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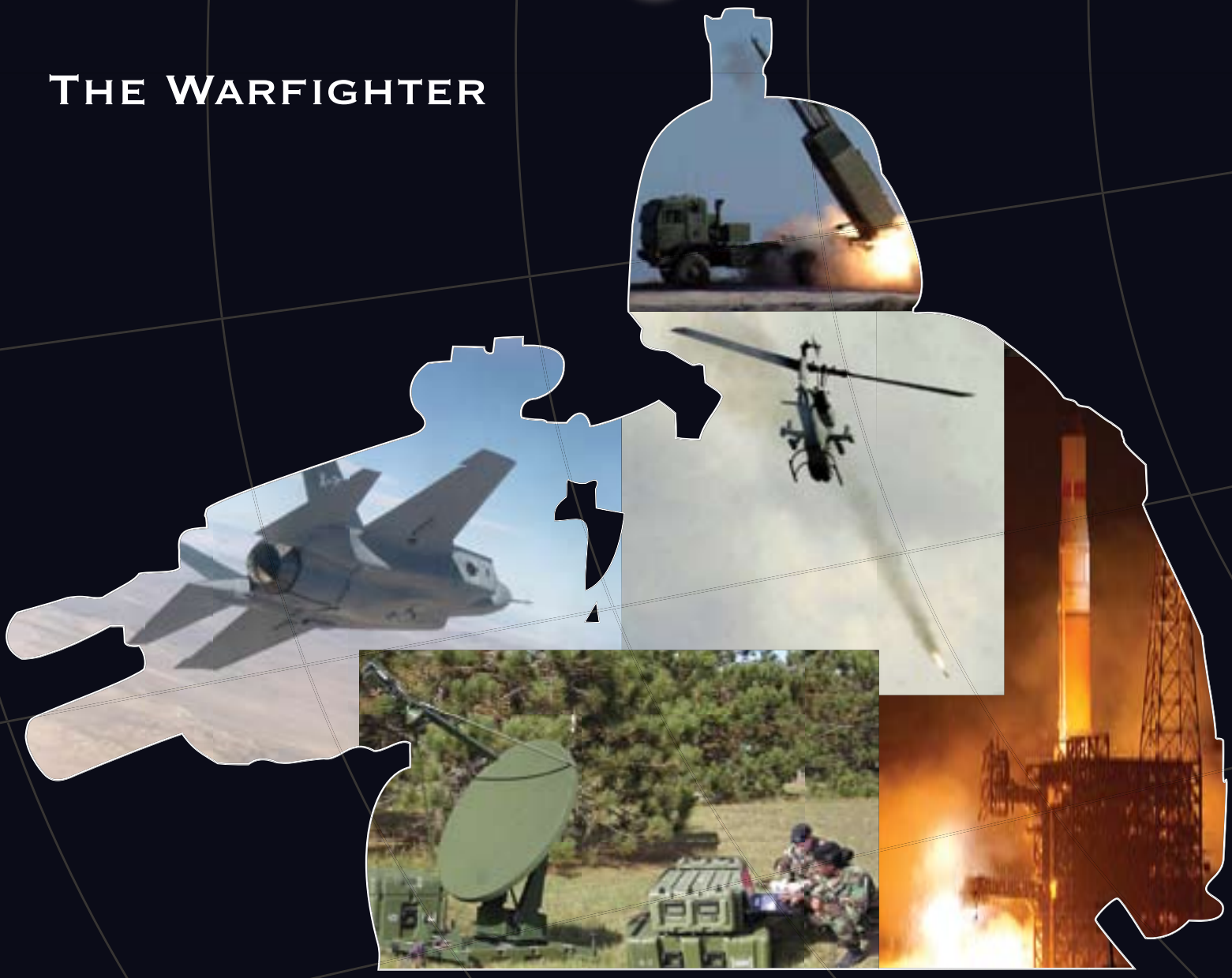
MilsatMagazine

The Warfighter



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MILSATMAGAZINE MARCH 2008

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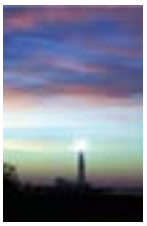
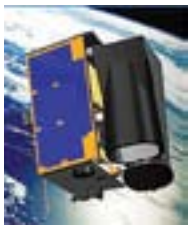
COVER STORY



Last December 16th, Orbital Sciences Corporation launched the TACSAT-2 microsatellite for the U.S. Air Force aboard a Minotaur I launch vehicle from NASA's Wallops Flight Facility. The client was the U.S.A.F.'s Space and Missile Systems Center (SMC) Space Development and Test Wing (SDTW), located at Kirtland Air Force Base in New Mexico. Approximately 11 minutes after lift-off, the Minotaur rocket placed the TACSAT-2 spacecraft into a low-altitude orbit. The rocket also deployed another microsatellite, GeneSat-1, for NASA's Ames Research Center.

FEATURES

by David Mulholland, European Correspondent



Europe's small satellite makers are preparing to cash in on strong demand for their diminutive birds, both from traditional space-faring countries such as Franceand from smaller countries that are interested in owning space assets. The drivers for the expected growth are threefold: changing requirements, lower costs and shrinking electronics.

by Jose del Rosario, Senior Consultant, NSR

An Air Force official interviewed by Reuters indicated that "one program that 'took a serious hit' in FY2009 and beyond is the Transformational Communications Satellite System (TSAT)." The official further told Reuters that the Air Force would apply its back-to-basics approach to the program, earmarking just $843 million in FY2009, and $6.6 billion over the next five years, which is about $4 billion less than initially planned.

by Jeffrey B. Benesh, Vice President of the Western Region, Government Division, Integral Systems

One company that has become a healthy provider of ground systems for Command and Control is **Integral Systems** *(***ISI***). Since the firm's inception, they have been highly focused on space ground systems. In addition, their record has proven their ability to deliver cost-effective, working solutions for satellite operations.*

INSIGHT

by Marc LeGare, CEO of Proactive Communications, Inc.

According to Wikipedia, nation building is the deliberate effort by a foreign power to construct institutions of national government. In the case of Iraq, its emerging government in 2004 had no intact communications infrastructure to support its evolving institutions. By the summer of 2006, however, the Iraqi Government had the world's largest secure VoIP network.

FOCUS ON

At ISCe 2008, military and government end-users, commercial satellite operators, as well as decision makers from the global satellite industry, will be on hand for a world-class program.

During the rescue mission, the SkyTrac system was used to provide reliable voice communication between the aircraft and ground-based coordination personnel and to continuously track the aircraft's location. As a result, MCA and CHC will continue to leverage the capabilities of this system as they develop new operational procedures that will ultimately help them improve future mission performances.

EXECUTIVE SPOTLIGHTS

Mr. Corry is a 22-year veteran of the United States Secret Service, where, from 1976 to 1998, he held various positions of increasing responsibility, including leading teams of over 100 people and protection of senior U.S. leaders as well as the President and Vice President. In 2007, Mr. Corry was appointed to serve on the Joint Advisory Committee on Communications Capabilities of Emergency Medical and Public Health Care Facilities. Established by the National Telecommunications and Information Administration (NTIA) and the Federal Communications Commission (FCC), the committee assessed the capabilities and communications needs of medical and public health care facilities across the nation and submitted its report to the U.S. Congress.

Hypres is a leading developer of superconductor microelectronics technology and the Digital-RF product line. The company is currently developing an All Digital Receiver for satellite communications. During a recent conversation with Richard, he talked with SatMagazine about the company's recently signed CRADA, live satellite demonstration, the All Digital Receiver family of prototypes, and where Hypres is targeting its efforts.

REGULAR DEPARMENTS

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EDITOR'S NOTES

You may recall reading at *SatNews* about a new directive from the Department of Defense that seemed to indicate much of the U.S. Air Force's control regarding GPS and Position, Navigation and Timing, had been removed. SatNews queried the authorities at the Global Positioning Systems Wing (GPSW) at Los Angeles Air Force Base, with the management of the project being at the Space and Missiles Center. The "official" reply indicates the DoD directive (DoDD 4650.05, dated February 19th, 2008) is a fairly straightforward update of the previous directive, DoDD 4650.5, which was dated June 2, 2003. The new directive incorporates national-level changes over the past five years related to PNT policy and governance.

OK, that much we could figure out from the directive's language. Basically, the new *National Security Policy Directive* (**NSPD**) on *U.S. Space Based PNT Policy*, dated on December 8th of 2004, replaces the previous governance structure, the *Interagency GPS Executive Board* (**IGEB**), with the new *National Space-Based PNT Executive Committee* (**NPEC**). If you can wade through the acronyms, you're just about halfway home...

Boiling away some of the milspeak, the DoD directive reaffirms the leads, as far as GPS acquisitions and operations, will continue to be within the realm of the U.S.A.F. The directive indicates no major changes related to GPS acquisitions and ops. The GPS Wing at L.A.F.B. will continue to acquire and modernize GPS satellites as well as the ground control system and military user equipment for U.S. and Allied forces.

The *50th Space Wing* at **Schriever A.F.B.** will continue to operate the GPS constellation and offer ongoing service. To affirm the U.S.A.F. lead, the official reply indicates that, in line with the new PNT DoD directive, the U.S.A.F. "takes great pride in developing and delivering the world's best PNT services and equipment." All GPS performance standards, from the *Standard Positioning Service* dated on October 4th, 2001, to the *Precise Positioning Service PS* dated on February 23, 2007, were developed by the U.S.A.F., and approved, and published by, the *Assistant Secretary of Defense* (**ASD**) office responsible for GPS. Bottom line, the U.S.A.F. retains a *significant* role in GPS—but nothing in the official reply negated current industry understanding that the U.S.A.F. will now take a backseat (as far as policy is concerned) to **DoD/Homeland Security** in regard to GPS decision-making. Implementation, apparently, will remain within the jurisdiction of the U.S.A.F. To us, it appears as though all involved parties will continue to jockey for better positioning. Will such harm the finest GPS system in use today? We don't believe so, as long as those coming to the GPS party rely upon an experienced designated driver and remain cognizant of the system's importance in today's world.

Thanks for joining us and we look forward to your suggestions for future issues. Don't forget to check www.satnews.com for daily news for our industry.

Hartley Lesser, Editorial Director,
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A WIN-WIN — ORS AND TACSATS

Last December 16th, Orbital Sciences Corporation launched the TACSAT-2 microsatellite for the U.S. Air Force aboard a Minotaur I launch vehicle from NASA's Wallops Flight Facility. The client was the U.S.A.F.'s Space and Missile Systems Center (SMC) Space Development and Test Wing (SDTW), located at Kirtland Air Force Base in New Mexico. Approximately 11 minutes after lift-off, the Minotaur rocket placed the TACSAT-2 spacecraft into a low-altitude orbit. The rocket also deployed another microsatellite, GeneSat-1, for NASA's Ames Research Center.

TacSat-2 aboard Minotaur I rocket as it lifts-off from NASA's Wallops Island Flight Facility

The purpose of the TACSAT-2 project was to rapidly deploy a low-cost satellite to explore the tactical utility of a space Intelligence, Surveillance, and Reconnaissance asset, which is a **Department of Defense** (**DoD**) objective spurred on by **Operationally Responsive Space** (**ORS**). The nature of this mission required a short schedule to prove the quick turnaround and launch capabilities of the **Minotaur** regarding the ORS mission for the U.S. military. When you consider the Minotaur/TACSAT-2 mission was accomplished in *just seven months*, from contract initiation to successful orbit insertion, you could definitely state mission accomplished.

The TACSAT-2 satellite demonstrates new technologies and capabilities for ORS support of military operations in the fact that there were multiple experiments on board the satellite. The primary experiment focused on a medium resolution imager, which demonstrated the ability to be autonomously tasked and rapidly provide data to warfighters on the ground. The TACTSAT-–2 and –3 partnerships include space organizations from the Air Force, Army, and Navy.

TacSat-2 Spacecraft in the clean room at NASA's Wallops Island Flight Facility, Wallops Island, Va., launch site.

The *TACSAT-2* project manager is *Neal Peck*, and *Thom Davis* holds an identical position for *TACSAT-3*. Both work for the **Air Force Research Laboratory**'s **Space Vehicles Directorate**, **Kirtland Air Force Base** in New Mexico. AFRL's Space Vehicles Directorate managed the program and they also served as the integrator of the space vehicle and also administered the on-orbit operations. The U.S. government team involved numerous organizations and companies working together to accomplish this amazing feat that included:

- **Air Force Research Laboratory, Space Vehicles Directorate —** *program management, spacecraft integration, experimental payloads*
- **Space and Missile System Center's Space Development and Test Wing (SDTW) —** *launch, mission operations*
- **Naval Research Laboratory —** *Target Indicator Experiment (TIE) payload development*
- **Office of the Secretary of Defense for Acquisition, Technology and Logistics —** *oversight of Advanced Concept Technology Demonstration (ACTD)*
- **U.S. Strategic Command —** *ACTD user sponsor*
- **Operationally Responsive Space (ORS) Office** *– oversight and sponsorship*
- **Pacific Command —** *user partner for operational exercises*
- **NASA Jet Propulsion Laboratory —** *Inertial Stellar Compass payload development*
- **NASA Goddard Space Flight Center —** *development of Low Power Transceiver Radi*
- **MicroSat Systems, Inc. –** *spacecraft bus development, attitude control system design, experimental solar arrays*
- **Broadreach Engineering —** *avionics and flight software development and Integrated GPS Occultation Receiver*
- **Interface and Control Systems, Inc. —** *ground system and spacecraft autonomy*
- **Jackson and Tull —** *spacecraft integration and mission operations*
- **Applied Technology Associates —** *mission operations*
- **Science Applications International Corp. (SAIC) —** *engineering design support for optical imaging system*
- **L3 Communications —** *development of Common Data Link tactical radio*
- **Honeywell —** *Miniature Vibration Isolation System payload development*
- **Orbital Sciences Corp. —** *launch vehicle and Nova Sensors — development of the four-color camera*

If you've never heard about Operationally Responsive Space (OSR), understand this is envisioned as a capability to assure space power focused on timely satisfaction of Joint Force Commanders' needs. ORS is intended to make critical contributions in terms of reconstituting lost capabilities and to augment existing capabilities. In addition, OSR will exploit new technical and operational innovations as well as enhance survivability and deterrence.

TacSat-2 spacecraft during vibration testing at Kirtland Air Force Base, N.M.

ORS will consist of spacecraft, launch vehicles, and ground segment to provide surge capability, reconstitute damaged or incapacitated satellites, or provide timely availability of tailored new capabilities.

Over the next few years, the Science and Technology community's *Tactical Satellites* (**TACSATS**) and the **ORS Office**'s **ORSSats** will make a unique pathfinding contribution by providing opportunities for operational experimentation as they test new technologies to determine how valuable they are in warfighter operations. This experimentation will help warfighters evaluate ORS capability to make critical contributions in terms of augmentation and reconstitution. Near term examples are the recently concluded TACSAT-2 operation and the upcoming TACSAT-3, 4, and 5 launches.

Closeout activities on the upper launch stack

Each of the ORSSats and TacSats require an appropriate launch vehicle. In the near term, ORS is using the *Minotaur* launch vehicle from **Orbital** and the *Falcon* launch vehicle from **SpaceX**. Also being explored by ORS are responsive, economical launch vehicles for experimentation and, ultimately, the operational phase. All contracts were awarded based on the AFRL's competitive procurement practices. However, there was one exception. The contract to **MicroSat Systems**, Inc., was a sole source award.

The Minotaur launch vehicle itself was selected as a result of a competitive procurement managed by **SMC's** *Space Development and Test Wing*.

There were three primary payloads:

- *There was an imaging system with a 20- inch telescope and a four-color camera that was developed by **AFRL**, **SAIC**, and **Nova Sensors***
- *The Target Indicator Experiment had an AIS receiver and a signal intelligence (SIGNIT) experiment that was developed by the **Naval Research Laboratory***
- *Common Data Link provided high data rate-tactical communications to a mobile ground station and was developed by **L3 Communications***

In addition, TACSAT-2 consisted of the following science experiments:

- *Hall Effect Thruster for orbit station keeping – developed by **AFRL***
- *Atmospheric Density Mass Spectrometer for collecting measurement of the neutral atmosphere at Low Earth Orbit, also developed by **AFRL***
- *Roadrunner Onboard Processing Engine (**ROPE**) image processing and storage experiment, another trial developed by **AFRL***
- *Integrated GPS Occultation Receiver (**IGOR**) high precision GPS that also measured occultation of the GPS signals passing through the earth's atmosphere and employed for weather prediction, developed by **Broadreach Engineering***
- *The Miniature Vibration Isolation System, which isolated the telescope system from vibrations induced by the spacecraft*
- *The Inertial Stellar Compass provided spacecraft position knowledge and also employs an attitude propagator, developed by **NASA**'s **Jet propulsion Laboratory** with the **Massachusetts Institute of Technology***
- *Amorphous Silicon Solar Arrays for lightweight supplemental power generation, developed by **MicroSat Systems, Inc.***
- *The Autonomous Tasking Experiment, which automated complex activities allowing the spacecraft to do much of it's own task scheduling and gave tactical users direct access to the spacecraft without the need for them to have detailed knowledge of the workings of the system, developed by **Interface and Control Systems***

Approximately two minutes into the flight, the TacSat-2 went "silent" — the first spacecraft contact found TacSat-2 "phoning home" exactly as scheduled. However, commands could not be sent to the spacecraft, due to a configuration error at the ground system. This was remedied in two days and all operations went as planned.

A final report is being prepared regarding the results and lessons learned from this enlightening project. Data acquisition performed as expected, with information distributed to users via a secure data network that allowed all to share the data with geographically distributed team members. The tactical communications link also performed as expected, however, there are inherent limitations when operating a tactical link with a space asset. Considering all of the needs, a space-based communications network would be most helpful for future tactical space systems.

The overall result was that TacSat-2 accomplished much more than was originally envisioned when the program was first conceived. All of the successes, as well as the failures, associated with TacSat-2 are already being leveraged by TacSat-3, -4 and –5. Moreover, the ORS office is ensuring the lessons learned will be employed in the development of future, operational ORS capabilities.

TacSat-2 satellite

As far as cost savings and speed of implementation tempting the Pentagon into additional missions, TacSat-2 is but the first of what is intended to be a string of successful TacSat experiments. TacSat-3 will launch this year, with TacSat-4 to launch in 2009 and TacSat-5 in 2010. Obviously, additional launches would not have been scheduled had TacSat-2 not met, and exceeded, expectations. Sincere congratulations to all who played a role in the program — the ultimate winner will be the warfighter and our nation.

Project Manager Biographies

In addition to serving as program manager for the successful TacSat-2 mission, Neal Peck also worked for the Air Force Research Laboratory's Space Vehicles Directorate, Kirtland Air Force Base, N.M., for 10 plus years in a variety of positions, including technology and strategic planner, as well as the Acting Chief, Strategy and Plans Branch. During his 11-year career as an Air Force officer, he was assigned primarily in the space experiments field at Vandenberg Air Force Base, California. This included a tour as the Shuttle Launch Complex operations manager for the $3.3 billion Space Shuttle Launch Complex. Mr. Peck earned a Master of Science degree in Aerospace Engineering from West Coast University, Los Angeles, Calif., and a Bachelor of Science degree in Aeronautical Engineering, Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio, and another Bachelor of Science degree in Chemistry, Cumberland College, Williamsburg, Kentucky.

Leading the TacSat-3 project, Thom Davis also held the same position five years ago for the Experimental Satellite System-10 flight experiment, which represented the first ever microsatellite to successfully demonstrate autonomous navigation and on-orbit proximity operations. Mr. Davis served 22 years in the United States Air Force, retiring as the Acting Director, Space and Missiles Technology, Phillips Laboratory, the predecessor of the Air Force Research Laboratory's Space Vehicles Directorate, Kirtland Air Force Base, New Mexico. A command pilot with more than 3000 hours of flight experience, Mr. Davis participated in operational assignments flying the HH-3E and UH-1N helicopters, as well as the KC-135 tanker, including a tour with the 89th Military Airlift Wing (Presidential) at Andrews Air Force Base, Maryland. He is also an AIAA Associate Fellow and lifetime member of the Air Force Association, Military Officers Association of America, and the Order of the Dadaelians.

All photos included in this article are courtesy of the U.S. Air Force

Executive Spotlight On...

JIM CORRY, VICE PRESIDENT OF GOVERNMENT SOLUTIONS, MOBILE SATELLITE VENTURES

***Sat Magazine* was delighted to be able to chat with Jim Corry recently, regarding his company's mutual aid radio talkgroups.**

What exactly is this service? Called SMART (Satellite Mutual Aid Radio Talkgroup), Mobile Satellite Ventures' nationwide push-to-talk satellite network allows law enforcement and public safety officials to participate in a nationwide, two-way satellite radio talkgroup. The network was conceived, and is administered in conjunction with, the U.S. Department of Justice (DOJ) and the Federal Bureau of Investigation.

Officials are first authorized by DOJ to participate in the talkgroup. Group members can listen to, or join in, conversations taking place over the talkgroup by using MSV's push-to-talk satellite technology. The talkgroup is available without any additional cost of MSV's public safety customers.

Mr. *Corry* is a 22-year veteran of the **United States Secret Service**, where, from 1976 to 1998, he held various positions of increasing responsibility, including leading teams of over 100 people and protection of senior U.S. leaders as well as the President and Vice President. In 2007, Mr. Corry was appointed to serve on the *Joint Advisory Committee on Communications Capabilities of Emergency Medical and Public Health Care Facilities*. Established by the *National Telecommunications and Information Administration* (**NTIA**) and the **Federal Communications Commission** (**FCC**), the committee assessed the capabilities and communications needs of medical and public health care facilities across the nation and submitted its report to the U.S. Congress.

Executive Spotlight On...

SatMagazine

Good day, Jim, and thanks for taking the time to talk with us. The first question deals with the reasoning for MSV establish satellite mutual aid radio talkgroups? What drove this project?

Jim

MSV has always championed interoperability—by actually establishing these large regional and national talkgroups, as well as finding public safety agencies willing to manage it, MSV is doing more than just offering lip service to interoperability...we're doing something about it.

SatMagazine

What problems do satellite talkgroups address?

Jim

Satellite talkgroups are immune to the congestion and destruction associated with terrestrial networks. They are a tool to solve, or overcome, interoperability problems.

SatMagazine

Why did MSV wish to establish emergency responder talkgroups?

Jim

Talkgroups enable and improve the capabilities of multiple agencies at the federal, state, local levels—and even private agencies—to communicate better and to coordinate operations.

SatMagazine

What are the benefits and features of the MSV's SMART solution?

Jim

Talkgroups can dramatically improve interoperable communications and have a profound impact on operational coordination and interoperability. MSV's unique push-to-talk dispatch-style service offers a private mode talkgroup—allowing law enforcement, public safety, and emergency responders—to conduct interstate and interagency, one-to-one, push-to-talk operations with all other units throughout the region that have subscribed to the talkgroup. Additionally, the MSV

service features a standard broadcast mode talkgroup—employing one-to-many, push-to-talk satellite technology—and provides a way for any member of the group to quickly communicate a message to the entire talkgroup.

SatMagazine
How has the implementation been going?

Jim
Since our initial announcement of the **Department of Justice SMART** talkgroup last August, the interest and uptake in joining or forming talkgroups has been keen. We have assisted in the formation of two talkgroups for the Gulf Coast states of Louisiana, Texas, Alabama, Mississippi, and Florida. They are called **GSMART**. We recently announced the formation of two more talkgroups—called **MSMART**—for the Mid-Atlantic States, including Maryland, West Virginia, Delaware, Pennsylvania, Virginia, and the District of Columbia.

As of February of this year, MSV now has more than 60 federal, state, and local government agencies around the nation participating in organized talkgroups using MSV services. They represent some 26 federal departments and agencies, 13 statewide organizations, and more than 25 county and city agencies. Our number of users has increased by almost 70 percent since November of 2007, which was when we developed our first talkgroup users report.

SatMagazine
Have there been any comments from those in the groups?

Jim
Here are some quotes from some of the officials organizing and running talkgroups:

"The MSMART talkgroups will serve as an important supplement to our existing communications at all levels of government and public safety throughout the Mid-Atlantic Region," said *Richard DeVore*, chief of the *Emergency Management Division* for the **Allegany County**, **Maryland Department of Public Safety**. "These talkgroups represent a major step forward in this region's communications interoperability, particularly when the terrestrial networks are damaged or congested."

"Louisiana is constantly looking for solutions to improve interoperable communications among government and public safety agencies," said *David Stone*, for the *Information Technology Section* of the **Louisiana Governor's Office of Homeland Security and Emergency Preparedness**. "The GSMART talkgroups are being set up proactively to allow more effective communications among officials from multiple federal, state, local, and relief organizations during emergency situations."

"Using MSV's satellite equipment and communications services, we are now able to coordinate police, fire and rescue equipment, plan medical contingencies, and quickly prioritize and move food, water, and shelter supplies to the critical areas," said *Randy J. Johnson*, the assistant manager of communications for **Plaquemines Parish**, **Louisiana**.

"Reliable communications are critical during natural or man-made disasters, when wireline and terrestrial wireless systems might be inoperable," explains *Larry D. Haughey*, **MSV Satellite Services** group vice president for the government sector. "The addition of talkgroups further improve the ability of first-responders and other government agencies to communicate and coordinate quickly and effectively in times of urgent need, regardless of location and infrastructure."

SatMagazine
Let's take a look at a case study that involved MSV helping southern Louisiana prepare for emergency response.

In 2005, hurricanes *Katrina* and *Rita* devastated the Gulf Coast states of *Alabama*, *Mississippi*, *Louisiana*, and *Texas*. Federal, state, and local emergency responders were overwhelmed by the magnitude of the devastation and destruction. The local communication's infrastructure was destroyed, crippling organizations' ability to command, control, and communicate with their responders in the field. The loss of communications exacerbated the life-threatening situation throughout the region.

At the outset of the 2007 hurricane season, the *City of New Orleans*, along with public safety and emergency response organizations of *Jefferson*, *Plaquemines*, and *St. Bernard* parishes, took part in "Op*eration Swift Response*", a Department of Homeland Security-sponsored event. The scenario included a category three, Katrina-like hurricane emergency. Federal, state, and local agencies all took part in the 10-day training and exercise.

Executive Spotlight On...

"The exercise tested the participants' knowledge, awareness, flexibility, leadership, and interpersonal skills under extreme pressure," stated *Dave Stone* of the **Louisiana Governor's Office of Homeland Security and Emergency Preparedness**. "The exercise also highlighted the limited capacities state, city, and parish agencies have, and stressed teamwork and technology to help improve response capabilities. One of the technology tools put to the test during the exercise was mobile satellite communications."

Plaquemines Parish, Louisiana was one of the hardest-hit areas and took much of the brunt of Katrina.

"Communications throughout our region were destroyed, and we soon found this to be our number one problem in trying to coordinate rescue and recovery efforts," noted Randy J. Johnson, the assistant manager of communications for **Plaquemines Parish**. "Following Katrina, we were totally unable to communicate with our teams in the field and unsuccessful in effectively directing emergency supplies and assistance to the areas that may have needed it the most. It is critical for us to be able to quickly move rescue workers, medical support, repair teams, and essential supplies in order to save lives and quickly begin recovery and rebuilding. And we can't do that when our communication systems are down."

A Communication Solution

After the 2005 hurricanes, Plaquemines Parish began looking for a communications solution its emergency personnel could depend on if another disaster struck. At the outset of "*Operation Swift Response*", the parish found that solution in **Mobile Satellite Ventures**' (MSV) push-to-talk satellite phones.

Plaquemines' response team established its command center in the parish's **Emergency Operations Center** (**EOC**) in *Belle Chasse*, Louisiana. Throughout the exercise, the Plaquemines Parish EOC was able to communicate to its mobile field unit via MSV push-to-talk satellite phones. The MSV satellite radio/telephones and service enabled the Plaquemines Parish EOC to maintain interoperable communications throughout the parish, with the surrounding parishes, and the state of Louisiana EOC.

For "Operation Swift Response", an MSV satellite radio/telephone "*Go Kit*" was installed in the 911 communications center and another with the mobile assessment team in a roving command vehicle. The mobile command vehicle toured the parish, stopping at some of the areas that were hit the hardest by the 2005 hurricanes – locations most likely to need immediate rescue and response assistance in the event of similar storms. Even with electricity out, and wireline and cellular phone service disabled, command and control communications continued uninterrupted over satellite.

During Hurricane Katrina, this parish had to evacuate their 911 center, leaving their installed satellite communications behind. By installing their *MSV MSAT G2* as a "go-kit" in their 911 center, the parish is now able to take their satellite communications with them should they ever have to abandon the 911 center in the future.

Plaquemines Parish also recognized the need for satellite equipment training. Prior to this exercise, the parish used MSV personnel to instruct critical personnel how to use the equipment. MSV assisted the parish in establishing a *Government Emergency Telecommunications Service* (**GETS**) account with the Department of Homeland Security's *National Communications System*. Senior executives within the parish now carry **GETS** calling cards. At MSV's advice, the parish is also exploring implementation of *Wireless Priority Service* on its cell phones and *Telecommunications Service Prioritization* (**TSP**) on critical wireline circuits throughout the parish.

"Using MSV's satellite equipment and communications services, we are now able to coordinate police, fire and rescue equipment, plan medical contingencies, and quickly prioritize and move food, water, and shelter supplies to the critical areas," *Johnson* commented.

Satellite Communications in the Future

"By using MSV's satellite communications technology in the future, we will be better able to communicate from our EOC to the field operators and respond to the needs of our community. Plaquemines Parish has a new Director of Homeland Security and Emergency Preparedness on board, and one of his first orders of business will be to acquire more satellite phones and expand our satellite communications capabilities," *Johnson* noted.

Requests to participate in **SMART** should be sent to SMART@usdoj.gov

IT'S THE LITTLE THINGS THAT MATTER

by David Mulholland, European Correspondent

Europe's small satellite makers are preparing to cash in on strong demand for their diminutive birds, both from traditional space-faring countries such as Franceand from smaller countries that are interested in owning space assets. The drivers for the expected growth are threefold: changing requirements, lower costs and shrinking electronics.

Dr. *Stuart Eves*, the head of military programs at **Surrey Satellite Technology Limited** (**SSTL**), arguably the world's leader in small satellites, likens traditional satellite makers to mainframe computer manufacturers, and SSTL to a PC maker. Moreover, just as most mainframes were replaced by PCs as their size shrank and their power grew, he expects small satellites to replace many larger ones in the years to come. He is not alone in that conviction, which is shared by SSTL's major competitors.

Small satellites also enable countries to loft constellations of satellites at a cost that isn't ruinous to their nation's budget. Additionally, a constellation of small satellites can do things that single satellites are unable to accomplish such as; interferometric synthetic aperture radar (SAR); gather better information from a radio signal by timing the difference in signal arrival; and provide fast tactical imagery.

"A lot of people are becoming aware of the merit of small satellites," *Eves* said.

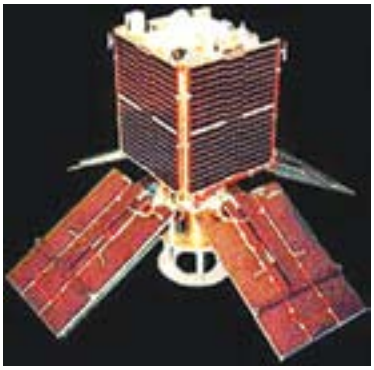
The United Kingdom, France, Germany, and to a lesser extent, Italy, are heading the European charge into small satellites.

Attack of the Stereotypes

The efforts to change are painfully typical of European technology programs. The British drive is headed by SSTL, a small, innovative, and successful company that pioneered small satellites, largely working with American agencies. Despite their technical achievements, they have received almost no backing from the U.K. government. The Germans, with a smallish company, **OHB**, are quietly doing some good work

with frugal support from the German government. The French government quickly realized the value of small satellites and has pushed its largest space company, the French subsidiary of **EADS Astrium**, to pursue the area with backing from the French space agency on technology and the French government on foreign sales. In summation, Italy is basically France — without the commitment.

The **French Ministry of Defense** was the first to acknowledge the promise of small satellites, leading the country to commission SSTL to build their first two small satellites, the *CERISE* and *Clementine*. Their missions occurred in 1995 and 1999, respectively. The French provide the *SIGINT* payloads, which could detect signals from 100MHz to around 17GHz.



Cerise satellite (SSTL) Clementine satellite is similar to the Cerise

In the classic pattern of British military acquisition, following the successful French missions, officials from the **British Ministry of Defence** stated that SSTL's actions were militarily relevant—therefore, they wanted to do business. A decade passed before a demonstration satellite, *TopSat*, was actually launched, although there was some work prior to that mission.

In addition, in the classic pattern of French military acquisition, the French started talking with their large satellite companies about making small satellites, which initially proved quite expensive by comparison. For example, the *Galileo* program purchased two satellites. They are *GIOVE-A* and *B* and are part of the future navigation constellation, which will conduct demonstration missions, and be placeholders for the frequency band.

Giove-A launch vehicle on pad

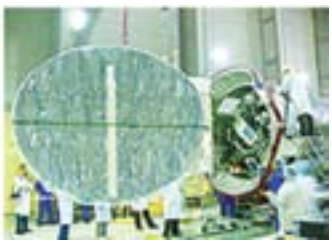
Giove-A pre-launch work

Alenia, **Alcatel,** and **Astrium** formed a consortium and bid 100 million euros. **SSTL** bid $28 million. The consortium revised their bid to 78 million euros. Both were awarded contracts. SSTL came in at their targeted bid price and on budget. That satellite is now nearing the end of its 27-month design life. The consortium's satellite is now two-and-a-half years late and has grown in cost by two-thirds.

Pleiades (Astrium)

Other "small" satellites are large and expensive by comparison. France's *Pleiades* satellites weigh about 1000 kg and costs 314 million euros for two. Italy's four *COSMO-SkyMed* satellites weigh about 1,700 kg and a total program cost about 1 billion euros. That compares to about 350 million euros for Germany's *SAR-Lupe* constellation of five satellites weighing in at about 750 kg.

SAR-Lupe 2 launch from Plesetsk facility



SAR-Lupe 3 integration into Cosmos 3M launch vehicle

SSTL

SSTL started life as an element of the **University of Surrey** in the mid 1970s. The *Department of Electrical Engineering* built their first satellite tracking station for the *OSCAR-7* and *OSCAR-8* research satellites. In 1978, **NASA** offered Surrey's researchers a piggyback launch and the University kicked-off the *UoSAT-1* small satellite research mission. UoSAT-1 was launched in 1981. Four years later, the university spun off SSTL as an independent company.

Oscar satellite- many versions have been launched over the years

UoSat (SSTL)

SSTL has a different satellite strategy. Traditionally, access to space is quite expensive, said *Eves*. This has led satellite makers to mitigate risk through exhaustive testing which has raised the cost of satellites. SSTL is trying to create a virtuous cycle. Instead of having a few extremely expensive satel-

lites with endless testing to bring down risk, SSTL wants to decrease the risk by lowering the cost of satellites and raising the volume. Essentially, the company is lowering risk by not having all the eggs in one basket.

As part of the strategy of lowering cost, SSTL does most of its testing on a system level, rather than a component, then subsystem, then system level.

"SSTL is taking a lot of what is going in terrestrial technology for things like mobile telephones and putting it into satellites," *Eves* said. "Our competitors aren't doing that, which is fortunate for us. We're riding the terrestrial technology wave. They are custom designing every component."

Another reason SSTL is able to come in on budget and cost is that the company has accepted many functions as in-house development tasks. *Eves* said, "This means if there is a problem, the fellow who can fix it is down the hall."

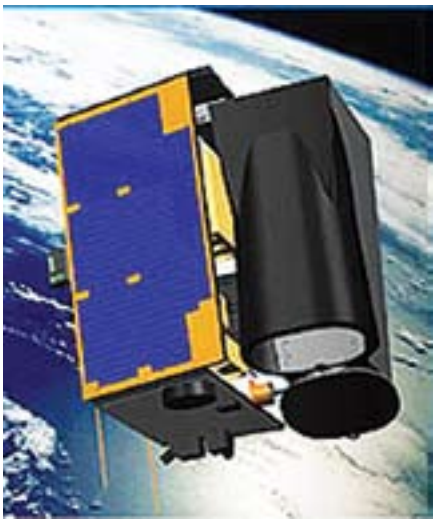
Due to the lower cost of small satellites, new countries are becoming customers, such as Turkey and Canada. Even the U.K. is interested in small satellites. *Eves* said, "We feel we're open for business. We've won the intellectual battle, now we have to get over the payment hurdle. When I talk to them they say, "That's all very good, Stuart, but we don't have any money."

To overcome this obstacle, SSTL is looking at a service provision contract similar to *SkyNet5*, where the U.K. MoD would pay per image with a guaranteed buy. The U.S. has been a major customer for SSTL. This may change, *Eves* said. The U.S. is looking to standardize satellites. If the interfaces are standardized, there will no problems. However, if what is behind the interface is standardized then SSTL will not be able to comply as everything would have to be redesigned.

TopSat

SSTL's first U.K. military satellite, *TopSat*, weighs about 120 kg and is about the size of a washing machine, costing less than £14 million ($28 million). Despite its small size, the sat-

ellite has a resolution of about 2.8-m and has outperformed expectations in reliability and performance. Further work is being completed on resolution for future satellites. Eves said 1m resolution is possible. With such low costs, small satellites can start competing with top-end, high-altitude, unmanned aerial vehicles (UAVs), such as the Global Hawk and EuroHawk.



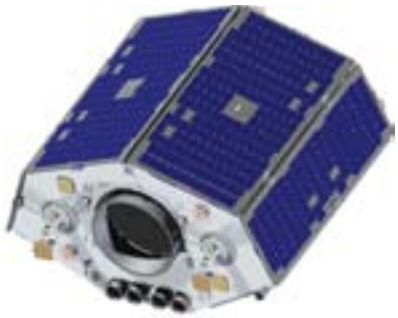
TopSat (SSTL)

One of the advantages of small electro-optical satellites, such as TopSat, is that they can keep the sensor pointed at the target as they pass overhead, allowing them to look at a target for a longer period of time, according to Eves. Larger satellites cannot do this because swiveling the sensor creates a wobble in the solar panels—that ruins the image. The small satellite is able to manage this maneuver because the solar panels are fixed to the body and do not vibrate. Improvements in solar panel technology, such as triple junction gallium arsenide that have 25-26 percent efficiency, about double the old silicon panels, help ensure the panels are small enough to remain attached to the satellite body.

The U.S. declined to participate in TopSat because the satellite was too small. However, the low cost and better-than-expected performance has reignited U.S. interest for small satellites that are able to provide timely tactical information.

Look Fast

During the Cold War, one of the primary uses of imagery satellites was to check up on other's nuclear weapon's sites. Having a satellite pass every several days met strategic needs. Today there is an emerging requirement for fast tactical imagery. SSTL has already demonstrated extremely short cueing times with TopSat. In one experiment, the time between sending the cueing order and receiving the image was 14 minutes. Another 15 minutes was required to process the image with an old computer, however that time requirement can be cut significantly with a newer computer in the ground station that consists of nothing more that an antenna and a computer. This compares quite favorably with the three or four days now required to cue a satellite to capture an image.



Hi-Res Earth Observation Satellite

Eves stated the best solution for this type of need is to have a constellation of small satellites providing multiple passes each day to shorten the time required to cue a satellite and receive the image.

In addition to the company's expertise on observation satellites, SSTL sees opportunities for military communications. Right now, 75-80 percent of the U.K.'s military communications is moving through commercial satellites. A constellation of small satellites could ratchet up the dedicated military communications capacity quickly.

France

France has a growing small satellite capability, primarily in the French part of **EADS-Astrium**. Although **CNES**, the French space agency, designed the 135 kg *Myriade* satellite that is the basis of Astrium's small satellite ventures. **Thales Space** also contributes to this venture.

Myriade product line (Astrium + CNES)

The state backing helped EADS Astrium beat SSTL in a bid for two reconnaissance satellites for Algeria weighing about 135 kg, a size class that SSTL dominated until the Myriade. This win sparked suspicions at SSTL that EADS Astrium was selling below cost to enter the market.

The satellites for Algeria are part of the **Algerian National Space Technology Center**'s *Alsat-2* program. The Alsat-2 satellites will each possess a resolution of about 2.5-m in monochrome and 10-m in four-band, multispectral mode. SSTL built *the Alsat-1*, which launched in 2002.

The French military procurement agency **DGA** has ordered 10 Myriade-based satellites from EADS Astrium: four *Essaim* electronic eavesdropping satellites that fly in formation; two *Spirale* infrared missile warning satellites; and four as part of their *Elint* radar-detection demonstrator program. These satellites are priced approximately in the same range as SSTL satellites.

Germany

Germany's **OHB** is building the *SAR-Lupe* five satellite constellation of small radar satellites. Those satellites are somewhat larger than SSTL's satellites, but still small at 750 kg and about the size of an upright piano with a large antenna and solar panels. The SAR-Lupe program came in on time and budget at about 315 million euros, including launch and ground segments. The size of the satellites are partly due to them having fully redundant systems, unlike TopSat.

SSTL and OHB have signed an agreement to cooperate on the Galileo program. The company has specialized in radar satellites but is branching out with a 200-band hyperspectral satellite for the German Space Agency, **DLR**. The company is intending to offer such satellites to the military to provide full capability, said *Fritz Meikle*, OHB's chief technical officer. In this vein, OHB is talking with the Turkish military about a multispectral satellite with 0.5-m resolution.

As is the case with SSTL, OHB is finding that small satellites are tempting new customers. Spain and Sweden have expressed interest in reconnaissance satellites.
"Our approach is to get ready for this market," said *Meikle*.

The company is conducting several studies for future military satellites. One study funded by the German armed forces is looking at a LEO missile-warning constellation optimized for Europe, with six to 10 satellites, an idea for which OHB is applying for a patent. OHB is also working on a **European Space Agency** program for two or more geosynchronous satellites for military communications. This is closely related to anther program looking to radio communications from the ground to high-altitude UAVs, or LEO satellites, and then laser links to GEO satellites.

Italy

Italy joined the small satellite parade with the *COSMO-SkyMed* constellation, built by **Thales Alenia Space**, a French-Italian company. The four small satellites have X-band radars. The program cost 1.05 billion euros and is being paid both by the Italian space agency and the military. These satellites have several modes of operation, with a spot mode resolution of 90-cm and swath as large as 200 km.

COSMO-SkyMed (Alenia)

David Mulholland has covered military affairs for more than a decade, reporting on NASA and the U.S. Department of Defense for ***New Technology Week***, the USAF for ***Defense News***, aviation and business for ***Jane's Defence Weekly***, and logistics as co-founder and editor of ***Military Logistics International***. He can be reached at: dmulholland100@hotmail.com

SECURE SATELLITE TELECOMMUNICATIONS IN A NATION-BUILDING ENVIRONMENT

by Marc LeGare, CEO of Proactive Communications, Inc.

As a provider of military satellite communications, our company's focus is, understandably, on network security. Deploying and maintaining secure networks in war zones that keep classified information out of the hands of the enemy is critical for the effective execution of military operations. The secure satellite communications system PCI provides in Iraq has also had a significant impact on another, equally important arena—nation building.

According to *Wikipedia*, nation building is the deliberate effort by a foreign power to construct institutions of national government. In the case of Iraq, its emerging government in 2004 had no intact communications infrastructure to support its evolving institutions. By the summer of 2006, however, the *Iraqi Government* had the world's largest secure VoIP network. By January 2007, the Iraqi Government had full control of this network and continues to operate it today. For **Proactive Communications, Inc.** (**PCI**) to accomplish this task, a number of factors had to be considered in designing, deploying, supporting, and transitioning a secure satellite network, while simultaneously supporting elections, Iraqi Security Force (ISF) operations, and internal government communications.

The security principles PCI initiated for this project are instructive for any future nation-building scenario. These principles are:

- Achieve Design and Export Administration Regulations (EAR)
- Balance and Monitor Deployment Processes
- Build Robust Management Capability
- Set Transition Conditions

The ***first principle*** is to understand the relationship between

the design requirements and the US Government (**EAR**). The design for the system should follow established models which provide multiple layers of defense/security to defeat both internal and external threats, while also supporting rapid communications. The design requirements should be based on integrated policies and procedures concerning hardware and software.

The constraint in a nation-building scenario is that hardware, software, and the intellectual/design properties, may be limited by the **Department of Commerce**'s *Bureau of Industry and Security* (**BIS**). The relationship between the "possible" and the probable should be addressed upfront. US Government contracting officers and Contracting Officer Technical Representatives often focus on getting the project going without understanding the limitations BIS might levy. In some cases, failure to gain approval through the BIS/EAR process could result in radical changes to the security scheme at worst, or at least cause a delay in gaining the necessary waiver for transition.

The ***second principle*** is the need to balance and monitor deployment considerations. The security concept involves multiple layers and so requires detailed integration. The following are the types of questions a security concept must address.

- *Is it prudent to conduct the detailed integration at the target site?*
- *Is the target site the appropriate place to discover an integration problem, IP address conflict, corrupted firmware, or other "surprises"?*
- *In scenarios where US forces are engaged in post-conflict stability operations, the environment may remain dangerous. Are US personnel conducting the on-site installation or are local nationals?*
- *Is there a primary and secondary means of communication available to the installation engineer?*
- *If a detailed test and integration can be conducted at a safe haven, can a critical piece of integration be withheld and done at the site to quickly bring the node into the secure network?*
- *If the node equipment is intercepted or lost in shipment, is there any possibility of the node equipment being used for anti-government purposes?*

As one can see from these security questions, if the installation is being conducted under hostile circumstances, sound risk mitigation measures must be practiced for both the work force and the equipment.

The ***third principle*** is to build a robust management capability. A secure satellite telecommunications network has to provide management capability that accounts for non-secure and secure components, satellite transport, teleport/hub, and node conditions. In addition, if local conditions warrant, this capability may need to reside at a location far removed from the customer nation.

A distributed location can allow for subject matter expert observation and troubleshooting without incurring high cost personnel deployments. A distributed location can also leverage foolproof electrical power and other elements of a safe haven. However, some consideration must be given to investing time and resources into a fledgling *Network Operations Security Center*, especially if there is a possibility of transitioning the network to the host country. The encryption/security device management capability must be robust enough to receive additional devices. Such a satellite network must have this capacity to expand built into the overall scheme. From a business point of view, expanding the network is good news, but if a growth plan isn't in place, a company might find itself doomed by success.

The ***final principle*** is to set conditions for transitioning the network to host government ownership. The US military paradigm of network security is well established; however, a model for transferring a secure network to a foreign government has yet to be developed. Functional areas of training, engineering, documentation, manning, risk mitigation, quality control/assurance, finance, and legal ramifications need to be addressed upfront. Not surprisingly, one solution does not fit all in these environments.

PCI has had the opportunity to work through these principles in Iraq. The project was started in late 2004 and was initially focused on providing a countrywide network between the major cities and *Baghdad* for the first elections in January 2005. We explored secure voice over satellite and deployed it that spring. As the network grew, different layers of security were added.

Satellite telecommunications was the ideal choice for standing up a secure government network in Iraq. Anti-Iraqi Forces had previously targeted cell/microwave towers, making these methods untenable. Satellite telecommunications, with its *Beyond Line of Sight* capability, ubiquitous antennas, and ability to be rapidly deployed and established, was the ideal solution. As one could imagine, the initial design parameters presented some security challenges, problems with faulty commercial power, customers with evolving technical skills, and myriad other unforeseen circumstances which would be difficult to overcome in a time-sensitive environment.

PCI worked through these issues and the network now offers a full range of communications options that include secure voice/e-mail, Internet, and web and file storage. The Government of Iraq personnel now have the flexibility to correspond with their internal and US counterparts in whatever way is most effective and efficient at a given time.

In Iraq, US military and Iraqi government personnel have used the PCI satellite communication system to operate through a number of dangerous situations. For example, the network supported communication/media requirements for all three of the major elections in 2005, the execution of *Saddam Hussein*, every major religious holiday since late 2004, as well as the deployment of the *Baghdad Security Plan*.

The network peaked at 258 nodes in January of 2007 and spanned Iraq from *Basra* in the south to *Dahuk* in the north, from the *Jordanian* and *Syrian* borders in the west, to the *Iranian* border in the east. In March 2007, this network became the first large-scale IT project to transition to Government of Iraq funding. The network remains operational to this day and is a milestone for the US Government goals for the Iraqi government to provide security, self reliance, increased capacity for essential services, and stronger law enforcement, thereby promoting civil rights.

Secure satellite telecommunications in Iraq has been a successful nation-building tool and provided a strong value position to the US and Iraqi governments. Creating secure communications in nation-building scenarios requires in-depth knowledge of how to achieve design and EAR balance, monitor deployment processes, build a robust management capability, and set transition conditions. If these principles are fully understood and addressed, satellite providers will continue to play a critical communications role in emerging countries throughout the world.

Marc LeGare is the CEO of Proactive Communications. He has a B.S. from the United States Military Academy at West Point, a Master of Science from the Air Force Institute of Technology, and a Master of Military Arts and Sciences from the School of Advanced Military Studies.

Executive Spotlight On...

TIM DEAVER, DIRECTOR, AIR FORCE PROGRAMS, AMERICOM GOVERNMENT SERVICES

Given the current state of affairs in our world, those with experience in the military aspect of our space and satellite capabilities are sought after by companies all over the world for their expertise. AMERICOM Government Services (AGS) has been highly involved with civilian and defense-related government agencies and their contractors since 1973.

One critical area within which the company works is in their Air Force Programs division. AGS integrates hybrid telecom and info technology systems, including IP platforms and applications, and provides secure broadband communications in support of mission-critical needs as well as day-to-day operations. The company's full range of satellite services includes highly reliable fixed, transportable, and on-the-move solutions. These are especially valuable as AGS has access to 37 satellites that offer global coverage and bandwidth portability.

In January of this year, AGS appointed a highly experienced individual to lead this important division—*Timothy L. Deaver*. With more than two decades of **U.S. Air Force** experience under his belt, and attainment of the rank of Lieutenant Colonel, Mr. Deaver's most recent military assignment was a *Deputy Chief, Space Control Architecture Division*, **National Security Space Office**. He directed the development of a long-term architecture for the **Department of Defense**'s space control capabilities. Prior to that position, he was the *Chief* of the *Space Control and Force Application Branch* for the **Undersecretary of the Air Force**, where he led the *Air Force Policy Team* on three *National Security Policy Directives* signed by President Bush. He also led overseas operations that involved a $260M/US surveillance system.

Somehow, between establishing his new office and new projects, Tim allocated some time for SatMagazine to discuss his new appointment.

SatMagazine
Tim, we understand you are the new Director for Air Force Programs for Americom Government Services. Would tell us a little bit about your background?

Tim
I have more than 22 years of experience in the space industry as well as degrees in communication systems and spacecraft design. I have worked in various areas of the industry, ranging from spacecraft operations, space surveillance and intelligence, to policy and acquisition.

SatMagazine
You mentioned acquisitions as part of your experience. Can you elaborate on these areas? Who did you work with in that capacity?

Tim
My acquisition experience was mainly in the test and evaluation area until I started working at the Pentagon five-years ago. I was working in a policy office that became part of the Under Secretary of the Air Force's office. This shift occurred as result of the Department of Defense (DoD) establishing the Secretary of the Air Force as the Executive Agent for Space. At the same time, DoD assigned the Under Secretary of the Air Force as the milestone decision authority for space systems. I spent the last couple of years in this office developing long-term architectures and performing program assessments as part of the DoD's annual funding development process.

SatMagazine
Your record reveals you have tremendous military experience. Can you tell us about your experience within the commercial satellite industry?

Tim
My previous experience with the commercial satellite industry focused on the ability for commercial communications and imagery companies to provide reliable and assured capabilities to the military at all times. I was part of the team that established the first meeting between senior DoD officials and the commercial providers' CEOs and Presidents. This meeting initiated an entirely new dialog between the DoD and the agency's providers. Quarterly coordina-

tion meetings continue to this day, with annual meetings between the senior DoD officials and corporate leaders. In fact, I will be representing AGS at the government's quarterly coordination meetings.

SatMagazine

What are your responsibilities in your new AGS position?

Tim

AGS prides itself on providing complete solutions for the U.S. Government; be it Transponder, Custom Network, or Strategic Satellite Solutions. I will be working across all three business areas to ensure we meet the needs of our Air Force customers with highly secure, fully integrated, complete end-to-end solutions. One area I am very enthusiastic about is the potential for hosting payloads for the U.S. Government on our satellites. We have a satellite manufacture and launch schedule, which allows us to offer approximately three spacecraft a year for a hosted payload. This is an exciting time in this area, as it has the potential to dramatically change the commercial SATCOM providers' relationships with the USG.

SatMagazine

Certainly, your experience should be of great benefit to Americom Government Services. How do you see yourself in this new role?

Tim

I hope to be able to combine my knowledge of the DoD acquisition process, the needs of the services (specifically, the Air Force) with the full-spectrum solutions capabilities offered by Americom Government Services. I am extremely familiar with the challenges the DoD community is experiencing in space system acquisition. One of my primary responsibilities will be to find the synergy between DoD requirements and our ability to deliver custom solutions. As we uncover these opportunities, we will work closely

with the Department of Defense, U.S. Strategic Command, the services, and their respective operational and product centers to develop these opportunities as cost beneficial capabilities for the warfighter.

SatMagazine

As Director for Air Force Programs, what do you believe Americom Government Services can do to support the unique requirements of the U.S. Air Force, given the hostile adversities warfighters face in protecting our nation and our worldwide interests as successful solutions must be afforded them as quickly as possible?

Tim

On the transponder solutions side, meeting the exponentially increasing bandwidth needs of mobile users will continue to be a challenge for all services. The growth in Airborne Intelligence, Surveillance, and Reconnaissance (AISR) assets provides a great partnership opportunity between AGS and the Air Force to meet the growing need. Some of the unique requirements in this area pertain to the potential operating locations of the AISR assets. Some of these areas have limited coverage by commercial SATCOM. In addition to hosted payload activities, Americom Government Services is looking at ways to help the Air Force meet specific space situational awareness (SSA) requirements. As a global satellite system operator, we are enormously interested in making sure we can operate in a safe environment and we believe we can help the Air Force with its national SSA mission.

SatMagazine

You mentioned AGS could help the Air Force with its national SSA mission. Are you in a position to provide some additional details?

Tim

As a geosynchronous satellite operator, we are concerned about other satellites and space debris that may come too close to our spacecraft and could potentially cause damage. We track, with great precision (within a few hundred meters), where our spacecrafts are at all times. Additionally, we know our maneuver schedule and the relative state-of-health of our spacecraft. We are working closely with the Air Force and other geosynchronous satellite operators on mechanisms to share this information for mutual benefit. It is comforting to know that U.S. Strategic Command has procedures in place to warn us if they believe something is a threat to our satellites; we believe through information sharing, we can help them do their job with great precision.

AMERICOM SATELLITE COVERAGE INFORMATION

Satellite	Orbital Location	Frequency Band	Coverage Area
AAP1	108° East	Ku-band	China; Northeast Asia; South Asia
AMC-1	103° West	C/Ku-band	North America; 50-State
AMC-2	85° West	C/Ku-band	North America; 50-State
AMC-3	87° West	C/Ku-band	North America; 50-State
AMC-4	101° West	C/Ku-band	North and Soth America; 50-State
AMC-5	79° West	Ku-band	Continental U.S.
AMC-6	72° West	C/Ku-band	North America
AMC-7	137° West	C-band	North America; 50-State
AMC-8	139° West	C-band	North America; 50-State
AMC-9	83° West	C/Ku-band	North America
AMC-10	135° West	C-band	North America; 50-State
AMC-11	131° West	C-band	North America; 50-State
AMC-12	37.5° West	C-band	North & South America, Europe, Africa
AMC-15	105° West	Ku/Ka-band	North America; 50-State
AMC-16	85° West	Ku/Ka-band	North America; 50-State
AMC-18	105° West	C-band	North America; 50-State - available Jan. 2007
AMC-23	172° East	C/Ku-band	Pacific Ocean Region - available Jan. 2006

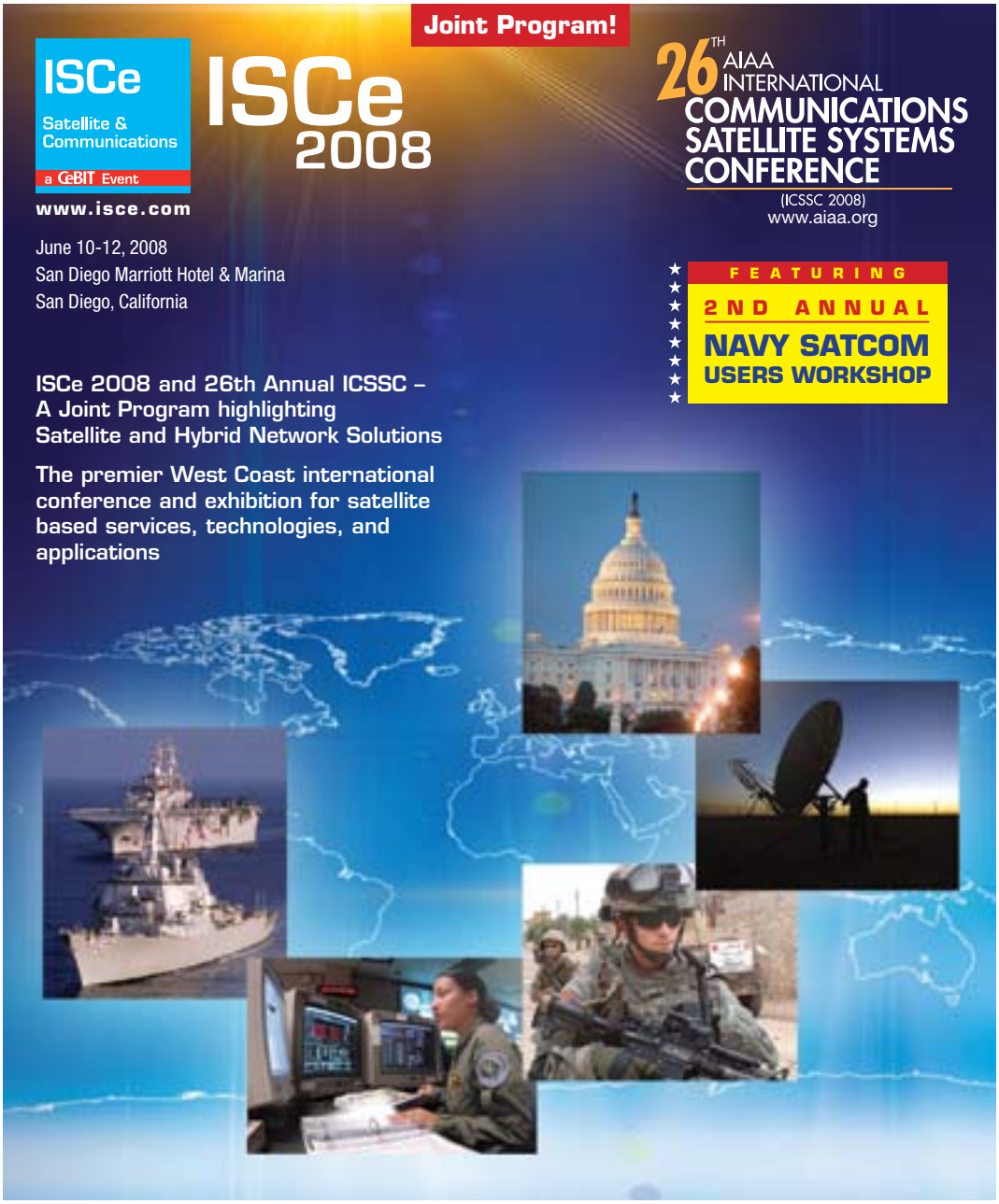
ISCE 2008

Tracking down information of use in our daily endeavors within the satellite communications and ancillary business arenas can be time consuming and difficult. There are a myriad of details to handle, from securing non-disclosure agreements, signing national security papers, and making certain all of our connections are "secure". Not an easy task, yet one we have to accomplish to ensure long-term viability, trust and competency in this amazing business.

There is a surefire method of gaining knowledge; a process highly acclaimed for to its personal aspects... one-on-one, one-to-many... and that is through the auspices of a conference. If you have a desire to acquire the ultimate in information and gain access to the satcom industry, the best venue is the ***ISCe 2008 International Conference & Exhibition***, sponsored by **Hannover Fairs USA, Inc**. The conference will be held at the **San Diego Marriott Hotel & Marina** in San Diego, California, June 10th through 12th.

This is much more than a single conference. This year's event will include three conferences in one. They include the *7th annual ISCe 2008* conference, the *26th annual AIAA International Communications Satellite Systems Conference* (**ICSSC**), and the *2nd Annual Navy SATCOM Users Workshop* have joined forces under one roof.

What a tremendous and rare opportunity to network with "those in the know". You'll also have the opportunity to attend information-rich sessions and to view, for yourself, many of the products being discussed in the conference's exhibit hall.



At ISCe 2008, military and government end-users, commercial satellite operators, as well as decision makers from the global satellite industry, will be on hand for this world-class program. Learn about the increasing number of opportunities awaiting your business acumen in the satellite and hybrid network arena.

ISCe 2008 Chairman *David Bross* took the time to answer some questions for us regarding ISCe and the role it plays in today's satcom environment.

SatNews

David, each year it seems as though the number of attendees, speakers and exhibitors at the ISCe conference grows... is this due to the international nature of our business segment?

David

After surveying our ISCe attendees last year (as well as our exhibitors, sponsors and supporting organizations) we decided to partner with our friends at AIAA, the California Space Authority, the Satellite Industry Association (SIA) and the Space and Naval Warfare Center (SPAWAR) to position the ISCe conference as the premier annual conference focusing exclusively on commercial-military satellite issues and opportunities for buyers and sellers of commercial satellite capacity.

SatNews

How did the amalgamation of the three conferences occur and merge under the ISCe banner?

David

We had been in discussions with our partners for more than a year and decided, as an industry team, that this conference would be the best vehicle in which to drive value for attendees, sponsors and exhibitors. Plus, San Diego is the perfect venue for this type of event given the proximity of SPAWAR and the support of the CSA.

SatNews

During the three days of the conference, there are a variety of interesting sessions to those in the business of milsatcom, whether on the military or commercial side. Could you enlighten us as to some of the topics to be presented?

David

ISCe 2008 will be broken into three distinct parts: the **ICSSC** colloquium and conference; the **ISCe Day 1** "*Continuity of Government Forum*", co-sponsored by **GVF** and the **World Teleport Association** (WTA); the **ISCe Day 2** "*Military Government & Requirements Forum*"; and the *Navy SATCOM "Users Workshop"*, sponsored by the **SIA** and **SPAWAR**. Each of these programs will feature the top-notch speakers representing government and military officials interacting with senior executives from commercial satellite companies in a unique, interactive setting.

Topics to be covered include:

- *Communications and Continuity of Government: An Overview*
- *Expecting the Worst: Emergency Management Communications in Uncertain Times*
- *Disaster Communications: Rewriting the Rules, Setting the Parameters*
- *Communications and Border Security: It's More Than Just Building a Fence*
- *Energy Source and Infrastructure Protection*
- *SIA's Annual "State-of-the-Industry Report"*
- *DoD's Double Imperative: Global Connectivity at Higher Speeds...in an Age of Cyber Threats*
- *Coordinating The "Comms": PACOM; STRATCOM; CENTCOM; NORTHCOM; EUCOM*
- *DISA Overview*
- *The View From Wall Street & DISA—The Analysts Speak*

SatNews

We noticed that on June 12, the SIA and SPAWAR are holding their 2nd annual Navy SATCOM Users Workshop. Is this open to all registered attendees?

David

As in previous years, all of the conferences held in conjunction with ISCe will be open to all full-conference registrants. Additionally, we will admit anyone with a valid military or government I.D. into both the conference and exhibit hall for free for the entire three-day event.

SatNews

How was San Diego selected for this year's exhibition?

David

Throughout its seven-year existence, ISCe has been a California-based show and will continue to be held in California. The conference launched in Long Beach, Calif., in 2001 and remained there for its first four years. For the past two years, the conference has been held in San Diego and will be again this year.

SatNews

What is the best way for interested folk to obtain ISCe information, conference registration, and hotel information/registration?

David

The fastest and easiest way to obtain information on the conference and to register for the event (and obtain housing) is to visit our web site: www.isce.com. We look forward to welcoming *SatNews* there and all of your readers, as well. *See you in San Diego, June 10-12!*

Thanks for chatting with us, David. For a complete listing of the ISCe 2008 schedule, go to http://www.isce.com/program — to register for the show, access http://www.isce.com/registration.

ISCe is the premiere West Coast satellite and communications event and highlights satellite-based services as well as the technologies and services and solutions for military, commercial, civil and consumer industries. This year's program should be of interest to all, especially given its location and outstanding sessions. We certainly hope we can meet you at ISCe 2008.

Executive Spotlight On...

RICHARD HITT, CEO, AND PRESIDENT OF HYPRES, INC.

Hypres is a leading developer of superconductor microelectronics technology and the Digital-RF product line. The company is currently developing an All Digital Receiver for satellite communications. During a recent conversation with Richard, he talked with SatMagazine about the Digital Receiver family of prototypes, and where Hypres is targeting its efforts.

SatNews

Richard, for readers who may not be familiar with Hypres and its technology, can you provide a brief summary of what the company does?

Richard

Hypres is the leading developer of superconductivity microelectronics. We are fabricating niobium-based circuits that, when residing in near absolute zero temperatures via a COTS cryocooler, exhibit no electrical resistance. Thanks to this superconductivity property, our circuits are able to greatly enhance the performance of components, devices and entire electronic systems.

Early on in the company's history, the Hypres team successfully applied superconductivity microelectronics technology to metrology applications. The company gained much notoriety in this area—our circuits are used in equipment that defines and measures Voltage Standards for most of the nations around the world. We also created the world's fastest oscilloscope.

Several years ago, we noted there was an opportunity to apply the technology to the RF complexities developing in the wireless communications sector. The proliferation of wireless

standards and protocols and scarcity of wireless spectrum is leading an industry effort to create high performance, spectrum efficient, wireless systems. We believe that the key to achieve this is with wideband direct digitization—often thought of as the Holy Grail in RF design. We're developing receivers, based on ADCs using our technology that are capable of direct digitization.

SatNews

Before you joined Hypres, you served in the U.S. Air Force and retired and then worked at Raytheon. What attracted you to Hypres?

Richard

I've spent the majority of my career developing wireless technologies for defense *C4ISR* (Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance) applications and various commercial markets. I became aware of Hypres while I was with Raytheon working on projects related to the *Department of Defense*'s (**DoD**) *Joint Tactical Radio Systems* (**JTRS**) program *software defined radio* (**SDR**). I believed that Hypres' technology addressed the most daunting challenge in developing a true SDR that would be able to operate over a wide swath of spectrum. Hypres offered the only solution that would allow for this wideband operation, via its direct-digitization capability. I was so impressed with Hypres that I joined the team when the opportunity became available.

SatNews

Without getting into too much techno-speak, can you explain how the technology aids in wireless performance?

Richard

When applied to wireless communications, digital superconductivity offers profound improvements in radio operating efficiency, data signal strength and speed, power conservation, and equipment cost reduction. Much of this performance improvement is due to the ultra-high speed, naturally occurring, magnetic pulses moving through the circuit—magnetic pulses fire at the speed of light, hundreds of times faster, and with much less complexity, than the electrons moving around inside a transistor circuit. This difference in speed and complexity can translate to the digitization of a wideband RF signal directly from the antenna, as opposed to the traditional—and more resource heavy—ways of conducting the process deep within the radio. In essence, superconductivity technology allows electronics manufacturers to remove most of a radio's now-unnecessary analog components.

SatNews
What is it that Hypres brings to the table for satellite communications (SatCom)?

Richard
SATCOM terminals rely on traditional superheterodyne-receiver frequency-downconversion methods to translate received X-band signals from the SatCom terminal antenna to lower-frequency intermediate-frequency (IF) signals that can be processed and digitized. Typically, this means downconverting and splitting the signal 56 times before it can be sent to each of the modems. This degrades and distorts the signal to the point that it becomes a real challenge to process the link. The result is tractor-trailer sized, expensive, inefficient, power hungry terminals.

The All Digital Receiver, however, is able to take the signal directly from the antenna, perform the analog-to-digital conversion, and then send the signal directly into a single modem. The result is the elimination of the analog components that seriously degrade a satellite terminal's signal—low noise amplifiers, downconverters, and associated cabling. The technology allows for smaller antennas while increasing the system's G/T by at least 3 dB higher—a figure that equals doubling the throughput, or amount of digital data, the terminal can deliver per time unit.

SatNews
Can you discuss your company's live satellite demo?

Richard
We performed a live satellite demo of our X-band digital receiver with engineers from Project Manage Defense Communications and Army Transmission Systems **(PM DCATS)**, and Communications-Electronics Research, Development, and Engineering Center **(CERDEC)**, at the *Joint SatCom Engineer-*

ing Center (**JSEC**) in Fort Monmouth, New Jersey. The receiver consisted of a bandpass delta-sigma ADC modulator and a digital channelizing circuit. They were both clocked above 10 GHz to convert RF signals in the 7.25- 7.75 GHz range to digital and perform downconversion and filtering completely in the digital domain. The receiver system was interfaced with a digital interface-enhanced modem.

The demo included transmitting data and video from an Army satellite terminal, to an XTAR satellite, and then back to earth for reception by the same terminal. At the terminal, our All Digital Receiver acquired, digitized, and processed the signals directly at X-band. Our receiver directly digitized signals in the 7.25 to 7.75 GHz range. We believe it is the first time anyone in the world has directly digitized frequencies this high.

SatNews
In addition to satellite communications, what are the other applications for the technology?

Richard
Hypres has been delivering All Digital Receiver prototypes—each configured to meet specific operating requirements—to various U.S. defense sector customers. The company continues to demonstrate that All Digital Receivers can be designed to directly convert RF signals to digital at virtually any frequency and bandwidth, with performance that exceeds currently fielded satellite and tactical communications, signals intelligence, electronic warfare, and software defined radio equipment.

The company is focusing its attention on addressing defense-related communications challenges—where harsh operating environments, expanding performance requirements, and extreme technology gaps are the norm, and where the benefits of superconductivity offer tremendous opportunity. As commercial wireless applications become more complex—via software defined radio, so-called "cognitive radio" and other technical advancements—the company will develop its technology to meet this sector's needs as well.

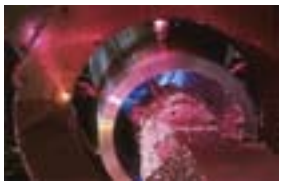
SatNews
What's next for the company?

Richard
We're continuing to experience increasing demand from defense prime contractors and systems integrators plus we're starting to hear more from the commercial sector regarding how we can address some of the RF complexities this sector is dealing with.

Also, we're continuing to work on the All Digital Receiver development, as it is part of a three-part project at Hypres to create an All Digital Transceiver. The other two parts include designing and producing an All Digital Transmitter, and then integrating the receiver and transmitter into a complete All Digital Transceiver.

SatNews
Thank you for your time, Richard. For those interested in learning more about Hypres and their product line, we recommend you check out http://www.hypress.com. The company is located in Elmsford, New York.

About Hypres



An aspect to the company we believe is noteworthy is the firm's complete, self-contained, microelectronics fabrication (fab) facility, complete with a full thin-films tools complement plus photolithography and etching. The aforementioned Niobium process is a full superconducting microelectronics circuit process. Additionally, Hypres can offer customized foundry services in several areas.

About Mr. Hitt

Mr. Hitt joined HYPRES in January 2003 as Vice President and General Manager of government products and systems. Prior to that, he served at Raytheon where he was Director of Joint Tactical Radio Systems (JTRS) programs, and director of business development for radios and terminals. During his career, he has held senior leadership positions with EG&G of Boston and Mnemonics, Inc., of Florida. His career in the Air Force included extensive time as a senior program manager in the advanced technology headquarters of the Air Force TENCAP program, where he was involved in bringing new space command, control, and communications technologies to tactical combat units. His commercial experience has focused primarily on bringing new technologies to mainstream command, control, and communications product lines and programs.

TSAT DELAYS AND BUDGET CUTS LIKELY TO BOOST COMMERCIAL COTM MARKET

NSR Building The Future With Knowledge™

by Jose del Rosario, Senior Consultant, NSR

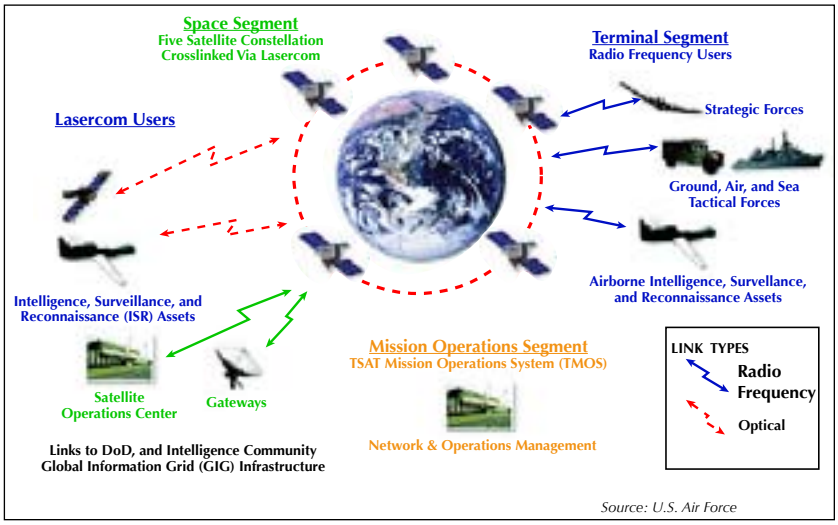
On February 4th, 2008, the U.S. Air Force requested $11.9 billion from Congress for military space programs and satellites for fiscal year 2009. This request represents a slight increase compared to the $11.3 billion appropriated by Congress for fiscal year 2008.

An Air Force official interviewed by *Reuters* indicated that "one program that 'took a serious hit' in FY2009 and beyond is the *Transformational Communications Satellite System* (**TSAT**)." The official further told Reuters that the Air Force would apply its back-to-basics approach to the program, earmarking just $843 million in FY2009, and $6.6 billion over the next five years, which is about $4 billion less than initially planned.

The expected contract award, which has already suffered delays over the past two-years, is expected to transpire in May of this year. In addition, the U.S. Air Force, which in recent years had planned to launch the constellation of five TSAT spacecraft starting in 2013, is now looking at the earliest launch to take place in 2016, due to budgetary issues and other concerns.

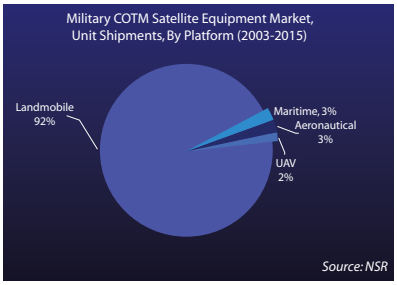
Moreover, and more importantly, the end result of substantial budget cuts is not only launch delays of from two-to four-years, but also the scaling down of TSAT's overall capabilities. TSAT, as foreseen by the U.S. Military's network architects, enables the realization of all DoD and Joint Force visions of future network-centric operations. This includes the **Army**'s *Communications on the Move* (**COTM**) and *Future Combat System* (**FCS**) concepts, as well as the **Navy**'s *Sea Power 21* vision and fleet *FORCEnet/FORCEview* concepts. Throughput for the five-satellite constellation, as originally planned, is to reach between 10 and 40 Gbps and have a total worldwide capacity of 28.5 Gbps. However, a $4 billion cut from the original budget of over $10 billion, or a 40 percent program decrease, will certainly present significant challenges for achieving original program goals.

Part of the TSAT architecture includes a terminal segment consisting of tens of thousands of small transmitters/receivers on aircraft, ships, ground vehicles and even in backpacks for communicating with the satellites. As COTM becomes more important for future warfighting, peacekeeping, and civil missions, the U.S. Department of Defense (which has already set its future network architecture for substantial COTM capabilities) will have to once again continue to augment, or perhaps even rely more heavily on, commercial assets and commercial service providers to address the impending shortfall.



In its recent report, "*Government & Military Demand on Commercial Satellites, 4th Edition*," NSR made its projections with the assumption that TSAT, a substantial future market restraint for commercial military demand due to its capabilities, would not be launched by 2013 as planned. NSR foresaw delays and budget cuts given the U.S. Congressional proceedings monitored in 2005 through 2007. In its market forecasts, NSR did not anticipate or account for TSAT as having any negative effects on commercial demand until the end of 2015. The recent announcement certainly validates the NSR projection.

The land mobile COTM sector is expected to account for the vast majority of in-service units as well as revenues within NSR's report forecast period. The other COTM sectors (maritime, aeronautical and UAVs), although accounting for a relatively small part of the market, are expected to exhibit healthy growth, as well. It is worth noting that the entire COTM sector is expected to be a large market segment. The small slices of market share for these other segments represent healthy and sustainable annual growth.



There are many links in the TSAT network that include optical and RF links. The vast majority of these links, as indicated in the figure above, are likely to be RF signals, which is where the commercial satellite industry can present its value proposition. Commercial assets in C-, Ku- Ka- and X-band (XTAR being owned by a commercial entity) can augment if not replace many of the RF links between TSAT and end user terminals. As military COTM demand grows while the TSAT budget declines, there is really nowhere else to turn except the commercial satellite industry.

A decreasing U.S. Military budget leads to a decrease in overall military-related demand. Nevertheless, in looking at TSAT alone and its effects on the commercial satellite industry, delays and perhaps a reduction in TSAT's capabilities should once again boost the commercial satellite industry. Perhaps this impetus will continue even until 2020 for COTM in peacekeeping and anti-terrorism activities.

Mr. del Rosario covers the Asia Pacific region for NSR and is a senior member of the firm's consulting team, where he focuses his research on quantitative modeling, data verification, and market forecasting for the wireless industry and satellite communications sector. He conducts ongoing research with specialization in policy analysis, regional economic indicators, regulatory initiatives, and end-user demand trends.

Information for this article was extracted, with permission, from this NSR report...

Government & Military Demand on Commercial Satellites, 4th Edition

A CASE OF SURVIVAL

UK Maritime and Coastguard Agency Helicopter Conducts Dramatic Rescue

On February 1st, 2008, the fishing vessel *Spinning Dale* ran aground on rocks in the remote Scottish archipelago of St. Kilda. With severe weather preventing the use of life rafts to evacuate the crew, helicopters were dispatched to the scene.

Coastguard Rescue Helicopter 100 from Stornoway, the newly introduce *Sikorsky S-92*, successfully evacuated all 14 crew-members from the foundering vessel. *Liz Forsyth*, the only female helicopter captain in UK civilian search and rescue, captained the helicopter.

Coastguard Rescue Helicopter 100, operated by **CHC Helicopter Corporation** (**CHC**) under contract to the **UK Maritime and Coastguard Agency** (**MCA**), flew with the added safety and capabilities of **SkyTrac**'s Satellite Communication (SatCom) and flight following technology.

During the rescue mission, the SkyTrac system was used to provide reliable voice communication between the aircraft and ground-based coordination personnel and to continuously track the aircraft's location. As a result, MCA and CHC will continue to leverage the capabilities of this system as they develop new operational procedures that will ultimately help them improve future mission performances.

Specific capabilities provided by the SkyTrac system that aided in this dramatic rescue include:

- *Enable the CHC ground crew and MCA personnel to "follow" all aircraft at all times (i.e. to know the aircraft locations with great accuracy and to overlay location information onto computerized maps)*
- *Support the flight crew in routinely communicating status messages by using predefined quick text messages or predefined message templates with editable fields*
- *Provide low cost, clear and reliable satellite voice communication that goes beyond the range of traditional radio communications*

- *Communicate alerts to CHC ground crew and MCA personnel in the event of an aircraft emergency (triggered by SkyTrac's MayDay)*
- *Assist the CHC ground crew and MCA personnel in planning and executing a search pattern during a rescue missions*

"Firstly, I think we should all salute the flight crew for carrying out this rescue mission in terrible weather with very strong winds," said *Carl Taylor*, a member of CHC's *Search and Rescue* (**SAR**) team. "Secondly, it is missions like this where we are especially grateful to have SkyTrac's system telling us where the aircraft is, and where it needs to go, and keeping us in constant contact."

About CHC's SAR Contract

The **U.K. Maritime and Coastguard Agency** contracted **CHC Helicopter** to provide coast guard search-and-rescue (SAR) helicopter services, using **Bell/Agusta AB139s** and **Sikorsky S-92s**, starting in July 2007. CHC will ultimately operate two S-92s from the base at Stornoway, two S-92s from Sumburgh, two AB139s from Lee-on-Solent and one AB139 from Portland.

The Portland base will operate during the day, the others around the clock. The contract marks the first time the S-92 will be used in a dedicated SAR role. CHC's S-92s will have dual hoists, autopilot, coupled-hover capability, and the new rotor-ice protection system.

About SkyTrac

SkyTrac supplies SatCom solutions for data, text and voice communications. With customers on every continent and from all areas of operation, the company has acquired a long list of *Supplemental Type Certificates* (**STCs**). In addition, the company's hardware has been installed on a large number of rotary and fixed-wing aircraft types from **AgustaWestland**, **Eurocopter**, **Bell**, **Sikorsky**, **MBB**, **Beechcraft**, **De Havilland**, **LearJet,** and **Raytheon**. For more information about SkyTrac, please visit: http://www.skytrac.ca/.

CALENDAR OF MILITARY SATELLITE EVENTS

Visit: http://www.milsatmagazine.com/cgi-bin/calendar.cgi for additional listings

Date	Event	Location	Contact	Web Address
April 7-10, 2008	**24th National Space Symposium**	Colorado Springs, CO at The Broadmoor Hotel	Tel: 719.576.8000 Fax: 719.576.8801 Email: custserv@spacefoundation.org	http://www.nationalspacesymposium.org
April 23-28, 2008	**The Annual European Navigation Conference – Global Navigation Satellite Systems (ENC-GNSS 08)**	Toulouse - France	Carte Blanche Tel: +33 5 63 72 31 00 Fax: +33 5 63 72 30 32 Email: contact@toulousespaceshow.eu	http://www.toulousespaceshow.eu/
April 28-30, 2008	**Military Satellites**	Hilton Arlington, VA, USA	Tel: +1 (646) 502 3252 Email: sponsorship@idga.org	http://www.iqpcevents.com/ShowEvent.aspx?id=57582
May 5-8, 2008	**AFCEA Technology Showcase**	Disney's Coronado Springs Resort, Orlando, FL	J. Spargo & Associates, Inc. Tel: 703-631-6200 Fax: 703-654-6931 Email: disaexhibits@jspargo.com	http://events.jspargo.com/disa08/public/enter.aspx
May 6-7, 2008	**MilSpace 2008**	St James & Albany Hotel & Spa, Paris, France	Fiona Punter Tel: +44 (0) 20 7827 6098 Email: fpunter@smi-online.co.uk	http://www.smi-online.co.uk/events/overview.asp?is=1&ref=2840
May 14-15, 2008	**Cyber Security**	Copthorne Tara Hotel, London, United Kingdom	Marita Jünemann Tel: +44 (0)207 827 6026 Email: mjunemann@smi-online.co.uk	http://www.smi-online.co.uk/events/overview.asp?is=1&ref=2880
June 10-12, 2008	**ISCe Conference & Expo**	San Diego Marriott Hotel & Marina, San Diego, California	David Bross Tel: +1.301.916.2236 Fax: +1.301.916.4731 Email: dbross@hfusa.com	http://www.isce.com/
June 17-19, 2008	**East 2008 (formerly Transformation Warfare)**	Virginia Beach Convention Center, Virginia Beach, VA		http://www.afcea.org/events/transformation/07/intro.asp
August 19-21, 2008	**LandWarNet Conference 2008**	Greater Ft. Lauderdale/Broward County Convention Center, Ft. Lauderdale, FL, USA	Terry Rogers Tel: (703) 631-6238 Email: trogers@afcea.org	http://www.afcea.org/events/landwarnet/
September 15-17, 2008	**Air & Space Conference/Technology Exposition**	Marriott Wardman Park Hotel, Washington, DC	Mary Ellen Dobrowolski Email: mdobrowolski@afa.org	http://www.afa.org/events/conference/2008/default.asp
October 6-8, 2008	**Strategic Space and Defense 2008**	Omaha, Nebraska	Tel: 1-719-576-8000	http://www.stratspace.org/
November 4-6, 2008	**TechNet Asia-Pacific 2008**	Sheraton Waikiki Hotel, Honolulu, HI	AFCEA International Tel: (800) 336-4583 Email: service@afcea.org	
November 17-19, 2008	**MILCOM 2008: "Assuring Mission Success"**	San Diego Convention Center, San Diego, CA 95476	Email: Hewins_MILCOM2008@raytheon.com	http://www.milcom.org/
November 19-20, 2008	**Aerospace & Defense Finance Conference**	New York, NY, USA	Lydia Janow Tel: 1-800-240-7645 or 1-212-904-3225 Fax: 1-212-904-3334 Email: ljanow@aviationweek.com	http://www.aviationweek.com/conferences/finmain.htm

THE FUTURE OF MILSATOPS…
MAKING A BIG IMPACT

by Jeffrey B. Benesh, Vice President of the Western Region, Government Division, Integral Systems

Secure… a command center… decision making… staffed by trained and highly skilled technicians… that's a concise list of the importance of ground control for Command and Control (C&C). No matter how advanced the Milsat on orbit, without a highly viable and effect ground system for C&C, all you have is an orbiting, daily reminder of how much of the budget was reduced for the technically competent, but inaccessible, spacecraft.

One company that has become a healthy provider of ground systems for Command and Control is **Integral Systems** (**ISI**). Since the firm's inception, they have been highly focused on space ground systems. In addition, their record has proven their ability to deliver cost-effective, working solutions for satellite operations. Over the years, the emphasis has expanded from bus command and control to payload control, remote station automation, signal monitoring, interference detection, and geolocation. The company has also grown from an initial four engineers in 1982 into a corporation with more than 500 employees. The company headquarters is in Maryland with a growing presence in Colorado, California, and New Hampshire.

The Operations Epicenter

While satellites continue to become more automated, there always remains the absolutely critical requirement for operator input—anomaly resolution, housekeeping, and maintaining station position. These systems are the only method of providing this access to space borne assets; thus, they're cru-

cial to maximizing an operator's huge financial investment, often in the hundreds of millions of dollars.

Space is a complicated domain within which to operate. Space systems—specifically satellites—are now an integral part of our everyday lives—navigation, communication, weather, and imagery services have significantly improved our lifestyle. People expect precision, responsiveness, and availability from our presence in space. They expect services to be available on-demand, 24-hours a day, 365-days a year (24x7x365). Satellite command and control systems are the essential software and hardware packages that keep satellites operating on a continual basis. Without command and control systems, satellites lose orbit position, systems fail, and services disappear.

Command and control systems are the operational nerve center of any space system. The ultimate utility of such a system is derived from the ability of the command and control platform to exploit a satellite's capability. As we have previously seen in many programs, added capability to a space system can be realized beyond original planning by improving the capability of the C2 node.

Satellite command and control systems have evolved, over the years. They started as dedicated, one-to-one behemoth systems, to mainframes systems controlling multiple satellites within a family, to powerful PC-based systems supporting multiple constellations. The footprint has shrunk as capabilities have increased. Automation has been a key improvement, allowing systems to automatically support routine operations. These same routine operations previously required a large group of operators working manually. Telemetry, Tracking, and Commanding have become much easier in a complex environment. Cost savings and system reliability are benefits resulting from these advances.

Open, Open, Open…

As technology changes so rapidly, the only way to maintain pace is through an open architecture, one that's extensible and flexible enough to accommodate advancing technologies. Spacecraft lifetimes are so long that requirements on the command and control system evolve over time. As you replace satellites, you typically replace the older ones or refresh the constellation with upgraded technology. Your command and control system must evolve with the technology. Closed systems or point solutions just can't respond fast enough to the advancing technology needs presented by the space industry.

The benefit of an open architecture is that such allows the system to keep pace with technology. This reduces costs and risks. You simply cannot solve every situation out of a COTS box. The ability to augment and extend their product lines is a key feature to ISI's large customer base and market leading presence. Examples include unique mission planning requirements and satellite mission data processing.

Providing a system with an open architecture lends itself to increasing the capability of the command and control system without major redevelopment of the entire platform. This type of system enables the rapid integration and realization of new capabilities.

ISI provides both turnkey systems and individual system components that can be integrated by the customer. Open APIs using standard interfaces, such as *Corba*, allow for this much-needed flexibility and have been an ISI hallmark. Their EPOCH Integrated Product Suite (IPS) is found to be useful in a wide range of applications.

Trend Analysis

On the commercial front, there's more consolidation, automation, integration, and a move to third-party operations. Legacy systems are migrating onto newer systems that support the consolidated ground segment operations of many spacecraft onto a single system.

By taking advantage of the automation provided in the newer systems, substantial operational efficiencies are realized. This has allowed the operations community to shift its emphasis from real-time operations to the planning or pre-operational phase. This takes advantage of the system to automatically execute nominal operations. There's also the integration of varied systems to provide a single integrated picture of the communications infrastructure—bus telemetry and command; payload monitoring and control; and network management. Operators now have an enterprise-level view of their assets.

The biggest trend in the government arena is the separation of the ground segment from the space segment as an acqui-

sition strategy. Separating the ground segment procurement from the space segment is integral to achieving the operational efficiencies realized in the commercial arena. This allows the Air Force to procure a ground system designed for the future, not for just a single mission. The commercial industry has been separating ground and space segment procurements for years in order for a single system to operate their entire fleet. CCS-C (*Command and Control System—Consolidated*) is an excellent example of this trend in the Air Force, and programs such as GPS OCX are moving in this direction.

The design and program objectives of CCS-C, established in 2000 and 2001, anticipated this trend. CCS-C is giving customers the opportunity to change the way they run their operations. If the system design and capabilities limit operations to a staff-centric **CONOPS** (*Continuous Operations*)—if the system requires extensive "care and feeding—the result will be experienced with larger operations and higher sustainment costs. This approach is inefficient, no matter how you cut it.

CCS-C is opening the door for more efficient operation implementations. In particular, 3 SOPS has been an innovator in the area of efficient operations. It has been fascinating to watch how satellite operations have changed and continue to evolve. The 3 and 4 SOPS space operators at **Schriever AFB** are continually deriving new ideas and approaches. From my time performing operations at Schriever using the old mainframe system, it's great to see what today's space professionals are managing to accomplish to change satellite operations.

Operators will continue to evolve Air Force satellite procedures. The new satellite systems placed into space are becoming increasingly complex. Future

space operations will require efficiencies to keep pace with added demands on the operator to manage complex space effects. Automation, consolidation, and integration are the only ways to do more with the same number of operators, while keeping pace with that one constant – change.

Additionally, the system's flexible design and openness enables the Air Force to procure a ground system designed for the future, not just for one instance of a mission. The reasons why the commercial industry has separated ground from space segment procurements are to be able to select the ground system that best fits their CONOPS (Continuous Operations) and requirements and to ensure a single standard system to operate their entire fleet. The CCS-C approach took advantage of the EPOCH IPS delivering a standard core capability with the flexibility and extensibility to support numerous and varied missions. The Air Force did a phenomenal job with this procurement effort.

All About Status

CCS-C is and has been on-schedule and on-budget from contract inception. The first initial constellation, **DSCS III**, completed testing in less than 18 months—four days ahead of the contract specified schedule. Since then, Milstar has been transitioned onto the CCS-C baseline, formal declaration of IOC for the system has been reached, and the first WGS vehicle has transitioned full-time onto the baseline. The **AEHF** (*Advanced Extremely High Frequency*) development continues on schedule to support the first vehicle's 2009 launch. The program has several activities and milestones this year, and CCS-C is in great shape to support each of these events.

The CCS-C design's flexibility has resulted in many enhancements. Once the system rolled out to the operational community, there were many requests for additional features and capabilities. This normal evolutionary path has been well supported. Due to a great relationship with the government procurement agency, an energetic and creative team atmosphere has been generated. This helps to maximize schedules and funding. One of the great attributes of CCS-C's architecture is the ability to upgrade or refresh the system without impacting satellite operations. *Change is the one constant*.

One significant aspect of growth with respect to the operational use of CCS-C has been in the area of automation. Three SOPS has taken the lead in using the automated capabilities inherent within CCS-C through *the EPOCH Integrated Product Suite*. Certainly, it has evolved with time as operators gained confidence in the new system, but staffing efficiencies are now realized. Such prepares the community for more complex, time-consuming operations. Three SOPS has created and instituted automated state-of-health supports along with other automated features. The *WGS* satellite is extremely complex and requires a great deal of detail. Once WGS commanding procedures were automated, operations that were more efficient were the result. The onus is on the system rather the operator, and this is a consistent trend within the satellite industry.

ISI initiated much preparation and planning to build an executable schedule to support the on orbit delivery of Wideband Global SATCOM transition. This included a significant investment in the development and validation of the entire set of automated on-orbit satellite procedures. An integrated team was created, comprised of the Air Force operational community (3 SOPS), the vehicle manufacture's technical experts (Boeing), and the government acquisition team. All needed to work side-by-side to validate the procedures. This approach streamlined and minimized the schedule required to produce fully verified and validated procedures ready for execution against the on orbit satellite. CCS-C is a great success and this certainly is a testament that the separation of ground and space acquisition strategy is working.

AEHF, CCS-C & Other Accomplishments

The partnership with the Air Force and space segment provider is fantastic. Proof, again, that the separation of ground and space segments is highly viable. This model can realize continued success for other mission areas as well, not just MILSATCOM. CCS-C is ready to support the critical activities of 2008. The adage, "When the satellite is ready; the ground system will be ready," continues to hold true. Satellite data provided by the vehicle manufacturer continues to mature as the program progresses toward launch. The 2008 schedule is full of activities leading toward launch in early 2009.

Time for a little history... the *Functional Requirements Document* for CCS-C was derived from the *Standard Satellite Control System* (**SSCS**) *Technical Requirements Document*. The SSCS document was developed in the mid 1990's with input from many different Air Force satellite program —more than just MILSATCOM programs. SSCS was canceled. However, the solid engineering and requirements analysis that were incor-

porated into the program enabled the government to possess a solid *Functional Requirements Document* for CCS-C. As a result, CCS-C provides a standard satellite control system core with the extensibility to support many different missions.

The CCS-C contract was a huge win for ISI. The project was a challenge, in some ways, to smartly grow the company. In example, the Colorado Springs office grew from two employees in early 2002, to more than one hundred employees at the end of 2007. With CCS-C, **RAIDRS** (*Rapid Attack, Identification, Detection and Reporting System*), **GPS OCX**, and other programs won since 2002, both the ISI Maryland and Colorado offices have grown significantly. Plus, a Los Angeles office has now also opened.

In Colorado Springs, 17,000 square feet of office space are being added to the ISI complex. Additionally, RT Logic, an ISI subsidiary purchased in 2002, has also grown and has hired many new employees. RT Logic recently built a new facility on the north side of Colorado Springs. In all, company revenue has doubled over the last five years. The company has worked diligently to hire wisely and acquire talented people.

COTS Benefits

COTS products are the standard method of business. A COTS product baseline allows a large user community to share the maintenance and evolutionary costs of the product baseline. Legacy custom-developed systems were extremely expensive, as the purchasing organization was required to fund the entire life cycle cost of the system. A COTS paradigm allows each user to provide only a small percentage of the overall expense associated with the maintenance and evolution of the product baseline. This has led to a huge life cycle cost reduction for command and control systems. That's especially important today with budget reductions and stiff competition for weapons systems funding. COTS make too much fiscal sense for any company to travel down any other path!

That said, this is true of only legitimate COTS systems. This is not true of toolkit approaches that claim to be COTS simply because they reuse software code. True COTS products save money, reduce risk, and reduce sustainment cost, while allowing for technology refresh throughout a mission's life.

Not all satellite applications lend themselves to COTS, but there are common attributes across space systems that are perfect for flying a satellite bus in space. For example, it just doesn't make fiscal or engineering sense to continue to reinvent satellite telemetry command and control capabilities. "TT&C is easy," but only if you use reliable, proven, and capable systems.

COTS products are becoming more popular now than in the past. In the case of CCS-C, this was a COTS product with a proven commercial legacy that allowed for risk mitigation, as compared to development of a brand new system. This saved costs in development, logistics, and sustainment. COTS products offer acquisition agencies the opportunity to rapidly prototype and produce command and control systems that are needed by the military user, as opposed to custom systems specifically built for a single application. And let's not forget—future budget constraints will drive government acquisitions to consolidate their space systems on common, COTS-based, command and control systems, for all of the stated reasons.

The government will consolidate on systems with proven performance in the satellite ground system industry. Couple life cycle cost benefits with lower development risk, and then mix in the superior performance and capability of products such as ISI's EPOCH IPS product baseline, and there is a winning solution.

An EPOCH In The Making

In 1992, ISI released the EPOCH product line. This was a COTS (Commercial, Off The Shelf) software solution for satellite command and control. The product was ready to go with published APIs accommodating an open, extensible architecture. As a result, the concept and products became extremely successful in the commercial market during the 1990's. Over the years, this approach has allowed the company's customers to focus their precious resources on difficult tasks; the challenge of complex space systems and new payloads.

ISI has also provided mission management and payload processing systems to the government. Many people don't realize that all of NOAA's (National Oceanic and Atmospheric Administration) on-orbit satellites are operated today by ISI-provided ground systems. ISI initially delivered the *Sen-*

FEATURES

sor Processing System and *Product Monitor* for the **GOES I-M** (*Geostationary Operational Environmental Satellites*) ground system. This was followed by the on-time, on-budget delivery of the *Polar Ground System* in the early 1990's. This, in turn, led to the delivery of the *Integrated Polar Acquisition Control System* in 1998, supporting **BRAC** (*Base Realignment and Closure*) requirements to integrate **DMSP** (*Defense Meteorological Satellite Program*) operations into NOAA's operations center at Suitland, MD, and six **SOPS** (*Space Operation Squadrons*) at **Schriever AFB**. Since then, ISI has delivered the **GOES N-P** system as well as several upgrades to the existing ground systems.

Winging Their Way Forward

The company has since expanded into the Air Force arena with their MILSATCOM Command and Control System—Consolidated (CCS-C) delivery, proving their capabilities on CCS-C. Today, the 50th Space Wing's operators are exploiting the system to do bigger and better things. Delivery of the **DSCS** (*Defense Satellite Communications System*) was four days early and ISI *transitioned Wideband Global SATCOM* onto CCS-C this past January without a hitch.

ISI has a renewed focus on core growth. Infrastructure investments allow us to meet the expanding needs of a growing customer base and product markets. ISI will continue to deliver cost-effective, timely solutions, providing products that work and by ensuring exceptional customer support. As one aerospace industry client stated during the company's DMSP days, "ISI, we're glad you're here—you always find a way to get things done."

Jeffrey B. Benesh joined Integral Systems, Inc. in 2002 and he is currently the Vice President of the Western Region, Government Division. His responsibilities include Site Operations of the Colorado Springs office as well as Business Development, Marketing, and Strategic Planning oversight for the Government Division. Before joining the company, Mr. Benesh served 20 years in the Air Force. He retired in 2002 as the Program Element Monitor for the Air Force Satellite Control Network and Spacelift Ranges in SAF/USA. From 1998 to 2000, he served as the AFSPC Command Lead for Satellite Control Systems in the Requirements Directorate. While at Schriever AFB, from 1995 to 1998, he served as the Wing Lead for GPS and DSP requirements for the 50th Space Wing and as a 1 SOPS Flight Commander for GPS and DSP operations. He also served from 1990 to 1995 as a Missile Maintenance Officer, and Minuteman III Launch Control Crew, at the 90th Space Wing, F.E. Warren AFB. Mr. Benesh holds a B.S. degree in Mathematics from the University of Nebraska at Omaha and an M.S. in Management from Lesley University, Cambridge, Massachusetts.

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NASA's Space Road Challenges Topic @ Space Symposium

The 24th National Space Symposium will feature a panel entitled "*Mind the Gap: Shuttle Retirement and Other Challenges on the Road to the Moon and Mars*." The symposium, the premier annual gathering of the global space community, will occur April 7 to 10 at The Broadmoor Hotel in Colorado Springs. Mr. *Lon Rains* of Imaginova Corp. will moderate the panel, which includes former NASA Astronaut and NASA Advisory Council Member Col. *Eileen M. Collins*, USAF (Retired); NASA Exploration Systems Associate Administrator *Richard J. Gilbrech*, Ph.D.; Kennedy Space Center Director Mr. *William W. Parsons, Jr.*; and NASA Associate Administrator Mr. *Chris Scolese*. The panel, which will take place at 10:45 a.m. April 8, will focus on the challenges NASA faces in bridging the gap between shuttle retirement in 2010 and the introduction of the new Orion Crew Exploration Vehicle in 2014.

Jason-2 To Make Leap Into Space For Eumetsat

The launch date of the Jason-2 ocean altimetry satellite is currently scheduled for the morning of June 15th from Vandenberg Air Force Base, California. Once in orbit, and after calibration, the satellite will provide oceanographic products on an operational basis to the large EUMETSAT user community using the European weather satellite organization's proven dissemination capabilities. The main instrument onboard Jason-2 will be the Poseidon 3 dual frequency altimeter. The final orbit of the satellite will be 1,336 km above the Earth at a 66° inclination. Operational readiness reviews are scheduled to take place at EUMETSAT at the end of March between the four partners—EUMETSAT, the French Space Agency (CNES), the US National Aeronautics and Space Administration (NASA), and the US National Oceanic and Atmospheric Administration (NOAA), at the beginning of April. Toward the end of April, Jason-2 will be transported by road from Cannes to Toulouse. From Toulouse, a 747 aircraft will fly the satellite to Vandenberg AFB.

Glowing Glowlink Report On WGS-1

Glowlink has announced the successful completion of the first phase of system deployment and support for the Department of Defense (DoD) in preparation for activating live traffic on the first Wideband Global SATCOM satellite (WGS-1). The WGS-1 satellite has been undergoing intense communications payload testing and evaluation by the WGS operational community since shortly after Boeing turned it over to the Air Force in January of 2008. Glowlink provided all aspects of engineering, installation, training, and logistical support for a key ground-based system used during the payload evaluation. The system—reinforced with robust, all-digital spectrum monitoring technology—consists of a global network of nexgen monitoring and interference detection nodes. Glowlink created these specifically for monitoring the WGS fleet of satellites. The WGS-1 satellite, launched on October 10th, 2007, is the first in a fleet of newgen DoD wideband communications satellites to be placed in orbits between 2007 and 2013, bringing dramatically increased bandwidth to the military SATCOM user community.

Integration For Endeavor Part Of Boeing's Mission

A *Boeing International Space Station* (ISS) team performed the complex task of integrating Canada's Dextre robotic device and a segment of Japan's Kibo laboratory ahead of their launch aboard Space Shuttle Endeavour. Kibo, a contribution to the ISS from the Japan Aerospace Exploration Agency (JAXA), will increase the station's research capability in a variety of disciplines. Dextre will work with the station's *Canadarm2* robotic arm to perform delicate tasks. The segment of Kibo being delivered on this mission is the Japanese Experiment Logistics Module Pressurized Section, the smaller of Kibo's two pressurized modules. The Dextre robotic device—the final element of the ISS Mobile Servicing System—will work with the station's robotic arm to install the pressurized module and other Kibo components.

Norwegian MilChat Provided By Harris

Harris Corporation has received a contract from the Defence Forces of Norway to provide several thousand RF-7800S Secure Personal Radios. The contract was awarded after a competitive evaluation. The Harris RF-7800S is a lightweight wideband radio that delivers secure tactical communications to individual soldiers. Norway will deploy the radios and accessories as part of a soldier modernization program to provide individual soldiers with digital voice and data communications. The Harris RF-7800S offers unique, full-duplex, dual-net voice capability, allowing up to three operators to talk simultaneously with an unlimited number of listeners.

RECENT NEWS

Lockheed Martin Proposes

Lockheed Martin submitted its proposal to the National Aeronautics and Space Administration (NASA) to design and build the spacecraft for the Geostationary Operational Environmental Satellite – Series R (GOES-R). This is the next generation geostationary environmental satellite for the National Oceanic and Atmospheric Administration (NOAA). The proposal builds upon Lockheed Martin's 48 years of successful partnership with NASA and NOAA providing reliable weather and environmental satellite systems on schedule including TIROS, NIMBUS, UARS, Terra and Landsat. In addition, the proposal incorporates knowledge from Lockheed Martin's successful GOES-R Program Definition and Risk Reduction contract.

DoD + SpaceX Jumpstart Their Relationship

Space Exploration Technologies Corp., otherwise known as SpaceX, announced it has signed a contract with the Department of Defense's Operationally Responsive Space (ORS) Office to carry their first Jumpstart mission payload onboard the upcoming Falcon 1 launch. Scheduled for flight in June 2008 from the SpaceX launch complex in the Central Pacific Marshall Islands' Kwajalein Atoll, the Jumpstart mission aims to establish a preliminary framework for responsive contracting. It will also demo the ability to rapidly integrate and execute a mission, from initial call-up to launch. The demo will encompass three separate candidate OSR payloads. The actual flight payload will be determined by the ORS Office at, or before, the SpaceX Flight Readiness Review for the Falcon 1 Flight 003 (F1-003) vehicle, which typically occurs two weeks before launch. In addition to the ORS primary payload, Flight 003 will also carry a rideshare adapter experiment for ATSB of Malaysia (the primary customer for the following Falcon 1 launch, F1-004), and two CubeSat payloads.

Norsat + N.A.T.O. Into Portability

Norsat International Inc. has signed a Basic Ordering Agreement (BOA) with NATO's Consultation, Command and Control Agency (NC3A) for their OmniLink and GLOBETrekker portable satellite terminals, as well as its suite of microwave products. A BOA is a procurement vehicle whereby the contract is negotiated in advance and placed centrally with a supplier. The BOA outlines the clauses that will be applicable to the future procurement of a specified range of goods and services. In the case of NC3A BOAs, all basic contract provisions are agreed upon, including prices or a definitive pricing methodology, after which NATO, NATO Member Nations and other eligible purchasers can place individual orders against the central contract. NC3A negotiates all BOAs on behalf of NATO in accordance with NATO guidelines and procedures.

Events For ICO @ Cape Canaveral

Preparations continue for the launch of the ICO G1 satellite on an Atlas V launch vehicle. The G1 spacecraft arrived at Cape Canaveral on February 28th and is undergoing final processing for the launch on April 14. The company is developing an advanced nexgen hybrid media system, combining satellite and terrestrial communications capabilities. ICO is deploying a mobile interactive media service known as ICO mim, which will combine ICO's interactive satellite capability with nationwide coverage. This service will deliver a new level of navigation, enhanced roadside assistance and mobile video, including 10 to 15 live channels of premium television content.

Galileo Getting GIOVE-B Gains

The European Space Agency's GIOVE-B satellite has successfully completed its test campaign and will depart from ESA-ESTEC, the agency's European Research and Technology Centre, on March 11th. GIOVE-B is the second Galileo in-orbit validation satellite. The spacecraft will be flown to Baikonur, in Kazakhstan. From there, the satellite will be lofted into orbit by a Starsem Soyuz/Fregat launch vehicle. The launch is scheduled for 04:16:02 local time on April 27th. (00:16 CEST, 22:16 UTC [26 April]). GIOVE-B will test novel, key technologies for the Galileo system. They include the high-precision passive maser clock and the triple-channel transmission of navigation signals. Instruments onboard the satellite will measure the radiation and spacecraft charging environments. GIOVE-B will be able to transmit a signal adopting a specific standard (known as MBOC), in accordance with an agreement reached only a few months ago by the European Union and the United States for their respective systems. The spacecraft was built by a consortium lead by Astrium GmbH (Germany) as satellite prime, with Thales Alenia Space (Italy) as subcontractor for satellite assembly, integration, and test. Telespazio (Italy) will be in charge of the operations in orbit.

Interesting Developments For Space Dev—Reflectors + Rockets Rule

SpaceDev, Inc. has been awarded a design and development subcontract from the Air Force Research Laboratory (AFRL) Space Vehicles Directorate, for development of cost effective deployable reflectors for satellites. The award is a Phase 1 Small Business Innovation Research contract, which will extend SpaceDev's deployable structures capabilities. The contract is for approximately eight months, during which time SpaceDev expects to demonstrate the feasibility of a new class of deployable reflectors system. The company has also been awarded a contract by NASA's Marshall Space Flight Center for the research and development of its nexgen proprietary annular hybrid rocket motors. The contract work will be performed over a six-month period, during which SpaceDev is expected to conduct development testing with the objective of validating performance parameters. This technology could provide significant improvements to hybrid rockets in terms of both performance and packaging efficiency that could significantly broaden their overall applicability and value.

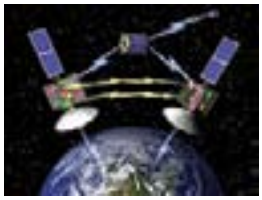
SWE-DISH Suitcase Packs Up for SPAWAR

SWE-DISH Satellite Systems, a DataPath company, was awarded an indefinite-delivery/indefinite-quantity (ID/IQ) contract by the U.S. Navy's Space and Naval Warfare Systems (SPAWAR) Center in which they will provide portable SATCOM terminals. The contract, awarded to SWE-DISH and six other companies, has a total value of up to $491 million over five years for all suppliers. The SWE-DISH portion of the award is for up to approximately $32 million in the first base year, with a potential value of up to $175 million for the base year and all option years. SWE-DISH specializes in highly portable and mobile SATCOM terminals, such as SWE-DISH Suitcase systems with CommuniCaseTechnology and SATCOM on-the move systems that deliver high-bandwidth capabilities outside the area of traditional networks.

Cool Developments By INPROX For NASA

Advanced silicon carbide (SiC)-based position sensors are being developed by INPROX Technology Corporation (ITC) for future space flight as well as for turbine engine controls and automotive engine applications. These sensors are being developed under supervision of NASA under terms of a Space Act Agreement (SAA) with NASA Glenn Research Center located in Cleveland. Silicon carbide electronics operate in temperatures as hot as 600 degrees Celsius. They represent a significant advancement over conventional silicon-based electronics rated to a maximum of 350 C, INPROX officials say. All of today's conventional electronics are shielded from high temperatures by often-costly cooling methods. Why develop them now? The rising costs of fuel and the drive for reliability at low costs has the sensors and electronics market anticipating the capabilities of these next generation SiC electronics and sensors. Future space missions and satellites will have high-temperature and radiation hardened requirements, company officials say.

Free-Flying Spacecraft Aim Of New DARPA Award To Lockheed Martin



A team headed by Lockheed Martin Space Systems Company (LMSSC) has received a $5.7 million contract from Defense Advanced Research Projects Agency (DARPA) to compete in the Phase 1 development of their System F6 space technology and demonstration program. F6 is shorthand for "Future, Fast, Flexible, Fractionated, Free-Flying Spacecraft United by Information Exchange." The DARPA System F6 program intends to demonstrate that a traditional, large, monolithic satellite can be replaced by a group of smaller, individually launched, wirelessly networked and cluster-flown spacecraft modules. Each "fractionated" module can contribute a unique capability to the rest of the network, such as computing, ground communications, or payload functionality. The ultimate goal of the program is to launch a fractionated spacecraft system and demonstrate it in orbit in approximately four years.

U.S.A.F. On A Winning Track & To Be Recognized By The Space Foundation

The Space Foundation has named the United States Air Force as the recipient of the 2008 Space Achievement Award. Each year, this award recognizes an individual or organization for significant contributions in advancing the exploration, development, or use of space. The Air Force will be recognized during the opening ceremony of the 24th National Space Symposium, on April 7. The premier annual gathering of the global space community, the symposium will take place April 7th through 10th at The Broadmoor Hotel in Colorado Springs. The United States Air Force was selected to receive the Space Achievement Award for its unprecedented string of more than 50 consecutive successful national security space

launches, providing 100 percent mission success for vitally important national security space missions.

COM DEV Believes Space Highly Suited For AIS Signals

COM DEV International Ltd. has successfully completed the airborne validation trials of its advanced Automatic Identification System (AIS) receiver solution. The trials have validated key aspects of system performance and demonstrated that COM DEV's receiver solution is capable of extracting a significantly greater number of AIS signals compared to a standard receiver approach. The results suggest that such a system, employed in space, will provide a persistent and predictable level of performance. COM DEV is also completing the development of a nanosatellite being built by the University of Toronto Institute for Aerospace Studies/Space Flight Lab. The spacecraft will be ready for launch in the spring of 2008 as planned and will be deployed in the first, space-based validation trial of an advanced AIS capability designed to deal with large numbers of overlapping AIS signals. In parallel, COM DEV's strategic AIS partner, Gatehouse, is developing software that will enable data collected from space to be displayed and managed as part of an integrated maritime domain awareness picture by adding the dimension of extended long-range monitoring capability.

SPAWAR In Globecomm's Corner

Globecomm Systems Inc. has announced they and six other companies have been awarded an Indefinite Delivery / Indefinite Quantity (IDIQ) contract from the U.S. Navy's Space and Naval Warfare (SPAWAR) Systems Center. The contract is for as much as $32 million in the base year, with a potential value of up to $175 million if the four option years are exercised. The contract vehicle enables all seven companies to bid on Portable Satellite Communications Terminals as required by SPAWAR. Globecomm's Auto-Explorer product line is the proposed platform for the Navy's requirements. All Auto-Explorer terminals are Internet Protocol (IP)-enabled to accept optional routers and IP satellite optimized solutions. The Auto-Acquisition and Terminal Management Software is designed to allow operation of the terminals by personnel with little or no communications or satellite communications experience. The terminals can receive IP data rates ranging from 64 kbps to 18.2 Mbps and send IP data rates ranging from 64 kbps to 8.4 Mbps. The Auto-Explorer product line is available in both C- and Ku-band frequencies and the Company is currently developing X-band capable terminals as part of a long-term strategy to address the growing use of X- and Ka-band frequencies by the U.S. government.

Partnerships Cemented Into Place For GMES

Sentinel satellite European Space Agency (ESA) Director General, Jean-Jacques Dordain and Heinz Zourek, Director-General of the European Commission's Directorate General for Enterprise and Industry Policy, have signed an agreement in Brussels to reinforce the performance of the Global Monitoring for Environment and Security (GMES) earth observation system. GMES is a European Union-led initiative organized in partnership with European Space Agency (ESA) to combine ground and space-based observations to develop an integrated environmental and security monitoring capability. ESA's role within GMES is to implement the dedicated GMES Space Component, which involves developing the Sentinel satellite series and their ground segment and to coordinate access to data stemming from the Sentinels and from other missions which contribute to fulfilling of the GMES service requirements.

SUIRG Reports Unacceptable WiMAX Interference

The Satellite Users Interference Reduction Group (SUIRG) has released their formal findings of a field test on the compatibility of Fixed Satellite Services (FSS) and WiMAX services sharing the C-band spectrum. SUIRG, a non-profit association comprised of both private and public sector satellite organizations, is dedicated to combating the increasing and costly problem of satellite radiofrequency interference (RFI). The test, conducted in the latter quarter of 2007, conclusively demonstrated that WiMax communications pose a significant interference threat to satellite signals transmitted in the C-band frequency. The field test was performed with support from several key industry organizations. The primary objective of the plan was to measure interference levels generated by fixed WiMAX transmissions into an FSS satellite receiving station. The method employed taking measurements of C/N (carrier/noise), I/N (interference/noise), BER (bit error rate), and spectrum plots of a satellite down link video channel. Testing was performed in 2 phases and the results showed that the WiMAX transmit signal could cause significant problems to a satellite digital signal well in excess of 12 km distance. At the extreme measurement distance, the video program was operational with the WiMAX carrier centered on the video carrier. However, the data BER was degraded from a nominal 10-8 to a BER of 10-4. This is an unacceptable quality of service in the digital telecommunications industry. The full text of the WiMax frequency sharing with FSS earth stations Field Test Report and detailed Test Plan & Procedures are available on the SUIRG website at http://www.suirg.org.

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