ultra-low-latency, Medium Earth Orbit (MEO), Ka-band, fiber-speed satellite network. The network is designed to improve Internet access for millions of consumers and businesses in emerging and developed markets, as well as selected vertical markets.

According to *John Finney*, Executive Vice President, Sales & Marketing, "O3b was started with a vision to connect the unconnected. O3b's importance is significant for the people we will serve, who without us, will not have the economic relevance, potential and opportunity which we all believe is so important. 2009 was a strong year for us in achieving this objective. Everyone member of our team, our vendors and consultants and even our customers have embraced this vision"

This year started off on a positive note for O3b, with **Thales Alenia Space** completing the *Preliminary Design Review (PDR)* of the *Constellation Space Segment*. This PDR demonstrates progress towards an on-time delivery of the O3b constellation and this progress also created customer confidence as the company completed the first quarter with major contracts from its target markets for a range of services. O3b was also able to make significant progress over the next two quarters of 2009 in both customer acquisition and product launch.

Some of the changes in the new organization included the appointment of *Greg Clarke* in November as its new Chief Executive Officer. Mr. *Clarke*, a former Chief Executive Officer of Cable and Wireless joined O3b with over 25 years experience in the telecommunications industry.

Mr. Clarke was asked about the momentum of his company, and he replied, "We are really excited about our progress and importantly, the response of customers to our product portfolio. We are proud to report that we have presold every application we developed for the initial launch of our satellites.

"We listen carefully to our customers ensuring that our services are available to meet the most advanced network requirements in time for O3b Service activation. This gives customers the assurance that they have a solution that is right for the growth they are anticipating. Our attractive pricing and flexible terms has also made it easy for customers to make purchasing decisions to meet their long term bandwidth requirements."

Mr. Clarke then added, "We are immensely proud of our achievements at O3b Networks so far. In just under two years, O3b has met and exceeded its internal revenue projections and raised start-up capital from leading companies across the world. We have designed a revolutionary system; one that will transform the way communications are handled in many of the world's underserved markets. As we move into 2010, we look forward to

O3b Networks

working with our partners and suppliers to ensure our project remains on schedule.

We also intend to expand the support we give to our customers to help them fulfill their business goals and vision for developing the Internet beyond its traditional boundaries."

The company also made significant progress in its funding activities, announcing in mid-September that it had secured a US\$465 million credit facility, secured from **Coface**, the export credit agency acting on behalf of the French Government.

More recently, in November, the company announced that it received US\$75 million in funding from world renowned satellite operator **SES**, who reaches 99 percent of the world's population via a fleet of over 40 satellites. As a major investor in O3b, SES will provide engineering and commercial support to assist the company's development. According to Mr. *Clarke*, "The financial, technical and commercial support of SES will help make O3b one of the most innovative communications companies on the planet, bringing broadband Internet access to the 'other three billion' who currently have no access to these services."

"O3b's positioning perfectly meets our vision of bringing people closer together through the power of satellites," said *Romain Bausch*, President and CEO of SES. "Through its innovative satellite technology, O3b will be able to provide emerging markets with fast, competitively priced Internet connectivity that is currently only available to the developed world. As we look to celebrate our 25th anniversary next year, and reflect on how far we have come since we were a young start-up company, we are excited to embrace and support this next generation infrastructure initiative, and to help O3b make their vision — and ours — a reality."

Having achieved a great deal in 2009, the company is now firmly focused on, and looks forward to a promising and successful year ahead.



OmniBus



Ian Fletcher, CTO

No one would have wanted to predict at the start of 2009 what the year would bring for the industry. Most people probably feared the worst and held their breath. But about halfway through the year, it became clear there was not going to be a fall-off in new infrastructure investment and, in fact, from our viewpoint, the industry seemed to have been unaffected by the crisis. Satellite broadcasters, in particular, appear quite buoyant, despite the troubled waters. A subscription-based funding model must help here — other broadcast sectors which are more reliant on advertising revenue may be finding the current situation somewhat more difficult.

If 2009 turned out to be an extremely busy and successful year for **OmniBus**, perhaps this shouldn't be a surprise as our flagship product — the **iTX** production, automation, and transmission platform — offers a next-generation approach to getting high-value channels on air. The technical and financial advantages of the all-software iTX platform over a traditional transmission system are enormous. And while broadcasters are still launching channels with no sign of slowdown, they are increasingly wanting to accomplish this task in the most efficient and cost-effective way — to some degree, the economic circumstances are working in favor of iTX.

When it was launched in 2006 as the industry's first software-based, full-featured automation and transmission solution, there was some natural skepticism about committing critical broadcast transmission to software driven systems. Never mind that many other areas of broadcasting had accepted the software revolution and been the better for it: transmission, the traditionalists felt, needed proprietary hardware.

Three years and nearly 1,000 installed channels later, this view has been largely superseded by a widespread realization that the old approach to transmission infrastructure is no longer viable. The high-profile example of large-scale iTX operators in the USA, such as **DIRECTV**, pointed the way for others attracted by the benefits of iTX's IT-based alternative to the traditional transmission and automation chain.

The largest satellite broadcaster in the world, DIRECTV, also currently has the largest iTX installation to date. DIRECTV'S launch this year of its new HD services also saw an industry first: the first commercially-available broadcasts in 1080p24. This advance meant that for the first time, high-end consumer sets could receive broadcast content at the highest supported quality, and DIRECTV'S successful launch was a great validation of the iTX platform's ability to power demanding, high-performance applications.

In the satellite sector in particular, where the launch of new and often innovative channels and services continues apace, dictated by market logic, iTX offers the most attractive solution for channel launches. Technically, its capabilities outstrip the previous generation of transmission solutions, but it's also a good fit for the times because, like-for-like, an iTX installation requires around 50 percent less investment than a traditional transmission chain. Ongoing costs are also significantly lower, both in energy consumption and maintenance, and in operator expenses.

Omnibus

At movie channel operator **Starz Entertainment**, where the obsolescent transmission infrastructure has been replaced by an all-new iTX installation, the company has freed up 45 bays of equipment space — that's a lot of real-estate. With all the cabling, power supply and cooling that 45 ceiling-height bays require, that represents a considerable impact on investment and running costs. And the benefits increase with scale — the larger the installation, the greater the savings.

Broadcasters carving out new market share with channel launches and new services in the current climate are also acutely aware of the need to closely gear infrastructure roll-out to growth in the subscriber base. With traditional transmission chains it's been difficult to do this: not only is the hardware expensive in itself, it's also difficult and time-consuming to weld disparate components from a variety of manufacturers into a workable, broadcast-ready system. It takes time and a lot of engineering input to do it — an area of cost and delay that loses a fast-moving broadcaster a lot of money. By contrast, new iTX channels can be installed and on-air within a matter of hours of taking the decision to launch. Every 'component' of the transmission chain is provided within the unified iTX software suite, and the IT hardware required to run iTX is readily available at the drop of a hat anywhere in the world from industry-standard suppliers.

While the conditions are hardly auspicious for infrastructure investment, broadcasters in the satellite sector have marched on through 2009 with new launches and expansions. New technology such as iTX fits their needs perfectly, allowing them to create the services they want to launch, but significantly faster and more cost-effectively. While the HD market has driven growth in the U.S., which is rolling out through Europe and Asia, operators have had to become far more cost-conscious, ready to adapt to market opportunities more quickly, and able to evolve in ways not constrained by unwieldy and inflexible infrastructure.

We see no sign of this trend weakening in the coming year and beyond, even as recovery gathers pace. In fact, the efficiencies and new technical potential offered by the new technologies are essential to that recovery. Meanwhile, ground-breaking developments such as the 1080p24 service from DIRECTV will surely inspire imitation, as providers strive to carve out market share and reach new audience sectors.



Omnibus iTX at work

Satellite operators, in particular, are well-placed to develop tightly customized services as they know a great deal about the viewer profile — this will allow them to use highly-tailored content and service provision as a way of maintaining profitability. With the highly adaptable transmission platform now available to broadcasters, there is vast new potential for creating tightly customized services that would have been impossible to implement until recently. The repercussions of the economic crisis may not yet be fully played out, but it's fair to predict that broadcasters will use the new cutting-edge IT based technologies to help them drill down into ever more targeted services that will keep the subscriber base growing throughout 2010.

Pactel International

2009 has been a year when many companies have been forced to cut back on investment — thankfully, Pactel International is moving from strength to strength. To align with our expansion strategy and the growth of new geographical markets we changed our name from Pacific Teleports early in the year. Pactel International announced its new name on July 1st, stating its long term strategy to advance our global presence while continuing to maintain a strong focus in Asia Pacific.

This year has seen many key achievements for the company. We commissioned our new *Shiron Intersky* hub in Hawaii which allows us to deliver high-speed, reliable connections coupled with the latest delivery technologies to anywhere in the Asia Pacific region, including onboard marine vessels.

This year also saw **Pactel Mobile** (part of Pactel International) appointed by **Tuvalu Telecom Corporation** to install a replacement mobile phone network to operate on the main Island of *Funafuti*. The existing network had been damaged by a storm, leaving the Island's customers without mobile phone coverage. The GSM mobile network system allows prepaid customers to access normal mobile services at extremely reasonable rates, where other current technologies would not make commercial sense. The tragedy of being unable to communicate effectively at a time of crisis was never more evident than when tsunamis hit the Pacific islands earlier this year. The new network installed by Pactel allowed effective and timely communication to be sent to island residents warning them of the possible dangers and giving them vital time to prepare.

As the market moves into 2010, mobile telephony is expected to continue to outpace fixed-line connections growth. Pactel International intends to take full advantage of this market by continuing the roll out of our mobile system throughout Asia Pacific and partnering with like-minded companies (e.g., **Shiron, SES New Skies, Intelsat**), delivering high speed bandwidth throughout the region, including vessels at sea. In addition, the change in world economies and boom in the resource sector provides a springboard for Pactel International to drive new ventures into these areas, such as oil & gas as well as mining. Pactel plans are quite simple — to grow from being the premiere satellite Internet provider in the Pacific to becoming a true global presence.

Pactel International was co-founded in 2003 by *Andrew Taylor* and *Steffen Holzt*, both having more than 20 years of experience in the satellite and telecommunications industry. Pactel is focused on innovative, forward thinking, and flexible telecommunication solutions that provide added value for their customers. Plus, Pactel International prides itself on its ability to understand customers' unique connectivity requirements and provide bespoke solutions guaranteed to meet individual needs and budgets.



Paradise Datacom

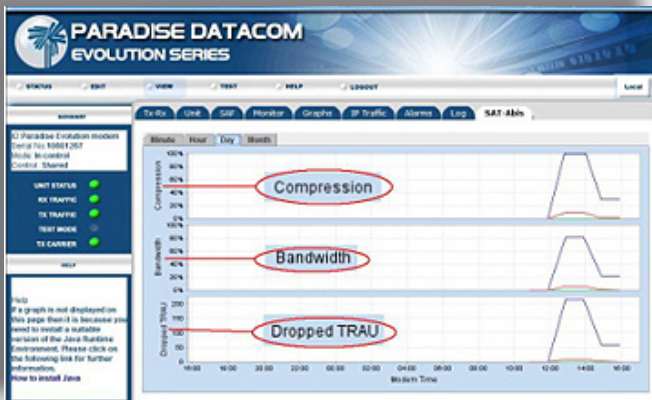
Few would argue that 2009 has been a challenging year. Though SATCOM has purportedly fared better than many industries, some of our commercial markets are witnessing increasingly frugal customers tightening their belts. This has slowed previously ambitious plans for upgrades or expansion, resulting in fierce competition across the board. For Paradise Datacom, market diversification has been a key element in maintaining a healthy market position. Long-term government programs go a long way in smoothing out the rough spots in a turbulent commercial market as working capital and consumer confidence begin to rebound.

In spite the difficulty of today's global economic plight, opportunities for some of the more fortunate players have surfaced. With many SATCOM service providers seeking ways to gain operational efficiency through cost reductions without having to decimate staff, the availability of new products containing bandwidth-saving technologies are creating frenzy in the market. **Paradise Datacom** released

two new modem features this year that can drastically reduce the amount of space segment required to support many satellite-based services.

Our teaming agreement with **ViaSat** to incorporate their patented *Paired Carrier Multiple Access (PCMA)* technology into our line of satellite modems offers customers the possibility to achieve up to 50 percent savings on transponder costs by allowing transmit and receive carriers to be superimposed upon one another. In addition, the release of our **Sat-Abis**, an embedded **Abis** optimization feature, gives cellular operators who use satellite links to backhaul traffic the opportunity to realize additional savings without the need for external components and associated system complexity. Internal diagnostics and graphing tools allow operators to see exactly how much they are saving.

Paradise Datacom, well known for our line of RF products, continued to raise the bar with the release of **PowerMAX** — our *solid state power amplifier (SSPA)* system that delivers soft-fail redundancy, hot-swap removable RF modules, and field expandability that can generate thousands of watts for extremely high power applications or any application that requires the ultimate in maintainability and service reliability.



In addition, 2009 saw the initial release of our new line of SSPAs based upon *Gallium Nitride* transistor technology. **GaN** devices offer the ability to produce higher power levels in smaller packages with reduced power consumption.

At Paradise Datacom, we pride ourselves on our perpetual efforts to stay ahead of the curve by incorporating the latest technologies and forward-looking features into both our RF and modem product lines.

Pilat Media

2009 was the year when everyone's worst fears did not come to pass — at least not within the satellite broadcast industry. Whatever the economic climate in the wider world, operators in the DTH market have continued to expand with new service offerings throughout the year, to make the most of the available bandwidth. Two big growth areas have been the expansion of HD services, and the developing momentum of the push-VOD sector, together with the hybrid services of push data with return path via modem.

Geographically, the biggest growth for **Pilat Media's** satellite customers has been in Asia Pacific, with Europe already having a fairly well-established HD sector. In our experience premium services are being spearheaded by sports: in India, China, and south-east Asia, sports events are the key draw for new subscribers, and our customers like **ESS (ESPN/Star Sports)** are prominent in this field.

Pilat Media's software products help satellite operators grow their businesses efficiently and cost-effectively, with comprehensive tools for managing the entire content lifecycle and advertising sales and traffic activities. Pilat Media systems are format agnostic, handling SD and HD equally, and making it easy for broadcasters to deploy new HD services and scale their operations accordingly.

Recession or no recession, we haven't seen any change in the growth pattern of HD services over the past year. The subscription model that nearly all satellite broadcasting is based on helps, and whatever the economic conditions, viewers who want HD seem to have the money for it. Broadcasters who were planning HD services were committed to it before the crash, and did not exercise the option of pulling the plug on the development.

Satellite operators have certainly been less affected by the recession: subscription revenue comes in whether the advertising time sells or not, so they are much more resistant to hard times when advertising spend drops. Consistent progress has been made in Asia and Europe, where operators such as **Sky Italia** and **BSkyB** have continued to expand their HD offering.

In terms of 2009 developments at Pilat Media, we continued to enhance our rights management functionality which with the growth of multiple platforms has become much more important for media content management. Satellite providers are increasingly offering content on their websites; in SD and HD. Each of these outputs may have different contractual agreements and usage rights have to be managed for each individual piece of content. The complexity of rights management has increased exponentially as a result, so the development of Pilat Media technology for dealing with it has been a big priority for us and our customers.

Pilat Media

We've also launched enhanced reporting and analysis tools which give broadcasters what they need in recessionary times: the ability to analyze profitability and drill down into detail on the relationship between income from advertising and subscription, and the cost of programming. Broadcasters can now set KPIs into the schedule that set levels of desired income attainment and content type — important to operators so that they can measure the effectiveness of their schedules as part of the scheduling operation.

Push VOD services using PVR storage have been another noticeable growth area in satellite broadcasting over the year. This is where content is pushed out to the set-top box (STB), based on the broadcaster's assessment of what will be popular, and then when the viewer requests it for VOD viewing, the content is already available on the STB. In some cases the decision about which content to push is tailored to the customer profile, but the broadcaster or DBS may also decide — for example — that a certain episode of a drama contains a key plot development and should therefore be pushed out to the STB for viewers who missed it and forgot to set up a recording. In other cases, the decision to push may be based on rights: if the rights exist to push it to the STB, then it will be pushed. This year, to support the growing demand for on-demand services, Pilat Media introduced a VOD add-on module for its IBMS suite, which enables broadcasters to deploy and differentiate on-demand services that maximize the value of content across multiple delivery platforms.

For the coming year, we are already seeing the fabled green shoots of recovery. Customers who have been putting off decisions are making them now, and becoming buyers. The trend that we are seeing is that a key focus for their investment is in better targeting of customers. For example there is a lot of interest in consumer-level targeting of advertising. There will still be the demand for generic ads that everyone will get, but there is a big move toward putting targeted ads into specific programming and targeting them based upon specific consumer profiles. Especially in satellite broadcasting, the PVR space can be used for pushed ad content.

A lot of work and feasibility testing is already being conducted with installations in Europe. One of the factors driving this development is that people are watching less live television, and so this creates the opportunity to replace some of the advertising if they are watching stored material. If the ads can be replaced based on the time the content is watched, as well as the consumer profile, there is the potential to create much more effective campaigns with greater response rates. Satellite operators are in a unique position through their subscriber management systems since they know a lot about the viewer base, so their scope for targeted advertising is much greater. In fact, earlier this year we announced a relationship with a key content delivery provider to integrate our advertising solutions to offer pay-TV operators an end-to-end addressable advertising solution...and launched IBMS:OnTarget which enables content and service providers for the first time to integrate both targeted and traditional advertising using the same campaign and inventory management software.

Expect to see much more targeted advertising projects to pop up in the marketplace during 2010.

RigNet

RigNet, a leading global provider of managed communication services exclusively to the oil and gas industry, experienced yet another year of remarkable growth in 2009 — in spite of the economic recession. RigNet's international business accounts for the majority of revenues, which allowed the company to be relatively hedged from the recession in 2009 while maintaining enough exposure to the U.S. oil and gas market to participate meaningfully in the inevitable upturn moving forward.

We are proud that, once again, **RigNet** has been recognized in 2009 for its record-setting revenue growth, ranking again as one of America's fastest-growing private companies by *Inc. Magazine's* distinguished **Inc. 500**, **Deloitte's Fast 500**, and the *Houston Business Journal's FastTech 50*. The accolades and success are driven by our key differentiators, engineering prowess, cutting-edge networks and global positioning of talented and energetic resources. Our managed communications solutions make it possible for clients to share mission-critical information between remote sites and offices.

Most important to our solutions is our commitment to service and quality. RigNet deploys top-of-the-line satellite equipment and designs solutions using **Cisco®** gear for networking. RigNet holds the prestigious **Cisco Powered Network** designation for its managed IP service, meeting the most stringent standards for network reliability and performance. A global MPLS terrestrial network, over which runs an Internet Protocol (IP) layer end-to-end, connects rigs to offices. This all-IP network is unique in the industry, providing greater reliability, scalability and flexibility worldwide as compared to conventional transport networks. Furthermore, we monitor the entire network out to an IP-device level on rigs, allowing RigNet to diagnose any issues quickly and precisely. If a problem cannot be resolved from a desktop, proper technicians and replacement equipment may be dispatched as efficiently as possible.

In 2010, RigNet will continue to provide superior service while expanding its geographic locations and market share. Recognizing a greater need to make drilling rigs smarter and more productive, RigNet will provide increased productivity for customers as well as improve the quality of life for their employees in remote locations. The upstream energy market provides ample growth runway for the next several years and, next year, RigNet will strengthen its primary segments: offshore communications (including **SOIL** — a private extranet that stands for **Secure OIL Information Link**) and onshore remote communications. We expect the offshore segment, our flagship division, will continue to drive the company's success for the foreseeable future. There will also be significant opportunities for RigNet to expand this business internationally beyond the company's strong U.S. base as well as participate meaningfully in the expected U.S. industry upturn.

We are excited about the opportunities and challenges that 2010 brings and look forward to continuing RigNet's story of success.

Rockwell Collins

Rockwell Collins, a pioneer in the development and deployment of innovative communications and aviation electronic solutions, completed a major investment this year with the acquisition of DataPath, a provider of SATCOM networks for the military, disaster relief operations, intelligence agencies and commercial broadcasters. Rockwell Collins installs, operates and maintains its SATCOM products and networks around the world, including more than 300 field service technicians embedded at U.S. military bases around the world.

DataPath and its wholly-owned subsidiary, **SWE-DISH**, provide a complete range of satellite and wireless systems that enable high-bandwidth connectivity anywhere. Solutions include rugged manpack, fly-away, towable, vehicle-based, transportable, teleport and on-the-move systems integrated with complementary technologies such as wireless, cellular, video, data and software. Their contribution includes more than 1,600 SATCOM terminals installed in over 80 locations around the world and solutions deployed to every continent, including Antarctica.

Rockwell Collins' Command, Control, Communications and Intelligence (C3I) solutions business, which provides these SATCOM capabilities, is responsible for developing products and systems that enable decision and information superiority. These products and systems include advanced communications and mission system applications and technologies encompassing electronic warfare, information assurance and networking. The DataPath acquisition adds capabilities in the following areas:

Netcentric C3I

Rockwell Collins designs and delivers high bandwidth SATCOM networks that connect frontline warfighters to command and control — and even to regional and global resources — with interoperable, flexible and rugged everything-over-Internet Protocol (EoIP) communications systems. These communications networks and video applications allow for the collecting, analyzing, distributing and acting on intelligence from resources around the world and on the battlefield, including *Unmanned Aerial Vehicles (UAVs)*, *Communications On-The-Move (COTM)* systems and forward-operating units. Some of the networks Rockwell Collins has built and serviced include:

The U.S. Army's Joint Network Node (JNN)/Win-T program — The U.S. Marine Corps' Support Wide Area Network (SWAN) — U.S. Central Command's Deployable Ku & Ka Earth Terminal (DKET) network — The Defense Information Systems Agency's (DISA) global teleport system

Communications On-the-Move (COTM)

As a leading systems integrator providing everything-over-IP capability for the U.S. military, Rockwell Collins delivers a wide range of advanced COTM capabilities. These solutions, which support mobile network-centric warfare and first responders, include: A system that fits into a standard **SINGARS** mount and bridges *Ultra High Frequency (UHF)* and SATCOM, providing mobile, beyond-line-of-sight communications capabilities; a rack-mounted system that integrates satellite, wireless and cellular systems with applications for *Video TeleConferencing (VTC)*, *Global Positioning System (GPS)* mapping, and *Voice over Internet Protocol (VoIP)* to extend the edge of the traditional SATCOM network. This system is being used by the U.S. military in Iraq today. Plus, there's the breakthrough technology for maritime applications based on a stabilized four-axis antenna which can provide impressive uplink data rates, global availability and

Rockwell Collins

interoperability; uses spreading and non-spreading waveforms to maximize deployment capability and operates with all existing fixed-site super high-frequency systems

Emergency Preparedness

Rockwell Collins' SATCOM terminals were deployed with the U.S. Army National Guard and federal, state and local agencies for *Hurricane Katrina*. SWE-DISH satellite systems were used in support of disaster relief efforts in Southeast Asia after the tsunami in 2004. Rockwell Collins is also the prime contractor for the National Guard's *Joint Incident Site Communications Capability (JISCC)* program, which provides nationwide incident site command and control capability. These customized solutions integrate IP-based SATCOM, wireless, cellular, land mobile radio, telephony and video teleconferencing applications.

Network Management and Control

Rockwell Collins' **MaxView®** network management software ensures the flow of information essential to military and government agencies in remote areas of the world and allows for local control and central command.

Ultra Portable SATCOM

Rockwell Collins delivers highly compact, easy-to-use and quick-to-air SATCOM terminals for special operations teams, first responders and commercial broadcasters. These include the **miSAT-X** manpack terminal and **CommuniCase Technology (CCT)**, including the **CCT 90** and **CCT 120 Suitcase®** terminals. CCT is a common, modular architecture that includes products which feature swappable modules, including modems and transceivers.

The acquisition of DataPath strategically augments Rockwell Collins' SATCOM offerings for protected military satellite.

Rockwell Collins has been selected to provide Extended Data Rate (EDR) International Partners Variant (IPV) Single Channel Anti-jam ManPortable (SCAMP) terminals to the Canadian Department of National Defense (DND) for use with the U.S. Advanced Extremely High Frequency (AEHF) satellites. The five-year contract is valued at \$52.3 million.

Rockwell Collins' SCAMP terminals provide worldwide secure, jam-resistant, covert voice and data communications. They offer communication for a wide variety of applications and users. The terminals feature EDR capability that delivers data rates comparable to high quality, Digital Subscriber Line (DSL) modems.

As one of the world's premier dual-use commercial and military suppliers for SATCOM and MILSTAR, Rockwell Collins has teamed with industry leaders for the Family of Advanced Beyond-Line-of-Sight Terminals (FAB-T). The FAB-T program upgrades the existing satellite

communications for Advanced Extremely High Frequency (AEHF) modes, increasing data capacity resulting in a faster data transfer rate between airborne platforms and ground command posts. This program will also establish a network-centric, SCA-compliant family of terminals that uses a common open system architecture to link users to different satellites. It will also enable planned incremental capability for robust, secure strategic and tactical communications between ground, air and space platforms.

The first planned increment of this protected product line provides connectivity with the MILSTAR and AEHF satellites. The next increment includes support of Wideband Global System (WGS) operations on surveillance aircraft, including Global Hawk and Predator, with other platforms to follow in the future.

The FAB-T increments will develop capabilities to support waveforms including the Extremely High Frequency (EHF) waveforms, AEHF, Global Broadcast System (GBS), Ka-band Wideband Gapfiller System/Transformational Satellite Communications (WGS/TSAT) waveforms and Ku/Common Data Link (CDL) waveforms.

SAT-GE

Amidst the global economic downturn of 2009, satellite demand in the Pacific Ocean Region (POR) remained robust — SAT-GE experienced yet another year of significant growth. GE-23 is positioned directly over the region with broad C-band coverage as well as unique Ku-band coverage. The Ku- array serves the entire pacific with interconnected spot beams from Los Angeles to Beijing and Alaska to Perth. Leveraging the unique capabilities of GE-23, SAT-GE benefitted from expansion in many sectors that included the following particulars.

U.S. Government

The U.S. Government increased their use of *Netcentric* and *Communications on the Move (COTM)* applications. Such drove demand at a time when cancellations or delays of Government-owned satellites resulted in more overall reliance on commercial satellite providers. We saw an increase in demand for our services that support remote operations, maritime, and aeronautical applications in key Asian theaters of operation across the POR.

Cellular Backhaul

The expansion of mobile phone usage in developing nations continued unabated during 2009. Satellite's ability to provide 'instant' infrastructure resulted in strong growth in this application area. Among regions seeing significant expansion of cellular services, Indonesia emerged as an important market for **SAT-GE**.

Maritime + Aeronautical Broadband

The insatiable need for ubiquitous, Internet connectivity was a key driver for broadband demand in the maritime and aeronautical sectors in the major transpacific airline and shipping routes. While the growth in newly installed platforms was impacted by economic conditions, incremental growth in usage of existing platforms continued.

Looking forward, we expect to experience continued growth in 2010 and beyond. Demand for the type of Ku-band connectivity provided by **GE-23** today is expected to grow dramatically. For C-band, the picture is less dramatic, but given the world's appetite for video & other C-band drivers, the outlook is good, nonetheless. We remain very optimistic about our prospects for future growth.

SAT-GE, the only U.S.-based operator to provide international fixed satellite services, offers capacity on the GE-23 satellite at **172 degrees East**, via 6 individual beams (5 Ku- and 1 C-band) and provides continuous land and oceanic coverage from Perth, Australia, to Los Angeles and from Alaska to South New Zealand, encompassing East Asia and the Pacific rim.

SatLink Communications

As the satellite industry progressed through the economic quagmire that was 2009, (as well as that of 2008), SatLink Communications Ltd.'s business provided a ray of light emanating from the Middle East. In 2009, the company continued to grow by providing value added services for channels, broadcasters, networks, IP providers, satellite operators, governments and other content providers to assist them enlarge their reach around the globe. From the company's early years, CEO David Hochner realized that global content distribution was quietly changing from a transmission service to a value added business proposition. And in 2009, he continued to lead the group by adding new skill sets, expanding operations, bringing new equipment on-line and by taking advantage of business opportunities.

This past year, **SatLink** succeeded in becoming a more full partner with its customers and more than just a strategic geographically located facility in the Middle East that reaches Europe as easily as Asia and Africa. With more options opened this year, the company offered additional flexible transmission solutions over multiple satellite platforms, fiber and IP, in a worldwide network covering five continents. 2009 was definitely the HD year for SatLink. Following implementation of a full set of 12 HD simultaneous streams (that included encoding, decoding, and multiplexing), the organization added a new layer of technologically advanced services, making it a major gateway for sports, news, and special occasional events. The systems enable the insertion of different languages into the streams prior to re-transmission and distribution, as well as down conversion of HD to SD and vice versa. With HD in place, SatLink began broadcasting the 2009-2010 season of **UEFA Football Cups** to Asia. In addition, during the fourth quarter, SatLink's HD crews worked with the **BBC** in the Old City of Jerusalem and throughout other sites in Israel to support a full HD production for the broadcaster's *Christmas* and *Easter* holiday specials.

2009 brought added recognition as the **World Teleport Association** announced the company was the world's fifth fastest growing teleport. In addition, SatLink was ranked 15th among the world's *Top Independent Teleports* for the year. "It is a great honor to be among the world's top players in the teleport market. Being included in these two lists is a tribute to our team's abilities to provide the right solutions with the highest service level in a global market," commented *Hochner*. During the past 12 months, the company expanded services with new bouquets over Asia on **AsiaSat 5**; in Africa with a new platform on the **ASTRA 4A (Sirius 4)** satellite; and continued to add to its neighborhood in Europe on **HotBird** and in the U.S. on **Galaxy 19**, among other platforms.

"Our strategy is to provide networks, broadcasters and governments from around the globe our comprehensive satellite and fiber capabilities for worldwide coverage. SatLink is highly attractive to channels and satellite operators seeking to add markets and thus create more value to their offerings," said Hochner. "In a dynamic business world, we are a global content distribution provider positioned perfectly at the intersection of the fast growing markets in Africa and the developed markets in Europe, the Middle East, North America and Asia."

This article was written by Yael Shamos, V.P. Marketing, SatLink Communications

SatStream

The close of 2008 saw the birth of a new company, **SatStream**. Over recent months, we have witnessed a growing trend for live events to stream via the Internet. This is, in part, due to the nature of the Internet itself. Technology has developed at a startling rate over recent years, allowing wide accessibility across the globe — additionally, much faster last-mile connectivity has occurred for developing countries. A few years ago, watching a football event over the Internet, for example, would have been practically impossible. Now, viewers can experience a premium rate broadcast on their PC or mobile phone.

This is where **SatStream** comes in. The Company's founder, *Craig Moehl*, one of the pioneers in the European webcasting market, realized there was a gap in the market for providing content owners and rights holders with a turnkey solution for making satellite broadcast content available for use on the Internet. From its bespoke broadcast-standards facility in London, SatStream is able to provide the entire package, from acquiring the satellite feeds, adding commentary and security where required, encoding to web formats (such as **Flash** or **Windows Media**) to a bespoke player on the clients' website. In addition, SatStream manages the entire delivery process, guaranteeing delivery of the streams to the global viewers in the most reliable, yet cost-effective way possible.

Since its launch, it has been a busy year for SatStream, with projects including the signal acquisition, transcoding, and streaming of the **BUPA Edinburgh Great Run** in May. In June, SatStream provided a two-hour briefing to the world media and viewers of Microsoft XBOX EMEA and disclosed not only the newest games releases, but also new collaborations with sites such as **fast.fm**, **Facebook**, and **Twitter**. This year also saw SatStream provide **Endemol Sport** with webcasts of a number of **Manchester City Football Club** matches, including three from South Africa that formed part of the **Vodacom** challenge, a pre-season football tournament. The matches were beamed live over satellite, received at the facility in London, then encoded into high-quality Flash and distributed globally over specialised networks to the web. SatStream will be ending the year with an open day at its London facility. Broadcasters, digital agencies and streaming companies are invited to attend. For more information, please contact helen@bithammillpr.com

What does 2010 have in store? The recent success of the Internet-only *England vs Ukraine* match confirms that SatStream is in the right space at the right time, offering the right services to rights owners. This demand for Internet streaming will continue to grow, as EPG's become more and more overloaded and broadcasters look to webcasting to add value and augment revenue streams. SatStream is well placed to assist broadcasters augment their current services by adding editing, commentary, chat/feedback facilities, and new encoding technologies to different platforms. Looking even further forward, SatStream already has interest from broadcasters looking to book services for **London 2012!**



ScheduALL

ScheduALL continues to dominate the global landscape relative to resource and transmission management and our growth is a testament to our commitment and execution to serving the Broadcast and Satellite industries. In the tough economic climate of 2008, ScheduALL grew at a 32 percent clip. In 2009, ScheduALL listened to its customers and invested heavily in R&D and client satisfaction to enable greater collaboration and to streamline business workflows by extending our core application's capabilities.

With an existing community of more than 1,200 leading broadcasters, satellite, and post production businesses around the globe, **ScheduALL** continues to develop technologies that address specific workflow, interoperability, and profitability needs facing our client partners. A few recent examples include our development of the **ERM** appliance which allows

ScheduALL systems to interact, share resources and make bookings in real time anywhere within the enterprise. This solution was launched in September at IBC and received critical acclaim in its ability to improve resource utilization and manage projects and resources in real time from any geographic location, or business unit within the corporate domain. Now Operations and Financial management can gain visibility on ROI, how often assets are used, and projects can be accelerated at less expense. Additionally, areas of expertise and geographic price points can be developed to deliver even greater quality and improved profitability.

In early 2010, this unique functionality will extend beyond the corporate domain and into a vendor supply chain. Studios, broadcasters, crewing companies and SNG truck companies who own ScheduALL will have the opportunity to publish and/or book resources as an "opt in" feature. Each business will continue to run their individual operation as before, but should they choose to work with a specific crewing, SNG Truck or satellite vendor, they will be able to establish a real time booking interrelationship.

Additionally, digital or "file based" work flows are further enabled with our **Weave (Work Flow)** solution which is due to market early 2010. This toolset allows for faster project and process management by leveraging templates, dependencies and alerting functionality that reduces duplication of entry for the same work. With Weave, a user or manager can build a process one time and reuse the template over and over by easily dragging and dropping into a larger workflow process.

2009 has proven to be yet another exceptional year for ScheduALL. We have seen significant growth and the products we are bringing to market are poised to deliver sizeable gains for our client community. One area I am most proud of is our employees and delivering on our client commitments. When times are tough it is easy to overpromise things that are just not possible, in order to achieve revenue objectives. At ScheduALL, I am so very proud of our ability to remain vigilant to client needs. I am proud to know we have stood shoulder to shoulder with our client partners to deliver on our commitments. This speaks volumes about who we are, our culture, and our future potential — this is why our ScheduALL solutions will serve a greater good for many years to come.



Skycasters

Skycasters is a leader in broadband satellite Internet solutions for businesses that require more than traditional terrestrial landlines. Everything in Skycasters' infrastructure, including teleports, hubs, and the network operating center, is business-grade and company-owned. Even the equipment at the customer's location is business-grade, and designed to meet the unique challenges of industry, no matter how rugged the conditions. Skycasters is headquartered in Akron, Ohio.

During 2009, the world seemed gripped more in fear than in actual turmoil. Acting in the face of fear, **Skycasters** chose to keep building and improving. We continued our infrastructure development, our facilities improvements, and strove to deliver the best possible service to our customers. We hired new staff, purchased new equipment, and spent the money necessary to run our business the right way. While we were pursuing this course, we found that many customers were doing the same thing. Sure, some belt-tightening was occurring everywhere around us, but our customers were retooling or wholly revamping their IT processes to include satellite broadband Internet as either a primary connection or as a business continuity solution.

Skycasters' mobile communications trailer and our business continuity and failover services were the brightest stars in our year. Some customers purchased the trailers for primary connectivity at remote job sites, but the key momentum was with the first responder community. VSAT trailers are maintained for disaster response on the premise that terrestrial connections will either be too distant or wholly or partially compromised by the event that prompted the emergency response. Fully deployable in minutes, first responders gain broadband Internet access within cable reach of the trailer, or within 1,000 feet via the wireless hotspot standard on all our trailers. These customers find that deploying an auto-acquire antenna on a trailer, rather than on a vehicle (van, bus, mobile command center), leaves the tow vehicle free to leave the scene. Painstakingly engineered and refined during a 24 month R&D cycle, this trailer represents our best thinking in terms of quality and value. The standard size trailer may be equipped with **C-Com's** .98m or 1.2m **iNetVu** auto-pointing antenna. Our slightly larger trailer accommodates the 1.8m iNetVu. The antenna rides between the rear mechanical utility box and the removable front electronics box on an ultra strong boxed aluminum frame with diamond plate decking. A rigid cover is available for additional protection and peace of mind.

In 2009, Skycasters moved into the business continuity market. Educating business owners that redundancy of terrestrial connections is not truly redundancy for the simple reason that whatever knocks out the first connection is likely to knock out the second, has been particularly effective. Few businesses consider the risks of having only a landline-based Internet service provider. When made aware that a simple water main break, routine road construction or a natural disaster can accidentally damage or disconnect a landline, most agree protecting their business with a less vulnerable Internet connection makes sense. Skycasters' unique formula of end-to-end business grade equipment, managed network, and committed information rates makes our

Skycasters

backup Internet solution the most reliable for business continuity. Our VSAT systems are high-speed (up to 5.5 megabits per second), reliable, cost-effective, secure and always available. Some of the solutions we offer include optimizing the customer's system for VoIP; helping the customer set up a VPN; creating a secure, private network with VLANs that restrict how the connection can be used; and connecting the customer's VLAN to a corporate-based VPN or a dedicated line back to their corporate data center. Traditionally, customers setup their business continuity relationship using our standard service plans. However, our flexible and affordable business continuity service options priced from \$59 to \$99 per month, and suggested by our customers, put the customer at ease because it's "true high speed satellite Internet that's there when I need it."

Skycasters is looking to 2010 to break the mold of Internet service providers in three service sectors.

- **Communities.** *In the 21st century, universal access to the Internet is as important as rail lines, telephone service and electricity were in the last century. Communities are being intrigued by the \$7.2 billion broadband stimulus portion of the American Recovery and Reinvestment Act, and want to better serve their unserved and underserved residents. Providing broadband Internet access to every citizen in a community doesn't have to be hard.*
- **Internet Cafés.** *In many parts of the world, the Internet café plays a key role in the local communications infrastructure. We should know. We've been working behind the scenes, providing service to cafés for years.*
- **Travel Destinations.** *In today's always-connected world, if a resort, park, campground, or other vacation destination that's off the grid can't provide broadband access, they can't attract the best guests.*

Skycasters can establish a Point-to-Multipoint WiMAX service in about 90 days. A turnkey solution, Skycasters handles all billing and administration, as well as end user credit card transactions. Communities may receive access credits that can be used by police, fire, EMS or governmental offices. Internet cafés and travel destinations can receive a percentage on the revenue. The Skycasters Point-to-Multipoint (PTMP) solution is fully compatible with any existing distribution architecture. Our PTMP solution works well with fixed (wired) networks as well as wireless. Our hybrid WiMAX solution can cover over 25 square miles. We even help customers design it.

It will be years before fiber goes everywhere. When it does, the PTMP infrastructure will be 100 percent reusable, with Skycasters satellite remaining on site as a backup. Call it obsolescence protection. When the end user accesses the Internet, they are taken first to a secure login and payment page, customized for each community or business. It takes only a minute to sign up, and no special software is required. Designed to help stimulate your local economies, the installation includes a free community news web site, with free unlimited access for all citizens. Local businesses could manage various aspects. The local newspaper could manage the news site, a local phone company could run a VoIP PBX, and the local video rental store could co-locate a Video on Demand server. Or if a business, they could run it all.

Custom rate plans help the community choose the rate plans offered, and how to use the access and maintenance credits they receive. They can even provide pre-paid cards to disadvantaged members of their community, and apply for ARRA stimulus funding to subsidize the costs. Skycasters will be with you every step of the way.



Space Foundation

The Space Foundation saw a number of triumphs and accomplishments during the past year that moved the organization even further as the leading advocate for space.

With more than 8,000 attendees, including space and defense professionals, educators, students, exhibitors, speakers, and sponsors, the **25th National Space Symposium** was the largest and most successful to date. Held in early spring at **The Broadmoor Hotel** near the **Space Foundation's** headquarters in *Colorado Springs*, the four-day event featured presentations from top-level U.S. and international space leaders, including the secretary of the Air Force, commanders of the Air Force Space Command and the U.S. Strategic Command, leaders from the European, Japanese, and Chinese space agencies, and major commercial space industry leaders. The Space Foundation honored space pioneers and leaders,

including Dr. *Neil deGrasse Tyson*, former Under Secretary of the Air Force *Peter Teets*, the **Phoenix Mars Lander** team, China's **Shenzhou 7 Space Mission**, and a Florida educator who brings space to kids through innovative hands-on activities. The sold-out exhibit center gave insight into the latest and greatest in space technology and provided an excellent venue for networking and deal-making. Students and teachers benefited from training sessions, tours, visits with astronauts, and a space career fair. And, the **Space Technology Hall of Fame** inducted two diverse space inventions that make life on Earth better: aerodynamic vehicle design and algae-based food supplements.

The 25th National Space Symposium also marked the publication of **The Space Report 2009: The Authoritative Guide to Global Space Activity**, the Space Foundation's comprehensive space overview. Packed with useful information, the publication covers global space budgets and revenues, space technology and applications, workforce and wage information, and space education issues. In addition, The Space Report includes space industry forecasts and an analysis of broader trends that will shape the course of space activity in years to come. As 2009 nears its close, the Space Foundation is already preparing for an even more exciting **26th National Space Symposium**, to be held April 12-15 at The Broadmoor. For details, go to www.nationalspacesymposium.org/about-the-show.

The Space Foundation's education programs grew tremendously in 2009. The **Jack Swigert Aerospace Academy**, an aerospace-themed middle school, was created through a partnership between the Space Foundation and Colorado Springs (Colorado) School District 11 (D-11). The school, which opened in August with more than 500 students, uses aerospace themes and principles to build student proficiency in science, technology, engineering, the arts, and mathematics. It is named in honor of Colorado native and Apollo astronaut *John L. "Jack" Swigert*.

The Academy campus is also home to the **Space Foundation Discovery Institute** — the Space Foundation's brand new national professional development center and education destination for teachers and students from around the world. The Space Foundation Discovery Institute houses classrooms, a **NASA Educator Resource Center**, and, eventually, three major laboratories: a simulated space mission operations

Space Foundation

center to open in early 2010; a simulated Martian terrain laboratory in early 2011; and a Science on a Sphere facility in early 2012.

A third major change in the Space Foundation's educational offerings was the introduction of **Space Across the Curriculum**. These week-long, graduate-level, in-residence courses provide PreK-12 educators with science, technology, engineering, and mathematics content that is instantly transferable to the classroom. The class schedules have grown to include courses targeted to specific groups during the school year.

The Space Foundation has long believed — and actively communicated — that meaningful space exploration and development require nations to bridge political gaps and work together. This year, the organization strengthened U.S. relationships with the Chinese space program. The initiative began with the Space Foundation's presentation of the **Space Achievement Award** to China's **Shenzhou 7 Mission** at the 25th National Space Symposium. This historic first visit to the U.S. by the head of China's Manned Space Program, Dr. *Zhou Jianping*, and Taikonaut *Zhai Zhigang*, led to an invitation to tour China's major space installations. In September, Space Foundation CEO *Elliot Pulham* led a delegation to China and visited several **China Academy of Space Technology (CAST)** sites and the production facilities where the **Shenzhou 8** spacecraft, **TANG-1** spacecraft, and various satellites are in assembly, as well as the **China Astronaut Research and Training Center**. At the **Jiuquan Satellite Launch Center**, the delegation toured the launch control center, vehicle assembly building, and launch pad. Delegation members were the first Westerners to visit many of the Chinese facilities.

Further emphasizing international cooperation in space, the Space Foundation released two white papers in 2009. **The International Space Station: Decision 2015** strongly recommends that the United States keep the International Space Station (ISS) functioning until at least 2020 and beyond, if possible. **Solutions from Space: Space Applications for International Development** says that space-based technology can overcome infrastructure and access issues and help solve economic, public health, and standard of living issues for developing nations.

As part of its mission to bring together interested parties to discuss critical space issues, the Space Foundation hosted two additional gatherings in 2009. **Space Business Forum: New York** brought leaders from the public and private sectors together in an intimate setting to discuss the future of the space industry. **The Strategic Space Symposium**, presented through a **Space Foundation/United States Strategic Command** partnership, brought together 1,800 attendees in Omaha, Nebraska, for a creative interchange between the private sector and the government on challenging space operations and warfighter issues.

As is the case with all Space Foundation programs, these two events created an environment where space leaders could build relationships to advance space-related endeavors to inspire, enable, and propel humanity.



Spacenet

As most companies will tell you, 2009 has been a turbulent year, given the global economic circumstances. Many organizations across a range of vertical markets have significantly reduced their IT and communications budgets or have placed major projects on hold, which has clearly impacted consumption of communications networks.

In this environment, customers are demanding a higher ROI and are closely watching where every dollar is going. As a communications services provider, **Spacenet** has focused our efforts on working more effectively with customers to find new benefits of satellite and hybrid terrestrial/satellite networks. Even in this environment, Spacenet has continued to deploy services for thousands of new sites at both commercial and government organizations. In addition, we have launched new product and technology introductions, and continued to strengthen our strategic programs. Spacenet highlights of 2009 included:

The Missouri Department of Transportation (MoDOT), one of Spacenet's key public safety customers, was awarded the **Innovation & Technology Award for 2009** at the **International Satellite & Communications Exchange (ISCe)** Conference. MoDOT teamed with **Spacenet** and **Orbital Data Net (ODN)** to design and implement its innovative emergency communications satellite solution. The solution integrates terrestrial communications assets with satellite connectivity for a complete continuity of operations and first responder solution. This satellite solution enables the agency to fulfill its mission of ensuring public safety with constant access to critical communications during emergency situations and is based on fixed and transportable satellite systems, all the while supporting full **Voice over IP (VoIP)** and **Radio over IP (RoIP)** capabilities with **Quality of Service (QoS)**, Internet access, and can interface with trunked radio systems and analog systems. The solution enables seamless transmission capabilities and control to communicate and interconnect remote tower sites by satellite, and interoperability with legacy systems. The team also created a unique telephone solution, **Satellite Transport Audio Circuits (STAC)** that provides efficient and cost effective voice services.

Spacenet and a leading technology company in the **Land Mobile Radio (LMR)** market introduced new emergency response services that help public safety organizations maintain reliable and secure communications in virtually any situation, including a new interoperable LMR and satellite solution. This solution is suited for a wide range of public safety organizations. To avoid the risk of being vulnerable to local outages during emergency situations (as most LMR systems are networked via terrestrial technology) and ensure constant access to communications, satellites can provide seamless backhaul for LMR and provide backup to terrestrial lines that support the **Public Safety Access Points (PSAPs)**.

Spacenet introduced its new **Prysm Pro** application and network appliance to help multi-site enterprises support multiple secure networks with centralized management and hybrid switching between wireline and wireless technologies. The innovative Prysm Pro is a modular, scalable, off-the-shelf IP network appliance that offers unique features and can be customized to support multiple secure wireless networks.

Spacenet

Spacenet also introduced its new *Cisco integrated Federal Information Processing Standard (FIPS) 140-2* certified encryption solution over satellite in 2009. The FIPS certified solution from Cisco and Spacenet provides new satellite communications options to government customers, including services for CONUS based Department of Defense agencies and backhaul services between EMEA and the U.S. using their existing Cisco infrastructure. Spacenet's integrated VSAT Cisco solution supports FIPS 140-2 as well as acceleration of the encrypted traffic without the need to install additional devices at the remote location. The solution uses the Spacenet and Cisco co-developed *Integrated Acceleration and Encryption (ITAE)* technology to provide end-to-end accelerated FIPS 140-2 certified encryption over satellite.

Another focus in 2009 was on the *American Recovery and Reinvestment Act (ARRA)*. The satellite industry, as a whole, has worked hard to make sure that satellite plays a key role in the economic stimulus initiatives and the national broadband strategy. Spacenet, as one of the pioneers of rural communications in this country, placed a significant amount of focus into this initiative and submitted multiple proposals to the *U.S. National Telecommunications and Information Administration (NTIA)* to provide broadband access via satellite to rural and underserved areas.

2009 introduced new challenges for Spacenet given the global economic situation. Our response to the situation has been to work harder and more creatively in order to find new opportunities that leverage our technology advantages. Although we don't expect the economic situation to change overnight and realize it will take time for companies to recover, we are optimistic about the future and believe that the changes we have made during the hard times will pay off.

One major initiative that we plan to leverage in 2010 is the launch of our new **SkyEdge II** VSAT platform. SkyEdge II's advanced technology enables Spacenet to offer an even broader range of service options for our clients with high multi-megabit per second bandwidth requirements. The SkyEdge II platform is optimized for IP applications, VoIP networks and two way video; offers faster speeds than previous generations; provides higher availability (99.9 percent or better); and supports high-speed mesh services.

We also plan to continue focusing on our traditional enterprise market with an increased focus on providing managed services. We will continue moving towards more specialized and higher value markets. The increasing need for high availability networks and emergency communications among IT Managers across many different industries presents an opportunity for satellite. In some markets, satellite provides a high value proposition that goes beyond simple network connectivity.

We will continue to ramp up our offerings for the first responder market. Public safety and emergency response is a critical area where satellite provides a strong value proposition. It's also notable for the way satellite has been integrated seamlessly into their terrestrial network to support voice over IP as well as LMR applications.

Overall, Spacenet will continue to adapt to the changing environment and focus on providing highly reliable networking solutions across both our core and expanding markets, enabling organizations to benefit from the latest in converged data, voice and video communications via satellite.



SpaceX

In just seven years, Space Exploration Technologies (SpaceX) designed the family of Falcon launch vehicles and the Dragon multi-purpose spacecraft from the ground-up. Each year SpaceX has marked key milestones in its overarching goal of increasing the reliability and reducing the cost of space access, and 2009 continued that progress.

The most notable **SpaceX** achievement of 2009 was the launch of the first privately-developed liquid-fueled rocket to put a satellite into Earth orbit. The fifth flight of **Falcon 1**, a two-stage, liquid oxygen/rocket-grade kerosene vehicle designed and manufactured by SpaceX, lifted off on Monday, July 13. This launch placed the Malaysian satellite **RazakSAT** into a *Near-Equatorial Low Earth Orbit (NEqO)* at 685 km altitude and a 9 degree inclination, achieving the desired orbit and marking another successful flight.

Falcon 9 leverages the reliability built into the Falcon 1 design by employing the same architecture as the Falcon 1; Falcon 9 also offers engine-out launch capability for the first time in the United States since the Saturn programs. In 2009, SpaceX accomplished a series of major achievements in preparation for the inaugural launch of the new Falcon 9 vehicle and **Dragon** spacecraft, both designed and built by SpaceX.



At under US\$10 million per launch, Falcon 1 is the world's lowest cost solution to accessing Earth orbit; the ideal vehicle for the small satellite community and the baseline vehicle for SpaceX's Falcon 9.

Just after New Year's Day 2009, the SpaceX team verified ground support hardware by taking the rocket vertical for the first time using the SpaceX-designed transporter erector. The early part of the year also saw key milestones in the development and production of Falcon 9. In March of 2009, SpaceX's new **Merlin** vacuum engine, which powers the upper stage of the **Falcon 9** launch vehicle, demonstrated a vacuum specific impulse of 342 seconds — the highest efficiency ever for an American hydrocarbon rocket engine. Since then, the Falcon 9 has completed final structural and propulsion acceptance testing at SpaceX's Texas Test Site and has shipped to Florida for its inaugural launch. As 2009 comes to a close, the launch site team is in the final stages of refurbishing *Space Launch Complex 40 (SLC 40)* at **Cape Canaveral Air Force Station** in Florida.

The first launch of the Falcon 9 launch vehicle is a demonstration flight and will carry SpaceX's Dragon spacecraft qualification unit, providing valuable aerodynamic and performance data for the Falcon 9 configuration that will fly on the following *Commercial Orbital Transportation Services (COTS)* and *Commercial Resupply Services (CRS)* missions for **NASA**.

The Falcon 9/Dragon system is poised to provide a complete commercial solution for transporting cargo, and potentially crew, to the International Space Station

SpaceX

(ISS). The second flight of the system will begin SpaceX's participation in NASA's COTS program, a first-of-its-kind program that awarded SpaceX three launches to demonstrate the capability to berth with the ISS, transfer cargo, and return the cargo safely to Earth.

In preparation for the COTS flights, 2009 saw the full qualification of the Dragon spacecraft and all associated systems, including **DragonEye**. SpaceX's DragonEye *Laser Imaging Detection and Ranging (LIDAR)*, was launched aboard NASA's **STS-127** shuttle mission in July of 2009. Developed in just 10 months from concept to final hardware, the DragonEye LIDAR provides three-dimensional images based on the amount of time it takes for a single laser pulse from the sensor to reach a target and bounce back, and provides range and bearing information from the Dragon spacecraft to the ISS.

Following completion of the COTS program, the Falcon 9/Dragon system will begin to execute the 12 missions under the NASA CRS contract award for transporting a guaranteed minimum of 20,000 kg to the ISS. The firm contracted value is US\$1.6 billion, and NASA may elect to order additional missions for a cumulative total contract value of up to US\$3.1 billion.

While it will initially be used to transport cargo, the Dragon spacecraft was designed from the beginning to transport crew. Almost all the necessary launch vehicle and spacecraft systems employed in the cargo version of Dragon will also serve the crew version of Dragon. As such, Dragon's first cargo missions will provide valuable flight data that will be used in preparation for future crew transport flights. This allows for a very aggressive development timeline — approximately three years from the time funding is provided to transform from cargo to crew.

In 2009, the SpaceX team also closed three significant international and domestic contracts, bringing the total value of its launch manifest to over US\$2 billion. These contracts include two launches for **CONAE**, Argentina's *National Commission on Space Activity*, aboard SpaceX's Falcon 9 medium-to-heavy lift vehicle; multiple launches for 18 **ORBCOMM Generation 2 (OG2)** satellites aboard SpaceX's **Falcon 1e** (an enhanced version of Falcon 1); and a key contract with **Astrium** to launch a satellite designed by Astrium or its recently acquired subsidiary **Surrey Satellite Technology (SSTL)**, also on a Falcon 1e.



DragonEye as seen from the International Space Station (Image courtesy NASA).

2009 was a great year for SpaceX, and as the team looks forward to 2010, all eyes will be on Cape Canaveral for the first flight of the Falcon 9 / Dragon system. For more information and additional SpaceX 2009 achievements — including the qualification of a heat shield reentry material and growth to over 800 employees — please visit the company's web site at www.SpaceX.com.

Space Systems/Loral

2009 was a significant year for Space Systems/Loral (SS/L). Starting out the year, it was uncertain what impact the world's economic climate would have on satellite manufacturing, but our sales remained strong and it was a record year for launching some of the world's most complex and powerful satellites.

Industry analysts agree the satellite industry, in general, was not hit by the financial crisis the same way other segments of the economy have been... at **Space Systems/Loral**, we were able to respond to the strong demand for replacement satellites, particularly for *fixed satellite services (FSS)*. While start up companies had a harder time obtaining financing, the incumbents, with steady revenue streams and proven business plans, such as **AsiaSat**, **Intelsat**, **Hughes Network Systems** and **Telesat** continued to actively expand their fleets. It was also a year of building interest in the value of hosted payloads for government services.

The **Space Systems/Loral 1300** satellite platform is based on a modular design that makes it very well-suited for a broad range of applications including broadband, fixed satellite services and DTH Television, satellite radio and mobile satellite services. The 1300 accommodates a range of satellite sizes and over the years has been developed to provide the highest power available for commercial satellites with several 20-kW satellites launched and the capability to go to 25-kW. **SS/L** was driven to develop this high power capability to meet the needs of the DTH video market and now our 20-kW satellites help satellite operators maximize the number of high definition channels that they can provide. Our sweet spot is for satellites that generate 8-kW or more — **SS/L** often wins more than 40 percent of the contracts awarded each year in this market.

In 2009 we started the year off with a contract to build a satellite for AsiaSat. With **AsiaSat 5** ready to ship in the late summer, the company wanted to protect itself in the event of a launch failure by having a replacement satellite underway. Now **AsiaSat 5R** will be used to expand the company's services in the Eastern Hemisphere. We expanded our list of blue chip customers with a contract to build the new **Jupiter** satellite for **Hughes Network Systems**. Our third and fourth satellite bookings for the year were **Intelsat 19** and **20**, which will be among the most powerful FSS satellites ever built. They will replace existing satellites that currently provide services to five continents and will offer services for broadcast television and telecommunications. The satellites also will have the capacity to support mobile communications and higher data rate network services. When Telesat Canada decided to replace Telstar 14 with a larger and more powerful satellite for fixed satellite services in the Americas and over the Atlantic Ocean, **SS/L** was the manufacturer selected and is scheduled for launch in late 2011.

In addition to full satellite awards, **SS/L** was also awarded a contract to add a government payload to **Sirius 5**, a multi-mission communications satellite being built for **SES**. The primary payloads provide high performance coverage for DTH broadcasting, broadband, point-to-point, and VSAT services in Europe and Africa. The added government payload provides navigation services for the **European Union**. The hosted payload is part of the **European Geostationary Navigation Overlay Service**

Space Systems/Loral

(EGNOS), which is being developed by the **European Space Agency (ESA)** and the **European Commission (EC)**. SS/L also demonstrated its hosted payload capability with the integration of a **Cisco IP Router** on **Intelsat 14**. Completed and launched on November 23rd, Intelsat 14 is an FSS satellite replacing an older satellite in the Intelsat fleet. The **Internet Router in Space (IRIS)**, the first of its kind on a commercial satellite, is designed for government use, enabling converged, space-ground network services to obtain more efficient bandwidth usage, anytime-anywhere on-demand broadband services, last-mile connectivity solutions, efficient one-hop communications, and next generation voice, video and data applications. The timing complexities to integrate this payload without impacting the satellite's crucial schedule requirements were quite an accomplishment.

In 2009, the company delivered to launch seven completed satellites. Among the most challenging projects for the year was the success of SS/L's simultaneous missions for **SIRIUS XM Radio** and **TerreStar Networks**, whose satellites were launched on June 30th and July 1st. As these satellites were designed to provide service to mobile devices, they have very large S-band antennas that were folded like an umbrella for launch and then had to be unfurled once the satellites were in their orbital slots. These post launch maneuvers for the satellites were handled simultaneously — in orbit testing confirmed the large antenna reflectors are performing according to plan.

TerreStar-1 is the largest commercial satellite ever launched and will be used to provide satellite phone service using a regular cellular phone. Ground breaking ground based beam forming technology, developed by SS/L in conjunction with Hughes Network Systems, enables the satellite's power to be focused where it is needed the most to provide service to a phone that is approximately the size of a Blackberry device, with no external antenna. 2009 also included two successful launches of SS/L built satellites for **Telesat** — **Telstar 11N** launched on February 26th and was designed to help meet growing demand for mobile broadband from commercial and government customers in shipping and aviation. **Nimiq 5** was delivered ahead of schedule and launched on September 17th to deliver a variety of HD and specialty DTH television services in North America. Launched on August 11th, **AsiaSat 5** was built by SS/L to replace **AsiaSat 2** at **100.5 degrees East**. **NSS-12** launched on October 29th to replace **NSS-703** at **57 degrees East** and is the largest satellite in the SES WORLD SKIES fleet, designed to enable communications services for an estimated two-thirds of the world's population.

Looking forward to 2010 we believe that there will be a steady demand for our highly reliable spacecraft and there will be an ongoing need for replacement satellites going out for the foreseeable future. We believe more satellites will be funded as the capital markets recover. We also see the potential for the U.S. government to glean more benefit from commercial satellites. With a backlog of US\$1.6 billion reported at the end of September 30, SS/L continues to have excellent business prospects and we expect to deliver about a dozen completed commercial satellites over the next two years. SS/L continues to provide the infrastructure needed to support continued growth. We are proud to be a leader in putting commercial satellite communications capacity into space and have made a commitment to continue providing the most powerful, advanced and reliable, spacecraft available today. We also thank all our launch partners who helped make these satellites successful including **Arianespace**, **ILS**, **Land Launch** and **Lockheed Martin Commercial Launch Services**.



Stratos

From every perspective, 2009 was a banner year for Stratos — we enhanced our position as the world's leading provider of mobile and fixed-site remote communications solutions. New relationships with some of the world's leading maritime, energy, mining, government and military organizations led to robust sales — helping us fully execute our growth strategy in this pivotal year.

Perhaps the year's biggest news came in April when Stratos became a wholly-owned operating division of **Inmarsat**. As we operate as an independent subsidiary, we continue to demonstrate our commitment to being a multi-technology service provider, helping meet our clients' complex networking requirements with solutions from **Inmarsat**, **Iridium** and other leading companies. In 2009, our customers accessed the benefits of **The Stratos Advantage**, which make mobile satellite services easy to use and efficient to own. The Stratos Advantage provides cost control, firewall management, full

traffic information, pre-paid facilities, high security options, easy VPN access, messaging services and full IP range.

Stratos Dashboard, the foundation of The Stratos Advantage, was enhanced with an improved graphical interface, increasing ease-of-use. We also introduced **StratosNet Accelerator**, a free Internet-optimization application that helps customers reduce airtime costs required to operate **Inmarsat BGAN**, **FleetBroadband** and **SwiftBroadband** mobile satellite services. In the maritime market, Stratos led all *Inmarsat Distribution Partners* in FleetBroadband activations, including important deployments by **Albacora Group**, **Bernhard Schulte Shipmanagement** and **MPC Steamship**. We recently reached a milestone of 2,000 FleetBroadband activations. The strong penetration of the powerful BGAN service in the land-mobile sector continued with key deployments in the media and mining markets. This year, BGAN from Stratos reached the milestone of 11,500 activations, with perhaps the most notable media-market deployment coming from **Al Jazeera English**.

BGAN from Stratos continued to help military organizations worldwide improve their effectiveness and safety. Our customers in the energy markets derived great benefit from our **DataSat II** shared-hub VSAT service that supports **SCADA** applications. It supports applications for data collection and monitoring of remote assets. Stratos continues to offer enhanced IP or serial polling and 24x7 network monitoring from our Denver Network Operations Center (NOC).

Looking ahead to 2010, we expect to continue to sell and support the very latest remote-communications offerings from Inmarsat, Iridium and other providers, to include building relationships with shipping companies who wish to deploy Inmarsat's new **FleetBroadband 150** service as a low-cost entry to the broadband environment. We also look forward to the mid-year launch of Inmarsat's **Global Satellite Phone Services**, which will offer a powerful alternative to the handheld, fixed and maritime phone solutions currently available in the marketplace — bringing the right combination of product selection, value-added services and ongoing support.

Streambox

As 2009 draws to a close, Marshall McLuhan's concept of a "global village" is closer to reality than ever, thanks to satellite technology. Even in the furthest-flung corners of the world, humans now have unprecedented capabilities for receiving and sharing up-to-the-minute information thanks to the latest in satellite-enabled live newsgathering systems. Technologies that can improve the quality and reliability of newsgathering via satellite have been a strong focus for Streambox this year, and will continue to be so going forward. A case in point is our new Streambox Advanced Distribution Service (ADS), which provides a cost-effective and efficient method of receiving broadcast-quality IP video over a public Internet connection — therefore bypassing the expense of a leased line.

A little background: **Streambox's** business is dedicated to providing a software-based platform for live and file-based newsgathering and IP base video transport and acquisition. Our solutions are based on the industry-leading **ACT-L3™** codec, which provides unrivaled performance, reliability, and quality over low data rate IP networks for fast transmission and playout of video streams in HD and SD. For mobile newsgathering, a Streambox encoder-equipped laptop and a low-bandwidth Internet connection are all that's needed for non-technical news teams and reporters to file breaking news from rugged field locations — presenting a powerful and inexpensive alternative to deploying microwave trucks.

As reliable Internet services are often not available in remote and less developed locations, low-bandwidth (up to 384 kb/s) satellite terminal solutions such as **Inmarsat BGAN** and **Thuraya IP** can bridge the gap between the laptop encoder in the field and the ground station or POP in the nearest major city. Although the Streambox encoder provides easy-to-use tools for field reporters to add *forward error correction* (**FEC**) to help prevent packet loss, the additional overhead will affect its quality when forced through the BGAN terminal's narrow uplink pipe. The problem is solved with **Streambox ADS**, which adds FEC to the video stream immediately after it is downlinked from the satellite to the BGAN or Thuraya IP Earth station. From there, the stream can traverse the much-higher bandwidth of a public Internet connection to be delivered to customers' receivers without packet loss, with minimal latency, and at the highest-possible picture quality. As customers don't have to invest in servers, leased lines, or virtual private networks (which can rack up prohibitive installation costs and monthly service charges), Streambox ADS provides the most cost-effective approach available for satellite newsgathering. For customers who already have a VPN or leased line return path infrastructure in place, the solution provides a reliable backup IP service. Streambox ADS is currently offered by **Vizada** as part of a bundled BGAN or Thuraya IP service package and is directly connected to Vizada's network infrastructure.

The demand for services such as Streambox ADS will only continue to increase with the proliferation of global information and the increasing competition among news outlets to deliver live, breaking news to viewers as events unfold. Streambox's objective is to partner with satellite providers to make this task easier and more cost-effective without compromising video quality — especially for news that is breaking from remote or difficult locations.



TerreStar

Over the past 12-months, TerreStar has redefined the mobile communications landscape by successfully launching the world's largest, most powerful communications satellite and developing the first integrated satellite and cellular 3G smartphone. Our goal is to provide critical communications services when terrestrial networks are unavailable, thereby ensuring true ubiquity and reliability in North America for those who depend on their wireless device to always be connected.

2009 was a breakthrough year for **TerreStar**. **TerreStar-1** was launched on July 1st from *Kourou*, French Guiana. On July 14, TerreStar-1 successfully deployed its 18 meter reflector, the largest commercial satellite antenna ever unfurled. When this reflector and high power feed array are coupled with our advanced ground based beam forming system, TerreStar-1 generates more than 500 dynamically-configurable spot beams. These spot beams enable TerreStar's network to allocate power and capacity to ensure voice and data services when and where needed most. And thanks to our cutting edge handset/chipset development, we

can deliver these services to an everyday mobile device.

Our first of its kind network needed a user device that would offer fully functional 3G mobile service capabilities for typical communications needs within the existing wireless coverage areas, and also allow users to switch to our satellite service when out of range of cellular service or when cellular service is unavailable due to a natural or man-made disaster. Meeting this need meant we had to create a well-designed mobile device with integrated satellite and terrestrial connectivity options, as well as work with our partners to define the potential for future devices to be created by others.

In April, we introduced the world's first quad-band GSM and tri-band WCDMA/HSPA smartphone with integrated all-IP satellite-terrestrial voice and data capabilities. The **TerreStar™ GENUS™** is similar in size, look and feel to today's cellular smartphones, but will also allow users to seamlessly and securely stay connected to TerreStar-1, as well as terrestrial networks. We believe the TerreStar GENUS is a revolutionary device, combining 3G terrestrial wireless capability with satellite voice and data in a standard smartphone size and form factor. The device uses the **Windows 6.5 Mobile®** operating system to provide rich smartphone functionality and includes premium features such as a touchscreen, WiFi, Bluetooth®, GPS and a QWERTY keyboard.

The solution is intended to work as a user's everyday cellular smartphone device, with satellite access capability as a back-up option when needed. We were proud to announce on July 20, 2009, the successful completion of the first end-to-end phone call over TerreStar-1, between two TerreStar GENUS smartphones. The call demonstrated not only the power of TerreStar-1 and the TerreStar smartphone, but also showcased the flexibility of TerreStar's all-IP core network.

TerreStar

We have also started work on the nextgen of integrated satellite/terrestrial devices. We have signed agreements with **Qualcomm** and **Infineon** to add our satellite capability into their next generation chipsets. We believe these agreements will enable ubiquitous mobile communications coverage from anywhere in North America using mass-market devices costing about the same as cellular-only devices. The goal is to create an ecosystem where satellite-terrestrial handsets that will operate with multiple cellular and satellite-based communications technologies — where satellite capability becomes a standard in next generation chipset designs.

Building on this year of 'firsts,' on September 30th we announced our first distribution agreement with **AT&T**, which plans to offer the TerreStar GENUS solution to its government and commercial customers, providing these customers with an everyday wireless smartphone with the capability to connect to a satellite network as a backup, all using one phone number and on one bill. TerreStar-1 will act as a cell site in the sky to provide coverage required to help AT&T subscribers stay connected.

The steady stream of success in 2009 included:

- **April 1: Infineon and TerreStar announced an agreement to develop the world's first satellite-cellular mobile platform based on SDR technology; technology is recognized as a breakthrough for feature-rich multi-mode handsets.**
- **April 1: TerreStar and EB introduce the world's first quad-band GSM and tri-band WCDMA/HSPA smartphone with integrated all-IP satellite-terrestrial voice and data capabilities- later named the TerreStar GENUS.**
- **July 1: TerreStar-1 launched from French Guiana by our partner Arianespace. It is a geosynchronous satellite covering North America, and will support the delivery of advanced all IP-based mobile voice, data, and video services.**
- **July 14: TerreStar announced the satellite had been successfully placed into its assigned orbital slot (at 111 degrees), and also the successful deployment of the 18 meter 2GHz S Band reflector.**
- **July 20: TerreStar announced it had successfully completed the first handset to handset call over TerreStar-1.**
- **August 27: TerreStar announced the successful completion of in-orbit testing.**
- **September 30: TerreStar and AT&T announce an agreement to bring to market the first fully integrated satellite cellular smartphone, the TerreStar GENUS.**
- **October 5: TerreStar and AT&T demonstrated the TerreStar GENUS Smartphone at a special event at the IACP (International Association of Chiefs of Police) annual conference in Denver, Colorado.**

2009 was a momentous year for TerreStar as we worked with our partners to create a historic list of 'firsts' in this newly-formed category of mobile communications. As we transition into 2010, we look forward to continuing the momentum established this year and will focus on launching a service that will fuse the power of the nation's first all-IP mobile communications network with an integrated next-generation satellite — all to enhance the mobile experience and redefine mobile communications for our customers.

We are focused on growth in 2010 and remain steadfast in our quest to offer a resilient integrated communications services to government, energy, utility, transportation and maritime users, as well as to provide the critical communications interoperability and back-up capability — essential for public safety agencies, first responders, emergency services and disaster recovery groups.

Thrane & Thrane

2009 will be remembered as the year that broadband SATCOM came of age. Demand for Inmarsat's BGAN services continued to grow as users in the maritime, aeronautical and, indeed, land mobile segments began to truly understand the efficiency improvements and cost savings that broadband satcoms enable across a massive range of applications.

The growth in interest and use of **BGAN** was improved by the late 2008 launch of the **Inmarsat I-4** satellite, which went online in February 2009, making it a truly global service. This was a significant push to the global SATCOM market.

Our two new BGAN satcoms product launches in 2009, **SAILOR® 150 FleetBroadband** for the maritime segment and **Aero-SB Lite (SwiftBroadband)** for the aeronautical segment, were very successful and boosted our business significantly. We have huge expectations for these products going forward.

Interestingly, Inmarsat's launch of FleetBroadband 150 also helped to drive sales for our existing **SAILOR 250** and **500 FleetBroadband** products. We found, on many occasions, that once a potential user had initiated dialogue regarding SAILOR 150 FleetBroadband, they soon witnessed the benefits and return on investment that could be gained from using the 250 or even the 500. Having said that, for smaller vessels, SAILOR 150 is performing exceedingly well and we expect this to improve as users that previously might not have considered a broadband connection at sea can now do so at a very reasonable cost.

Despite the tough economic climate we have all faced, **Thrane & Thrane** was positioned well to supply new users of BGAN with brand new products via our well-proven, existing portfolio. Due to our viable product lineup, we had a strong 2009. Based on our 2009 performance, I feel positive about 2010. I don't believe all of the issues we've seen in the market during 2009 will disappear in a flash, but we do see a more positive trend now than we saw six months ago. I feel that demand for broadband at sea, on land, and in the air — where we already have an exciting product introduction lined up for January — will continue to grow.

We introduced several exciting new products in the latter half of 2009, which will make a positive contribution when they reach users next year — company confidence is already high as we enter 2010 with a stronger product roadmap than ever before. One of the key drivers for the continuing growth of broadband SATCOM next year will be that more and more people are switching to IP networks. By having the correct communications package, people can save time, increase their efficiency and, in some of the more hazardous industries we supply, improve health and safety. For instance, within the maritime segment, it's not just crew welfare or communications for passengers, as everything on the ship needs to be connected these days in order to run at maximum operational efficiency.

With a quick and high return in several areas, users are now, more than ever before, prepared to invest in broadband SATCOM.



Thuraya

As a dynamic mobile satellite operator, Thuraya this past year offered the SATCOM world new products and solutions that confirm the Company's dedicated customer-centric approach. The most remarkable achievement of 2009 was the introduction of the world's toughest satellite phone, "Thuraya XT". The launch of this rugged handheld provides more competitive edge for Thuraya allowing the Company to maintain its leadership in the MSS handheld arena. But Thuraya is not just about handhelds, it is also renowned for offering the world's smallest portable broadband solution, ThurayaIP which throughout the year has been enhanced to ensure the most efficient and versatile service.

Thuraya, this year, devoted its commercial energy to targeting vertical sectors which require tailor-made products and solutions, which Thuraya has meticulously ensured are part of the Company's provided services. With professional users in mind, the Company has added specific services to its portfolio to ensure all market needs are met.

The World's Toughest Satellite Phone

Continuing Thuraya's prowess in mobile satellite handhelds, the Company launched what is known as the world's toughest satellite phone, **Thuraya XT**. The innovative phone has been tried, designed, and tested to endure the harshest of circumstances, which is a core feature for mobile satellite users. Thuraya XT is the only satellite phone that complies with world telecom **IP54/IK03** standards, making the phone splash water resistant as well as dust and shock proof. The phone also has the longest battery life, with a talk time of as many as six hours and a standby time of up to 80 hours. Thuraya XT has an extremely professional and user-friendly menu and boasts a glare-resistant display for readability in bright environments. The phone was engineered to support the robust activity of its users across a diversity of sectors. Since the phone's launch, Thuraya XT has generated great interest from distributors and customers and has ignited huge market interest.

The Enhanced ThurayaIP

Last year, Thuraya launched **ThurayaIP**. Uniquely A5-sized, and the first satellite broadband terminal to enable video-streaming speeds of as high as 384 Kbps, ThurayaIP is recognized for its portability. More service however, is the backbone of ThurayaIP, which is a congestion-free network — users always have access to high-speed data, regardless of location within Thuraya's coverage area and regardless of the number of simultaneous users.

Throughout 2009, Thuraya has depended on the flexibility of ThurayaIP and has, accordingly, introduced several services and enhancements based on this competitive solution. Two main additions to ThurayaIP's services are **Thuraya NettedComms** and a **ThurayaLease** service. Thuraya NettedComms is the world's only netted communications solution in the MSS industry that integrates differing communication technologies into a single closed user group. Such enables users to communicate effectively. The service is ideal for use by disaster and relief management agencies in times of crisis when terrestrial networks have been destroyed or are non-existent.

Thuraya



For heavy data users, ThurayaLease provides unlimited bandwidth (in multiples of 64 Kbps) for major customers in need of high-speed data. The service provides users with priority access to the satellite network. Customers may use any number of ThurayaIP terminals in their assigned bandwidth capacity. Moreover, ThurayaLease assigns accessibility to an entire satellite footprint, which permits use of ThurayaIP across vast areas and the Company has ensured the service is available in all hotspots of the globe.

With streaming speeds of up to 384 Kbps, Thuraya has deployed the necessary infrastructure and established a *Point of Presence (POP)* and *Meet Me Point (MMP)* to enhance the performance of ThurayaIP streaming customers. Through the POP and MMP, user data is well-managed, secured, and routed to the end destination with guaranteed service quality. Other additional enhancements to ThurayaIP include controlling multimedia buffering as well as flexibly determining the base IP address of the terminal.

Maritime Offerings

The largest sector within the MSS industry in need of specialized services are the maritime arenas. Thuraya this year focused on providing attractive and cost-effective call offerings for users of **ThurayaMarine**, the Company's specialised maritime solution. Thuraya also focused on expanding its maritime distribution chain to ensure availability of the product in key markets.

ThurayaMarine is an ideal multi-purpose communication device for cabin crew calling especially in small and medium size sea vessels. It is also a great backup for large ships who require voice, data and fax services which the solution provides. Designed with a stable omni-directional antenna, ThurayaMarine can withstand any sea movements no matter how harsh.

Glimpse into the Future

Consistently innovative, Thuraya will continue to introduce new services and products in the year to come, all combining superior technology blended with market needs. Thuraya will upgrade its portfolio of products and services to ensure it maintains its edge and leading position in the MSS industry. The Company will constantly refine its portfolio of products to make certain customer needs are met in order for Thuraya to continue to establish itself as an MSS operator offering and providing specialized services.

Furthermore, the Company will continue rolling out its products to both vertical and new geographical markets. To achieve this, Thuraya will aggressively widen its distribution chain and will continue its dedication to its customers — Thuraya intends to meet the market needs of all relevant segments to remain the operator of choice for MSS users.

UltiSat

This past year has been an exciting year for UltiSat. Despite a challenging economic downturn, UltiSat was able to make some remarkable progress on new projects and to complete an acquisition that expands its global presence. This past year was similar to 2008 in having a strong market for military, government, and nongovernmental organization (NGO) satellite services. However, government and military users are competing for space on commercial satellites, with private-sector segments such as the broadcast industry, combined with the increasing sophistication of applications deployed by all of these users, is starting to exhaust capacity. In regions such as Southwest Asia (SWA), space segment prices are at record highs and availability at record lows.

The industry has responded with various solutions — better data-compression techniques, increasing use of hybrid satellite/terrestrial techniques, and maximizing capacity on all available satellites and frequencies. However, more capacity, better ground technology, and alternative spectrum will have to come onto the market if all the military and commercial needs are to be met. **UltiSat** was well positioned to leverage its global infrastructure to accommodate its military, NGO, and infrastructure operator customers in 2009. Acquisition of a well-maintained, modern teleport in Denmark enhanced UltiSat's ability to offer premium SWA and Africa services and coverage. Most of UltiSat's new business in 2009 was created due to the Company's ability to provide soup-to-nuts SATCOM services that ensured best-value solutions for each customer's specific needs. Access to premium bandwidth, a platform-agnostic philosophy, and in-house systems design and implementation experience allowed UltiSat to provide, secure, reliable, and cost-effective operations for its clients.

Broadband IP is clearly the new network standard. Successful companies will be those offering ubiquitous, high-quality, and reliable interworks that can cope with data-rich, graphics-heavy applications. Military users increasingly need easily transportable products, from manpack units in the field to flyway units that can be installed and operated simply and quickly. The military is looking for multipurpose, multiband equipment that can be easily deployed and redeployed. UltiSat has positioned itself to provide these types of terminals.

Alternatives to the traditional C- and Ku-band services such as in X- and Ka-bands and the introduction of the U.S. military's *Wideband Global Satcom* (**WGS**) constellation, are going to be increasingly important to the military and government markets. Of particular interest in the short term are the possibilities offered by the X-band spectrum. As Ku- capacity in SWA dries up and become increasingly expensive, X-band becomes an attractive alternative and its use is reserved exclusively for government users. Organizations that already use multiband terminals can often migrate current equipment to X band, but the challenge will be in offering smart designs for new networks. Companies that design networks that can be moved back to Ku-band when prices inevitably drop will be ahead of their competitors in selling useful networks to government users. With offerings of multiband terminals, UltiSat can support any band that might be used by its customers.

UltiSat

Africa continues to offer opportunities for turnkey-solution providers and systems integrators. UltiSat has already installed more than a dozen networks in Africa and is well positioned to support the African market. The prospect of new satellites with African coverage combined with the expansion of cheaper high-capacity, backbone cable will open the continent up to VSAT networks of every variety. Experienced managed VSAT network providers such as UltiSat, will continue to find opportunities to provide custom networks operating in both C- and Ku-band spectra.

Local and regional Internet service providers are continuing to establish Earth stations to offer affordable IP services to an ever-hungry market. As an end-to-end systems integrator, UltiSat has provisioned a number of large-antenna (greater than 6m) fully redundant, uplink gateways, and hubs in Africa and then provide continuing operation and maintenance. The latest example of this was the successful installation and integration earlier this year of **AFCOMSAT**'s teleport in Nigeria.

Finally, we see growth not only in portable and flyaway systems, but also in mobile satellite services. From office-in-a-box solutions to satellite telephony, UltiSat sees an increasing need for "anywhere, anytime" systems that can be deployed not only by traditional users such as journalists, surveyors, and international aid workers, but by also by state and police agencies, first responders, and the military. To meet this burgeoning market's needs, UltiSat has developed a new product line — based on its **UltiKit** technology — that provides a premier portable solution for any location on the globe.

The outlook for 2010 for UltiSat is bright — the Company is prepared to meet challenges with cost-effective SATCOM services and value-added applications. While the continuing capacity shortage demonstrates demand, if capacity completely dries up, sales will, no doubt, be suppressed. Certain segments of the market, primarily government and military and some underserved regions, will continue to thrive, regardless.

We believe the biggest and most consistent users of customized satellite communications networks in 2010 will be the military followed by NGOs; either in support of, or on the ground, in areas of turbulence and conflict. Broadband access for morale, welfare, and recreation (MWR) requirements, as well as data-rich applications for military users and defense contractors, will continue to create opportunities in all areas of operation, particularly in SWA and Africa. As the military demands smaller, less conspicuous equipment that can be operated in harsh conditions on the front line, companies looking to be competitive in this market will have to be able to quickly deploy cost-effective solutions that maximize space segment.



UltiSat is optimistic that 2010 will be another great year for those that can offer a range of end-to-end solutions that can be integrated into easy-to-manage networks. Companies with the experience and capabilities to engineer networks that take into account specific customer needs and accommodate both the latest technology and the current spectrum limitations will find success supporting end users in remote markets.



ViaSat

We believe one of the most exciting new frontiers in our industry is in pushing the boundaries of broadband delivery by satellite. We took a giant leap in 2008 by starting construction of our ViaSat-1 satellite — by far the most capital efficient broadband satellite ever. We envision satellite broadband as a global and broadly horizontal market that may ultimately be the most ubiquitous of applications.

Looking back on 2009, we note a lot of progress toward that goal. It's becoming increasingly clear satellite broadband should be a core component of just about every country's national broadband deployment plans. Our key international partners such as **Eutelsat**, **Barrett XPloreNet**, **IPSTAR**, and **BB SAT** made important progress in integrating satellite broadband into national strategies in western Europe, Canada, Australia, and Japan this year.

It's noteworthy that, like the U.S., each of these markets already has high levels of broadband penetration, yet sees the potential for a high-performance satellite service. The challenge is that, frankly, satellite services have not measured up to their terrestrial counterparts. It's critical to note that in each case these countries are not necessarily embracing satellite as it is now, but are looking ahead towards the promise of what it can be in the future.

While FSS satellites traditionally have been good at reaching people where other technologies cannot, it is now evident that satellite subscribers are under-served in terms of bandwidth. The answer is to vastly reduce the cost of "manufacturing" bandwidth — and that is primarily going to happen through new space systems, increasingly at Ka-band.

ViaSat, and our partner **Eutelsat**, are leading that transformation with high capacity satellites launching in the last quarter of 2010 and the first quarter of 2011. We also took a decisive step in bringing this new bandwidth technology to market by acquiring **WildBlue Communications**, the world's leading Ka-band service provider. The combination of WildBlue and ViaSat creates an integrated satellite broadband powerhouse. The WildBlue subscriber base of more than 400,000 retail and wholesale customers, all at Ka-band, provide the distribution and fulfillment platform to bring the quantum improvements enabled by **ViaSat-1** to well over a million new subscribers.

As the leader in Ka-band space networking systems and terminals, ViaSat is committed to making this new technology accessible to markets around the world. And to helping service providers benefit from the lessons learned in the fast growing U.S. market. A key event this past year was our contract with **YahClick**, which will commercialize the Ka-band payload on the **YahSat 1b** satellite, providing service across the Middle East and parts of Africa. The strategically important geographic coverage of **YahSat** adds to an already compelling global footprint standardizing on ViaSat's Ka-band broadband network.

ViaSat

In addition to consumer services, we see a number of adjacent markets where the same compelling economics can increase opportunities for satellite communications, such as military SATCOM, video distribution, and mobile communications. The emergence of Ka-band in military SATCOM markets is underway with initial deployment of the *Wideband Global SATCOM (WGS)* system. With two WGS satellites operational as of August 2009, ViaSat Ka-band gateway infrastructure is operating for the **DoD** already, and is coming soon to Australia, as part of a recently announced contract with the **Australian Defence Force**.

Two pervasive themes are driving growth in military SATCOM:

- **An ever-increasing demand for more and more bandwidth to support Internet Protocol (IP) network-centric applications, and...**
- **Pushing the availability of high-speed IP satellite links to lower and lower military organization echelons**

This combination is resulting in exponential growth in the number of military SATCOM terminals deployed, compared to the previous decade.

With the continuing launches of WGS spacecraft, along with coming new capacity from the **Mobile User Objective System (MUOS)**, **AEHF**, and increased leased commercial Ku-band capacity, the demand for military SATCOM terminals has never been greater. We see significant growth ahead in the sale of ground systems to the U.S. DoD, especially for our open standard modems such as the **MD-1366 EBEM, Joint IP Modem**, and **LinkWayS2 Current Force Modem**.

In the rest of the world, where Ka-band is not yet available, ViaSat and our partners are putting the finishing touches on a seamless global Ku-band broadband mobile network. While Ku-band often looks prohibitively expensive to fixed-site broadband subscribers, compared to L-band it is very attractive for bandwidth-intensive mobile applications.

But ultimately, Ku-band systems used for airborne, vehicular, and other mass transit broadband access will eventually face the same constraints on user experience through lack of bandwidth as fixed-site systems, providing additional opportunity for the abundant, low-cost capacity that high-throughput Ka-band systems can provide. With a new way to deliver greater volumes of bandwidth at lower costs than ever before, we're very excited about the future potential of satellite communications.



ViaSat technical staff and program managers get a firsthand look at the assembly of ViaSat-1, underway at Space Systems/Loral.

The fast pace of change in communications means we're never quite sure of all the opportunities ahead, but the underlying, universal desire for more high-bandwidth applications is undeniable, and we feel well-positioned to capitalize on that trend.



Vizada

The changes in the 2009 SATCOM market, while extensive, were also typical for a well-established industry. The mobile satellite services market experienced overall growth during the economic downturn. We also saw market consolidation that will have continuing implications for services and channel strategy. For Vizada, this is not new. Our company has prevailed over the last 30 years and demonstrated its ability to remain resilient during these evolutionary cycles that separate the leaders from the followers.

Today, **Vizada** enjoys a unique position as the only major independent provider with a multi-satellite network operator (**SNO**) and indirect sales strategy. Vizada distributes the services of all major MSS SNOs, including Inmarsat, Iridium and Thuraya enabling more choices in satellite communications than any other provider.

In a show of confidence, service providers have selected to increase business with Vizada. We recently won the top industry award from **Inmarsat** for the greatest overall revenue growth in 2009. Our market share has increased across all verticals — aeronautical, land and maritime — with aeronautical and leasing services to the U.S. government being key drivers for the Americas market. Vizada also remains the premier provider of on-demand MSS services for all three major mobile satellite network operators and service categories: Inmarsat 3G and 4G on-demand services, IP broadband, and handheld.

With an increased commitment to helping service providers grow and exceed their business objectives, Vizada is actively investing in its channel programs. This past year we introduced a new training program, the **Vizada Solutions™ Certification Program** to give our service providers the business and technical knowledge they need to successfully sell, support, and promote our value-added solutions. Fully certified partners from the Americas and EMEA were recently acknowledged at a channel event in Berlin. The program has received high marks from participants and openings for coming programs are filling fast. The company is also focused on innovation, expanding our solutions portfolio to provide customers with the increasingly robust SATCOM capabilities they require. We've rolled out a succession of notable products and service enhancements, including:

Vizada Solutions™ Portfolio

Enhancements to **The Source**, our web-based business management tool enabling **BGAN** and **FleetBroadband** users, to enroll in **Vizada Solutions** at the point of activation, giving them more SATCOM capability while building value with each new subscription. Additionally, service providers can save time by batch activating BGAN and Thuraya terminals.

Vizada

There are also new **SkyFile** capabilities: **SkyFile Weather** provides multi-lingual, professional weather information.

SkyFile Mail gives greater flexibility to **Inmarsat, Iridium,** and **Thuraya** service users.

Base Connectivity Services

High speed base connectivity solutions from all three SNOs, including:

Inmarsat BGAN

Extreme, ThurayaIP for land users (*i.e.*, media, and government), **Iridium OpenPort®** and **Inmarsat FleetBroadband 150** for smaller commercial and leisure vessels and **Inmarsat SwiftBroadband** for business jet and government aeronautical users.

In addition to these investments, Vizada continues to build out its infrastructure to ensure reliable communications worldwide. This year, Vizada's network of BGAN PoPs was expanded to include Hong Kong, enabling customers throughout Asia to locally terminate broadband mobile satellite data traffic reducing traffic transmission distances and times. We can securely deliver broadband IP traffic for media, defense or corporate organizations with guaranteed bandwidth to any place on the continent. Our diverse and resilient network offers unmatched, centralized control over business operations via The Source.

Vizada's success over the past year has been the result of tremendous effort on the part of our employees. Our strong, capable team continues to grow along with our customer base, solutions and services. To accommodate growth, **Vizada Americas** will start the New Year in a new corporate headquarters. This building will include state-of-the-art resources, like the **Vizada Technology Center**, and is specifically designed to better serve the needs of our customers, partners and valued employees.

The past year was a strong one for Vizada, and the company looks forward to building on this momentum in the year to come.

Vocality International

Vocality designs and manufactures routers and multiplexers for the satellite industry user — primarily mobile SATCOM, such as military tactical or satellite news gathering. The Vocality kit is widely used in Paradigm Secure Services's defence communications platform operated for the U.K. MoD, along with the Army and Navy users in a growing number of countries as well as by some of the largest NGOs and the majority of the main "three letter" broadcasters for communications in North Europe and the U.S. Everything hasn't been plain sailing at Vocality in the last couple of years. The company has been required to mature to address the technology demands of its client base — demands that include a broader range of router technologies, high product stability for demanding environments and ever reducing costs of products — more bang for their buck.

However, the last 12 months have seen an astounding revolution at **Vocality**. Core multi-function products such as the **V150** are the backbone communications platform behind a large number of welfare, tactical, and satellite news gathering networks. These products are stable and highly functional. That said, for the OEM integrator or tactically deployed, they sometimes needed something else. Vocality's CEO *Julian Bashford* explains. "The U.S. market, in particular, has been a very tough market for Vocality, for a number of reasons, but as our key partners are aware, Vocality makes really solid and highly specified products. This means explaining how a product which is a router, a multiplexer, a voice gateway, an ISDN Extender, and a secure voice platform — can be offered all in one box. It's too much for many users to work with. For a start — it's not CISCO!!" For a small company in a market where CISCO is king, it is easier to work with CISCO than against, so we gave users the option not to use Vocality as the router, but to use CISCO, which is pre-approved for use in defence applications. This epiphany moment has defined and shaped our growth strategy for the coming years."

With the support of many — what seemed at times like the entire satellite industry — Vocality released **BASICS**, a range of single function devices, offering tactical voice, four wire or IP services within a very small form factor (PC104). Importantly, for users — there's no router, is what the customer wishes. The kit is ideal for integrating into third party systems. With the launch of BASICS in 2009, Vocality was able to provide a 'kit of parts' to the industry, providing low cost voice over satellite. These solutions have been taken straight to the hearts of key decision makers in tactical networks worldwide.

Vocality has completed some critical restructuring and Vocality is ready to address what we believe will be the most significant years of growth in Vocality's history. Vocality has been awarded some significant contracts recently, including one which could be valued at up to 11million pounds. The fundamentals of the company remain the same as we enter 2010. We save customers satellite and bandwidth space, time in training, time in deploying and, best of all, we save customers money Vocality is ready to take these fundamentals to a significantly larger audience and enter 2010 in a very fit, cash positive and solid fashion, with plans for new products, markets and technology which are sure to excite our users over the coming 12 months.



Volicon

Maintaining the highest-possible video quality in the most cost-effective manner possible has never been a greater challenge — not only for companies that distribute video content via satellite, but the cable providers and TV stations that must answer to their viewers when something goes amiss. The explosion in linear, on demand, and interactive content coupled with the pressure to reduce the operating cost per channel puts enormous demands on the content provider. Even with the global economic downturn in the mix, these dynamics presented Volicon with a “perfect storm” of opportunity in 2009 as we experienced unprecedented demand for our award-winning digital content monitoring and logging solutions.

For example, the **Volicon Observer® RPM** for cable and telco operators represents the state of the art in digital video monitor and logging solutions because it provides automatic, around-the-clock scanning and monitoring of video content. These systems afford proactive monitoring capabilities at the point in the delivery chain that is most important: the output that viewers are actually seeing on their televisions. The Observer RPM enables cable and telco operators to evaluate the quality of their NOC/headend and remote hub site broadcasts from any location, automatically scanning hundreds of channels around the clock and testing signal integrity. When a video fault such as macroblocking, black screen, frozen video, no video, no audio, or violations of audio thresholds occurs, the system automatically issues alerts (via email and SNMP) to the on-call engineer together with a clip of the offending video, so that faults can be resolved before they turn into customer complaints.

The Volicon Observer replaces inaccurate and inefficient manual approaches with an automated process — an operator can realize significant cost savings in labor savings and related increases in quality. As a case in point, Italian digital satellite TV provider **SKY Italia** implemented the Volicon Observer to provide 24/7 monitoring and fault detection to help maintain quality of service standards for aired content, a move that has greatly streamlined the provider’s monitoring capabilities and delivered greater flexibility in identifying and accessing recorded clips. In addition, SKY Italia has identified another compelling application for the system: proof of compliance with government communications regulations. As a replacement for SKY Italia’s former tape-based monitoring process, the Observer archives instantly accessible content from 52 channels for up to 90 days via *RAID 5* storage hardware, with four spare recording channels at the ready. The move to server-based monitoring eliminates the need to change out videotapes manually and saves space, occupying a smaller footprint than the facility’s old VCR systems and requiring no external storage area, as the broadcaster’s tape archives once required. The system can easily be scaled to accommodate additional channels.

Going forward, the demand for powerful and yet easy-to-use tools for validating and confirming video quality will only grow as content continues to proliferate and viewers become more discriminating. The digital/HD revolution is here to stay, and content distributors as well as cable providers must continue to abandon costly and manual processes in order to maintain the quality levels their viewers expect.



W.B. Walton Enterprises

W.B. Walton Enterprises Inc. (also known as Walton De-ice) designs and manufactures the broadest line of equipment available for preventing snow and/or ice accumulation on satellite Earth station antennas. The original Walton De-ice product includes a behind the antenna main reflector plenum (enclosure), which is heated with hot air, for antennas ranging in size from 5 to 32m in diameter. Walton De-ice offers several options for heating including, gas heaters, or the low maintenance Stainless Steel Electric Heaters.

During 1990s, a line of products called the **Snow Shield** was introduced by W. B. Walton Enterprises. These products are being used on antennas ranging in size from 0.6 to 6.3m in diameter. The Snow Shield consists of PTFE coated Gore-Tex® material which has a very low coefficient of friction, stretched over the satellite antenna. The Snow Shield can be used as a passive system, as most snow and ice will slide off due to the PTFE coating, or heat can be added for a higher level of protection — the addition of heat will not require the existing snow shield be replaced. The Snow Shield PTFE coated GOR-TEX® Fabric covers are made from Radome material that will survive harsh chemical and extreme environmental conditions while providing the lowest transmission loss among all Radome materials.

The GOR-TEX **Snow Shield** Passive Cover works great in almost all conditions — however, should icing become a problem, the client goes to the VSAT and taps on the cover and all of the ice or snow slides off the cover. With the Company's Ice Quake, also released earlier this year, there's no more going out and tapping on the cover — it's all done for you, automatically.

The **Ice Quake** product is an electric vibrator housed in a small aluminum enclosure installed on the edge of the antenna reflector using cylindrical vibration isolators to prevent damage to the antenna reflective surface. A piece of PTFE acts as the actuator arm, which is the same material the Gore-Tex Snow Shield Cover is made of. Ice Quake is riveted to the housing and then slipped into a pocket sewn into the Snow Shield Cover. The PTFE actuator arm transfers the vibration from the electric motor into the Snow Shield cover. Because of the vibration isolators, the vibration is not transferred to the antenna by the vibrator assembly, or transferred to the feed horn assembly. Ice Quake is ideal for military or remote applications where a generator is required to power the portable site. In the past, as much as 4,500 watts of power would be required to power the de-icing System on a 2.4 meter antenna. With the vibration system, less than 100 watts is required to remove snow or ice from the Gore-Tex Cover. The spares that would normally be required to support the vibration system would also be a cost savings factor. The only components are the vibrator assembly and the DS-2 assembly.



With a solid core of products to help ensure signal viability, W.B. Walton Enterprises, now celebrating their 30th Anniversary, is looking forward to gaining even more customers during 2010, both in the commercial and military segments of the industry. With Snow Shield and Ice Quake so easy to install and operate, the future looks extremely bright for these leading products.



XipLink

Another change of decade is upon us and the satellite industry keeps rolling right along and re-inventing itself with new applications that result in tangible, positive results to customers.

As we entered 2000, the "dot.com" bubble was about to burst — and so were many business plans within the satellite sector. Today we can look back at the exciting growth of the mid 90's and the steady market movements forward in the last few years that resulted in significant new or shifted markets:

- **ISP Backhaul stagnated, but converted to broadband IP access Direct Broadcast Satellite continued to be highly successful with higher take rates.**
- **The IP-TV Industry was born with the first production implementations deployed.**
- **Surprise! Residential Broadband was a huge success...and not just for rural access.**
- **Capacity glut turned into limited capacity...creating a market for wireless optimization.**

The immediate future also offers some exciting new opportunities in the satellite sector. In our opinion, Mobile IP for *Communications On The Move* (**COTM**) will be an explosive growth opportunity, as users demand continuous broadband connectivity. Another exciting and related area is simply the competitive position of satellite capacity via lowering the cost per bit by a 10x factor as new generation Ka-Band satellites are launched in the near future.

From a **XipLink** perspective, the last 12 months were particularly exciting, with a number of key accomplishments. Strategically, XipLink completed the asset acquisition of our partner company, **Trispen Technologies** of Centurion, South Africa. This acquisition has allowed us to migrate our **XA** appliances from traditional accelerators to fully featured wireless optimization products, thus enhancing the existing TCP traffic to fully use available capacity, while also exceeding that capacity with **XipOS** integrated stream compression, caching and web optimizations. Another key strategic accomplishment was release of **XipLink version 3.0**, which allowed our customers to scale their networks to very high capacity levels (155 Mbps+), while adding *Class Based Queuing* capability for more complex networking and reduced box count through elimination of some packet classifiers in the network — all at the lowest capital cost in the marketplace. Other major accomplishments in 2009 include:

- **Expansion of employee count by another 50% to continue XipLink innovations.**
- **Release of the lightest, full function portable optimizer for MSS networks—XipStick.**
- **New account growth exceeding 40% of our revenues in the last 12 months.**
- **Deployment of embedded XipLink (XE) to new Military, Aeronautical and Maritime devices.**
- **Winners of the Frost & Sullivan "Innovation Award" for Military applications.**
- **We are still on the planet.**

All of us at XipLink thank our employees, customers, partners, and other friends and wish you great success in 2010!

