SatCom For Net-Centric Warfare February 2012

MilsatMagazine

WGS-4

...Up, Up + Away

a major MILSATCOM enhancement

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Michael Bristol, TeleCommunication Systems
Cloaking (University of Texas)
Hughes Spaceway
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NOC @ Bagram
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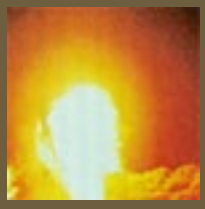

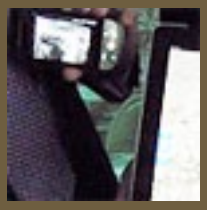

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FEATURES

Observations: Is Iraq A Failing State?

Given the staggering amount of resources committed to the Iraqi conflict, from satellite communications, capacity and bandwidth, to the weaponry and support facilities, to the cost in human lives... *by Lt. Col. [RET] U.S. Army, Michael E. Silverman* — **Page 26**

Close Support: Crisis Control Through Imagery

In a crisis, every second counts. Lives can be lost if decision makers cannot react to a situation fast enough. Up-to-date information is the most important factor in preventing loss of life. Whether the disaster is natural or manmade, geospatial intelligence can play a critical role in the effective management of ground personnel... *by Stephen Wood* — **Page 30**

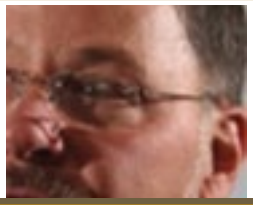
Command Center: Michael Bristol, TeleCommunication Systems

Michael Bristol oversees all aspects of the government business divisions of TCS, which offers the TotalCom™ family of products and services, including Deployable Communications, Managed Network Services, Integrated Logistics Global Support, Space & Component Technology, and Professional Services. — **Page 34**

Prime: Teamwork = WGS-4 Launch Success

Cape Canaveral Air Force Station was the scene of an important launch on January 19th, 2012. Having previously proven itself three times for this series of satellites, United Launch Alliance (ULA) managed the Boeing built, Worldwide Global SATCOM satellite number four. — **Page 40**

Event: Welcome To Colorado Springs...



Eliot Holokauahi Pulham, the chief executive officer of Space Foundation, will welcome one and all to the 28th National Space Symposium (NSS), which is in session from April 16th through the 19th, 2012. — **Page 46**

Close Support: Fixed Comms For Defence + Government

Fixed Satellite Communications are used for multiple applications within government and defence operations. The fixed communication infrastructure is the permanent or semi-permanent backbone link between headquarters and remote operation sites. **Page 50**

Command Center: Rob Mitrevski, ITT Geospatial Systems

Mr. Mitrevski is responsible for the development and delivery of space, air, and ground-based mission critical systems for military and civilian government agencies and commercial customers. — **Page 56**

Event: NAB 2012

Everyone know that the NAB is the huge trade show event that features all manner of commercial properties, technologies, and events for the digital media industry. One element of this industry may well be overlooked — the military and government market segments. — **Page 62**

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New Officers + Directors

The board of directors of the Space Foundation at its annual meeting has officially welcomed a new slate of officers and five new board members and recognizing six board member retirements.

- *William F. Ballhaus, Jr., Ph.D., former president and CEO of The Aerospace Corporation, retired from the Space Foundation board of directors and was named director emeritus. Ballhaus had served as a member of the board since 2001, was vice chairman 2008-2010 and chairman of the board from 2010-2012.*
- *Martin C. Faga, former president and CEO, The MITRE Corporation and former director of the National Reconnaissance Office, succeeds Ballhaus as chairman of the board. Faga has served on the board of directors since 2007, and was vice chairman from 2010-2012.*
- *Lon C. Levin, co-founder of XM Satellite Radio and president of SkySeven-Ventures, was elected vice chairman. He has served on the board since 2004.*
- *The Honorable Barbara Barrett, president and CEO, Triple Creek Ranch and former ambassador to Finland, continues as corporate secretary.*
- *Anita M. Antenucci, senior managing director of Houlihan Lokey, was elected treasurer. She has served on the board since 2008.*

The executive committee also includes *Elliot H. Pulham*, chief executive officer of the Space Foundation.

The board of directors elected five new members to three-year terms:

- *Richard F. Ambrose, president, Lockheed Martin IS&GS — National*
- *The Honorable Robert E. Cramer, chairman, Wexler & Walker*
- *Lynn A. Dugle, president, Raytheon II*
- *John W. Elbon, vice president and general manager, Boeing Space Exploration*
- *P.J. O'Rourke, author and political satirist*

Returning board members:

- *David Caddey, executive vice president, Space Missions Group for MacDonald, Dettwiler & Associates, Ltd.*
- *Adm. James O. Ellis, Jr., USN, Ret., former commander, United States Strategic Command, and president and CEO, INPO*
- *Gary W. Ervin, corporate vice president and president, Northrop Grumman's Aerospace Systems*
- *James Maser, president, Pratt & Whitney Rocketdyne*
- *Kay N. Sears, president, Intelsat General*
- *David L. Taylor, president and CEO, Ball Aerospace & Technologies Corp.*
- *Kathryn C. Thornton, Ph.D., University of Virginia professor and former NASA astronaut*

Elected to second terms:

- *The Honorable Patricia Grace Smith, former assistant administrator, Federal Aviation Administration; principal, Patti Grace Smith Consulting*
- *Dave Weldon, M.D., head of Dave Weldon Consulting and former U.S. representative from the State of Florida*

Retiring from the board and named life directors:

- *Capt. Frederick H. Hauck, USN, Ret., former president, AXA Space, and former NASA astronaut*
- *Joanne M. Maguire, executive vice president, Lockheed Martin Space Systems Company*
- *The Honorable Charles Robb, former U.S. senator and former governor of the State of Virginia*
- *Col. Brewster Shaw, Jr., USAF, Ret., former vice president and general manager, Boeing Space and Exploration Systems, and former NASA astronaut*
- *Heidi R. Wood, managing director and senior equity analyst — aerospace, defense & defense electronics, Morgan Stanley*

"The Space Foundation is very fortunate to have such a diverse board with highly regarded leaders and members who are instrumental in achieving our mission of advancing space," said Space Foundation CEO Elliot Pulham. "We greatly appreciate the hard work and dedication of all of our members, especially those who are retiring from our board."

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Soundings Start

An ITT Exelis breakthrough technology for severe weather forecasting is now fully operational and capturing invaluable weather data from space.

After launching October 28, 2011, and completing on-orbit preparation, the Exelis-built Cross Track Infrared Sounder (CrIS) instrument began measuring atmospheric profiles for temperature, moisture, and pressure from space to the Earth's surface.

Called soundings, these measurements are crucial for global weather models, which directly impact two- to seven-day weather forecasts in the U.S. The sounding accuracy of CrIS is well beyond the capabilities of previous operational sounders. CrIS enables weather forecasters to more accurately predict days in advance the path and severity of weather like tornados and snowstorms.

"CrIS is the first U.S. operational hyperspectral sounding instrument and will be one of the most effective instruments for weather forecasting missions today," said Rob Mitrevski, vice president and general manager, Integrated Geospatial Sensing Systems and Environmental Intelligence at Exelis Geospatial Systems.

"The CrIS instrument will benefit communities by providing more accurate predictions of weather patterns and storm tracks. This milestone is a testament to our ability to help our customers see and solve some of the world's toughest problems."

CrIS is an integral part of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP), the next-generation U.S. climate and weather monitoring system. CrIS is the first in a series of advanced operational sounders, flying at an altitude of 512 miles and circling the globe as much as 14 times per day. Sounders work by measuring the energy through an atmospheric column from the ground up through the clouds.

The sounders flying today for the U.S. provide 19 slices of the column. The CrIS instrument will take more than 1,000 slices — critical for improving weather forecast models by providing more detailed information about moisture, temperature, and pressure. ITT Exelis company information here.

NOC @ Bagram

Every time someone emails a policy letter, instant messages their family or takes time out to watch a movie on their desktop, the airmen of the 455th Expeditionary Communication Squadron network control center at Bagram Air Field, Afghanistan, are comforted by the indicators of yet another successful work day.

A network control center serves as a data center to provide communication support to Bagram, to include server maintenance and backup, event logging, virus definition managing, and email routing. In addition, the network control center performs non-secure Internet protocol router network and secure Internet protocol router network service management to eliminate network vulnerabilities and ensure reliable connectivity.

The network control center airmen provide two basic services while deployed to Bagram: morale services and network connectivity.

During deployment, good morale is an important aspect of maintaining a warrior airman. At Bagram, the network control center addresses this need by providing services such as free wireless Internet, Internet protocol television and various morale drives.

Internet connectivity is one way network technicians help Bagram deployers focus on performing their duties every day.

Tech. Sgt. Brian Randazzo, 455th Expeditionary Communication Squadron network technician, said the network control center places resources toward the morale network so people can be in the right mindset while at work.

"When people start their duty day they can focus on work, because they know when they get back off duty they can use social media to check on things back home and talk to their family," he said. "They don't have to worry about getting DSN calls or waiting for mail in order to stay in touch."

Tech Sgt. Ian McNiff, 455 ECS network control center night shift non-commissioned officer in charge, also appreciates the impact of maintaining Internet connectivity during a deployment.

"I was in Kuwait in '93," McNiff said. "We had to wait in line to talk on a tactical phone for up to an hour. And, someone was standing there timing you. When your 15 minutes were up, you were out of there. He would put his finger on the receiver and hang up the phone. It blows my mind to come out here and be able to talk to my wife on the phone or Skype almost every night. I get to see my kids. The difference is day and night."

The network control center manually joins every computer onto their wireless network and closely controls bandwidth usage to help ensure everyone has a fair chance to use the network. They even had technicians volunteer to add new computers onto the network over the Christmas holiday to ensure new arrivals could speak to their loved ones.

Another product of the crew's dedication to support is the implementation of IPTV, a system through which television services are delivered using non-secured Internet, or niprnet, instead of being delivered through traditional terrestrial, satellite signal, and cable television formats.

The network control center sends multiple Armed Forces Network television channels to the desktop of any computer on Bagram.

After arriving just over three months ago, the network technicians identified an opportunity to upgrade the level of service the network control center gives its users. Therefore, they combined spare parts with their technical knowledge to hardwire old equipment so it could provide IPTV to all of their customers.

"It helps with being in this environment because there is a captive audience," Master Sgt. George Walton, 455th Expeditionary Communication Squadron network control center superintendent said. "Our customers get involved in activities or sleep a bit, but most people end up back in the shop. Watching AFN on your desktop is a nice break since it gives you something different to look at other than secure network or niprnet traffic."

Along with AFN news, sports and movies, users of Bagram's niprnet also have the option of watching movies, TV series or music on their niprnet computers through the Sharepoint morale drives.

Staff Sgt. Edouard Thompson adjusts the satellite position outside the network control center at Bagram Air Field, Afghanistan, January 23, 2012. Thompson is a network technician with the 455th Expeditionary Communications Squadron and is deployed from Buckley, Colorado. Photo by Airman 1st Class Ericka Engblom.

Senior Airman Eric White, 455th Expeditionary Communication Squadron network technician, said these resources are especially valuable to locations that do not have a television or where a cable run is not practical.

The network control center is currently working to increase the morale Wi-Fi bandwidth. This will help speed up media streaming and other data traffic, allowing more users to enjoy clearer video and faster Internet connections.

Although morale services are important to base support, the primary mission of the 455th Expeditionary Communication Squadron is to provide reliable, secure, network connectivity.

For a deployed location, it becomes a challenge to provide seamless network support when rotating out most of the technicians who maintain the systems.

"They got to hit the ground running," Walton said. "There is no slow spin up. We have to be able to learn and secure the network almost immediately. It's our job to make sure the systems are running correctly." For this particular rotation, that responsibility held a few extra challenges. The Airmen of the 455th Expeditionary Communication Squadron network control center are made of a variety of skill sets and backgrounds.

Walton sad many of the technicians don't normally work on servers or network connectivity at their home stations. A mixture of computer security managers, network managers, and other specialties in both reserve and active duty jobs make up the core of skilled technicians supporting Bagram's network. This meant stepping out of their professional comfort zones.

"Everyone came together to understand the importance of where we are in a deployed environment," Walton said. "They were all willing to learn, and everyone stepped up to perform each other's job and get exposed to a different environment."

However, one of the advantages of having such diverse manning presented itself as the network control center reduced the number of reported system vulnerabilities from 6,000 a month to 1,200 a month.

McNiff said 6,000 vulnerabilities a month had been the standard for 17 months. He said Senior Airman Nathan Kanuchok, cyber operations technician deployed from Whiteman Air Force Base, Missouri, utilized his training and experience to write a script which streamlined the way computer systems on Bagram were being patched. This was instrumental in the increased security of the network.

The network control center provides 24-hour support by performing preventative maintenance, upgrading existing systems, applying command-directed fix actions, installing security patches to systems, and educating end-users on their role in computer security.

"For us to be thrown together in this melting pot, different bases and skill levels, and be able to stick to a common goal and realize what is important is a credit to the technicians working here," Walton said.

Despite all their production and hard work, the network managers of the network control center prefer to be the silent workers keeping Bagram Air Field's morale network, siprnet and niprnet running.

"The harder we work, and the more we get done, the less people know that we are here," Kanuchok said. "That is because nothing is broken and everything is working the way it should."

Article by Tech. Sgt. Vernon Cunningham

VCAS Venture In Afghanistan

Vizada Network, recently acquired by Astrium, has completed the installation of a custom designed VSAT Camp Antenna System (VCAS) for FMV, the Swedish Defence Material Administration.

The antenna system will be used by the Swedish Armed Forces (SwAF) within their role as members of the International Security Assistance Force (ISAF), Afghanistan. FMV handled the commercial and technical part of this procurement, appointing Vizada Networks as the preferred supplier following an open RFP, while operation of the system in theater is performed by SwAF.

In addition to providing the best balanced value/technical proposal, the RFP required the supplier to have the logistical and technical presence in theatre to guarantee Mean Time to Repair (MTTR) of less than four hours for any electrical part (BUC, LNB, control units, fibre conversion units etc.) of the VCAS, when applicable spare parts and personnel are available.

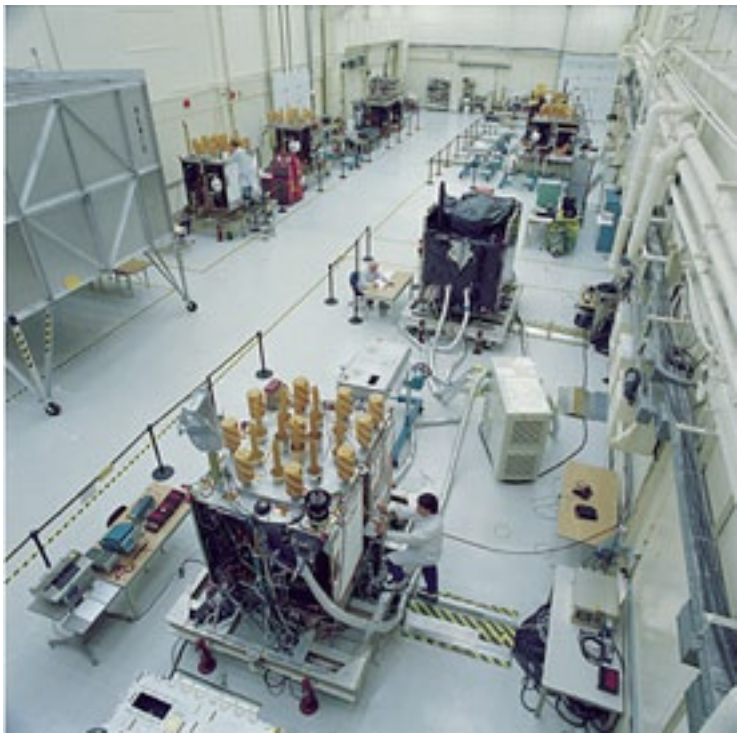
The scope of supply included design, implementation, and integration of the VCAS, on-site installation, testing and training. The VCAS is based on a 3.8m antenna that may be operated in the X-, Ku- and C-band frequencies by changing the antenna feed and RF-equipment. In addition to the antenna itself, Vizada Networks engineers also installed the RF Ku-band kit and Spectrum Analysers before carrying out in-depth operator and technical training on the system.

Subsequent to the completion of the VCAS, the Swedish Defence Material Administration has recently awarded Vizada Networks the contract to develop and install a second VCAS.

Collectively Speaking Of GPS

The U.S. Air Force's fleet of Global Positioning System (GPS) Block IIR and IIR-M satellites has accumulated 150 collective years of successful on-orbit operations.

The Lockheed Martin built GPS IIR and IIR-M satellites make up the majority of the current operational GPS constellation and have provided a reliability record of better than 99.9 percent. In more than 150 cumulative years of on-orbit life, this translates to less than one minute of unscheduled outage for every month of operational service, an unmatched



In this heritage photo, Lockheed Martin engineers work on the GPS IIR satellites for the U.S. Air Force. Lockheed Martin designed and built 21 GPS IIR satellites and subsequently modernized eight of those spacecraft, designated GPS IIR-M, to enhance operations and navigation signal performance. The oldest GPS IIR satellite was launched July 23, 1997 and has been operating for nearly 15 years, five years beyond its design life. The final GPS IIR-M satellite launched August 17, 2009. Photo courtesy of Lockheed Martin.

record of performance and reliability for GPS users around the globe.

Like the Internet, GPS is an essential element of the global information infrastructure. GPS technology is found in everything from cell phones and wristwatches to shipping containers, and ATM's. The system boosts productivity across a wide swath of the economy, to include farming, construction, mining, surveying, supply chain management and more. Major communications networks, banking systems, financial markets, and power grids depend on GPS and the technology is embedded in virtually every U.S. military asset making our armed forces safer and more effective. Lockheed Martin designed and built 21 GPS IIR satellites for the Air Force and subsequently modernized eight of those spacecraft, designated GPS IIR-M, to enhance operations and navigation signal performance.

The oldest GPS IIR satellite launched July 23, 1997, and has been operating for nearly 15 years, five years beyond its design life. The final GPS IIR-M satellite launched August 17, 2009. Lockheed Martin heritage also dates back to the production of the Oscar and Nova satellites, the original navigation programs that paved the way to the current GPS system.

As satellites age and GPS becomes increasingly vital to modern civilization, the Air Force and Lockheed Martin are developing the next generation system, known as GPS III. GPS III will be a catalyst for profound new applications as it brings on significant capabilities including increased accuracy, availability, anti jam power, integrity and reliability. The satellites will also add a fourth civil signal that will be interoperable with International Global Navigation Satellite Systems, providing even better precision and increased Earth coverage.

With first launch in 2014, GPS III is the lowest risk solution to constellation sustainment and the most affordable path to meet the needs of military, commercial and civilian users worldwide.

A SATCOM Game Changer?

As the interoperability discussion continues, so does the frustration of many who have worked on this issue for decades but haven't seen their goals realized. So it makes sense to take a look into the future of what could be a bright spot, given the right circumstances, some money and a will to make it work.

Satellite technology has proven itself during major events but its limitations are known. During Hurricane Katrina, satellite technology allowed for some semblance of interoperability when most communications systems were down, including allowing the U.S. Department of Veterans Affairs medical centers to provide connections for veterans and to order medications.

As useful as satellite communications can be, it's limited by a necessity for a clear line-of-site and spot beam capacity. It also is susceptible to heavy rains.

A new satellite launched three years ago by Hughes has the ability to be a "game changer," in the words of some neutral panelists at a recent emergency management summit.

HUGHES' SPACEWAY® 3 satellite is a high-capacity commercial satellite and offers onboard switching and routing.

The Hughes satellite, which the Company calls Spaceway, offers path diversity. It doesn't just bounce up from an antenna to the satellite and reflect down to a ground hub and connect to the Internet or a data center like the traditional satellite. The Spaceway is a router in the sky that can make multiple connections at once, enabling conference calls and video conferencing.

The Department of Defense tested the satellite's ability in 2009, creating video teleconferencing between the U.S. Northern Command, the Naval Surface Warfare Center's Dahlgren Division and the Space and Naval Warfare Systems Center in San Diego. The after-action report described it as "relatively quick to set up with the ability to carry on high-definition, clear and stable communications with other locations." FEMA was scheduled to test it during winter 2011.

With the Spaceway, user groups can be built prior to an event and connect when necessary. Agencies, counties, states and private-sector entities that don't work together every day can connect quickly during a crisis when other terrestrial communications are not working.

The Spaceway satellite is more akin to a mesh network than the traditional reflector satellite, which enables it to invoke community groups. Another way of describing it is "any-to-any" connectivity instead of "one-to-one" connectivity.

Tony Bardo, assistant vice president of Government Solutions at Hughes, called it a "Plan B" network. "If the ground infrastructure is down and you are unable to put together a user group, your P25 radios and so forth are down and you can still get to the governor's office. You can quickly invoke a community of users and managers and decision-makers that have access to this Plan B network. And we don't have a Plan B right now."

During Hurricane Katrina, circuits and Bell South towers were inoperable because they were submerged by the flooding. When the towers fell during 9/11, cables and servers went down under the rubble. "These structures on the ground that support our telecommunications are very much in harm's way when it comes to natural disasters and attacks," Bardo said.

With Spaceway, both the satellite and the routing capacity are 22,000 miles above Earth and away from harm, unlike ground-based communication infrastructure.

"If you think about that ground hub in the old system, the ground hub is the router," Bardo said. "The intelligence is taking place on the ground. Spaceway, with its router in the sky, can enable me to communicate with you in another field office and add another party somewhere else, and out of harm's way. I send up your IP address, and it connects me with you. I want to connect with the data center, so I send up the IP address on the antenna of the data center and it connects me there." The traditional satellite that's been used thus far is a reflector network that offers a single large beam of coverage. There are about 15 of them over North America.

Spaceway has about 100 spot beams that are 200 or more miles wide, high and deep. "Imagine a soccer net draped over the central part of America," said Bardo, who added that Spaceway is a 10-gig satellite with the capacity of "seven or eight of the traditional satellites over North America." An advantage of the 100 or so spot beams is that they can help overcome heavy rain, the Achilles' heel of traditional satellites.

"When you're operating a [traditional] satellite that has a single beam across the country and one part of the country is getting heavy rain, there's not a lot that can be done in real time," Bardo said.

Bardo said Hughes has the ability to adjust Spaceway to heavy rain. A link to the National Weather Service senses if weather is affecting transmission in a certain area, allowing the reallocation of power from one spot beam to another to boost power in the affected area.

In the event of a cyberattack, a Spaceway network would be vulnerable in the sense that a cyberattack could disable computing systems, clouds and data centers that could be accessed by the satellite connectivity. But the satellite itself wouldn't be the target, Bardo said. "It's a private network, not part of the Internet."

The cost of each site would be about $2,200. Other network charges would apply depending on the number of gateways required.

Article authored by Jim McKay for Emergency Management Magazine — ***website link***

Cloaking Becomes A Reality

U.S. researchers say they have "cloaked" a three-dimensional object making it invisible from all angles for the first time.

The process uses a shell of what are known as plasmonic materials that create a "photo negative" of the object being cloaked, effectively canceling it out. However, the demonstration has only been achieved for waves in the microwave region of the electromagnetic spectrum, not for visible light.

Andrea Alu and colleagues at the University of Texas at Austin have made a 7-inch-long cylinder invisible to incoming microwave light. The success with the cylinder suggests further work with different wavelengths of light is worth pursuing. Alu said. "It's a real object standing in our lab, and it basically disappears," he told BBC News.

While the technique is unlikely to work at the visible light part of the spectrum, Alu said, the approach could be applied to the tips of scanning microscopes to yield an improved view of even smaller wavelengths of light.

Modernizing Networks

Army officials hosted more than 275 industry representatives at new integration facilities at Aberdeen Proving Ground, stressing the service's commitment to its new "agile" approach to modernizing the tactical communications network.

The January 11 event was the second informative Industry Day held since the Army launched the Network Integration Evaluations, known as NIEs, which are semi-annual events designed to rapidly integrate and mature the tactical network. The NIEs and Agile Process will allow the Army to field "capability sets" that provide integrated connectivity from the command post to the dismounted Soldier, and update that equipment on a two-year cycle to reflect improvements in technology and changes in operational needs.

"We can't afford to build a network capability like we build a tank," said Col. John Morrison, director of the Army G-3/5/7 LandWarNet-Battle Command Directorate. "We want to leverage industry innovation. For this process to work, industry is a key partner."

Industry representatives from small to large defense companies received detailed updates on criteria to participate in the Agile Process, the Army's new quick-reaction acquisition methodology to address defined capability gaps and insert new technologies into the overall network at a lower cost. This funda-

mental change in business practices is even more critical in light of planned cuts in defense spending, Morrison and other senior leaders said.

"As budgets go down, this will become more important to the Army and Department of Defense," said Maj. Gen. Genaro Dellarocco, commanding general of the Army Test and Evaluation Command. "The NIE and Agile Process are going to endure."

Industry Day also coincided with the release of a "sources sought" notification for systems to participate in NIE 13.1, which will take place in the fall of 2012. That will be the final NIE prior to the synchronized delivery of Capability Set 13, the first integrated group of network technologies that will be fielded to up to eight brigade combat teams starting in fiscal year 2013.

Held twice a year at White Sands Missile Range, New Mexico, the NIEs leverage a full brigade combat team to assess new network capabilities in a robust operational environment. Prior to receiving a field tryout with Soldiers, these capabilities must pass through the laboratories at Aberdeen Proving Ground, or APG, for technology evaluation, assessment and integration. The lab assessments inform the Army's choices on what

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systems will participate in the NIE and provide detailed "score cards" to industry on how their technologies performed and what could be improved in the future.

Industry representatives toured seven of the laboratories and integration facilities that support the NIE, Agile Process and capability set fielding. Built as part of the recent Base Realignment and Closure move of Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance, known as C4ISR, organizations to Maryland, the laboratories are linked through direct fiber optic connectivity — creating an integrated environment for government and industry to measure system performance and interoperability.

The APG facilities are already yielding tangible benefits for key Army network efforts, such as the mission command "collapse strategy" that is combining fires, sustainment, air defense and airspace product lines onto a common workstation. Engineers from General Dynamics recently used the Program Executive Office for Command, Control and Communications-Tactical, or PEO C3T, System of Systems Integration Facility for some of this integration work.

The facility recreates the environment of a brigade or division level command post, allowing engineers to simulate challenges like high volume traffic on the network.

"It was our chance to integrate in an environment that was going to be more similar to what people were going to see in the field," software engineer Austin Murray said. "(The testing) was able to expose some of the areas where we can enhance what we're doing."

Other resources highlighted for industry included facilities focused on tactical radios, satellite communications, intelligence and the integration of C4ISR equipment onto various vehicle platforms.

"The synergies we have at APG allow us to take advantage of the other laboratories, integration facilities and test capabilities on the installation — and this is a tremendous asset," said Robert Zanzalari, associate director of the Communications-Electronics Research, Development and Engineering Center, known as CERDEC, which owns several of the labs. "I think the NIE support and the capability set efforts taking place here are going to be prime examples of how this community at APG can coalesce onto a high-priority, high-visibility project for the Army. That's important for the future of agile acquisition."

Industry Day attendees said the experience and information exchange was valuable, especially in light of the significant changes in the Army's network modernization strategy.

"It's important for us to be talking to one another," said Lori McKaig, a senior executive with the Accenture Defense group. "Given this is a totally new process, it's more important than ever."

Opening The MAINGATE

Raytheon Company's Mobile Ad hoc Interoperability Network GATEway (MAINGATE) radio system successfully provided tactical networking capabilities at two major U.S. Army exercises, giving soldiers reliable battlefield information.

During the recent Army Expeditionary Warrior Experiment (AEWE) at Fort Benning, Georgia, MAINGATE provided the backbone for wideband networking. It also successfully performed as an alternative to the cancelled Ground Mobile Radio program during the Network Integration Evaluation (NIE) at Fort Bliss, Texas. During the testing, MAINGATE simultaneously provided multiple channels of real-time video, situational awareness, chat and other applications.

Soldiers at the squad level reliably received multiple unmanned aerial vehicle video feeds and other high-bandwidth data services from the battalion to the tactical edge. MAINGATE provided needed capacity for reliable connectivity among cellular networks, hand-held radios and the Warfighter Information Network - Tactical (WIN-T) system. It also allowed soldiers to integrate information across battle command systems and sensors.

"During the entire AEWE event, Raytheon's network provided the Experimental Force soldiers with a very reliable high-speed backbone that did not require any soldier or field representative intervention," said Harry Lubin, chief of the Experimentation Branch at Fort Benning's Maneuver Battle Lab. "It just worked the whole time, allowing us to focus on the soldier technologies," he added.

MAINGATE is comprised of a high-throughput radio that uses the Next Generation Mobile Ad Hoc Networking Waveform and a gateway that enables seamless battlefield connectivity. MAINGATE is a mature, off-the-shelf system in production today, with more than 100 units currently deployed in theater.

The non-proprietary waveform provided 10 times more network capacity and supported four times more nodes than competing radios at the NIE. And, it exceeds wideband networking requirements in the upcoming Mid-Tier Networking Vehicular Radio solicitation.

"Giving our soldiers that added edge is a critical feature of MAINGATE," said Scott Whatmough, vice president of Integrated Communication Systems for Raytheon's Network Centric Systems business.

"We filled a gap no one else can fill today," he added. "We look forward to continuing our participation in the next NIE phase, 12.2, to build on our Internet protocol-based networking experience to deliver the most advanced networks at a much lower cost than other systems in development today."

ORS-1 On Station...

On January 3rd, Air Force Space Command commander General

William Shelton declared the Operationally Responsive Space-1 (ORS-1) satellite had achieved initial/final operational capability.

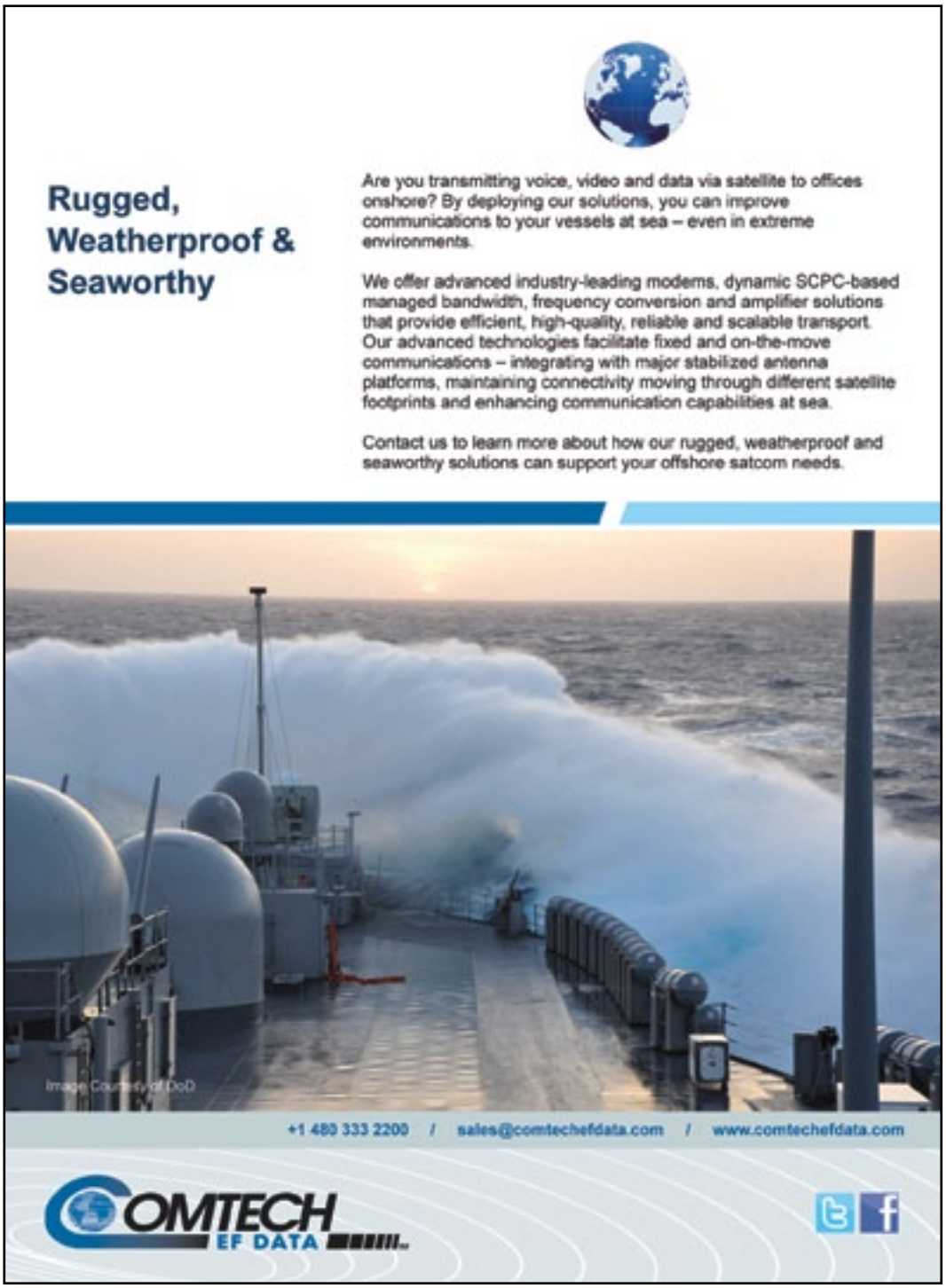
This declaration marked another milestone for the record-breaking spacecraft, which moved from the drawing board to the launch pad within 32 months and earned early combatant command acceptance in September 2011, less than 90 days after liftoff.

"Feedback we have received from U.S. Central Command is that they are very pleased with the performance of ORS-1 to date," said Thom Davis, ORS-1 program manager at Kirtland Air Force Base. "It is meeting requirements we established at the start of the program and they (USCENTCOM) are now finding new uses for it, so it continues to be a big impact to their overall mission operations."

Featuring a modified version of the SYERS-2 sensor, currently employed by U-2 aircraft, the ORS-1 satellite program began in October 2008 after USCENTCOM addressed an urgent requirement for enhanced battlespace awareness with U.S. Strategic Command. That discussion ultimately prompted the ORS office's involvement in meeting the need through the initiation of their inaugural spacecraft.

Established in May 2007, the ORS office, a DoD-administered unit, which reports to the Secretary of the Air Force in his position as the department's executive agent for space, has been tasked to design and develop low-cost, rapid-reaction payloads, buses, space lift and launch-control methods to meet joint military operational requirements for on-demand space support and regeneration.

ORS-1 program partners include ATK Spacecraft Systems & Services, Beltsville, Maryland, Goodrich Corporation ISR Systems, Danbury, Connecticut, the U.S. Naval Research Laboratory, Washington, D.C., and the Air Force Space and Missile Systems Center's Space Development and Test Directorate at Kirtland AFB. The satellite, which reached orbit in June of 2011, will remain under the



control of the 1st and 7th Space Operations Squadrons at Schriever Air Force Base, Colorado.

"Having a little time to think back and reflect on what the whole ORS-1 team was able to accomplish, it really gives us a lot of lessons about how we can do these kind of programs in the future," said Dr. Peter Wegner, ORS office director. "As urgent needs come up, we really have developed processes and teams that can take those problems and turn them into solutions in very short times for reasonably small amounts of money. That is being both responsive and responsible."

Classified Recon Satellites On Display

Military, government and industry officials gathered in Dayton, Ohio, on January 26th to officially place three formerly classified reconnaissance satellites on public display in the Cold War Gallery at the National Museum of the U.S. Air Force here.

The three satellites — Gambit 1 KH-7, Gambit 3 KH-8 and Hexagon KH-9 — were among the most important U.S. photo reconnaissance systems used from the 1960s to the 1980s, and played a critical role in winning the Cold War and maintaining U.S. national security, officials said.

Passing in space high over their targets, these satellites used specially-designed film and cameras to take photos in orbit. The satellites were unmanned and unlikely to be shot down, and therefore minimized risks to military personnel while still obtaining information about areas of the world that the U.S. could not access.

Led by the National Reconnaissance Office, the Department of Defense, U.S. Air Force, Central Intelligence Agency and industry partners worked together to create these amazingly complex and capable satellites, officials said.

According to retired Air Force Gen. Bruce Carlson, the NRO director, NRO reconnaissance systems -- from planes to satellites such as Gambit and Hexagon -- have been and continue to be the foundation for global situational awareness in protection of our nation.

"Last year the NRO celebrated its 50th anniversary, and we announced the declassification of two NRO systems, Gambit and Hexagon, which were America's eyes in space and the most sophisticated satellites of their time," Carlson said. "These systems were critical for monitoring key targets in the USSR and around the globe and provided much-needed cartographic information to the DOD to produce accurate, large-scale maps."

Gambit 1 satellites were the first American high-resolution space reconnaissance systems. This first generation of Gambit vehicle flew from 1963-1967. Gambit 1 added important new close-up capability to wide-search satellites already in use and were the first satellites to feature stereo high resolution cameras.

Gambit 3 satellites improved upon the Gambit 1 by providing much better image resolution in tracking adversaries' weapons development. Gambit 3 was a long-lived system and completed 54 missions from 1966-1984. The most notable advancement from Gambit 1 to Gambit 3 was the addition of a "roll joint" between the camera module and the Agena control vehicle in the rear. This rolling joint made the satellite extremely stable as a photo platform, conserved film and increased the number of targets photographed. In addition, new super-thin photographic film allowed the vehicle to carry more film.

Hexagon satellites were the largest and last U.S. intelligence satellites to return photographic film to earth. Hexagon provided vital intelligence and mapping photos from space that allowed U.S. planners to counter Cold War threats. Between 1971 and

Gambit 1 KH-7 is one of three formerly classified reconnaissance satellites that went on display at the National Museum of the U.S. Air Force in Dayton, Ohio. Photo courtesy of the U.S. Air Force.

The Hexagon KH-9 reconnaissance satellite. Photo courtesy of the U.S. Air Force.

1984, 19 Hexagon missions imaged 877 million square miles of the earth's surface. Objects smaller than two feet across could be imaged from around 80-100 miles altitude. Analysts could search broad and wide areas for threats with Hexagon and then focus in on suspect areas with surveillance from Gambit satellites.

Both Gambit and Hexagon systems returned exposed film to earth in re-entry vehicles or "buckets" that separated from the satellite, fell through the atmosphere, and descended by parachute. Air Force aircraft were assigned to pluck the buckets from the sky at around 15,000 feet.

Retired Air Force Lt. Gen. Jack Hudson, the director of the National Museum of the U.S. Air Force, said the three satellites are a great addition for the Air Force's national museum because the Air Force played a key role in space reconnaissance from the beginning.

"Gambit 1, Gambit 3 and Hexagon satellites are significant and rare artifacts, which will enable us to better present the story of Air Force operations in space," Hudson said. "The Air Force has provided launch, tracking, control and range safety services for reconnaissance satellites throughout the entire Cold War, and it continues these activities today."

To commemorate the event, Hudson presented Carlson with a painting of the Hexagon satellite by nationally recognized artist and Dayton, Ohio, resident Dr. Richard Black, which was commissioned by the Air Force Museum Foundation.

Eventually, the satellites will be placed in the museum's planned fourth building, which will house the Space Gallery, Presidential Aircraft Gallery and Global Reach Gallery.

The National Museum of the United States Air Force is located on Springfield Street, six miles northeast of downtown Dayton. It is open seven days a week from 9:00 a.m. to 5:00 p.m. (closed Thanksgiving, Christmas and New Year's Day). Admission and parking are free. For more information about the museum, visit...

http://www.national-museum.af.mil

Story by Rob Bardua, National Museum of the U.S. Air Force

SMC Is CCS-C'd

Kratos Defense & Security Solutions, Inc. (Nasdaq:KTOS) has announced that the U.S. Air Force (USAF) Space and Missile Systems Center (SMC) has awarded its Integral Systems subsidiary a $15.69 million extension to its Command and Control System-Consolidated (CCS-C) contract.

Under the terms of the contract extension, Integral Systems will continue to provide the USAF and SMC with its EPOCH Integrated Product Suite (IPS) to simplify operations by consolidating satellite ground systems. The award extends CCS-C system sustainment, hardware maintenance, software maintenance, and operations support through calendar year 2012.

The CCS-C contract, first awarded in 2002, enables a unified Command

and Control (C2) capability for the 50th Space Wing's complete family of MILSATCOM satellite programs. By employing standards-based systems and an open architecture approach, the 50th Space Wing efficiently and cost-effectively supports legacy, new and emerging satellite platforms and programs. CCS-C is currently configured to support MILSATCOM satellites across four systems: the Defense Satellite Communications System (DSCS), Milstar, Wideband Global SATCOM (WGS) and the AEHF system.

CCS-C consists of high-specification, commercially-available computer servers and workstations running commercially-available Telemetry, Tracking & Command (TT&C) software packages on a local area network-based client/server architecture. CCS-C products are operational at the Air Education and Training Command, 533rd Training Squadron at Vandenberg AFB, the 14th Air Force, 50th Space Wing and the 3rd and 4th Space Operations Squadrons at Schriever AFB. ***Integral Systems company information here.***

"This is a testament to the exceptional sustainment support delivered by Integral Systems to integrate the command and control systems of the USAF's mission critical MILSATCOM assets," said Larry Lind, CCS-C Senior Program Manager for Kratos Integral Systems. "We are proud to be working in close partnership with the USAF to ensure CCS-C's operational readiness to execute the MILSATCOM program mission."

GPS Block IIA satellite over Earth. Graphic courtesy of U.S.A.F.

Aging With Grace

Since Jan. 13, the 2nd Space Operations Squadron here has been busy disposing of an old and trusted satellite.

Squadron members could soon refer to the vehicle, known as SVN-30, as the satellite that keeps on giving because crews continues to garner invaluable information concerning how Global Positioning System Block IIA satellites behave as they degrade.

"We still have 12 GPS Block IIA vehicles on orbit," said Lt. Col. Dean Holthaus, the 2nd SOPS director of operations. "In addition to the normal end-of-life test and disposal procedures, we're conducting some tests (that) will help characterize how the other Block IIAs will behave with regard to their sensors, attitude control, etc., during future disposal operations."

The Air Force launched SVN-30 during September 1996 and the vehicle began providing position, navigation and timing data for GPS users worldwide the very next month. Designers placed four atomic frequency standards, or clocks, on the satellite during construction and it took nearly 16 years for all four to degrade beyond their usefulness. Operations crews began noticing that SVN-30's final clock was experiencing trouble during May 2011, so 2nd SOPS crews resurrected a residual satellite, SVN-35, to replace it in the GPS architecture.

That's when the satellite that keeps on giving leapt back into service.

"We've known for some time that SVN-30 was going to present itself as the perfect test bed," said Capt. Jayson Andersen, the 2nd SOPS assistant flight commander, GPS Mission Analysis.

"Its navigation payload has degraded to the point where it can't support position, navigation and timing missions anymore, but its bus components are still operating on the primary side and there is plenty of fuel onboard. We have an incredible opportunity to gain some understanding and knowledge about how Block IIAs behave at the end of their operational lives."

More than 50 personnel, including 2nd SOPS and 19th Space Operations Squadron operators and orbital analysts, will coordinate with Boeing and Aerospace contractors to test the satellite before its disposal later this month.

"The major benefit for us is that the information we gain from testing will drive down risk in future disposal operations," Holthaus said. "We know if anything falls outside the norm during future operations, we'll have quantifiable data from SVN-30's disposal for use in a scenario where we can't dispose of a vehicle in the standard fashion."

Andersen contends that the 2nd SOPS is showing forward thinking by trying to protect high-value GPS slots, which could be compromised if a satellite were to become inoperable in place.

"We may not dispose of another vehicle for several years," he said. "But, when we are forced to dispose of it, we want to go into it with high confidence so that we

have the lowest risk disposal possible. We want to be able to vacate that slot and bring in a new vehicle."

Final shutdown of SVN-30 will occur at the later stages of the operation, when crews will command the vehicle to fire its thrusters, pushing it out and up to a higher orbit, deplete the vehicle of its remaining fuel, discharge all batteries and open all valves. Telemetry shutdown and final contact with earth is planned for Jan. 27.

In addition to taking safety precautions to ensure a mishap free transition, the 2nd SOPS will also coordinate with external organizations, such as the Joint Space Operations Center, to provide predicted burn vectors and post-burn vectors so crews can conduct collision avoidance operations with other vehicles on orbit.

"I am proud of our team for their innovation and forward thinking in this regard," said Lt. Col. Jennifer Grant, the 2nd SOPS commander. "We are constantly trying to find ways to utilize every satellite on orbit to the best of our ability. This end-of-life testing will pay dividends in planning for future disposal, or contingency operations for future disposal operations."

Story by Scott Prater
50th Space Wing
Public Affairs

"Uplifting" Nuke Tests

A new analysis of satellite data from the late 1990s documents for the first time the "uplift" of ground above a site of underground nuclear testing, providing researchers a potential new tool for analyzing the strength of detonation. The study has just been published in Geophysical Research Letters.

Lead author Paul Vincent, a geophysicist at

Oregon State University, cautions that the findings won't lead to dramatic new ability to detect secret nuclear explosions because of the time lag between the test and the uplift signature, as well as geophysical requirements of the underlying terrain. However, he said, it does "provide another forensic tool for evaluation, especially for the potential explosive yield estimates. In the past, satellites have been used to look at surface subsidence as a signal for nuclear testing," said Vincent, an associate professor in OSU's College of Earth, Ocean, and Atmospheric Sciences.

"This is the first time uplift of the ground has correlated to a nuclear test site. The conditions have to be just right and this won't work in every location. "But it is rather interesting," he added. "It took four years for the source of the uplift signal - a thermal groundwater plume - to reach the surface."

The focus of the study was Lop Nor, a nuclear testing site in China where three tests were conducted - May 21, 1992; May 15, 1995; and Aug. 17, 1995. Vincent and his colleagues analyzed interferometric synthetic aperture radar (InSAR) images from 1996-99 and detected a change in the surface beginning four years after the tests.

Though the uplift was less than two inches, it corresponds to known surface locations above past tests within the Lop Nor test site.

From past studies, the researchers knew that heat from underground detonation of nuclear devices propagates slowly toward the surface. At most sites - including the Nevada National Security Site - that heat signal dissipates laterally when it reaches the water table, which is usually deep beneath the surface.

At Lop Nor, however, the water table is only about three meters below the surface, and the heated groundwater plume took four years to reach that high, lifting the ground above the detonation site slightly - but enough to be detected through InSAR images.

Lop Nor also is characterized by a hard granite subsurface, which helps pipe the heated water vertically and prevents the subsidence frequently found at other testing sites.

A past study by Vincent, published in 2003, first shed light on how subsidence can manifest itself in different ways - from the force of the explosion creating a crater, to more subtle effects of "chimneying," in which the blast opens up a chimney of sorts and draws material downward, creating a dimple at the ground surface.

Before joining the OSU faculty in 2007, Vincent spent several years as a physicist at the Lawrence Livermore National Laboratory.

Vincent said the analysis of nuclear explosions has become a specialized field. Seismology technology can provide an initial estimate of the energy of the explosion, but that data is only good if the seismic waves accurately reflect coupling to the connecting ground in a natural way, he explained. Efforts are sometimes made to "decouple" the explosive device from the ground by creating specializing testing chambers that can give off a false signal, potentially masking the true power of a test.

"Subsidence data combined with seismic data have helped narrow the margin of error in estimating the explosive yield," Vincent noted, "and now there is the potential to use test-related thermal expansion as another forensic tool."

Co-authors on the paper with Vincent include Sean Buckley of the Jet Propulsion Laboratory, Dochul Yang, the University of Texas-Austin, and Steve Carle, of Lawrence Livermore National Laboratory.

Story by
Oregon State University

Smart Phones + The Battlefield

A joint demonstration involving multiple defense agencies and several aerospace companies proved that smart phone technology can be used to improve battlefield awareness.

A tactical digital network, featuring advanced digital radios, hand-held cellular smart phones, a helicopter-mounted "cell tower in the sky" and

a boarding party in the Chesapeake Bay recently completed a joint interoperability demonstration.

"This is a big deal because until recently, we've not been able to communicate between devices in a tactical networked environment without extensive preplanning and coordination," said Cmdr. Chris McMahan, Naval Aviation Center for Rotorcraft Advancement demonstration coordinator. "Today's data links are mostly point-to-point networks where ad hoc connections aren't possible."

Participating teams displayed ad hoc data sharing on a simulated battlefield in a December exercise by using handheld cellular smart phones to send and receive real-time video, voice and text sharing between a small-boat team on the Bay and the Naval Air Warfare Center Aircraft Division's Surface/Aviation Interoperability Laboratory.

The participating teams included NACRA, SAIL, Defense Advanced Research Projects Agency and aerospace companies Northrop Grumman and Rockwell Collins.

"It's the same idea as accessing the Internet from a smart phone or a Wi-Fi-capable notebook to share email or a video with a friend," explained McMahan. "The Internet doesn't care what your device is as long as it uses the right protocols. This is the same thing, only we're doing it encrypted in a tactical environment where we have to bring our own mobile cell tower mounted on the helicopter."

And while that might seem routine for civilian Internet users, it's challenging in a secure tactical arena. "We're trying to achieve 'platform agnosticism,' where you don't have to preplan participation," McMahan added. "Much like how we're able to access the Internet via any number of available devices and modes, we wanted to demo an encrypted tactical network where the data is important and the devices are relatively transparent."

Specific network capabilities included Quint Networking Technology, 4G/LTE wireless networks,

L band, C band and UHF radios, PRC-117G radios, Blue Force Tracker and a 3G/4G LTE transmitter mounted on one of NACRA's testbed helicopters.

Key to the demo was DARPA's Tactical Targeted Network Technologies -- an Internet Protocol (IP) based, high-speed, dynamic, ad hoc network hosted by the Rockwell-Collins QNT networking radios.

The Naval Air Warfare Center's SAIL acted as a ship, providing a sea-based node to the network, demonstrating the ability to access an IP-based network from the sea.

VSAT Keeps HR Soldiers Combat Ready

Battles can be won or lost in the blink of an eye, making technological connectivity on today's battlefield more crucial than ever. In a rapidly changing combat environment, the ability for human resources units to establish, maintain and exchange reliable communications with leaders and other units about casualties, personnel issues and other information is vital.

During Silver Scimitar 2012 training exercise, Human Resources soldiers, assigned to casualty operations received training on how to operate the Very Small Aperture Terminal, a portable satellite system that can data-connect with other VSATs and with network architectures established in theater. It provides critical connectivity in an austere environment when other options are not available, and has been used to support Army operations since at least 2003.

"Using VSAT has been a great experience. When our casualty assistance center communications went out several times in Kuwait, we had communications backup within minutes," said Chief Warrant Officer 4 Stacy Malloy, Human Resources technician, Casualty Operations Division, 14th Human Resource Sustainment Center.

Malloy is currently stationed in Kuwait and on temporary orders to Silver Scimitar. He's one of a number of instructors and subject matter experts who have dealt with the technology while deployed and can share valuable lessons learned with soldiers participating in Silver Scimitar. He recalled the HR mission prior to the fielding of the VSAT and the significance of this technology for his soldiers.

"Before this system, we worked through the G-6 [chief information officer] and they would provide static IP addresses," he said. "We weren't able to do it on our own. Now this [technology] allows us to go anywhere and have communications; send emails, send casualty reports and [have] more capabilities through VOIP [voice over internet protocol]."

To get the hands on experience needed, soldiers assembled and disassembled the satellite system and learned about its capabilities.

Despite not having operating the system, Fajardo was much more comfortable with using it after receiving the training. "I like it," he said. "It's like plug and play. Once you follow the instructions, it's pretty easy to put up."

Soldiers appreciated both the depth of the instruction and the subject matter expertise of the instructors.

"I think the training was outstanding. They provided detailed information in order for us to perform our job when we are in theater," said Staff Sgt. Tyra Thompson, casualty operations noncommissioned officer, 8th HRSC. "I have used the system before. The HRSC conducted multiple training events on how to set up and tear down the VSAT. I would definitely feel comfortable [with] setting up the system in the field."

Story and photo by Spc. Cal Turner, 214th Mobile Public Affairs Detachment

Staff Sgt. Atavis Taylor (right), Casualty Operations 2nd shift officer-in-charge, 14th Human Resources Sustainment Center, assists two soldiers from the 8th HRSC in assembling the Very Small Aperture Terminal System during Silver Scimitar 2012, the annual training exercise that prepares human resources soldiers for overseas missions.

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Is Iraq A Failing State?

by Lieutant Colonel (RET), U.S. Army, Michael E. Silverman

Given the staggering amount of resources committed to the Iraqi conflict, from satellite communications, capacity and bandwidth, to the weaponry and support facilities, to the cost in human lives, we asked the author of the recently published book *Awakening Victory: How Iraqi Tribes And American Troops Reclaimed al Anbar Province And Defeated al Qaeda in Iraq* his opinion regarding the recent drawdown by the United States from this nation, that throughout history has been the scene of conflict. The following is one Iraqi combat veteran's opinion of the current results of the exit from Iraq.

Iraq is in crisis and bordering on chaos! At least, that's what major media outlets say. They point out the tumultuous political machinations ongoing in Iraq and a spike in sectarian violence immediately following the U.S. withdrawal and they claim that Iranian influence is on the rise in Iraq. Well, not so fast. The future of the Arab World's fledgling democracy is not yet settled and all is not lost!

Why Did We Withdraw?

It is clear that the situation in Iraq is worse than it was prior to our December 18th withdrawal. There is no doubt that Iraq would be more stable had we negotiated a phased withdrawal of our forces. In addition to providing military training and advice, members of **U.S. Forces—Iraq** (**USF-I**) provided tutelage to senior members of the Iraqi government including the Ministers of Defense and Interior. Also, the commanding general had routine access to Prime Minister *Noori al Maliki* and President *Jalal Talibani*. These daily and routine contacts were critical in guiding Iraqi leaders and providing "strategic overwatch" in a way that ensured that Iraqis embraced their own laws and stayed on the path of democracy.

The influence of American military leaders on Iraqi government officials was undeniably strong and positive. Why, then, did we not negotiate a phased withdrawal from Iraq? The Obama Administration tells us that the reason for our complete withdrawal (that they argue was negotiated by the Bush administration) was Iraqi intransigence — that the Maliki government was unwilling to grant immunity from prosecution to our troops who might have remained in Iraq. If true, that certainly is a deal breaker.

Perhaps that is the only reason for our withdrawal, but facts on the ground dispute that, namely, according to U.S. Embassy records, neither President Obama, nor Vice-President Biden, spoke personally to Prime Minister Maliki about the importance of keeping a small force of advisors on the ground. Certainly, that doesn't reflect bringing the full weight of diplomacy on negotiations with an ally.

This leaves two possible reasons for the withdrawal: either the administration didn't understand the importance of maintaining an advisory presence in Iraq, or President Obama was more interested in keeping an election promise to end the war than he was in the future of a vital ally. Regardless, the result is that Iraq is now, finally and fully in the hands of Iraqis.

The Situation Today

Prime Minister Maliki is making a play to wrest control of the government from the hands of the secular **Shia-Sunni al Iraqiya** coalition who won more than 25 percent of Iraq's parliamentary seats in the last election. (In fact, the only reason Maliki continues as prime minister is because he completely outmaneuvered *Iyad al Alawi* and the Iraqiya coalition post-election.)

The power-play started just days after the U.S. withdrawal, when the Ministry of Interior swore out an arrest warrant for *Tariq al Hashemi*, the Sunni Vice President of Iraq and a senior Iraqiya coalition member, accusing him of running "death squads" responsible for killing Shia civilians and government officials. Most observers put little stock in the accusations and see them as completely political.

Al Hashemi is now in hiding in the autonomous Kurdish region and those leaders refuse to surrender him to Bagdad authorities. The result is that the al Iraqiya members of parliament and the nine al Iraqiya cabinet ministers have boycotted both parliamentary and cabinet meetings, while refusing to surrender their posts.

While the situation appears dire, it is actually business as usual in the rough-and-tumble post-Saddam era of Iraqi politics. In 2007, as the **Sunni Awakening** swept across *al Anbar* and *Salladin* Provinces, it was relatively commonplace for Bagdad officials to swear out arrest warrants for the sheiks and leaders of the Awakening Movement, accusing them of terrorism and insurgency. In fact, according to a recent *AFP* report, another senior al Iraqiya member, Deputy Prime Minister *Salah al Mutlak* said, "The problem is that in this country... you cannot work as an opposition because an opposition means that you are going to be accused of... terrorism…" The fact that this situation has now continued for a month with no bloodshed that can be directly attributed to the stand-off is, in my estimation, a good sign that there will ultimately be a political resolution to the problem.

Sectarian violence in Iraq is spiking and even many "Iraq hands" in the media see the increase in violence as a reflection of the political stalemate. However, it is clear to me that these attacks bear the fingerprints of al Qaeda in Iraq, an organization that represents foreign interests and has not had a home in mainstream Sunni politics since 2006 when the former nationalist insurgents broke with the group and actively fought to remove al Qaeda influence in the so-called Sunni Triangle.

The Sunni Awakening of 2006-2009 ended any serious threat by al Qaeda inspired groups to gain political control in Iraq. Al Qaeda in Iraq has conducted spectacular and heinous attacks against government targets and Shia civilians at a rate not seen since 2008, and those attacks are likely to continue well into the summer. However, they are the work of mostly foreign fighters and do not indicate a movement by the Sunni population writ large to re-establish the ill-fated Islamic State of Iraq. In my estimate, based on my exposure to Sunni patriots (many former nationalist insurgents) al Qaeda will never again be capable of recruiting large numbers of Iraqi recruits — the Sunni population will not stand for it. Neither are there any indications that the former Shia insurgent groups (like the *Mahdi Army*) have become active in the latest spate of violence. I don't see a sectarian civil war on the horizon.

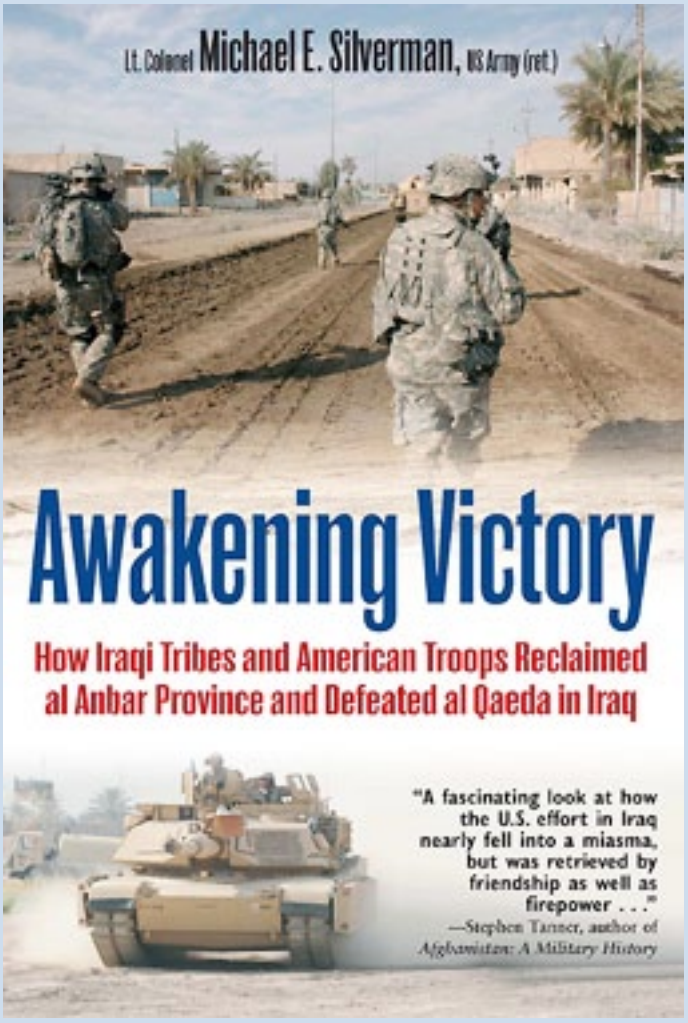
Lastly, although many decry the growing influence of Iran in Iraq, I see no indications that the relationship has grown stronger. In fact, Iraq recently failed to grant the equivalent of most-favored nation trading status to Iran.

While some point to Iraq's failure to support Arab League sanctions against Syria as a nod to Tehran, I see it as an Iraqi desire to avoid a potentially devastating foreign entanglement at a time when they can ill-afford to make enemies in the region. Although there is a small, but vocal, minority in the Iraqi Shia population who would prefer an Iran-like Shia theocracy in Iraq, the average Iraqi has great disdain for the Iranian regime and remembers full well the 1980-1988 Iran-Iraq War in which Iraq lost as many as 300,000 killed (mostly Shia) in what was the longest conventional war of the 20th Century. Those wounds have not fully healed in the Iraqi population. For that reason, a close partnership between the two is probably out of the question.

Yes, Iraq is in turmoil. However, the signs are not as bad as some media outlets wish to portray the situation. From my foxhole, now is the time to redouble our efforts to support the fledgling democracy, not to merely turn our heads and ignore it.

About the author

Lt. Col. Michael E. Silverman is a 25-year veteran with the United States Army and is the recipient of numerous awards, medals, and commendations. Retired in 2008, he now spends his time writing about the war on terror and serving as a consultant to the U.S. Army on counterinsurgency. He is well-versed in international affairs and world religions. His writing reflects the experience and authority of a combat veteran who has been blown up by an IED, and who assisted in shaping U.S. strategic policy for the global war on terror. His latest book, Awakening Victory from ***Casemate Publishers***, has received numerous positive remarks, including this quote from *Publisher's Weekly*, "...instructive first-hand account of how Iraq's insurgents were defeated." *Jerry Morelock*, the editor of *Armchair General,* stated, "This is a riveting account of the 'sharp end' of fighting insurgents in Iraq. The successes Silverman reveals should give pause to the pundits who claim American forces are incapable of defeating a modern insurgency. Kudos to Casemate Publishing for another terrific book!"



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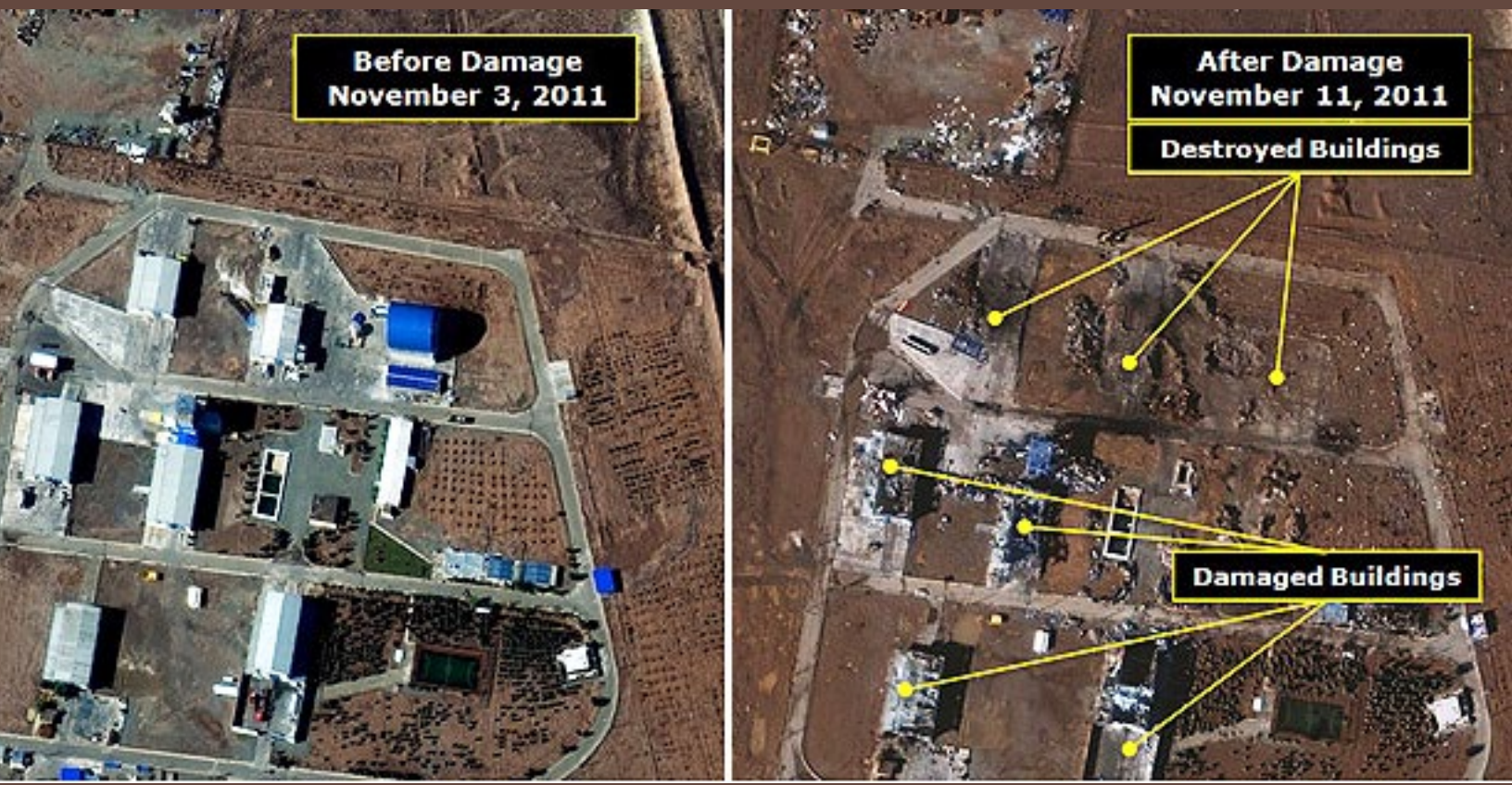
Crisis Control Through Imagery

by Stephen Wood, Vice President, DigitalGlobe Analysis Center

In a crisis every second counts. Lives can be lost if decision makers cannot react to a situation fast enough. Up-to-date information is the most important factor in preventing loss of life. Whether the disaster is natural or man-made, geospatial intelligence can play a critical role in the effective management of on-the-ground personnel. To fill the spatial and logistical voids often associated with disasters, DigitalGlobe recently launched two new geospatial intelligence services that enable faster response and smarter decision making.



DigitalGlobe's FirstWatch service provides customers with rapid imagery-based analysis of the scope and magnitude of an event, as well as the event's impact on critical infrastructure and populations. Satellite imagery and geospatially-based insight are used to deliver relevant, time-dominant information. FirstWatch customers are provided with an analysis report which presents a rapid, initial assessment of an event, highlighting areas of interest and importance within the imagery.

These two products are part of **DigitalGlobe**'s vision for the fourth "era" of the commercial satellite industry: analytics. For government customers, the need for rapid and accurate analysis of imagery is becoming as important as the imagery itself. Another important component of the effective use of imagery is cloud services. This solution of cloud services is especially valuable to government, agency, and humanitarian organizations that are responding in a crisis situation. Real-time information is essential in developing a unified strategy. DigitalGlobe has reaffirmed their commitment to providing the most current information available by launching two new geospatial intelligence offerings — ***FirstWatch*** and the ***Diplomatic Facilities Support Package***.

DigitalGlobe FirstWatch

The first service is FirstWatch, which is designed to provide rapid analysis of satellite imagery to users. The development of the FirstWatch offering stemmed from customers' requests and needs. Customers in crisis situations needed to know how to get to the affected area to help save lives and start rebuilding. Imagery is a starting point, but what our customers really needed were the answers, which FirstWatch helps provide.

In response, FirstWatch was developed to extend the value of DigitalGlobe's FirstLook crisis event monitoring and imagery delivery service, by publishing detailed analysis of FirstLook imagery along with associated information relevant to event management and response. This analysis and information gathering is conducted by experts in the DigitalGlobe Analysis Center, and varies in detail and scope based on the needs of the customer.

When a crisis occurs, the DigitalGlobe FirstLook service is activated, and DigitalGlobe's satellites begin collecting new imagery from the affected region. Immediately after the new imagery is received, DigitalGlobe's analyst begins to process it, using multiple sources of data to turn images into information.

Satellites, radar and airborne sensors, open source content and social media combine to provide the most comprehensive understanding of what's developing, and what needs attention. In the event of a disaster, up-to-date images are matched with archived images from the DigitalGlobe high-definition ImageLibrary, which is the largest in the world. These comparisons allow analysts to quickly understand the extent and specifics of damage on the ground. The analysis is then published into

The Diplomatic Facility Support Package, developed by CACI and DigitalGlobe, assists the evacuation of citizens and others by providing web-based access to consistently refreshed imagery and features information of diplomatic facilities and important local infrastructure to identify intermediate staging bases and other areas for subsequent safe haven operations. The view of current data layers enables collaboration via virtual whiteboards and incorporates annotation tools for multiple users to view, edit, and share critical information.

a comprehensive DigitalGlobe FirstWatch report within hours after the event occurs.

The wide range of information included in a FirstWatch report is designed to aid customers in assessing the scope and magnitude of an event, providing vital details that are often only visible from a satellite view.

The human element in the FirstWatch service is what sets it apart, as DigitalGlobe analysts are often able to identify imagery elements that might otherwise be overlooked, or be very difficult to distinguish. Details included in a report can include evidence of structural damage, infrastructure failures, changes to topography, flood water depth, and other potentially life-threatening elements. With the necessary insight into the situation, decision makers are freed up to begin formulating the most effective response plan.

DigitalGlobe has produced FirstWatch reports for more than 50 events worldwide. One of the most notable was the report produced for the tragedy in Japan in early 2011. During this crisis, DigitalGlobe satellites constantly monitored the area for 10 consecutive days and captured the explosions and failures at the nuclear facility, the state of the country's highways, and the damage at major infrastructure like main ports and refineries. DigitalGlobe's FirstWatch report allowed users to visualize the destruction on a street-by-street basis and enact targeted response plans for rescue and humanitarian aid.

Diplomatic Facilities Support Package

DigitalGlobe's Diplomatic Facilities Support Package was jointly developed with **CACI International**, which provides professional services and IT solutions needed to prevail in the areas of defense, intelligence, homeland security, and IT modernization and government transformation.

DigitalGlobe's Diplomatic Facilities Support Package was specifically designed to allow governments to quickly and intelligently respond to threats to diplomatic facilities and citizens abroad, and is unprecedented in its ability to serve governments in crisis situations. Similar to the FirstWatch analysis reports, the development of this offering was initiated with customers' needs. When governments or commercial entities are dealing with their operations, the Diplomatic Facilities Support Package offers much more precision with the analysis and information provided than just an image.

The service seamlessly combines DigitalGlobe's sub-meter resolution imagery with CACI's advanced geospatial feature content, giving governments an "eye in the sky" during critical periods. The constantly refreshed imagery provided by the service gives users a current line-of-sight into geographical landscapes, structures, routes and roadways, and critical resources. It goes beyond simply capturing imagery, by providing users with their own analysis implements, such as virtual whiteboards and comprehensive annotation tools. This suite of options allows user to layer data on top of existing imagery and customize the information at hand. Customization is critical for identifying high-risk areas, planning staging bases and safe-haven operations, managing key resources and collaborating with partners.

Collaboration is made possible by the service's ability to be accessed and edited by multiple users simultaneously. Regardless of their location, users can take advantage of the complete functionality of the service with only a browser and Internet access. The program can be accessed through a desktop, laptop or most handheld devices. Furthermore, because the imagery, feature information and whiteboard annotations are updated dynamically through the cloud, all users can be sure they are accessing the more up-to-date information at all times.

Integration with DigitalGlobe's FirstLook crisis event monitoring and image delivery service adds to the real-time nature of the Diplomatic Facilities Support Package. When viewing an area of interest in the service interface, users are alerted through on-screen icon notifications when FirstLook imagery becomes available for the region they are viewing. The DigitalGlobe FirstLook service can then be selected from the list of available content layers, instantly replacing the existing basemap imagery with new FirstLook imagery captured within hours after the event occurs.

Looking Forward

These new offerings are aligned with DigitalGlobe's vision for the future of the satellite imagery industry. Going forward, it is clear that the insight derived from imagery will become more important than just the pixels themselves. The insight provided by a partner "in the sky" can make an important difference in evacuation planning, disaster response, recovery, and rebuilding in regions worldwide. DigitalGlobe's FirstLook and FirstWatch services, and the Diplomatic Facility Support Package, are among the newest tools decision makers can use to more quickly and efficiently respond and overcome the challenges of our rapidly changing world.

About the author

Stephen Wood is the Vice President of the DigitalGlobe Analysis Center. He joined DigitalGlobe in July, 2000 after nearly 14 years with the Central Intelligence Agency, and has held a range of defense sales and marketing positions at DigitalGlobe.

The author also posted, to the DigitalGlobe blog, the following information that illustrates the importance of imagery during a disaster.

Earthquake and Tsunami damage, Japan-March 14, 2011 Dai-Ichi Power Plant

Even now, after we've imaged the entire Earth's surface many times over, I continue to be amazed at the unique, critical perspective satellite imagery offers to the pressing events of our time. In the last decade we've been involved in responding to many disasters. There has been nothing like the recent disaster in Japan — a terrible and devastating combination of a massive earthquake, a tsunami, and a nuclear disaster. Thankfully, our constellation has been able to cover all of this.

Monitoring in this kind of situation takes on a new dimension. When numerous hazards, from road wreckage to nuclear explosion risks, make it impossible to conduct on-the-ground assessments, only the eyes in the sky can safely see what is going on. Passing over the impact zone for 10 straight days, our satellites revealed widespread destruction including evidence of collapsed structures, extensive debris, massive flooding and damage to key infrastructure.

Earthquake and Tsunami damage at the Dai-Ichi Power Plant

They witnessed the explosions and failures at nuclear facilities (including incredible images taken less than one minute before and three minutes after the explosion at the Fukushima Dai-Ichi Nuclear Facility, Unit #3), documented the state of the country's highways, and assessed damage at the main ports and refineries.

DigitalGlobe's online web and analytic services, FirstLook and FirstWatch, enabled browsers to see damage on a street-by-street basis, enabling in-country organizations to deliver aid and medical care and attempt to rescue those trapped in collapsed buildings. We have now collected nearly 500,000 square kilometers in imagery of the disaster region — more than Japan's total land mass of 377,923 square kilometers. The whole idea of revisit and refresh takes on new importance in this situation. Using our ImageLibrary — the largest in the world — our team was able to match fresh images with historical archives to confirm rapidly the degree of damage to the area.

Our imagery and analysis are helping the Japanese and U.S. governments, FEMA, the United Nations, Open Street Maps and concerned groups and citizens around the world to understand the scope of the disaster, manage the ever-changing situation on the ground, and set the path for recovery. Though this disaster is oceans away from many of us, it will have major political and economic repercussions across the globe for years to come. We hope that with our efforts and technology, we'll continue to bring insights into this situation a little closer to home.

Note: The author's views expressed in this posting are his own and do not necessarily reflect the view of DigitalGlobe.

Michael Bristol, Sr. V.P. + G.M., Government Solutions Group, TeleCommunication Systems

Michael Bristol oversees all aspects of the government business divisions of TCS, which offers the TotalCom™ family of products and services, including Deployable Communications, Managed Network Services, Integrated Logistics Global Support, Space & Component Technology, and Professional Services. Mr. Bristol has several decades of business experience at various management levels, including serving as a Senior Director with Oracle Corporation. While there, he was responsible for managing Oracle's Navy/Marine Corps. professional services practice, delivering enterprise software applications.

Mr. Bristol served nine years as the Vice President and Chief Operating Officer at Infocus Communications. Prior to that he was employed by Atlantic Research Corporation where he held several P&L positions. He has held board positions with Infocus Communications and The Clovis Group. Mr. Bristol graduated from the U.S. Military Academy at West Point, where he earned a bachelor of science degree in engineering. He served as a Captain, U.S. Army Military Intelligence officer, and spent most of his career in the Army assigned to Ft. Bragg. Mr. Bristol serves as a public sector board member of TechAmerica, and is a member of the Association of the United States Army as well as a number of other DoD and communication-related professional societies.

MilsatMagazine (MSM)
Good day, Mr. Bristol. Given your impressive career, which includes management experience at such leading companies as Oracle and Infocus Communications, as well as serving on the board of The Clovis Group, what prompted you to move to TeleCommunication Systems to lead their Government Solutions Group?

Michael Bristol
Prior to TCS, I had the good fortune of working in a very small, privately held company, Infocus Communications, and in a large, publicly held corporation, Oracle. Both had their advantages and disadvantages. Like in the story of Goldilocks and the Three Bears, TCS was just right. TCS has all of the capabilities, infrastructure, qualifications and financial assets to make investments that enable us to compete with the major government contractors. Yet, TCS has the critical attributes of flexibility, innovation and focus that small, hungry, entrepreneurial start-ups possess. Plus, its focus on the high tech/government space made it an ideal platform to advance my career.

I also recognized that TCS has some innovative technologies and exceptional people behind it, and that's an unbeatable combination. I saw the potential for TCS to really expand their reach into the government sector, and I knew that given my background, I could make a positive and lasting contribution. Additionally, as my wife and eight children are all pretty comfortable in the D.C. area, the fact that TCS is based here was also a draw.

MSM
As a West Point graduate and having served as a U.S. Army intelligence officer, how did you make the transition from the military to the commercial world? Has your military experience assisted you in interfacing with the various acquisition agencies and military commands? How so?

Michael Bristol
West Point gave me a broad engineering background and taught me the fundamentals of leadership. Both of these attributes are useful in either the military or commercial worlds. Of course, having a military background gives me a solid perspective of my customers, and I leverage lifelong connections that I developed while at West Point. Having the credentials of being a military officer has helped me to build instant credibility, because I believe my customers can relate to me more easily, as I am someone who has "walked in their shoes," so to speak. It's more difficult for someone who doesn't have a military background to come in and establish these relationships.

MSM
How did you become involved with the TCS TotalCom™ (total communication) portfolio? Is this simply a merging of TCS product into military-specific bundles, or is it something more tailored to command needs? Please explain.

Michael Bristol
In the past, you had to piece together offerings from satellite companies, ground infrastructure companies, field equipment companies, etc., as well as find someone to provide support in order to create a practical, cost-effective, total communications solution. We saw the opportunity to take our existing SwiftLink products and superior support capabilities, as well as make strategic acquisitions and develop new products — such as our Tactical Transportable TROPO, Impact Tactical and SwiftCell — to create the TCS TotalCom portfolio. TCS is now one of a very small group of companies who can deliver this core to the edge capability.

As new technologies develop, we will adjust the products in the lineup in order to provide the latest in commercial off-the-shelf (COTS) and custom communications technology. Thus, the more accurate description of TCS TotalCom is that it's the blending of current and anticipated best of breed, commercial, off-the-shelf technologies, along with a global network of strong support in order to provide a complete range of secure, cost-effective communications solutions that can be tailored to each end-user's unique needs.

MSM
Exactly what is the TCS TotalCom portfolio, and what are the unique, or perhaps unprecedented features it offers military and government clients?

Michael Bristol
TCS TotalCom is designed to be a portfolio of best-of-breed COTS solutions, created by both TCS and our hand-selected partners and complemented by our cradle-to-grave program support services — all at a competitive value. The elements in the TCS TotalCom portfolio are:

TCS secure line-of-sight and beyond-line-of-sight RF communications, next-generation Tactical Transportable TROPO, Wireless Point-to-Point (PTP) and Point-to-Multipoint (PMP) systems; all of which enable the extension of secure LAN to remote locations.

The TCS Impact Tactical IP Terminal, which is the smallest ruggedized communications kit to date in the TCS family of products. Its features include a modular design that allows efficient adaptation as user requirements change for vehicles, rack-mount, tents, etc. with plug-and-play ease.

SwiftCell Lite, which is a completely self-contained cellular network housed in a small, discrete ruggedized case. In a matter of minutes after powering up SwiftCell Lite, users can communicate privately on their own cellular network, regardless of the terrain or environment, enabling users to call each other, send SMS text messages and share other vital information just as if they were on a commercially provided cellular network.

Global meshed satellite connectivity, which employs both traditional bent pipe technology and seamless IP satellite networking through TCS' exclusive first commercially available network to take advantage of Cisco's Internet Routing in Space [IRIS] technology on Intelsat-14, using TCS' global network of teleports and dedicated networks.

Home station in-building distributed antenna systems that capture cellular and radio signals from outside the building and retransmit them inside the building.

Professional services, including deployable systems field support and other integrated logistics support, cyber security training and assessment, and continuity of operations capability (COOP) by TCS-certified and cleared personnel, who have served as trusted advisors to key government agencies since the company's inception nearly 25 years ago.

MSM
Who would be most interested in the TCS TotalCom portfolio? How can they benefit from

TCS' TotalCom field support — one system, one problem, one engineer, one solution

The TCS Impact Terminal Modular Communication System

such technological inclusions? Situational awareness for "boots on the ground" is critical to success — how can these products aid the warfighters and command and control structures in saving lives and enhance mission success?

Michael Bristol
Obviously, the military would be a prime customer for TCS TotalCom, given its complete, "core to the edge" capability. We are unique in that, via TCS TotalCom, we can blend satellite, terrestrial and wireless communications and lifecycle support to provide the best, most secure and reliable communication solution to support the "boots on the ground."

That said, the Department of State and Department of Homeland Security, among others, have very similar needs and requirements that are equally suited for TCS TotalCom. We also see commercial applications, such as with global Fortune 1000 companies, mining companies and others who operate in remote or disparate areas of the world.

All of these entities have the same need — best of breed technology that is commercially available and currently on the shelf, along with complete lifecycle support — all at a reasonable price.

MSM
Many field deployments of communication products are complex... could the same be said of the TCS TotalCom portfolio? And, what networks are supported?

Michael Bristol
The solutions in TCS TotalCom are designed to be easily and rapidly deployed. They are created to be 'plug and play,' in order to connect with a managed service environment and can be seamlessly upgraded as new technology develops or is mandated. As TCS TotalCom is IP-centric and includes interoperability platforms, most existing and planned network architectures can be accommodated.

MSM
The connectivity with Cisco's Internet Routing in Space, otherwise known as IRIS, is a feature definitely worth exploring for TCS TotalCom. How does TCS TotalCom avail itself of Cisco's satellite technology?

Michael Bristol
As I briefly mentioned earlier, TCS OS-IRIS is the world's first commercial service offering of a Cisco-enabled Internet Routing in Space (IRIS) managed network service. The combination of Cisco IRIS satellite and terminal architecture, in addition to our global network implementation and support capabilities, bring a new era of true IP end-to-end communications to the satellite industry and our clients.

TCS OS-IRIS offers single hop architecture of reduced latency and improved application performance. You can communicate across four continents simultaneously through a single connection, using 1.2 to 2M terminals, while achieving up to 5 megasymbols direct connect from a 1.2M Ku-band dish to a 2M C-band dish on different continents and different transponders. This level of power and flexibility was previously unattainable in the industry.

MSM
As with any product, whether it's for the military or commercial market, after-sale support is a very important consideration. How does TCS manage this support, especially given the field conditions under which operation is mandatory?

Michael Bristol
One of TCS' strengths is its program lifecycle support from our integrated global services team, who operate on every continent and every major theater for the DoD, including from TCS' own forward logistics depots, situated in current theaters of operation. Our globally deployed field service engineers all tie back into our world-class network operations and data centers — the same centers which runs half of the USA's wireless E9-1-1 calls. TCS also has a culture of not resting until the customer is satisfied. This service is just as "ruggedized" as our equipment; our technicians are experienced professionals; many of whom have experience working in the harshest of conditions.

MSM
What are your thoughts regarding the satellite interference challenges facing MILSATCOM? What can be done — both in the short and long term — to alleviate this situation?

Michael Bristol
Satellite interference is derived from multiple sources, ranging from solar activity, to the misuse

of spectrum by well-meaning users, to deliberate jamming by rogue elements and frequency noise at the ground level. The satellite industry has become much better at predicting the solar side and identifying the source of deliberate, or inadvertent, directed interference. The big problem remains on how to mitigate it quickly enough not to affect operations, especially military operations. X-band achieves some of that, but spectrum is limited and approvals are cumbersome, while protected satcom has traditionally been prohibitively expensive and rare in availability.

New technologies, such as next-generation protected satcom, dynamic spectrum access to counteract spectrum blockages and greater payload hardening will all serve to help defend against interference, but, at the end of the day, multiple-path communications strategies will always remain the most resilient — as enabled by the TCS TotalCom architecture.

MSM
Do you believe hosted payloads for military satellites aboard commercial launch vehicles is an answer to the capacity problems, especially in regard to cost and expediency considerations?

Michael Bristol
Hosted payloads for the military will continue to provide a cost-effective manner to deploy new technologies and accelerate uptake of new programs, such as improved UHF radio interoperability, capability and reach. However, these upticks will not provide the necessary bandwidth to adequately address global capacity shortfalls and issues of affordability. MILSATCOM needs a mixed approach of government-owned, hardened infrastructure for top-level needs, which will always have to be complemented by a greater pool of COTS capacity from the commercial sector — in either hardened or unhardened form.

The advantage of this strategy will actually be faster migration by the satellite to higher-powered, greater-throughput Ka- platforms — and greater innovation in the sector to improve all-around performance. As with most IT spaces, the government is best served working with industry — not against it.

MSM
Looking back over your career, both when with TCS or other firms, what projects have you been involved in that bring the most sense of satisfaction to you?

Michael Bristol
I would say the projects associated with our Army contract, Worldwide Satellite Systems (WWSS), namely the SNAP program. What we've done here is build deployable communication solutions that are being used to provide critical communications to our warfighting customers. I've received numerous testimonials from actual soldiers on the ground who have said that our equipment has literally meant the difference between life and death. It's not often you get to hear how projects you have worked on have made such a direct impact on soldiers' lives, and it's tremendously gratifying to hear positive feedback like that. It's a double bonus — building a business for TCS' shareholders, while, at the same time, supporting our military.

For further information, please visit
the TCS website

About TCS TotalCom...

TCS TotalCom Field Support consists of cleared personnel with military and government experience supporting deployed operations at client and TCS facilities in CONUS and OCONUS; including Southwest Asia, Europe, Asia and the Horn of Africa. They have the skills, certifications, and expertise to support TCS, partner, and client products and services as part of TCS' commitment to global Total Communication Solutions. TCS' TotalCom Field Support philosophy derives from an answer to a battlefield commander's request, "Why do I need two engineers to repair one problem on our system?" As technologies mature and converge, such as transport and IP, engineers must have the expertise to address both layers of the networking architecture. The TCS answer is simple — one system, one problem, one engineer, one solution! Features and benefits of TCS TotalCom Field Support include:

- ◇ *Complete, end-to-end services and support*
- ◇ *Full implementation, inventory and program management options*
- ◇ *Cleared personnel with in-field military and government backgrounds*
- ◇ *Manage entire network and multiple IP-based systems across battlefield*
- ◇ *Proven, hands-on experience in harsh, hostile and remote environments globally*
- ◇ *Familiar with military and government standards, protocols, and procedures*
- ◇ *Minimizes service disruptions and inventory management costs*
- ◇ *Improves operational efficiency*
- ◇ *Multi-discipline engineers — lowers headcount*
- ◇ *24x7 help desk and network operations center support*

Teamwork = WGS-4 Launch Success

Cape Canaveral Air Force Station was the scene of an important launch on January 19th, 2012. Having previously proven itself three times for this series of satellites, **United Launch Alliance** (**ULA**) managed the **Boeing** built, ***Worldwide Global SATCOM*** satellite number four. With a dramatic push away from Earth, the satellite successfully slipped into its orbital slot aboard a ***Delta IV*** vehicle, empowered by **Alliance Techsystems** and **Pratt & Whitney** engines. This was actually the second launch by ULA using the Delta IV, with two previous missions completed with the ***Atlas V*** launch vehicle. Noteworthy is that ULA can now launch satellites with more alacrity, as the Company can use both the Atlas V and the Delta IV for such tasks.

On January 19th, 2011, the first signals from WGS-4 were received, indicating the satellite's health is as anticipated, and orbital maneuvers and ops testing were started. Ground stations in Dongara, Australia, as well as Boeing's Mission Control Center in El Segundo, California, all received initial contact and confirmed that the satellite is functioning as expected.

The Boeing Build

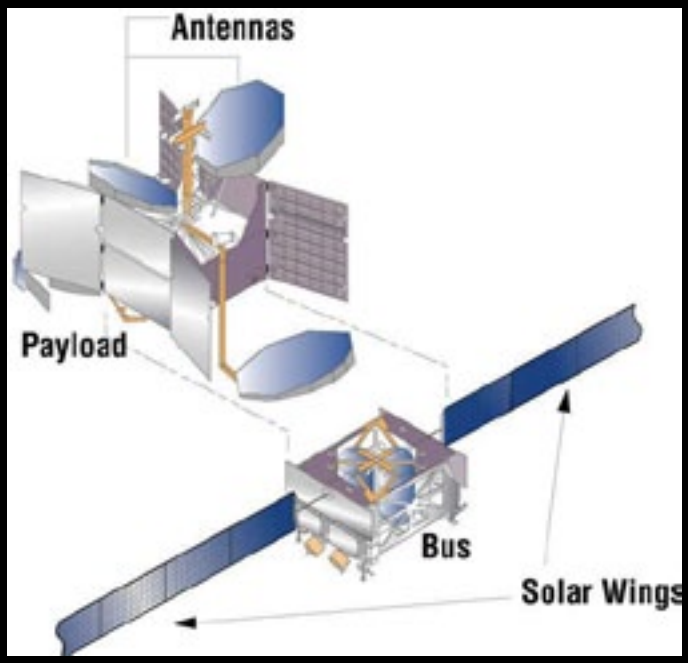
For **Boeing**, the ***Wideband Global SATCOM Four*** (***WGS-4***) is worthy of special note. The satellite will, of course, support anywhere MILSATCOM is critically needed for our nation's warfighters. However, WGS-4 is also the only military satellite capable of simultaneous X- and Ka-band communications. Network support for tactical C4ISR is therefore, enabled.

The stated purpose of the WGS satellites is to provide broadband communications connectivity for U.S. and allied warfighters all around the globe. To ensure such is enabled, Boeing invested in phased antenna arrays as well as digital signal processing. The end result is the implementation of the 4Cs for even the most demanding ops... capacity, control, connectivity and capacity.

Additionally, WGS pumps up data processing to more than 3.6 gigabits per second — 10x that of previous MILSATCOM satellites. CommLinks are supported through 500MHz of X-band and 1GHz of Ka-band spectrum that can take advantage of more than 4.8GHz of usable comms bandwidth through the reuse of frequency and digital channelization. The latter divides uplink bandwidth into some 1,900 independently routable sub-channels, resulting in extremely efficient bandwidth use by the satellite.

There are four *WGS Operations Centers* (**WSOCs**), all using Boeing provided control elements via software and databases from **Boeing**, **ITT** and **Raytheon**. Actual platform control is handled by the *3rd Space Operations Squadron* (**3 SOPS**) located at **Schriever Air Force Base** using mission software that was designed by Boeing in tandem with the U.S.A.F.'s CCS-C, which is fielded by **Kratos Defense and Security Systems**' subsidiary, **Integral Systems**.

Boeing has also just received authorization from the U.S. Air Force to produce and launch the eighth and ninth WGS satellites. The ***WGS-9*** authorization and the ***WGS-8*** production option, which was authorized last month, have a combined value of $673 million and are part of the $1.09 billion contract modification announced by the Air Force in September 2011. WGS-8 and -9 will join four other satellites that are part of the **Block II** series, which adds a switchable radio frequency bypass that enables the transmission of airborne intelligence, surveillance and reconnaissance imagery at data rates approximately three times greater than the rates available on Block I satellites.



New Partnerships

Just signed is a new WGS international partnership between the United States, Canada, Denmark, Luxembourg, the Netherlands and New Zealand. This partnership, based upon the U.S. and Australian ***WGS-6*** Memorandum of Understanding that was signed in November of 2007, will allow the Partners immediate access to existing WGS satellites. Additionally, the funding by the Partners will enable expansion of the ninth satellite, WGS-9. Resource allocations will be based upon ongoing satellite development and the operational status of the WGS System, for WGS 1 to 9. Specific requirements needed by each Partner will be addressed over time. The costs for each nation, with a total ceiling contribution of up to US$10.530 billion, are:

- Canada — $396.5M
- Denmark — $62M
- Luxembourg — $49.6M
- The Netherlands — $49.6M
- New Zealand — $62M
- USA — $9,910.6M

The Partnership's first steering committee meeting was held in Washington, DC, on January 17th of this year.

Boeing's 702HP Platform

The WGS satellites are built upon Boeing's ***702HP*** satellite platform with its *xenon-ion propulsion system* (XIPS), solar cells comprised of triple-junction gallium arsenide, and even deployable radiators with flexible heat pipes that allow for a far cooler and more stable environment for the bus and the payload. And why is such important? Because

Boeing's 702HP satellite platform

performance variations that could occur over the life of the satellite are reduced and component reliability is increased.

Boeing announced the 702 Series in October of 1995. In 2009, the Company introduced a mid-ranged version, the ***702MP*** for "mid-power." At that time, the legacy Boeing 702, which has continuously evolved, was designated the Boeing 702HP, the HP an acronym for "high-power," which evolved from the proven 601 and 601HP (high-power) spacecraft.

The first Boeing 702HP satellite was launched in 1999. The satellite can carry more than 100 high-power transponders and deliver any communications frequencies that customers request. The Boeing 702 design is directly responsive to what customers said they wanted in a communications satellite, starting with lower cost and including high reliability with a broad spectrum of modularity. A prime example of such modularity is the payload/bus integration. After the payload is tailored to customer specifications, the payload module mounts to the common bus module at only four locations and with only six electrical connectors. This design simplicity confers major advantages. First, nonrecurring program costs are reduced, as the bus does not need to be changed for every payload, and payloads can be freely tailored without affecting the bus. Second, the design permits significantly faster parallel bus and payload processing. This leads to the third advantage: a short production schedule.

Additional efficiencies are derived from the 702's XIPS, which is 10 times more effective than conventional liquid fuel systems. Four 25cm thrusters provide economical stationkeeping, requiring only 5kg of fuel per year, a fraction of what bipropellant or arcjet systems consume. Using XIPS for final orbit insertion conserves even more mass as when compared to using an on-board liquid apogee engine. Customers can apply the weight savings to substantially increase the revenue-generating payload at a small marginal cost, to prolong service life, or to change to a less expensive launch vehicle (when cost is based on satellite mass). The Boeing 702HP also incorporates a bipropellant propulsion system, which can lift the satellite into final orbit after separation from the launch vehicle.

Dual and triple-junction gallium arsenide solar cells, developed by **Spectrolab** (a Boeing subsidiary) support power ranges of up to 18kW. The Boeing 702HP separates the bus and payload thermal environments and substantially enlarged the heat radiators to achieve a cooler, more stable thermal environment for both bus and payload. This increases unit reliability over service life. Deployable radiators use flexible heat pipes, which increase packageable radiator area. Further thermal control occurs through passive primary rejection via heat pipes.

The Boeing 702HP geomobile satellite system features a 12.25m deployable antenna as well as onboard digital signal processing and beam-forming. This satellite system integrates a Boeing geosynchronous-orbit satellite with a ground segment and a user terminal segment. The baseline Boeing 702 is compatible with several launch vehicles: Delta IV, Atlas V, Ariane 5, Proton, and Sea Launch.

The ULA Launch

The WGS-4 mission was initiated from Space Launch Complex 37 (SLC-37) at Cape Canaveral Air Force Station (CCAFS), Florida on a Delta IV Medium+ (5,4) vehicle. The two-burn mission

A technician holds a germanium wafer at Spectrolab. Ultra-triple-junction gallium arsenide solar cells are grown onto the wafers using specialized machine]

flew an easterly trajectory from SLC-37 with an approximately 101 degree flight azimuth. The separation event released the WGS-4 satellite into a super synchronous transfer orbit with a 237 nautical mile (nmi) perigee, an apogee radius of approximately 36,108 nmi, and an approximately 24 degree inclination.

Developed in partnership with the U.S. Air Force (U.S.A.F.) *Evolved Expendable Launch Vehicle* (**EELV**) program, the Delta IV family of launch vehicles meets all customer requirements for the launch of high-priority U.S.A.F., **National Reconnaissance Office** (**NRO**), **NASA**, and commercial payloads to orbit. With operational launch pads on both coasts — *Space Launch Complex-37* at **Cape Canaveral Air Force Station**, Florida, and *Space Launch Complex-6* at **Vandenberg Air Force Base**, California — every Delta IV configuration is available to service the requirements of current and future satellite programs.

The Delta IV Workhorse

The Delta IV launch system is available in five configurations: the ***Delta IV Medium*** (***Delta IV M***), three variants of the ***Delta IV Medium-Plus*** (***Delta IV M+***), and the ***Delta IV Heavy*** (***Delta IV H***). Each configuration is comprised of a *common booster core* (**CBC**), a cryogenic upper stage and either a 4m-diameter or 5m-diameter *payload fairing* (**PLF**).

There are three variants of Delta IV M+ configuration. The Delta IV M+(4,2) uses two *strap-on solid rocket motors* (**SRMs**) to augment the first-stage CBC and a 4-m diameter PLF. The Delta IV M+(5,2) and Delta IV M+(5,4) have two and four SRMs, respectively, and 5m-diameter PLF. The latter was used for WGS-4.

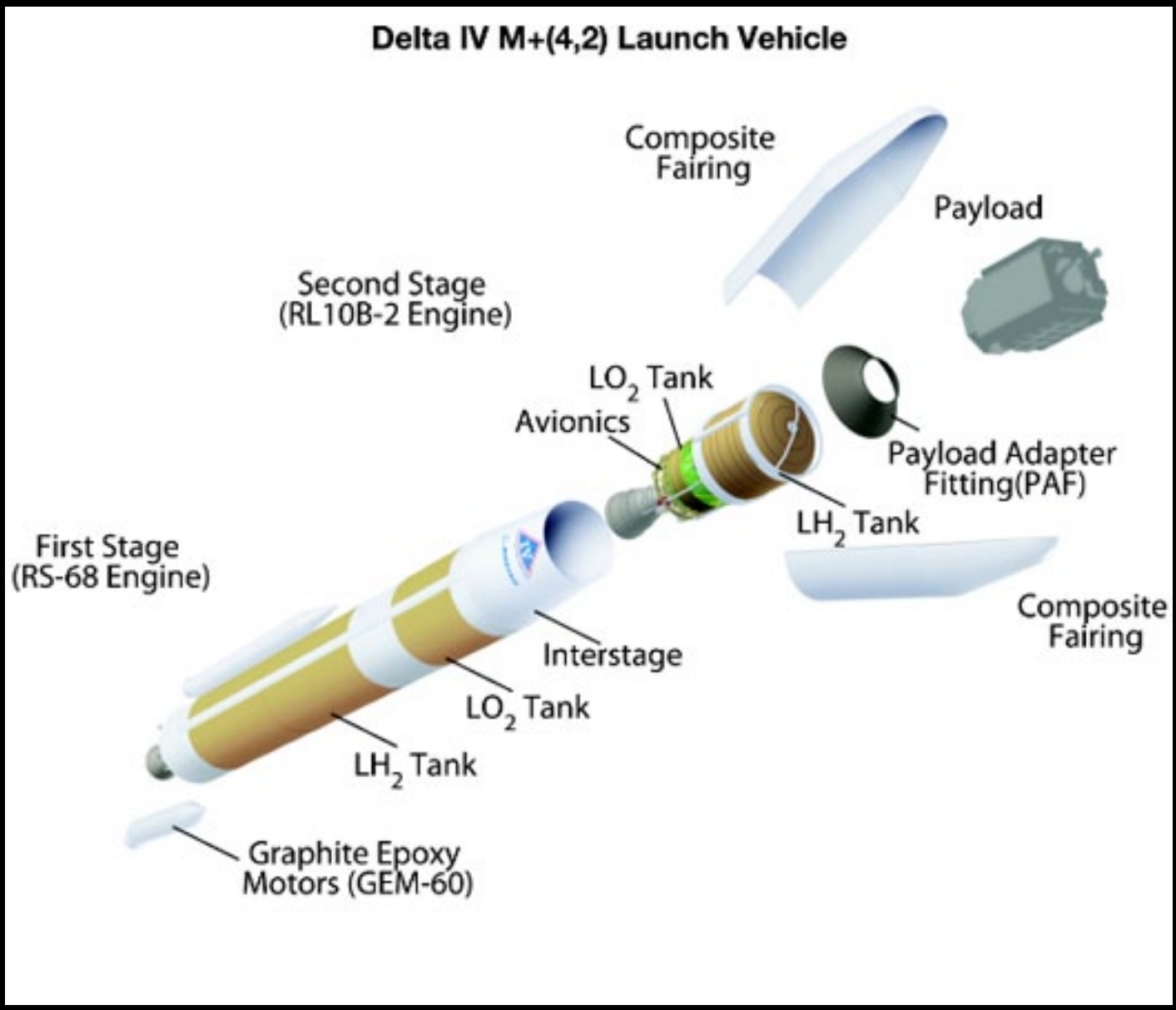
The main engine for the Delta IV is the **RS-68**. Designed and manufactured by **Pratt & Whitney Rocketdyne**, the throttleable RS-68 engine is the largest existing hydrogen-burning engine. Conceived using a simplified design approach, the resulting engine requires 80 percent fewer parts than the Space Shuttle main engine, is lower risk, has reduced development and production costs and has inherently reliable operation.

- ◇ *Nominal Thrust (sea level): 663,000 lb*
- ◇ *Specific Impulse (sea level): 359 seconds*
- ◇ *Length: 204 in*
- ◇ *Weight: 14,876 lb*
- ◇ *Fuel/Oxidizer: Liquid Hydrogen/Liquid Oxygen*

For missions requiring additional thrust at liftoff, the Delta IV M+ configurations use either two or four **Alliant Techsystems**-manufactured *solid rocket motors* (**SRM**). Separation is accomplished by initiating ordnance thrusters that provide a radial thrust to jettison the expended SRMs away from the first stage.

Boeing 702HP

- Anik F1
- Anik F2
- DIRECTV 10, 11, 12
- Galaxy IIIC
- Galaxy XI
- Inmarsat-5 F1, F2, F3
- MEXSAT-1, MEXSAT-2
- PAS-1R
- NSS-8
- SkyTerra 1, 2
- SPACEWAY 1, 2
- SPACEWAY 3
- Thuraya-1 (geomobile)
- Thuraya-2,3 (geomobile
- XM-1, 2
- XM-3, 4



Delta IV M+(5.2 or 5,4) Launch Vehicle

- *Peak Vacuum Thrust: 280,000 lbf*
- *Total Vacuum Impulse: 17,957,000 lb-seconds*
- *Length: 637 in*
- *Maximum Diameter: 60 in*
- *Weight: 74,500 lb*
- *Burn Time: 90 seconds*

Both the Atlas and the Delta IV second stages rely on the ***RL10*** propulsion system to power their second stages. Logging an impressive record of more than 385 successful flights and nearly 700 firings in space, RL10 engines, manufactured by Pratt & Whitney Rocketdyne, harness the power of high-energy liquid hydrogen and boast a precision control system and restart capability to accurately place critical payloads into orbit. The Delta IV employs the RL10B-2 with the world's largest carbon-carbon extendible nozzle.

- ◇ *Nominal Thrust: 24,750 lb*
- ◇ *Specific Impulse: 465.5 seconds*
- ◇ *Fuel/Oxidizer: Liquid Hydrogen/Liquid Oxygen*
- ◇ *Length: 86.5 in (stowed); 163.5 in (deployed)*
- ◇ *Diameter (nozzle extension): 84.5 in*
- ◇ *Weight: 664 lb*

Fairings protect the payload once the payload is encapsulated through the boost phase of flight. The 5m-diameter composite fairing is of bisector design and comes in two standard lengths. The 14.3 m (47 ft) fairing is used on the Delta IV M+(5,2) and M+(5,4). The 19.1 m (62.7 ft) fairing is used on the Delta IV Heavy.

The 5m metallic trisector fairing (the baseline for heritage government programs) is a modified version of the flight-proven ***Titan IV*** aluminum isogrid fairing designed and manufactured by Boeing. All PLFs are configured for off-pad payload encapsulation to enhance payload safety and security and to minimize on-pad time.

The advanced technology and capabilities of the 6.5 ton WGS-4 satellite, with solar-power wings spanning 134 feet, will prove to be an immensely crucial asset for MILSATCOM needs, with access at speeds up to 2.8 gigabits per second. For UAV/UAS ISR missions, the increased communications capacity — thanks to the bypass feature that enables two uplink and two downlinks for 3x normal channel bandwidth — brings a much wider pipeline into strategic play.

Mr. *Jim Sponnick*, the vice president of mission operations for United Launch Alliance, said, "WGS was the first constellation of satellites to launch on both Delta 4 and Atlas 5 vehicles since the formation of ULA. We're honored to have worked closely with our Air Force partners in integrating and launching these important WGS satellites. Our ability to integrate and launch satellites successfully and efficiently on two launch systems to provide operational flexibility was a primary reason that ULA was formed."

Mr. *Mark Spiwak*, the WGS program director for WGS at Boeing, stated, "WGS is the DOD's highest capacity communications satellite system. These satellites provide tremendous operational flexibility to deliver the needed capacity, coverage and connectivity in support of demanding operational scenarios. Everyday WGS helps save and improve the lives of users worldwide. This launch (is) another important step in advancing these capabilities."

Mr. *Dave Madden*, the director of the Military Satellite Communications System Directorate at the U.S.A.F.'s Space and Missile Center, noted, "WGS provides critical operation and situational awareness information to the warfighter. I want to thank Boeing and the work they have done to give us a first-class quality satellite that's going to be a critical add to our constellation."

Go Boeing! Go United Launch Alliance. Go WGS!

Editors' Note:
We wish to thank Boeing and United Launch Alliance for their presentations regarding the WGS and WGS-4 satellites and the Delta IV launch vehicle, from which the contents of this article were assembled by the editors. All imagery is courtesy of Boeing and/or United Launch Alliance.

Welcome To Colorado Springs...

Elliot Holokauahi Pulham, the chief executive officer of Space Foundation, will welcome one and all to the 28th National Space Symposium (NSS), which is in session from April 16th through the 19th, 2012, at The Broadmoor Hotel in Colorado Springs, Colorado. For those engaged within the global space community, here is a terrific opportunity to engage in some of the best networking opportunities ever to be obtained. If gleaning information is important to you, consider the more than 100 subject-matter experts who will be employing their speaking talents to inform and advise attendees. There are also several superlative events, ranging from the highly popular Space Technology Hall of Fame® dinner, an opening ceremony featuring the Colorado Springs Philharmonic Orchestra, forums conducted by some of the greatest scientific minds of our lifetime, a new Pavillion within the Ball Aerospace Exhibit Center, as well as Cyber 1.2.

The venue for NSS — the beautiful Broadmoor Hotel.

What is Cyber 1.2? This event occurs on Monday, April 16th, and emphasizes hot button issues that are important to those in the space industry. Additionally, the development of human capital, interntional dimensions and cyberspace's evolving challenges are the focus and presented by senior leadership from within the industry. This is a full day conference that occurs directly preceding the official opening of NSS and includes a networking breakfast, a luncheon sponsored by General Dynamics, plus a networking reception co-sponsored by Raytheon.

One can learn a great deal from trade exhibitions, symposiums, and industry events. From networking with one's peers, to garnering new information to assist you with your business and missions, the National Space Symposium is among the most highly regarded of such events in our industry.

Open registration starts on Sunday, April 15th, from 4:00 until 7:00 p.m. This occurs at the International Center in the foyer. Registration then continues on Monday, April 16th, starting at 6:00 a.m.

A list of the speakers who have committed to presenting at NSS reads like a "Who's Who" of the industry… alphabetically, they include...

- ***Lt. Gen. Michael J. Basla, USAF, Vice Commander, Air Force Space Command***
- ***Mr. Kevin M. Bilger, Vice President & Gen. Mgr. of Global Communications Systems, Lockheed Martin Space Systems Company***
- ***Mr. Steve Bochinger, Director of Institutional Affairs, Euroconsult and Managing Director, Euroconsult North America***
- ***Mr. Charles F. Bolden, Jr., Administrator, National Aeronautics and Space Administration (NASA)***
- ***Mr. Bruce Carlson, Director, National Reconnaissance Office***
- ***Mr. John Celli, President, Space Systems/Loral***
- ***Dr. Leroy Chiao. Special Advisor — Human Spaceflight, Space Foundation***
- ***Ms. Nancy S.A. Colleton, President, IGES, Executive Director, Alliance for Earth Observations***
- ***Ms. Ariane Cornell, Executive Director, Space Generation Advisory Council***
- ***The Honorable Madelyne R. Creedon, Assistant Secretary of Defense for Global Strategic Affairs, U.S. Department of Defense***
- ***Lt. Gen. Charles E. Croom, Jr., USAF, Ret., Vice President, Cyber Security Solutions, Lockheed Martin Information Systems and Global Services***
- ***Mr. Matthew Desch, Chief Executive Officer, Iridium Communications, Inc.***
- ***Dr. Catherine Doldirina, Co-Chair, Space Generation Advisory Council***
- ***Mr. Jean-Jacques Dordain, Director General, European Space Agency***
- ***Dr. Chummer Farina, Vice-President, Canadian Space Agency***
- ***Mr. Warren Ferster, Editor Space News***
- ***Mr. Jean-Lin Fournereaux, Deputy to the Chief Operating Officer and Corporate Senior Vice-President Space, Safran Group***
- ***Mr. Michael Gass, President and Chief Executive Officer, United Launch Alliance***
- ***Mr. Samer Halawi, Chief Executive Officer, Thuraya***
- ***Mr. Steve K. Hawkins, Vice President, Information Security Solutions, Raytheon Intelligence and Information Systems***
- ***Mr. John Higginbotham, Executive Chairman, Blue Ridge Networks***
- ***Mr. Kiyoshi Higuchi, Vice President, Japan Aerospace Exploration Agency (JAXA)***
- ***Maj. Gen. John E. Hyten, USAF, Director, Space Programs, Office of the Assistant Secretary of the Air Force for Acquisition***
- ***Mr. John Jolly, Vice President & General Manager, Cyber Systems Division,***
- ***General Dynamics Advanced Information Systems***
- ***Gen. C. Robert Kehler, USAF, Commander, United States Strategic Command (USSTRATCOM)***
- ***Mr. Phillip Larson, Communications and Policy Analyst, White House Office of Science and Technology Policy***

- ***Mr. Lon Levin, President, SkySevenVentures***
- ***Ms. Letitia A. Long, Director National Geospatial-Intelligence Agency***
- ***General Lance Lord, USAF, Ret., Chief Executive Officer, L2 Aerospace***
- ***Dr. Amy Mainzer, WISE Deputy Project Scientist, Jet Propulsion Laboratory***
- ***Mr. Jim Maser, President, Pratt & Whitney Rocketdyne (PWR)***
- ***Mr. Francis X. McKenna, President, International Launch Services***
- ***Dr. Francisco Javier Mendieta-Jimenez, General Director, Mexican Space Agency (AEM)***
- ***Mr. Clayton Mowry, President, Arianespace, Inc.***
- ***Dr. George C. Nield, Director, Office of Commercial Space Flight, Federal Aviation Administration***
- ***Dr. Ger Nieuwpoort, Director, Netherlands Space Office***
- ***Mr. Bill Nye, Bill Nye The Science Guy, Nye Labs, LLC***
- ***Mr. Robert (Tip) Osterthaler, President and Chief Executive Officer, SES Government Solutions (SES-GS)***
- ***Mr. P.J. O'Rourke, Political Satirist, Journalist, Author and H.L. Mencken Fellow at the Cato Institute***
- ***Mr. William V. Parker, Special Advisor for International Affairs, Space Foundation***
- ***Lt. Gen. Ellen M. Pawlikowski, USAF, Commander, Space and Missile Systems Center***
- ***Dr. Carolyn Porco, Sr. Research Scientist Space Science Institute***
- ***Dr. Dumitru Dorin Prunariu, Chairman, UNCOPUOS***
- ***Mr. Elliot H. Pulham, Chief Executive Officer, Space Foundation***
- ***Dr. Lisa Randall, Frank B. Baird, Jr., Professor of Science, Harvard University***
- ***Gen. Victor E. (Gene) Renuart, USAF, Ret., Former Commander, USNORTHCOM and NORAD***
- ***Mr. Frank A. Rose, Deputy Assistant Secretary for Space and Defense Policy, U.S. Department of State***
- ***Gen. Norton A. Schwartz, USAF, Chief of Staff, United States Air Force***
- ***Ms. Kay Sears, President, Intelsat General***
- ***Dr. Ronald M. Sega, Vice President for Energy and the Environment and Woodward Professor of Systems Engineering, Colorado State University***
- ***Mr. Scott J. Seymour, President and Chief Executive Officer, GenCorp / Aerojet***
- ***Gen. William L. Shelton, USAF, Commander, Air Force Space Command***
- ***Ms. Gwynne Shotwell, President, SpaceX***
- ***Mr. Mark N. Sirangelo, Corporate Vice President, Sierra Nevada Corporation Space Systems***
- ***Dr. Steven W. Squyres, Goldwin Smith Professor of Astronomy, Cornell University***
- ***Mr. Mark Stevenson, Best-Selling Author and Futurist, "An Optimist's Tour of the Future"***
- ***Mr. Andrew Sukawaty, Chairman, Inmarsat***
- ***Mr. Don L. Thoma, Chairman, Hosted Payload Alliance***
- ***Dr. Neil deGrasse Tyson, Director of the Hayden Planetarium, Best Selling Author and Host of COSMOS***
- ***Maj. Gen. Suzanne Vautrinot, USAF, Commander, 24th Air Force***
- ***Ms. Kathy J. Warden, Vice President & General Manager, Northrop Grumman***
- ***Dr. Johann-Dietrich Wörner, Chairman of the Executive Board, German Aerospace Center (DLR)***

Given this cast of subject-matter experts, attendance at NSS almost seems mandatory! Add to this all of the exhibitors that will be ensuring your visit to the main hall is more than worth your while and you will find your time well spent in Colorado Springs.

To learn more, as well as to register, please visit the National Space Symposium website at:

http://www.nationalspacesymposium.org/register

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Fixed Communications For Defence + Government

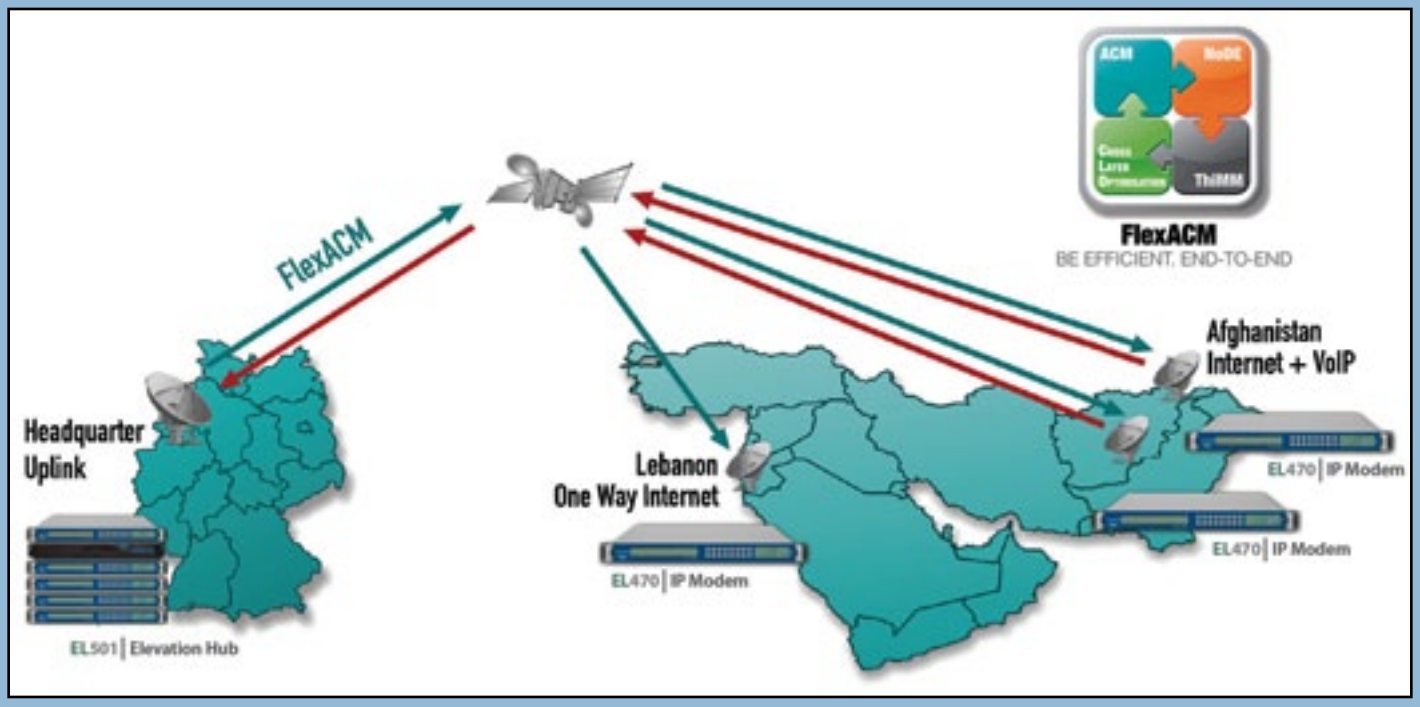
Fixed Satellite Communications are used for multiple applications within government and defence operations. The fixed communication infrastructure is the permanent, or semi-permanent, backbone link between headquarters and remote operation sites. In many cases, these sites are located in hotspots, or remote areas, around the world that have no access to terrestrial communication infrastructure.

The amount of data, voice and video exchanged between the headquarters and remote sites has grown substantially along with an ever-increasing number of applications. Government and defence customers continuously seek solutions to increase satellite link efficiency, to find available satellite bandwidth, and to drive down satellite bandwidth costs. While in operation, the satellite link needs to be available at all times to assure mission critical communications.

Government + Defence Applications
Fixed Satellite Communications infrastructures are deployed for a wide range of applications within government operations. The fixed communications establish a backbone link between headquarters and remote sites, and combine a number of services that are key to the success of the operation and the welfare of the deployed personnel. Applications for fixed communications include...

- ***Emergency response support***
- ***Morale, welfare and recreation***
- ***Peacekeeping missions***
- ***Government offices and embassies***
- ***Medical (hospitals/field hospitals/ medical imagery)***
- ***Disaster relief***
- ***Tactics and Logistics***
- ***Closing the digital divide***
- ***Environmental and climate monitoring***
- ***Distance learning***
- ***Intelligence gathering (Reverse Trunking)***

Newtec has introduced their ***FlexACM®*** technology for fixed communications over satellite at full efficiency. Simultaneously, optimal availability can be achieved in any fading conditions (inclined orbit satellites, weather, dust, interference) to maintain mission critical communications running at all times.



Satellite network links are established in point-to-point or star (point-to-multipoint) configurations.

The permanent or semi-permanent satellite link is established between remote locations (base, office, mission, school, hospital) and headquarters/uplink in a point-to-point or star (point-to-multipoint) configuration. Newtec satellite hubs, or modems, are installed on each side of the satellite link.

FlexACM combines the DVB-S2 standard with a set of technologies in order to double the throughput over satellite in the same bandwidth, with the capability to combine different services (video, voice, data) or applications (morale, welfare and recreation, medical, logistics, etc.) within the same satellite carrier.

Newtec can reflect on a track record of fixed satellite installations worldwide for a wide range of civil, state and defence applications. One striking example is the connection to Antarctica for climate research. Other examples include support for various humanitarian mission communications and for linking remote bases with homeland headquarters.

The Newtec modulators, demodulators and modems are based on ***DVB-S2***, the adopted standard for communication over satellite for data, video, and voice, allowing for full interoperability. Newtec acquired thorough knowledge on DVB-S2 as a pioneer on this global standard. Over the years, Newtec has established an outstanding reputation for its quality and reliable SATCOM equipment.

Newtec Satcom equipment is based on DVB-S2, the adopted standard for interoperable communications over satellite.

Global Connectivity

Humanitarian missions into man-caused or natural disaster areas, scientific research projects, and peacekeeping operations, bring government and defence agencies into remote locations worldwide to institute assistance. Often, terrestrial communication infrastructure is completely unavailable, or has been destroyed. Other forms of communication cannot operate over national terrestrial incumbent telecom infrastructures due to the sensitive nature of the information tghat needs to be exchanged (embassies, intelligence, etc.)

Through Newtec technology a satellite link can be established quickly anywhere in the world. Initial and highly essential communication can be established quickly to assess the situation at hand and to enact appropriate solutions. A permanent link over satellite allows the agencies involved to manage their operations and to more readily exchange video, voice, and data without interruption.

Same Bandwidth, More Throughput

Due to the increase in government and defence missions, the amount of data, video, and voice shared over fixed satellites links has grown substantially. The boost in charged rates needs to be matched to the satellite capacity.

In order to overcome such challenges (both physical and monetary), Newtec deploys FlexACM technology with their equipment. FlexACM uses the full capability of DVB-S2 and combines it with different technologies to deliver as much data as possible using the same satellite bandwidth. FlexACM will auto-adaptively set modulation parameters to their optimal point as well as overcome distortion, noise ,and variation in the satellite link. Newtec gets as close to the zero margin limit as possible to allow for the full use of the satellite link. Through FlexACM, the data rates between uplink and remote sites can be doubled in the same bandwidth without the need to acquire extra satellite capacity.

FlexACM is but one technology in the Newtec product offering that squeezes more efficiency of data delivery over satellite. Additional Newtec technologies such ***Clean Channel Technology***™, ***Cross-Layer-Optimization***™ and Bandwidth Cancellation will additionally boost the performance and increase the throughput.

- Newtec's Bandwidth Cancellation takes care of Point-to-Point, Point-to-MultiPoint and inclined orbit satellite networks and increases link efficiency by as much as 30 percent by combining the forward and return transmissions in the same satellite bandwidth.

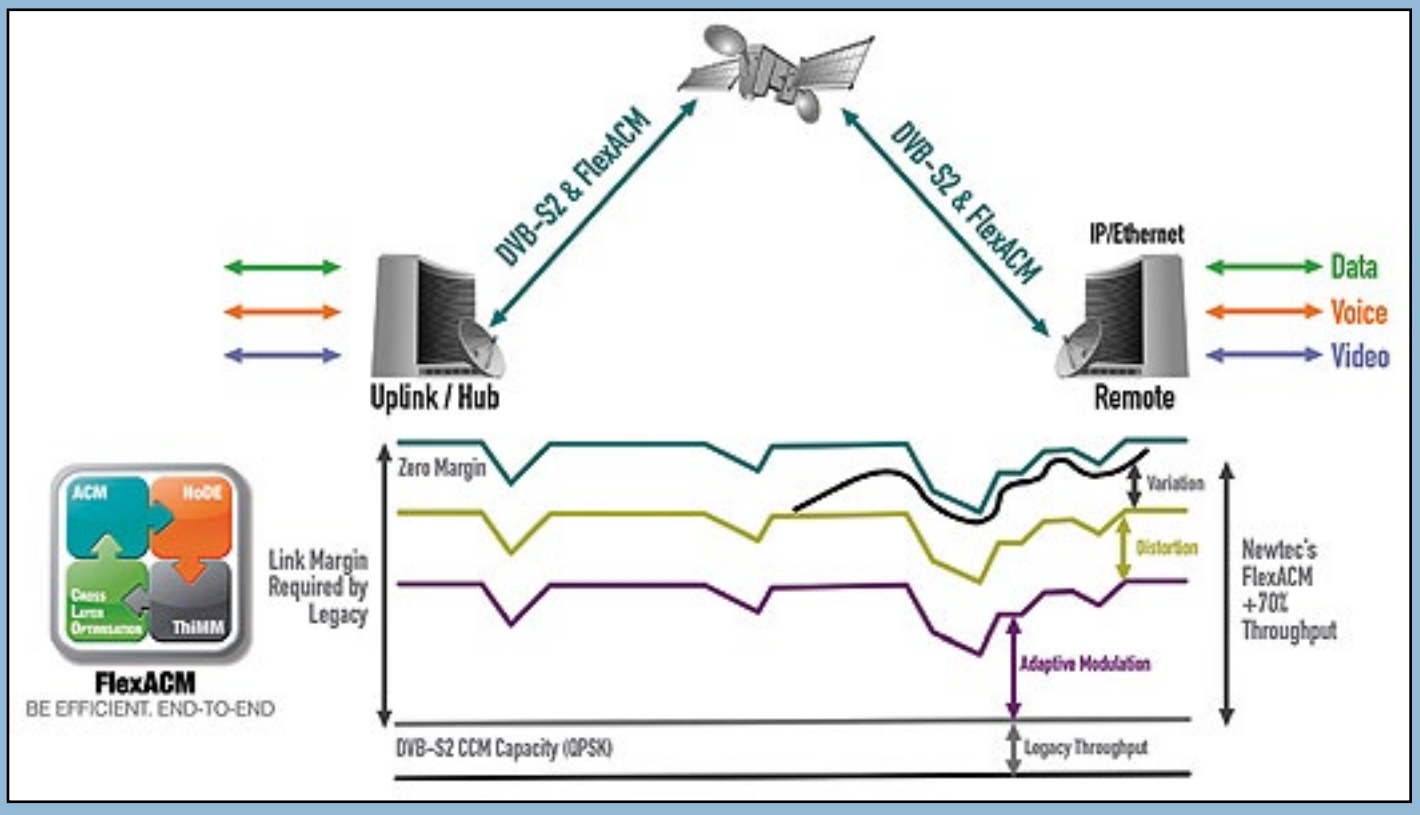
- Newtec's Clean Channel Technology™ improves links even further by offering an advanced filter technology that allows for a low roll-off factor and optimal carrier spacing, which adds 20 percent in extra efficiency.

Newtec was first in the market with the Cross-Layer-Optimization™ concept. The Cross-layer technology is the combination and interaction between satellite bandwidth management, IP shaping, and acceleration solutions, in order to allow maximum throughput all of the time.

Optimal Availability

Even in the most harsh and hostile conditions it is important to have communication lines over satellite available at all times to exchange mission critical and life-saving information. However, fading conditions can seriously disturb satellite transmissions and lead to temporary link losses. Fading conditions could be due to different circumstances: the choice of satellite (inclined orbit, Ku-, Ka- and X-band), environmental (rain, dust), or interference between two adjacent satellites.

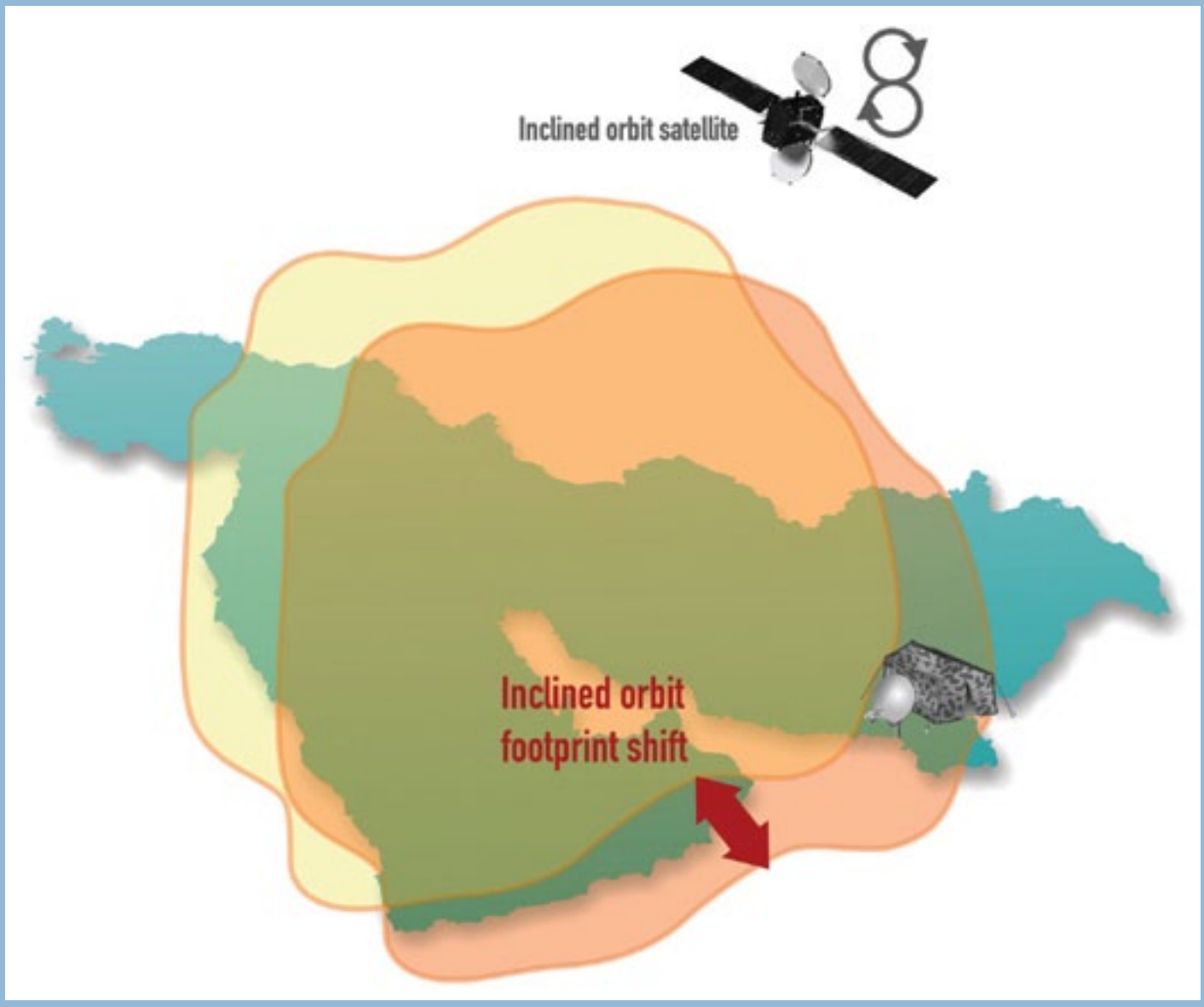
Thanks to the auto-adaptive technology incorporated within Newtec's FlexACM, fading conditions no longer interrupt the transmission between the hub and remote sites, nor is there a loss of data. In fading conditions, FlexACM switches to a more robust modulation and provides optimal availability. As soon as the fading conditions disperse, FlexACM technology automatically switches back to maximum efficiency. Moreover, through flexible bandwidth management and Quality of Service management, priority can be given to mission critical services in order to meet **SLA** (*Service Level Agreement*) requirements



FlexACM doubles the data throughput without the need to acquire extra satellite bandwidth.

During the entire operation, it is possible to sustain *Committed Information Rates* (**CIR**). Newtec is the only provider in the market with FlexACM's unique option to provide variable as fixed rate throughput in DVB-S2 **ACM** (*Adaptive Modulation and Coding*) to fulfill SLA requirements. By bringing fixed rates and CIR to ACM, the Company addresses the service providers in point-to-multipoint configurations with constant throughput at optimal availability in the most efficient way.

In comparison to legacy and DVB-S2 **CCM** (*Constant Coding and Modulation*) networks, Newtec's fixed ACM brings more than 70 percent extra bandwidth for committed information rates. The buffer (fluctuating) bandwidth can be used for occasional services or non-critical information transport over satellite.



FlexACM optimizes the throughput for fading sensitive satellites (X-, Ku-, Ka-band) as well as for Inclined Orbit Satellites

Maximized Efficiency For IP Traffic Via Inclined Orbit Satellites

Government agencies increasingly look into transmitting their applications and services over Inclined Orbit Satellites. The driving factor behind the transition towards inclined orbit birds is an operating cost (OPEX) consideration. The inclined satellites provide a good alternative as they reduce the bandwidth costs in half. Another driver for their use is the need to source bandwidth over regions where satellite capacity is scarce.

In order to extend the life of a satellite, some satellite operators decide to place the satellite in an inclined orbit. The switch towards inclined orbit operation has repercussions on the availability of the services as the satellite footprint shifts in a predictable and continuous pattern. Implementing technology to optimize the throughput over inclined orbit satellites is more essential than ever in order to increase margins, to keep OPEX under control, and to flexibly groom government missions regardless of the mission's location on Earth.

The Newtec FlexACM® implementation doubles the data throughput over inclined orbit satellites at optimal availability.

Flexibility

Flexibility is a key asset for government satellite communication equipment in order to anticipate the needs of continuous changing missions, services and areas of operation.

Through Newtec technology, new remote sites can be easily added to the network. Data, voice, or video services for different government applications are aggregated in a single carrier to obtain maximum efficiency out of the satellite link. At any time, these services can be removed, added or replaced. Moreover, the different services and applications will receive a prioritization scheme in order to ensure critical mission information passes first. FlexACM® allows government agencies to keep their cost under control at all time.

Newtec's FlexACM allows government agencies to keep their costs under control at all times.

OPEX Control

Government and defence agencies must ensure their costs are under control at all times. A solution for this need can be found by leasing commercial bandwidth, making use of inclined orbit satellites, or by turning to COTS equipment. However, most important is implementing technology to share information as efficiently as possible over satellite.

FlexACM doubles the throughput of video, voice, and data over satellite — more data can be transported in the same bandwidth, or, space segment requirements can be cut by half if identical rates will be used in future. Moreover, no extra or new ground infrastructure (antenna or amplifier) needs to be acquired to enable the higher data rates.

For additional, in-depth information, please visit our website at:

http://www.newtec.eu

Rob Mitrevski, Vice President & General Manager Integrated Geospatial Sensing Systems and Environmental Intelligence, ITT Exelis Geospatial Systems

Rob Mitrevski is the vice president and general manager of Integrated Geospatial Sensing Systems and Environmental Intelligence, ITT Exelis Geospatial Systems. In this capacity, he is responsible for the development and delivery of space, air, and ground-based mission critical systems for military and civilian government agencies and commercial customers. Major market segments served by Mitrevski's business include the Intelligence Community, Climate and Weather Monitoring Systems, Astronomical Systems, Commercial and Remote Sensing Systems, Precision Optics and Assemblies, and Advanced Remote Sensing Systems. These systems provide actionable data to enhance information superiority, contribute to our national security, and protect property and human life. ITT Geospatial Systems is also a global supplier of innovative night vision, remote sensing and navigation solutions that provide sight and situational awareness at the space, airborne, ground and soldier levels.

Prior to this assignment, Mitrevski served as the vice president and director of Commercial and Space Sciences at ITT Space Systems Division, which provided critical space instruments, sensors, and telescopes to NASA and NOAA for weather forecasting, space science missions, and payloads for high resolution images in the commercial remote sensing market. During his tenure, Mitrevski successfully led this business to increased sales and growth in core, adjacent, and new markets. Mitrevski joined ITT in 1988 in the Aerospace/Communications Division. During his career at ITT, he has held various assignments with increasing levels of responsibility in engineering, manufacturing, product assurance, integrated logistics, program management, and business area leadership for terrestrial, airborne, and space-borne systems. Mitrevski holds a B.S. degree in electrical engineering from the University of Michigan. He participates in several aerospace and environmental industry associations, and has spoken and moderated panels at a number of national and international industry forums.

MilsatMagazine (MSM)
Thanks for taking the time to participate in this interview, Mr. Mitrevski. May we ask how you came to be interested in the space and SATCOM environments? What led you to develop a career at ITT Exelis?

Rob Mitrevski
I knew from early on that I wanted to be part of this industry. I grew up watching the world's space programs grow rapidly using the most advanced technologies, developed by the world's most intelligent workforce. Fortunately, I was afforded the opportunity to work in the Geospatial Systems business at Exelis, to further expand my interest in, and knowledge about, space industry.

We all want a career that is relevant. The alignment of our Geospatial Systems division with our customers' unmet needs and relevant missions in commercial, civil and government markets, made it a natural and easy choice for me to build a career here. The most significant accomplishments at Exelis range from 40 years in the weather instrument business and 50 years supporting the intelligence community to our most recent commercial remote sensing imaging payloads that support warfighters, national government agencies and consumer needs. There are very few people in our industry who can claim to be part of something this interesting.

MSM
You have worked in and managed a number of divisions within Exelis since joining the Company in 1988, from manufacturing to program leadership in space-borne systems, remote sensing, and others — what drew you to the Exelis Geospatial Systems division? What are your duties with Exelis Geospatial Systems?

Rob Mitrevski
My duties at the Geospatial Systems division include general management and responsibility for our weather and intelligence business. Our products provide both government and public-private sectors with critical information needed to help with safety and security. Our weather satellite instruments provide data used by the military and intelligence community, the National Weather Service and local forecasters on broadcast television. In addition, our commercial satellite imagery instruments provide the pictures used on ***Google Earth***.

MSM
With technical know-how a key to producing leading products, how is Exelis Geospatial Systems locating and hiring competently trained personnel for its projects, given the seeming lack of STEM interest and training at the middle, high school and college academic levels? What can the industry do to support STEM training, and to entice youngsters into this field with its outstanding career opportunities?

Rob Mitrevski
Here at the Geospatial Systems division of Exelis, we understand the importance of STEM research and encourage educational training to back the developments of this growing industry. We've developed strategic relationships with our local universities and high schools to provide rotational, co-operative assignments for aspiring young engineers to quickly diversify their experience and exposure early on. Currently, our community partnerships span across senior project development, supported by local engineers at educational events and workshops, review board participation and funding research projects.

MSM
ISR is a most crucial aspect of MILSATCOM. How does your division support this endeavor by our Armed Forces?

Rob Mitrevski
Intelligence, surveillance and reconnaissance (ISR) is one of the Geospatial Systems division's largest components, supporting tactical and strategic mission areas for our armed forces customers. Our ISR systems enhance information superiority, contribute to national security, provide actionable data and protect property and human life. Every GPS satellite in orbit around the Earth carries components built by the Geospatial Systems business. In addition, we produce high-reliability remote sensing solutions for ground, air and space, offering active motion imaging, anti-jam signal generation data encryption, information processing, exploitation and intelligence dissemination. All of these solutions are supported by system performance modeling and simulation. Combined, our solutions range from space to ground, and enable customers to see and solve some of the world's toughest problems.

MSM
What payloads has Exelis Geospatial Systems developed and/or supported over the years? What are the Company's current plans in this area and what might we see over the next year or two? What are the benefits of these projects to your clients?

Rob Mitrevski
Since the inception of meteorology, Exelis has been part of the original team working with NASA and the **National Oceanic and Atmospheric Administration** (NOAA), which established the meteorological program in 1965. Exelis has built numerous sophisticated imaging and sounding space-qualified payload systems operating in both Geostationary Earth Orbiting (GEO) and Low Earth Orbiting (LEO). Our instruments are recognized for their innovation, performance, stability and longevity and have consistently achieved 100 percent on-orbit mission success.

Our meteorological payloads include ***Television Infrared Observation Satellite*** (TIROS), ***Polar***

Orbiting Environmental Satellite (POES) and ***Joint Polar Satellite System*** (JPSS) (U.S. Polar); ***Geostationary Operational Environmental Satellite*** (GOES) ***N-P*** (U.S. Geostationary); ***Communication, Ocean and Meteorological*** (COMS) (Republic of Korea); and ***Multi-functional Transport Satellite*** (MTSAT) and ***Himawari*** (Japan). Our ***GOES-R Advanced Baseline Imager*** (ABI) is expected to launch in 2015.

Our ***Cross-track Infrared Sounder*** (CrIS), an advanced atmospheric sounding instrument, was launched aboard NASA's ***National Polar-Orbiting Operational Environmental Satellite System*** (NPOESS) ***Preparatory Project*** (NPP) this past fall. CrIS is the first in a series of advanced operational sounders intended to provide accurate and detailed atmospheric temperature and moisture observations. The initial data just collected in January shows tremendous performance.

Our imaging payloads and sensors systems have been at the heart of nearly every U.S. commercial remote sensing satellite system. Our sensors currently provide all of the commercial high-resolution space-based imagery in the United States, and are expanding to pursue several new opportunities in Asia and the Middle East. Our environmental systems closely monitor and evaluate global space and airborne remote sensing and ground data processing. Our commercial payloads include ***IKONOS***; ***GeoEye-1*** and ***-2***; and ***WorldView-1***, ***-2*** and ***-3***.

For more than 50 years, Exelis has been working side-by-side with the U.S. government to provide the world's best solutions to difficult intelligence problems. These solutions have been instrumental in protecting the U.S. military and U.S. interest overseas. Examples of these critical activities include the National Reconnaissance Office's recently declassified top satellite reconnaissance programs — ***Hexagon*** and ***Gambit***. Exelis was a leading contributor to these once-secret programs.

Exelis has been involved in exploration and space science systems since the early days of human space flight. In the early 1960s, Exelis built the lunar orbiters that mapped the surface of the moon that helped identify the future landing sites for the Apollo missions. From the 1970s through the 1990s, Exelis participated in the great observatories program by processing the back-up mirror for the Hubble Space Telescope and designing and building the Chandra X-ray telescope. More recently, Exelis is working with NASA and Northrop Grumman Aerospace Systems to help build and test the telescope for the James Webb Space Telescope — the premier observatory of the next decade, serving thousands of astronomers worldwide.

MSM
As a civilian, how do you gain the attention of the various military and government components when attempting to present new product information and demos?

GOES N-P satellite

Rob Mitrevski
Exelis Geospatial Systems has a long-standing history of delivering high-performing products with great stability and longevity, allowing a consistent relationship with both military and government customers. This demonstrated success strengthens intimacy between our company and past, current and potential future customers.

Many former military personnel with connections to the broader military and government industries have joined Exelis over the years thanks to the reputation of our company, our employees and our products. They certainly help bridge relevant relationships when it comes time to present new product information and demos to those customers.

MSM
With your successful longevity in this business, you have noted a great many changes within the political environments and the budget processes for third-party technologies and offerings. How will Exelis Geospatial Systems manage the most recent, almost Draconian, budget cuts announced by the Secretary of Defense? With the stated

The Hexagon ISR satellite on display.

intention of improving equipment and technologies by the DoD to offset a lack of ground forces, could such bode well for Exelis Geospatial Systems, due to your advanced technologies development?

Rob Mitrevski
Despite the looming defense budget cuts, we will continue to strategically manage our portfolio. Our broad solutions, comprehensive programs and available budgets will help to buffer our business in the face of budgetary headwinds.

A key element of our strategy is not only to maintain technical proficiency, business efficiency and strong programmatic performance in established areas, but also to identify and expand our product base to address the needs of adjacent markets and alternative customer channels. Participating in the development and advancement of current and new capabilities deemed important by the DoD will be a key component of our continued success.

Many of our products show continued relevance to ongoing mission needs, despite with the drawdown of troops across the ground. Although we remain realistic about the current budget environment, we expect continued demand for our capabilities and solutions throughout the upcoming government fiscal years' budget trade-offs and reductions.

MSM
No one Company can do everything...does Exelis Geospatial Systems have various partners when developing broad-based product for government agencies and the military? Who are your partners?

Rob Mitrevski
Our partners' contributions range from software development to government lab accessibility across the mission value chain. In order to meet the best interests of our customers, we work with our partners to provide integrated systems solutions that also process, exploit and disseminate actionable intelligence useful to their respective mission areas.

Also, Exelis Geospatial Systems often partners with key suppliers to increase the robustness of our product offerings. By working hand-in-hand with our supply base, we're better able to understand technology and manufacturing limitations. By folding this understanding into our systems design methodology, we're able to provide our customers with best value solutions.

MSM
What is your view on the recent decrease in third tier suppliers (supply chain issue)? How is Exelis Geospatial Systems handling the impact to the satellite industry?

Rob Mitrevski
The recent decrease in third-party suppliers on the supply chain is a growing problem across the industry, and Exelis Geospatial Systems is actively working to address this challenge. To maintain and/or increase our cadence, we are currently working to expand our offerings to adjacent markets, including commercial and international. In addition, we are exploring alternative technologies that may mitigate areas of defined risk. Also, we selectively assess the idea of in-house component building when and where it makes sense to do so.

To alleviate potentially heavy impacts to the satellite industry, the Geospatial Systems division works with members of Congress to advise them on the state of the supply chain, often recommending funding alternatives to maintain the third-party supply chain without interruption to our customers' business needs.

MSM
Given that many of your projects are launched into orbit for their specific activities, what are your thoughts about the sparse capacity for military launches? Are you a proponent of Hosted Payloads? If so, from your vantage point, what gives such benefit? What are your thoughts about how the cost of satellite development and production could be reduced?

Rob Mitrevski
Hosted payloads are a creative solution to a tough challenge. We are working with both government and commercial companies to create a win-win situation by providing extraordinary solutions with minimal investments.

The satellite industry will benefit best by continuing to embrace alternative procurement methods, such as fixed pricing, public-private partnerships, co-hosted payloads and data buys. Exelis Geospatial Systems has experience in alternative procurement and has witnessed the mutual success it brings to both government and industry, as well

Artist concept of JPSS, courtesy of Ball Aerospace.

as to the growing commercial sector. Despite reduced budgets, we will continue to support these types of solutions that enable ongoing customer mission capabilities, and encourage cost reductions through requirements stability, reduced oversight, block buys, and fixed-price acquisitions.

MSM
Over the past couple of decades, with the dearth of projects for which you have been responsible, which programs bring you the most sense of satisfaction?

Rob Mitrevski
Over the past several decades, we've seen tremendous success across a variety of our platforms. In our weather area, our ABI and CrIS programs support GOES-R and JPSS, respectively, both of which represent our highest performance, next-generation, industry-leading capabilities. These programs will save both lives and personal property by enabling the most accurate weather forecasts in the world.

In our commercial remote sensing area, the WorldView and GeoEye programs support DigitalGlobe and GeoEye in the NGA's NextView and EnhancedView programs, offering the most affordable, highest resolution commercial imagery in the world.

The integrated persistent surveillance products in our airborne ISR area have provided our armed forces customers with significant support on Reaper UAV missions. Finally, a number of sensitive intelligence programs bring us great pride in the missions we continue to support that ensure the security of our nation.

MSM
What are your views about the future of DoD weather satellite mission, and how is Exelis Geospatial Systems involved with that work?

Rob Mitrevski
With the breakup of NPOESS, the DoD must develop its own weather satellites to cover specific DoD needs. We understand the budget difficulties the DoD is facing and are encouraged by Congress' FY 12 budget to maintain the mission but examine alternative approaches. We want to provide a low-cost, low-risk solution to DoD's needs by enhancing our established, proven, legacy NOAA instrument. We believe it can provide significant increase in current DoD capability at a fraction of the cost and minimal risk.

MSM
What is your company's current role in the international marketplace? What are your international plans for the future?

Rob Mitrevski
Exelis Geospatial Systems has a strong existing presence in the international meteorological payload arena, and also supports international imagery needs through our commercial remote sensing products. We plan to further penetrate existing markets and expand into adjacent markets and channels in our airborne, weather, and commercial remote sensing business.

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NAB Salutes Another Realm...

NAB is the huge trade show that features all manner of commercial properties, technologies, and events for the digital media industry. But there's an element of this show that may well be overlooked — the military and government market segments. These crucial environments are recognized at **NAB 2012** via the ***Military and Government Summit Leveraging Media to Create Actionable Intelligence*** track which will be conducted from Tuesday, April 17th, through Thursday, April 19th.

The Military & Government Summit offers the unique opportunity for professionals from the government and commercial sectors to discuss needs and solutions based on cutting-edge video technologies. The NAB Show has long been the premiere event for those immersed in digital media hardware and software applications. The Summit focuses on the challenges faced by government and industry, identifies solutions for those challenges, and looks toward future opportunities.

Cameras and sensors, efficient workflow analogies, asset management and complementary best practices are all part of the discussion as they relate to emergency response, intelligence, surveillance and reconnaissance. Experts from government agencies define their needs and are joined by their peers from industry offering the commercial perspective on possible solutions.

Attendees are invited to interact with speakers and panelists during morning sessions. In the afternoon, time is provided to visit and talk with exhibitors on the NAB Show floor. If you are seeking commercial solutions to your mission-critical needs or if you are looking for opportunities to work with government agencies, this is the event for you.

Day One
The Challenges

Tuesday, April 17

Moderator: *Joseph Smith*, **NGA**

Summit Day One lays out the challenges facing military and government agencies as they tackle the explosion of data and the issues of content management, while providing actionable intelligence to decision-makers. Speakers from government and industry will offer their perspectives.

8:00-8:30 a.m.
Keynote

8:45-9:00 a.m.
Introduction

9:00-9:30 a.m.
Case Study #1
Big Data, Big Physics
Jeff Jonas, Chief Scientist, IBM Entity Analytics Group and an IBM Distinguished Engineer, IBM

9:45-10:15 a.m.
Case Study #2
Video Considerations for Border Patrol Activities
Mark Borkowski, Asst. Commissioner for Customs and Border Patrol, Office of Technology Innovation and Acquisition, U.S. Dept. of Homeland Security

10:30-11:00 a.m.
Case Study #3
The Challenges Faced by the FBI – Video Networks
Gerald Bessette, Supervisory Special Agent, Asst. Section Chief Traditional Technology Section, Operational Technology Division, FBI Science and Technology Branch

11:00-11:30 a.m.
Case Study #4
The Challenges of Covering the Big Stories
Peter Doherty, ABC News Washington Bureau

11:45 a.m.-1:00 p.m.
Panel Session
This panel of presenters and additional experts will continue a discussion of the challenges for military and government agencies.

Day Two
The Solutions

Wednesday, April 18

Moderator: *John Bordner*, **Seicorp**

Summit Day Two investigates various solutions to the needs of government and industry – what is being done now, success rates, necessary improvements and potential innovations.

8:00-8:30 a.m.
Keynote
Byron Reese, Chief Innovation Officer, Demand Media

8:45-9:00 a.m.
Introduction

9:00-9:30 a.m.
Case Study #1
Mobile Journalism Based on Standard Business Tools
Rainer Kellerhals, Global Media & Entertainment Solutions Lead, Microsoft Corporation

9:45-10:15 a.m.
Case Study #2
Creating Video-centric Briefings with Real-time Input
Mike Palmer, Director of Broadcast Digital Distribution Systems and Strategy, Associated Press

10:30-11:00 a.m.
Case Study #3
Using Broadcasting to Mitigate Threats Worldwide
Robert Riegle, CEO, StratCorp

11:00-11:30 a.m.
Case Study #4
Geospatial Solutions for Decision Support
Colonel *Christopher Wolfe*, Director, Time Dominant Operations Center (TDOC), NGA

11:45 a.m.-1:00 p.m.
Panel Session
Our experts will focus meeting the challenges with solutions based on current technologies. Interactive participation by Summit attendees is encouraged.

Day Three
The Opportunities

Thursday, April 19

Moderator: TBA

Summit Day Three explores new possibilities that are on the horizon based on previous discussions and technology trends.

8:00-8:30 a.m.
Keynote

8:45-9:00 a.m.
Introduction

9:00-9:30 a.m.
Case Study #1
Back from the Future! Delivering the News in 2020
Mack McLaughlin, CEO, FX Design Group; *Marv Danielski*, Senior Vice President, Frank N. Magid Associates

9:45-10:15 a.m.
Case Study #2
Applying ISR Lessons Learned from Federal Law Enforcement
Louise Moggio, Business Development, Federal Law Enforcement, Harris GCS

10:30-11:00 a.m.
Case Study #3
Future Standards and Cyber Security
Jim Antonisse, Chief Scientist, Motion Imagery Standards Board

11:00-11:30 a.m.
Case Study #4
The New Surveillance – 3G/4G Wireless Tools
Paul Shen, CEO, TVU Networks

11:45 a.m.-1:00 p.m.
Panel Session
This will be a visionary discussion of changes now underway that may evolve into new methodologies for future consideration.

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