The U.S.A.F.'s AEHF-2 on launch day, photo courtesy of United Launch Alliance

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Derek Ireson
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FEATURES

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PROTECTED COMMS + SALE CEMENTED INTO PLACE

Space Systems/Loral (SS/L) (NASDAQ: LORL) has been selected by the U.S. Air Force Space and Missile Systems Center (SMC) to develop affordable design concepts for next generation Protected Military Satellite Communications (MILSATCOM).

The objective of the SMC program is to develop practical new architectures and technologies that will protect increasingly contested and threatened high security communications.

Space Systems/Loral will combine its expertise and existing technologies from commercial developments together with existing military technologies provided by a team of domain experts to assess options for both space and ground segment design.

The SS/L business is based on addressing changing requirements in mobile communications, broadband, and high-definition video broadcasting within the budget and schedule constraints of the commercial marketplace.

For the SMC's Protected MILSATCOM program, SS/L will help remedy existing gaps in the space communications layer and demonstrate specific design concepts focused on improved life-cycle affordability that will meet the warfighter needs far into the future.

"The protected MILSATCOM contract is an opportunity for SS/L to continue its efforts to serve the U.S. Government with cost-effective solutions based on commercial market innovation," said John Celli, president of SS/L. "Working with our industry partners, we will use domain expertise, proven military technology, and our supply chain efficiencies to quickly bring increased capability to the warfighter."

Of even greater portent is the Loral Space & Communications announcement that the SS/L sale to MacDonald, Dettwiler and Associates Ltd. (TSX:MDA) has now been completed

At closing, Loral received $968 million in cash plus a bank guaranteed three-year promissory note in the principal amount of $101 million for the purchase of certain real estate used in connection with SS/L's business.

"We are exceptionally pleased that we have closed the SS/L sale transaction at a value that recognizes SS/L's leadership and premier position in the global satellite manufacturing business," said Michael B. Targoff, Chief Executive Officer of Loral Space & Communications. "Congratulations to MDA. We are confident that the combination of SS/L with MDA will benefit SS/L's employees, customers and suppliers and the entire satellite communications industry."

"We are proud of our management team's success in establishing SS/L as a leading global commercial satellite manufacturer, and in bringing the transaction with MDA to closure," said Dr. Mark Rachesky, Chairman of the Board of Directors of Loral. "The transaction reflects the Board's continued commitment to delivering significant value to all Loral shareholders, and the Board will evaluate the opportunity to return capital to shareholders through a cash distribution of the net cash proceeds from this transaction."

#

A MOVING EXPERIENCE

TrustComm Inc. has opened its new federal government solutions facility at the Quantico Corporate Center in Stafford, Virginia.

The Quantico facility serves as TrustComm's new executive headquarters and new fully redundant, secure network operations center (S-NOC).

With its primary teleport operations and S-NOC at the highly secure Ellington Field Base in Houston, TrustComm has served government and commercial markets since 1999.

TrustComm also announced the addition of Rodrigo Gomez as Chief Technology Officer, Jim Tran as Chief Sales Officer and six other highly experienced telecom professionals to its executive team.

These announcements have enabled TrustComm to greatly expand its service to the U.S. Department of Defense (DoD).

With the expansion of the TrustComm team, the Company's skills and capabilities now include special-operations network design, intelligence data collection, exploitation and data mining, design of end-to-end turnkey network solutions, and IT security.

Each member of the team is a subject-matter expert in their field, with both direct and indirect U.S. government experience.

Jim Tran brings more than 16 years of telecom experience to his new position as TrustComm's Chief Sales Officer. He previously served as Vice President, Government Services, for Harris CapRock in Fairfax, Virginia.

Rodrigo Gomez brings more than 15 years of telecom experience to his new post as TrustComm's Chief Technology Officer. His previous experience includes senior engineering positions with Stratos Global Corp. (Bethesda, Maryland) and SES Americom, one of the world's largest satellite operators.

#

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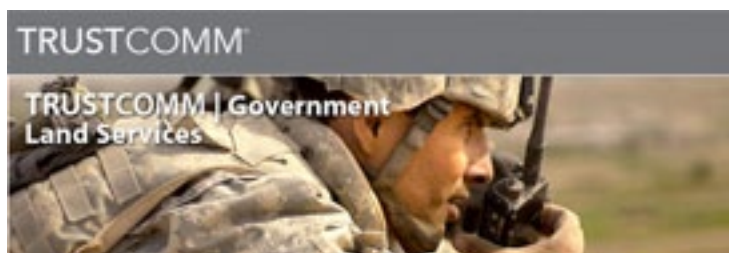
FIRST GANS DEBUT

Northrop Grumman Corporation has developed a line of gallium nitride (GaN) Monolithic Microwave Integrated Circuits (MMICs).

These devices represent the first commercial availability of GaN-based components from the company.

Initial engineering evaluation sampling is underway with quantities of three GaN MMIC products. They were developed for defense and commercial ground satellite communication terminal markets and the commercial wireless infrastructure market, said Frank Kropschot, general manager of the Microelectronics Products and Services (MPS) business unit of Northrop Grumman Aerospace Systems.

The initial set of three MMICs has these performance characteristics:

- *The APN149 is a GaN high electron mobility transistor (HEMT) MMIC power amplifier chip that operates between 18 and 23 gigahertz (GHz). This power amplifier provides 20 decibels (dB) of linear gain, +36 dBm (4 watts)* of output power at 1 dB gain compression and +38 dBm (6.3 W) in saturation with Physical Address Extension (PAE) of greater than 30 percent.

- *The APN180 is a GaN HEMT MMIC power amplifier chip that operates between 27 and 31 GHz. This power amplifier provides 21 dB of linear gain, +38 dBm (6.3 W) of output power at 1 dB gain compression and +39 dBm (8 W) in saturation with PAE of* 30 percent at midband. *For less demanding applications, the APN180 can be operated from a drain voltage as low as +20V while still producing +37 dBm (5 W) of saturated output power.*

- *The APN167 is a GaN HEMT MMIC power amplifier chip that operates between 43 and 46 GHz. This power amplifier provides 20 dB of gain, +35.5 dBm (3.5 W) of output power at 1 dB gain compression* and +38.5 dBm (7 W) in saturation with PAE of 19 percent at midband.

"These new products are the first of several we plan to introduce into the marketplace during the next few months as we roll out a new family of products using Northrop Grumman's 0.2µm GaN HEMT process developed partially under the Defense Advanced Research Projects Agency's (DARPA's) Wide Band Gap Semiconductors for Radio Frequency program (WBGS-RF)," Kropschot said.

He added the DARPA program was the first of several key GaN technology development contracts awarded to Northrop Grumman beginning in 2002. He noted that GaN devices are key components the new low-cost terminals recently introduced by an industry team consisting of Northrop Grumman, Lockheed Martin Space Systems and TeleCommunication Systems.

#

A HEFTY CONTRACT FOR COMMS BACKBONE

Harris Corporation has received a $50.5 million delivery order for advanced satellite communications terminals under the U.S. Army's Modernization of Enterprise Terminals (MET) program.

The nexgen military satellite communications terminals will provide the worldwide backbone for high-priority military communications and missile defense systems. Harris is the prime contractor for the Indefinite Delivery/Indefinite Quantity MET contract, which has a potential value of $600 million. Under this latest order, Harris will supply additional terminals, including large fixed X-/Ka-band terminals, and transportable X-/Ka-band terminals. The order also includes common electronics equipment, spares to support the fielding of the terminals and operator training.

Under the MET program, managed by the Project Manager, Defense Communications and Army Transmission Systems (PM DCATS), Harris will replace up to 80 AN/GSC-52, AN/GSC-39, AN/FSC-78 and other aging strategic satellite communications terminals with new X-band or simultaneous X-/Ka-band terminals. Harris also is supporting field activities such as site preparation, installation and testing.

Installations are already complete at Ft. Belvoir, Virginia and Ft. Detrick, Maryland, with rapid progression toward transition to their operations commands. The terminals will interface with the new Wideband Global Satellite constellation, as well as with legacy satellite systems.

#

UHURU PLAN UNVEILED

Futron Corporation offered its vision for an East African spaceport at the recent 5th Annual KESSA Conference in Bowling Green, Ohio.

Spaceports represent critical infrastructure for the 21st century, creating the foundation for technology development, economic growth, and advances space competitiveness.

The evaluation was well received by attendees. At the conclusion of the two-day summit, KESSA Conference stakeholders adopted Futron's recommendation to perform a feasibility study on the spaceport concept.

This past June, members of the National Society of Black Engineers (NSBE) Space Special Interest Group (SIG) joined with Futron to write a journal article on the potential of a spaceport off the coast of Kenya near the Italian-owned Broglio Space center facility.

Futron incorporated advice from Phezu Space, LLC, which is also developing a similar South African spaceport concept. Phezu suggested the Kenya spaceport could provide the greatest benefit if it served the entire East African Community (EAC).

Futron and NSBE Space SIG agreed and brought Phezu Space and its African affiliate, Isibizo Phezu Space Pty Ltd, into the conceptual development. Futron led the four-organization team in developing the East African Spaceport concept and writing the journal article.

"An East African spaceport, coupled with cooperation addressing space advancements in South, West, and North Africa will be one catalyst for integrating space technology into this rising continent's economic, political, and societal development," said Allen Herbert, CEO of Phezu Space, LLC.

The Futron team named the future East African spaceport "Uhuru," meaning "freedom" in Swahili. The vision for the Uhuru Spaceport is a dynamic space hub that leverages the emerging commercial space industry to help create sustainable economic growth for the entire East African region.

The Uhuru Spaceport's development will be guided by Futron's Spaceport Toolkit capability. This capability delivers an ecosystem of services and providers to a comprehensive set of spaceport requirements including Master Planning Support; Operations Support; Business Strategy, Planning, and Process Improvement; Sales and Marketing Support Services; Risk, and Crisis Management; Safety, Assurance, and Audit Compliance; and Architecture, Engineering, and Construction Services.

Futron has successfully worked with approximately 10 spaceports worldwide, providing a variety of business, management, and operational support services.

#

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MORE EASILY ATTAINABLE

A team led by Harris Corporation has been selected for the Global Tactical Advanced Communication Systems (GTACS) contract, awarded by the U.S. Army's Program Executive Office-Command Communications + Control for the work.

Harris was one of 20 prime contractors selected to compete under the five-year, $10 billion Indefinite Delivery/Indefinite Quantity contract, which enables defense and civilian federal agencies to quickly and cost-effectively procure a wide range of tactical communications products, systems and engineering services.

Under GTACS, the Harris team will pursue opportunities to supply the Department of Defense, as well as U.S. government agencies such as Homeland Security, with advanced communications solutions that range from wireless networking to tactical satellite communications and handheld JTRS-compliant radios.

"The GTACS contract vehicle makes it very efficient for customers to acquire a comprehensive mix of products and services from the Harris team," said Sheldon Fox, group president, Harris Government Communications Systems. "Harris and its partners will work together to provide advanced, networked communications systems that meet the critical needs of our warfighters and security agencies."

#

THAT'S SOME CEILING...$10 BILLION!

TeleCommunication Systems, Inc. (TCS) has also been selected as one of 20 awardees under the GTACS contract.

The multiple-awardee, Indefinite Delivery – Indefinite Quantity (IDIQ) vehicle has an estimated ceiling of $10 billion over five years.

This contract enables DoD agencies to purchase TCS' turnkey family of deployable satellite systems and associated support services for the Warfighter Tactical Communications Systems and Services (WTCSS) through the Department of the Army, Assistant Secretary for Acquisition, Logistics, and Technology, Program Executive Office Command, Control, Communications-Tactical (PEO C3T's), Special Projects Office, Northeast Regional Response Center (NRRC).

#

USMC INVOLVED IN SANDY RELIEF MISSION

The 26th Marine Expeditionary Unit function-check a satellite phone and a Broadband Global Area Network transmitter atop the USS Wasp off the coast of New York while providing support to disaster relief efforts in the aftermath of Hurricane Sandy

The 26th MEU can provide generators, fuel, clean water, and helicopter lift capabilities to aid in disaster relief efforts. The 26th MEU currently conducts pre-deployment training, preparing for departure in 2013. As an expeditionary force operating from the sea, the MEU is a Marine Air-Ground Task Force capable of conducting amphibious operations, crisis response, and limited contingency operations.

#

ON-ORBIT APPROVALS + A PLETHORA OF AWARDS

The U.S. Air Force Space Command Space and Missile Systems Center's second Advanced Extremely High Frequency military communications satellite successfully completed its on-orbit testing on September 24th.

The on-orbit test campaign included a period of single-satellite testing followed by a period of crosslink testing between AEHF-1 and AEHF-2, and culminated with testing in the operational Milstar constellation.

As part of this effort, communications terminals from the Army, Navy and Air Force exercised the command and control features of this system and verified expected performance.

Intersegment testing was led by the Space and Missile Systems Center MILSATCOM Systems Directorate with participation from the 14th Air Force, the 50th Space Wing, Lockheed Martin, Northrop Grumman, The Aerospace Corporation, Massachusetts Institute of Technology/Lincoln Laboratory and representatives from terminal operations and development communities.

The test campaign successfully demonstrated the performance of an all Advanced-EHF constellation. This ensures that globally assured and protected communication will be available in future years when the Milstar system is eventually retired. Additionally the test has proven that multiple AEHF satellites can operate seamlessly within a Milstar constellation.

AEHF is a joint service satellite communications system that will provide survivable, global, secure, protected and jam-resistant communications for high-priority military ground, sea and air assets for the U.S. and international partners.

The AEHF System is the follow-on to the Milstar system augmenting, improving and expanding the MILSATCOM architecture.

AEHF is developed by SMC's MILSATCOM Systems Directorate. The MILSATCOM Systems Directorate plans, acquires and sustains space-based global communications in support of the president, secretary of defense and combat forces.

The MILSATCOM enterprise consists of satellites, terminals and control stations and provides communications for more than 16,000 air, land and sea platforms.

Additionally, SMC has awarded 17 contracts totaling $84.3 million as a result of a Broad Agency Announcement (BAA) released in April for the "Protected Military Satellite Communications Design for Affordability Risk Reduction Demonstration."

This composite study will demonstrate elements of a MILSATCOM protected tactical system to position the U.S. Government in respect to affordability, performance and timeliness for the acquisition of a next generation protected communications enterprise in the FY20+ timeframe.

These awards will enable the next generation protected tactical system by using an unclassified waveform that jointly meets the needs of multiple Services across the Department of Defense while also addressing affordability.

These needs include Remote Piloted Aircraft support for the Air Force, Protected Communication on the Move for the Army, and tactical Maritime operations for the Navy.

To meet their requirements, the government identified elements of space, ground, and terminal segments for risk reduction and demonstration activities during the BAA. These include examining best placement of processing functions between the space, terminal, and/or ground segments relative to current traditional highly protected MILSATCOM system designs.

Awards in these areas will provide the government an increased understanding of opportunities and challenges when identifying more affordable design concepts.

These awards will also improve the government's understanding of cost, development schedule, and performance profiles of candidate component technologies and the respective building blocks that address future protected tactical communications.

To study the various aspects noted above, each selected contractor brings a unique idea and capability to the study. Furthermore, each company will present architecture solutions unique to its strengths. Awardees include multiple small businesses who enhance affordability, commercial contractors who provide new insight, and traditional MILSATCOM system design contractors.

The 17 contractors awarded represent a multitude of levels of effort. Those on the low end (~$150K) will participate in a working group, while those on the high end (~$10M) will build hardware and perform demonstrations and testing. Award of this BAA will position and grow the industry base for the future development of an affordable, protected MILSATCOM system.

The study kicked off in October 2012 and will last approximately 24 months. At the study's end, some companies will deliver hardware and/or software, while others will perform product demonstrations at an FFRDC facility or "in-house."

The following companies will participate in multiple areas of focus across the BAA.

Waveform Specification Development

- *The Boeing Company, Space & Intelligence Systems, Seal Beach, California*

- *Northrop Grumman Systems Corp, Redondo Beach, California*

- *Space Systems Loral, Palo Alto, California*

- *Raytheon Company, Marlborough, Massachusetts*

- *L-3 Communication Corp, Communications Systems West, Salt Lake City, Utah, and East Camden, New Jersey*

- *Hughes Network Systems, LLC Germantown, Maryland*

- *ViaSat Inc, Comsat Laboratories, Germantown, Maryland*

- *Orbital Sciences Corp, Dulles, Virginia*

- *General Dynamics Advanced Information Systems, Santa Clara, California*

- *Space Micro Inc, San Diego, California*

- *Lockheed Martin Corp, Space Systems Company, Sunnyvale, California*

- *Harris Corp, Government Communications Systems, Palm Bay, Florida*

- *Hughes Design Group, Culver City, California*

- *Arkham Technology Limited, Irvine, California*

- *General Dynamics C4 Systems, Taunton, Massachusetts*

Affordable Protected Space/Ground Segment Design and Demonstration

- *The Boeing Company, Space & Intelligence Systems, Seal Beach, California*

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- *Northrop Grumman Systems Corp, Redondo Beach, California*

- *Space Systems Loral, Palo Alto, California*

Affordable Gateway Risk Reduction and Demonstration

- *Lockheed Martin Corp, Information Systems & Global, Solutions, King of Prussia, Pennsylvania*

- *Northrop Grumman Systems Corp, Redondo Beach, California*

Affordable Mission Planning and Management Demonstration

- *The Boeing Company, Space & Intelligence Systems, Seal Beach, California*

- *Hughes Network Systems, LLC Germantown, Maryland*

Affordable Terminal Design and Demonstration

- *Raytheon Company, Marlborough, Massachusetts*

- *L-3 Communication Corp, Communications Systems West, Salt Lake City, Utah*

Affordable Terminal Cryptographic Component Development and Demonstration

- *ViaSat Inc, Comsat Laboratories, Germantown, Maryland*

- *L-3 Communications Corp, Communications Systems East, Camden, New Jersey*

#

MOVING AROUND

Boeing is rotating assignments for several executives in its Defense, Space & Security unit business unit as a cost savings move.

These steps allow Boeing to invest in growth opportunities. The affordability efforts continue as additional cost reductions are needed,and are supported by reductions in executive ranks and overhead costs. By the end of 2012, BDS expects to have 30 percent fewer executive positions than in 2010.

#

FIRST NETWORKED CAPABILITY SET IS FIELDED

The U.S. Army, through its System of Systems Integration Directorate, announced that the first fielding of Capability Set 13 has begun new equipment training with two brigade combat teams of the 10th Mountain Division at Fort Drum, New York, and Fort Polk, Louisiana.

Capability Set 13, or CS 13, is the first fully-integrated package of radios, satellite systems, software applications, smartphone-like devices and other network components that provide an integrated connectivity from the static tactical operations center to the commander on-the-move to the dismounted Soldier.

CS 13 marks the first time the Army is delivering network systems as an integrated communications package that spans the entire Brigade Combat Team formation.

New equipment training for the 3rd and 4th Brigade Combat Teams, known as BCTs, of the 10th Mountain Division, located at Fort Drum and Fort Polk, respectively, is already underway. Prior to deploying with CS 13 assets, both units will undergo several months of rigorous classroom courses and hands-on experience with the systems.

"These guys have been to Afghanistan and they know what this capability is going to have to do in combat," said Col. Walter E. Piatt, 10th Mountain Division's deputy commanding general for support. "So who better to get the latest equipment than the 10th Mountain Division?"

CS 13 is ideal for missions in austere environments such as Afghanistan because it provides mobile mission command to all echelons of the BCT.

As U.S. forces continue to draw down in Afghanistan they will turn over many of their Forward Operating Bases and other infrastructure to the local forces, gradually losing fixed network infrastructure locations. CS 13 systems provide mobile satellite and robust radio capability for commanders and Soldiers to take the network with them in vehicles and while dismounted as they conduct combat and security assistance missions. This mobile network greatly reduces the reliance fixed infrastructure.

CS 13 is anchored by two major upgrades: Mission command on the move, allowing commanders to take the network with them in their vehicles; and bringing dismounted Soldiers into the network, empowering ground troops with a new level of real-time information.

Inside mine-resistant, ambush protected vehicles (MRAPs), configured with components of CS 13, commanders will be able to exchange information and execute mission command using mobile communications technologies, rather than having to rely on a fixed infrastructure.

Both brigade combat teams will continue to receive CS 13 equipment in incremental phases over the next several months prior to beginning collective training with the entire capability set.

Story by Katie Cain, System of Systems Integration Directorate

#

EQUIPPING EMBASSIES

A new multi-million dollar Federal Government contract for an Australian and international satellite communications system has been awarded to diversified locally-based company, Hills Holdings Ltd.

The four-year contract is for the design, supply and installation of the Department of Foreign Affairs and Trade's (DFAT) bandwidth efficient global satellite network for 51 Australian Embassies and other DFAT offices around the world and for the continuing support for DFATs high security satellite communication requirements.

STEP Electronics—part of the Hills Holdings Group's expanding Electronics and Communications division—won the contract following a competitive tender process involving at least a dozen businesses, including many of STEP's major industry competitors.

STEP Electronics also holds significant contracts with Telstra and Optus, among others, for both supply and installation of satellite systems.

#

A WEATHER WIN

The U.S. Air Force has awarded the Raytheon Company an $11.5 million contract to enhance the Weather Data Analysis (WDA) system.

The modernized system is expected to deliver significant efficiencies and improve weather forecast analysis capabilities, enabling warfighters to make critical mission decisions.

"Enhancing WDA will deliver advanced capabilities to the Air Force, enabling the Air Force Weather Agency (AFWA) to process and disseminate data from next generation meteorological satellites more efficiently, significantly reducing sustainment costs," said James Olson, director of Space and Environmental Mission Solutions for Raytheon's Intelligence and Information Systems business.

The contract will upgrade the current meteorological satellite

capability and legacy systems at AFWA, improving the agency's analysis capabilities.

Modernizing the system with new hardware and open source database and application servers will expand the weather center's shared data environment, allowing the agency to maximize and distribute data collected by next generation weather satellites, including Suomi NPP and JPSS-1 and 2.

WDA is central to AFWA's global system architecture and is a major weather data and product contributor to the Air Force Weather enterprise. Enhancements delivered under Increment 4, Build B will provide a net-centric infrastructure capable of assimilating global sources of weather data to produce real-time information to warfighters.

Through greater interoperability with command, control, communications, computer, intelligence, surveillance and reconnaissance systems, warfighters will gain access to critical environmental and situational awareness intelligence, enhancing their competitive advantage in the battlespace.

In March 2003, under contract to the U.S. Air Force, Raytheon developed the initial WDA capabilities on the Increment 2 program. Subsequently, Raytheon completed Increment 3 and Increment 4, Build A to expand the system's capabilities. With the latest contract, Raytheon will leverage 40 years of expertise and proven performance in collecting, analyzing and delivering critical, actionable weather information to support mission success.

#

SUOMI NPP CELEBRATION

On October 28, 2011, the Suomi National Polar-orbiting Partnership (NPP) satellite successfully blasted into orbit in a spectacular night launch from Vandenberg Air Force Base, California.

Now, Suomi NPP has orbited the Earth more than 5,000 times and begun returning images and data that provide critical weather and climate measurements of the complex Earth system.

"The Suomi NPP flight and ground teams have spent the first year making sure the spacecraft, instruments and data products are working well.

As the instruments and data products have successfully checked out, the data go out to users," says James Gleason, Suomi NPP project scientist at NASA's Goddard Space Flight Center in Greenbelt, Maryland.

"These data help us improve our computer models that predict future environmental conditions," Gleason added. "Better predictions let us make better decisions, whether it is as simple as taking an umbrella to work today or as complex as responding to a changing climate."

Suomi NPP observes Earth's surface twice every day, once in daylight and once at night. The spacecraft flies 512 miles (824 kilometers) above the surface in a polar orbit, circling the planet about 14 times a day. Suomi NPP sends its data once an orbit to the ground station in Svalbard, Norway, and continuously to local direct broadcast users.

Named for satellite meteorology pioneer Verner Suomi, the Suomi NPP mission is managed by NASA with the National Oceanic and Atmospheric Administration (NOAA) providing operational support and NOAA's Joint Polar Satellite System (JPSS) managing the satellite's ground system.
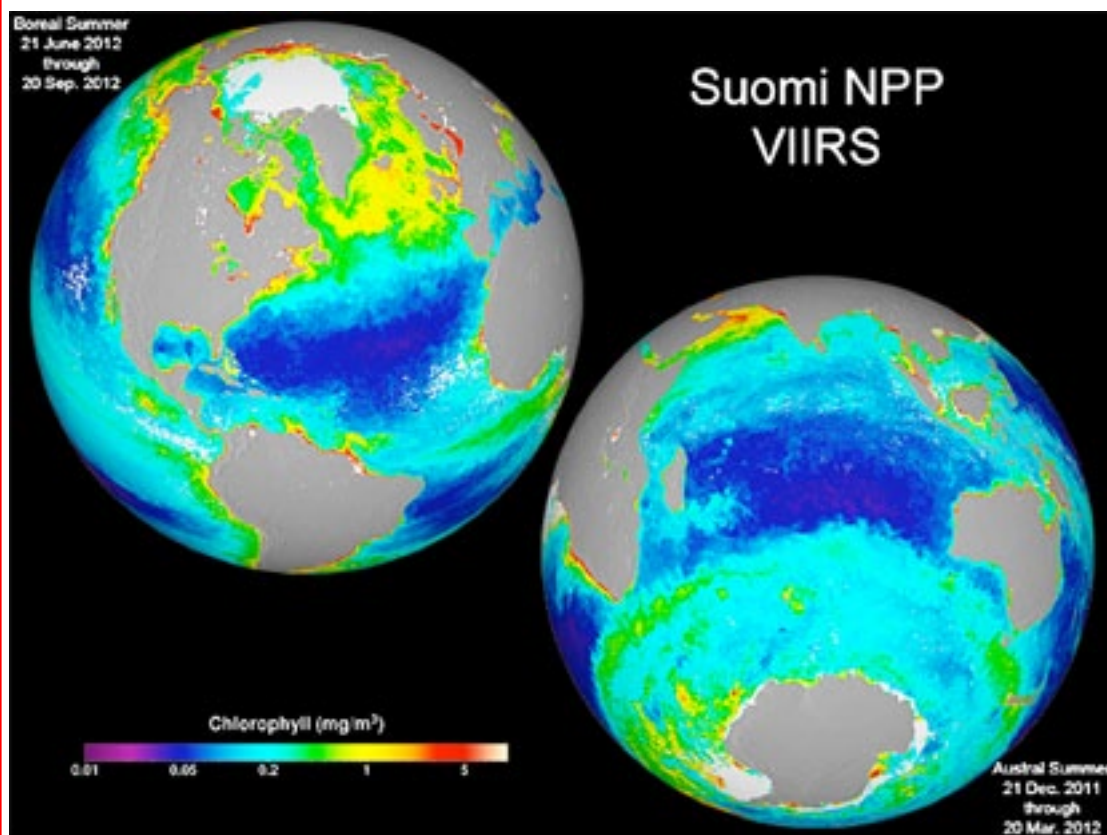
The two images are season-long composites of ocean chlorophyll concentrations derived from visible radiometric measurements made by the VIIRS instrument on Suomi NPP. The date ranges of the two composites are included in the individual images. These false-colored images make the data stand out. The purple and blue colors represent lower chlorophyll concentrations. The oranges and reds represent higher chlorophyll concentrations. These differences in color indicate areas with lesser or greater phytoplankton biomass.

Credit: NASA/Suomi NPP/Norman Kuring

What makes Suomi NPP such a powerful tool is the wide range of important observations it makes with its five instruments. These instruments send back data that allow scientists to see the entire globe from space and further understand oceans, clouds, ozone, snow, ice, vegetation and atmosphere. Suomi NPP's five instruments include:

- *Visible Infrared Imaging Radiometer Suite (VIIRS)*

- *Advanced Technology Microwave Sounder (ATMS)*

- *Ozone Mapping and Profiler Suite (OMPS)*

- *Cross-track Infrared Sounder (CrIS)*

- *Clouds and the Earth's Radiant Energy System (CERES)*

This year, VIIRS left the world in awe with a spectacular composite image of our planet that became known as the 'blue marble,' OMPS took its first measurements of the annual ozone hole, ATMS data are now being used to make weather forecasts, and CrIS data are just about ready to be used in weather forecasts.

The CERES data are being matched to that of its sibling instruments on NASA's Earth Observing System satellites Terra and Aqua with the goal of understanding clouds and the Earth's energy balance.

This fully functional satellite bridges more than a decade of observations by NASA satellites—NASA's Earth Observing System—to the next generation of U.S. Earth-observing satellites—JPSS.

JPSS, currently under development, is building on the success of Suomi NPP and will provide critical observations for accurate weather forecasting, reliable severe storm outlooks, and climate science, including global measurements of atmospheric, oceanic, and terrestrial conditions such as sea surface temperatures, ozone, vegetation, and more.

#

ANOTHER IMPORTANT PROJECT COMPLETED

The Army's current tactical communications wide area network backbone, Warfighter Information Network-Tactical, or WIN-T, Increment 1, hit a major milestone when it celebrated the final fielding of the last unit identified to receive the system.

"Because of WIN-T Increment 1, we are a more capable and lethal force," said Col. Ed Swanson, project manager, or PM, for WIN-T, which is assigned to the Program Executive Office for Command, Control and Communications-Tactical, known as PEO C3T.

"Increment 1 was a key component to modularity and the Army's transition to a brigade combat team-centric force. It enabled the autonomous operations of [brigade combat teams] by providing beyond-line-of-sight capabilities and supported secure and unsecured data, voice and video communications to the battalion level.

"Increment 1 has supported the full range of military operation in Operation Iraqi Freedom and Operation Enduring Freedom since 2004."

The fielding completion of WIN-T Increment 1 also sets the stage for the onset of WIN-T Increments 2 and 3 of the Army's tactical communications network, which will provide

WIN-Tactical System Architecture

the "initial" and "full" on-the-move network communications capability to the Army.

The milestone was marked with the hand-off of the last WIN-T Increment 1 system to a unit, providing for the first time a WIN-T Increment 1-equipped force across the entire Army. To commemorate the event, a ceremony was recently held at Aberdeen Proving Ground.

Many of the organization's current and past leaders were among those who paid tribute to the accomplishment and to the system that provides critical communication capabilities to Soldiers on the battlefield.

Similar to a home Internet connection, WIN-T Increment 1, formerly known as the "Joint Network Node, or JNN, Network," began fielding in 2004 to support operations in Iraq and Afghanistan. It provides Soldiers with high-speed, high-capacity voice, data and video communications down to battalion level units, at-the-quick-halt.

In just eight years, the Product Manager, or PdM, WIN-T Increment 1 fielded the entire Army with five Regional Hub Nodes, 18 Unit Hub Nodes, 36 Unit Hub Satellite Communications, known as SATCOM, Trucks, 415 JNNs, 1422 Battalion Command Post Nodes, 1837 Satellite Transportable Terminals and 48 Single Shelter Switches.

"This is one of the those historic times in a PM when you can take a step back, take a knee and highlight one of the great milestones of a program," said Lt. Col. Greg Coile, PdM for WIN-T Increment 1 and PdM Satellite Communications.

"With WIN-T Increment 1 in hand, Soldiers can reliably execute networked mission command at a faster pace, in conjunction with joint and coalition forces, across greater distances and over terrain obstacles that once blocked vital communication signals. This capability dramatically changed the way we fight on the battlefield. I thank the WIN-T Increment 1 and SATCOM team for their dedication and selfless service to deliver this capability."

Military operations in Desert Storm in 1992, as well as Operation Enduring Freedom in Afghanistan in 2001 and Operation
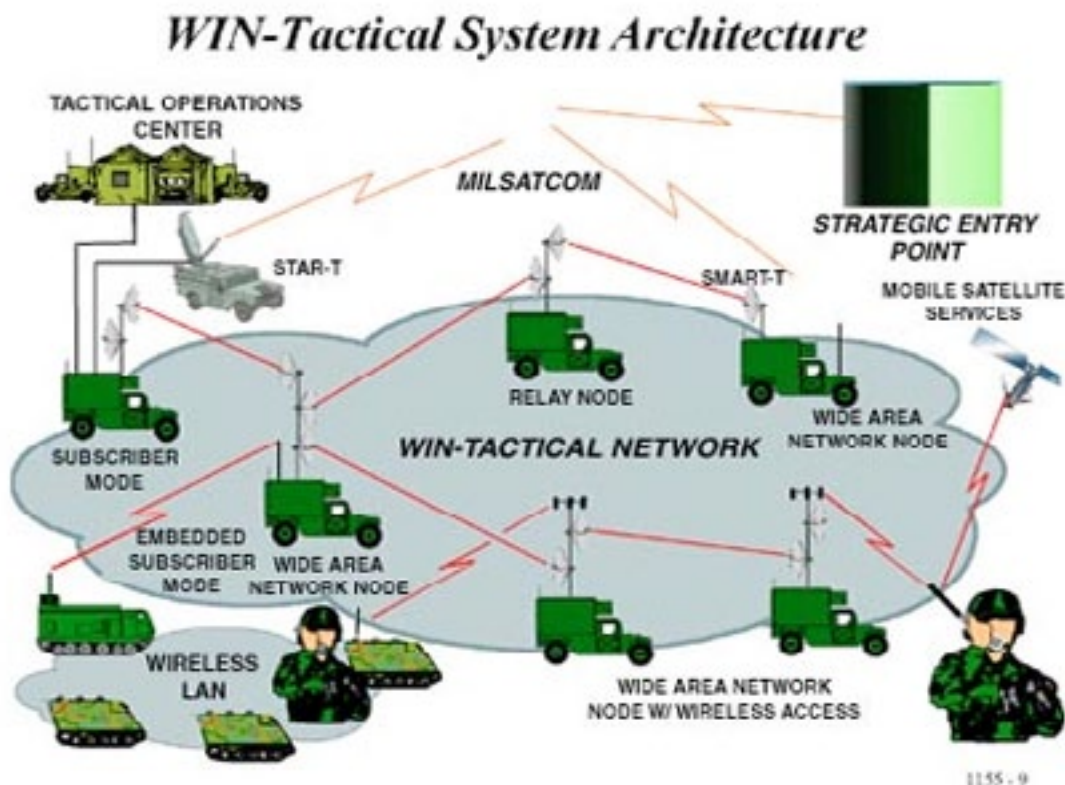
Iraqi Freedom in 2003, revealed inadequacies in the Mobile Subscriber Equipment, or MSE, communications system to support highly mobile and dispersed forces in a digital environment.

Before the widespread availability of satellite communications technology, battlefield communications required the installation and maintenance of relay towers and cables, limiting range and flexibility of mission support. The outdated MSE could no longer keep up with the pace of battle. WIN-T was conceived to solve this problem and to enable mobile mission command on the battlefield.

As an outgrowth of a 3rd Infantry Division Operational Needs Statement, a process that allows urgent requests from theater for equipment to be identified and rapidly fielded, the JNN network was developed to bridge the gap between the outdated MSE communications system and the "full" on-the-move WIN-T network capability.

The Army, along with congressional assistance in the form of supplemental funding, shifted priority from WIN-T to JNN. As the result of a Nunn-McCurdy restructure in June 2007, the WIN-T program was organized into four separate Increments. The JNN program was integrated into WIN-T as Increment 1.

"I don't think people truly realize the magnitude of the impact the WIN-T Increment 1 Product Office has had on the Army," said Col. Chuck Hoppe, former PM for WIN-T and current military deputy

director for the Communications-Electronics Research, Development, and Engineering Center. "It has touched every combat fighting team that has rotated into and out of theater, every time they have rotated. It fielded the entire Army in eight years. Phenomenal."

PdM WIN-T Increment 1 also completed the WIN-T Increment 1a upgrade in September, which establishes a common baseline across the force. Army units originally fielded with the early JNN network were upgraded to a common baseline. The upgrade provides newer technology for increased capability, a longer equipment life cycle and more efficient technology refreshments.

"It is amazing to think about this program office and the enormity of the impact it had and continues to have on the network and in supporting overseas contingency operations," said Col. Ray Compton, former PdM for WIN-T Increment 1 and current military deputy for Edgewood Chemical Biological Center.

This upgrade encompasses all WIN-T Increment 1 units and should be completed in FY 2016. The new upgrade increases interoperability with the second generation of the Army's tactical network, WIN-T Increment 2 and improves network security/efficiency.

Meanwhile, WIN-T Increment 2 completed its Initial Operational Test and Evaluation in May and is a critical part of Capability Set 13—an integrated baseline of network technologies that

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began fielding to Army brigade combat teams in early October.

WIN-T Increment 2 supports operations while "on-the-move," introduces networking radios, enhances Network Operations (NetOps) for network planning and monitoring and pushes capability down to the company level.

Development and testing continues on WIN-T Increment 3, which will add new capabilities and mature previously fielded Increment 2 capabilities to realize a "full" on-the-move tactical network for the Army. WIN-T Increment 3 will add an air tier to the WIN-T architecture to offload communications from satellite transponders, while increasing network speed and reliability.

WIN-T Increment 3 will also provide the Joint Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (JC4ISR) radio, which makes great strides in improving throughput capacity and extending communications ranges. Improvements in NetOps will also be realized with WIN-T Increment 3.

"WIN-T Increment 1 laid the foundation for the Army's future network," Swanson said. "And that network will allow for a more modular, flexible force to fight anywhere in world. By having the capability to act swiftly and with greater precision and speed, unencumbered by geographical topography, networked commanders will have a tremendous affect on the outcome of future battlefield operations."

Story by Amy Walker, PEO C3T

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WIN-T photo courtesy of Lockheed Martin

SATCOM TRAINING FOR PUBLIC AFFAIRS

Soldiers with the South Dakota Army National Guard's 129th Mobile Public Affairs Detachment trained on state-of-the-art satellite equipment at Camp Rapid in preparation for their upcoming deployment to Afghanistan.

The Defense Video and Imagery Distribution System's mobile satellite, known as DVIDS Direct, will give the unit, made up of journalists and broadcasters, the capability of providing U.S. news media with real-time broadcast-quality video, photography and print products.

"The unit could broadcast high-profile events live," said Donovan Hill, a support engineer with NORSAT Inc., who provided the training. "DVIDS Direct was used in the spring of 2012 to feed video of the president's address from Bagram Airfield."

"This technology allows television or radio stations the opportunity to interview soldiers from their community, live on-the-air," said Army Sgt. 1st Class Theanne Tangen, operations noncommissioned officer. "The system will also provide our unit internet capabilities."

The training focused on introducing members of the 129th to satellite terminology and the technical aspect of satellite news gathering.

"The unit has not used satellite systems prior to the training, so we were shown everything from setting up the satellite dishes, to operating the software and transmitting video," Tangen said. "We went through the entire process enough times that we're confident in our abilities and look forward to using the technology overseas to help us reach an even bigger audience."

The 129th will add two DVIDS Direct systems to their

Army 1st Lt. Samuel Otto, a public affairs officer in the South Dakota Army National Guard's 129th Mobile Public Affairs Detachment, connects a cable to the Defense Video Imagery Distribution System's mobile Satellite dish during operator training at Camp Rapid Oct. 23, 2012. The 129th MPAD is scheduled to deploy to Afghanistan in February and will add two DVIDS Direct systems to their inventory, enhancing the distribution of high quality print and broadcast media.

inventory, which will be used in Afghanistan and when they return home. "DVIDS Direct will let us distribute our products immediately to media outlets worldwide, whether we are in South America covering stories on our State Partnership Program or here in South Dakota reporting on the National Guard's role in statewide emergencies like the Missouri River Flood," said Army Sgt. Jacqueline Fitzgerald, broadcast noncommissioned officer.

"This technology will enhance our ability to provide media with reliable access to all branches of the U.S. armed forces and coalition partners serving overseas," Tangen said. "It also helps us fulfill the military's obligation to provide maximum disclosure of information with minimum delay."

Story by Army Spc. Manda Walters, 129th Mobile Public Affairs Detachment

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DISPATCHES

RISK REDUCTION FOR COMMS + MOVING ON UP

Northrop Grumman Corp. and the U.S. Air Force's Space and Missile Systems Center will demonstrate ways to make future protected military satellite communications capabilities more affordable with three awards received September 28th under the Protected Military Satellite Communication Design for Affordability Risk Reduction initiative.

Under the 10-month, firm fixed-price contracts, the company will:

- *Develop an unclassified, government-owned waveform specification and demonstrate its feasibility through component-level demonstrations.*

- *Design and demonstrate a space/ground modem at the component level through analyses, software simulations, waveform implementation and a hardware demonstration.*

- *Demonstrate gateway affordability by using commercial-off-the-shelf components combined with software emulation. The demonstration also will show the ability to interface with a mission management system, integration into an information assurance architecture, as well as other key gateway functions and capabilities.*

Additionally, the Company has appointed Chris Yamada vice president of its Aerospace Products organization.

In this role, Yamada will be responsible for the newly established organization, offering technology products from Northrop Grumman's Aerospace Systems sector to broader markets and customers.

He will retain leadership of several of the company's wholly owned strategic business units, including Adaptive Optics Xinetics, Astro Aerospace, Cutting Edge Optronics, Microelectronic Products and Services, and SYNOPTICS.

Yamada joined the company in 1983 and held positions as general manager of affiliates, director of directed energy systems strategic business planning and president of TRW Astro Aerospace.

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Chris Yamada

NSR ANALYSIS: EUROPEAN DEFENSE AGENCY AWARD TO ASTRIUM

The recent three-year contract awarded to Astrium Services by the European Defense Agency (EDA) for 2.3 million euros of commercial satellite capacity seems very small but still quite timely in a restrained budget environment.

However, how long will the window of opportunity last to sell bulk satellite capacity to government entities in Europe?

The climate of European defense over the past few months provides hope that a window of opportunity could lead to more deals like this for future ComSatCom in Europe.

With more than 20 military and civilian missions deployed over the past 10 years by members of the European Union, some governments view this record as a way to further strengthen the EU role beyond just managing the civilian side of conflicts and acting as a second fiddle to NATO.

France's new Foreign Affairs Minister recently stated that "the EUs security and defense cannot fall back on NATO's shoulder alone."

As the U.S. transitions its military focus to the Asia-Pacific region, he said that Europe "must take greater responsibility for its security…and act more autonomously across the spectrum of international security," when the U.S. is not interested in participating or leading operations such as in Libya.

The roadmap for this to happen consists in capacity-building, more cooperation, and pooling and sharing of resources, as reduced budgets take hold until a recovery is in sight.

The EDA contract is in that vein as it involves five countries that consider this expected savings a serious enough matter to buy and exchange capacity as a group. And at $3 million for three years, there is room to grow compared to commercial capacity leasing by EU member States, which stood at about one-tenth the U.S. level in 2010.

It is also peanuts compared to the overall European defence spending, which was just below 200 billion euros in 2011.

On the other hand, three of these countries have spent billions of euro on proprietary military satellites and terminals for years, so the envelope allocated is miniscule in comparison. Why would they then do this?

Perhaps the uncertainty in budgets is reason enough but with current budget pressures, we could see changes in these programs with more private-public partnerships where excess capacity could be sold commercially.

France (for one) is embarking on studies to find the best solution for its next-generation military satellites, and it has partnered with Italy for its Syracuse 3 military satellite system to save resources.

Underneath this austerity canvas, EDA was tasked with looking at programs that pool resources and increase cooperation to save close to 1 billion euros in European defense budgets.

Thus, synergies and more oversight of budgets in Europe can mean an opening for cheaper commercial capacity for defence.

NSR believes that for the short-term, the value proposition that offers an easy transition to improve performance in terms of capacity, bandwidth and equipment features will be highly-sought.

Still, a growing portion of users of satellite communications will continue to investigate and even migrate from C- and Ku-band to internal military capacity or higher frequencies (in particular X-band) due to the increasing bandwidth demand and the need for more secure communications.

And for some European defense ministries, such as Denmark, Luxembourg and the Netherlands, it is via partial funding of U.S. military satellites in the latter part of this decade that they will fulfill this need.

So, how much money and how big will the orders be for other EDA contracts?

Analysis by Claude Rousseau, Senior Analyst, NSR, France

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NEXT... PROJECT WITH DOD

On schedule to begin launching in 2015, this is the largest commercial space program underway anywhere in the world.

Iridium Communications Inc. has been awarded a five-year indefinite-delivery/indefinite-quantity (IDIQ) contract from the Defense Information Systems Agency (DISA) to upgrade the Defense

Artistic rendition of Iridium's NEXT satellite

Department's dedicated Iridium(R) gateway.

The IDIQ contract has a one-year base period and four one-year options, and has a maximum value of $47 million over the full five-year period.

Under the terms of the contract, Iridium will provide hardware, software and integration services to successfully upgrade the gateway and to ensure the gateway's compatibility with Iridium NEXT, the company's next generation satellite constellation.

Scott Scheimreif, Iridium's acting executive vice president, government programs, said, "We have been working together for many years, providing critical communications services to military installations and personnel around the world.

"The upgrades we will make under this new agreement will ensure the DoD's ability to leverage the unique capabilities of Iridium NEXT and to improve and enhance communications capabilities for our warfighters well into the future."

On schedule to begin launching in 2015, Iridium NEXT is the largest commercial space program underway anywhere in the world.

"Once fully operational, the constellation of 66 low-Earth orbiting (LEO) satellites and six in-orbit spares will extend Iridium's position as a critical communications partner for customers such as the DoD, as well as the Company's more than 275 commercial partners and consumers.

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CRUCIAL MILSATCOM SOLUTION FINN-ISHED

Norsat has provided satellite communication equipment and services for the Finnish Defence Forces since 2009. Prior to Norsat's involvement, the Defence Forces were using an external network provider—however, they needed a far more reliable solution.

Norsat met this need with an in-house communication network, which was scaled from an initial small network to a large communications hub. The network now provides a cost-effective, high-speed direct connection from Finland to the Finnish Army, Navy and Air Force troops located anywhere in the world.

Background

The **Finnish Defence Forces** (**FDF**), comprised of the Army, Navy and Air Force, are responsible for defending national territory, supporting other national authorities in safeguarding society, and leading and implementing international crisis management operations. More than 15,000 soldiers and civilians in the Forces are involved in deployments that include the European Union and United Nations peacekeeping missions around the world. The FDF have a critical need to communicate with their deployed troops in the challenging environments in which they operate, ranging from winter temperatures of -40 degrees C to desert highs of +50 degrees C.

The Challenge

Prior to **Norsat**'s involvement, the FDF were using a third party hub located outside of Finland to communicate with deployed units. The primary problem posed by this system was the lack of reliability in the terrestrial connection between the satellite hub and the Finnish military network. Additionally, the network was under third party control—the FDF were forced to rely on their provider to resolve all technical issues, regardless of their magnitude.

The FDF needed a more robust communication solution that would connect their troops in extreme environments. They wanted to move away from an external communications provider and bring their network in-house to ensure reliable service, strong security, and quality support. The ideal solution needed to be scalable so that it could be implemented in stages to validate the chosen technology, and spread capital expenditures over time. Maintaining or reducing operational expenses was also a firm requirement.

Chad Initiated Solution

Norsat began working with the Finnish Defence Forces in 2009, during a European Union peacekeeping mission in **Chad**. The army required a single C-band satellite communications link and Norsat met their needs with a 2.4m transportable satellite terminal for use in Chad, and a 3.8m hub antenna located in Finland.

The Norsat network enabled a reliable, direct communications link from Chad to Finland, and a second 1.8m remote terminal was provided shortly thereafter.

Norsat hub

Following the success of the network used in Chad, the FDF requested that Norsat assist them in expanding their communication network to support an on-going mission in Afghanistan. This mission required the use of a different satellite, operating on Ku-Band, and the FDF were looking to use a more reliable network which would remain under their own control, and enable shorter reaction times.

To meet this crucial need, Norsat proposed a complete turnkey solution, including upgrading the existing system to manage bandwidth via **Comtech**'s *Vipersat Management System*, and expanding the network to a second satellite. Norsat also upgraded the existing remote terminals to be dual-band (C- and Ku-) capable.

After consultation with the FDF and design of the network, Norsat provided a second 3.8 meter satellite terminal hub with Ku-band capabilities to support the new satellite, and sent a customer support team on-site to install and configure the hub equipment on base in Finland. The team ensured the new hub equipment was installed and functioning correctly and provided on-site training for technicians so that they could configure and operate the system, including the new Vipersat Management System, independently. Norsat also provided additional portable ground terminals, equipped with dual C- and Ku-band connectivity, enabling easy switching between frequency bands in the field.

As the FDF became more and more experienced with this system, Norsat proposed a number of upgrades to the hub equipment to provide for full redundancy. After planning and testing with two hub antennas, the FDF deployed a third 3.8m hub antenna, as well as fully redundant transmit and receive systems for each of the existing hub antennas, all necessary for mission-critical operation.

The success of this network led the FDF to investigate the expansion of this solution for use in their Air Force and Navy. In March 2012, the first ship was integrated into the existing satellite network. To achieve this, Norsat provided the necessary equipment to upgrade the ship's communications systems, and provided an on-site technician to ensure proper installation.

After the success of the field trial on the first ship, the Finnish Navy selected Norsat to provide the equipment required to integrate an additional four ships into the satellite network. The Air Force has also come to rely on the system, bringing a transportable antenna as part of their command element when participating in exercises and EU obligations.

Norsat's hub

In addition to equipment supply, installation and network design, Norsat provided frontline technical support including consultation on integrating the new network with within the existing infrastructure, customization of fit for purpose terminals, 24/7/365 telephone support, a dedicated customer service team, and second line network management services. Norsat's support engineers were frequently on-site in Finland to ensure the availability of the communication network and to train the FDF on the ongoing operation and maintenance of the system.

Results

Norsat's communication network has improved the reliability of communications for the Finnish Defence Forces and now enables Army, Navy and Air Force to communicate from anywhere in the world, including deployments in Afghanistan, Chad, Djibouti and Lebanon. This solution puts the FDF in full control of their communications systems, and improves network security by keeping their network in-house.

The network was scaled from the original single communication link for the Army to a fully redundant satellite teleport that now supports the entirety of the FDF. The scalability of this network enabled the FDF to assess the suitability of the solution before agreeing to expansion, and facilitated the management of capital expenditures. The network currently stabilizes their operating costs, and as it is expanded into the Navy and Air Force, it will begin to reduce operating costs as expensive pay-per use external satellite communication services are replaced by the fixed cost internal network.

The choice of the Vipersat Management System has been extremely beneficial to the FDF. The technology provides flexibility for operating the remotes, including on-demand bandwidth allocation and mesh connectivity between remotes, and it greatly reduces the requirements on the field operators.

Additionally, the dynamic *single channel per carrier* (**SCPC**) nature of Vipersat provides for significantly better *quality of service* (**QoS**) capabilities, and allows remotes with radically different capabilities to participate in the same network. This enables naval vessels with 1m antennas and 8 watt transmitters to participate in the same network as 2.4m antennas with 40 watt BUCs.

CRUCIAL MILSATCOM SOLUTION FINN-ISHED (CONT.)

> *"Most of all, we have been pleased with the technical support and training, which has enabled us to produce reliable communications around the world, with minimum interference."—FDF Head of Army CIS Integration Office, Captain Juha Pekka Leppänen*

Hub site set up

This communication solution provides a breakthrough for the Navy, as it enables access to shore-based resources that were previously unavailable while at sea. For the first time, the Navy now has full access to the military network while at sea, including access to secure documents and emails, which will facilitate improvements in productivity and reductions in response times. It also represents a significant cost reduction, as the Navy no longer has to rely on traditional global maritime communications providers for their day-to-day communications.

In the field, Norsat's rugged, portable satellite terminals consistently provide communication links in the extreme environmental conditions of desert deployments, wet conditions and cold Northern winters.

Norsat's easy to use "*LinkControl*" interface has enabled FDF technicians to successfully operate in the field with minimal training and expertise. Additionally, the portable terminals can be quickly set up without tools, an essential requirement for the FDF troops who often use the terminals in extremely cold conditions where gloves are necessary. The dual band functionality of the terminals also enables the army to switch bands easily in the field and make communications decisions on a mission to mission basis.

Regarding Norsat's involvement in the satellite communications network, the FDF Head of Army CIS Integration Office, Captain *Juha Pekka Leppänen* said,

> *"The team has been helpful, flexible and effective in helping us to meet the demanding equipment criteria of Crisis Management Operations. Most of all, we have been pleased with the technical support and training, which has enabled us to produce reliable communications around the world, with minimum interference. We look forward to continuing our personal and supportive cooperation in the future."*

About the company

Founded in 1977, Norsat International Inc. is a leading provider of innovative communication solutions that enable the transmission of data, audio and video for challenging applications and environments. Norsat's products and services include leading-edge product design and development, production, distribution and infield support and service of portable ground station satellite terminals, antennas, Radio Frequency (RF) conditioning products, microwave components, maritime based satellite terminals and remote network connectivity solutions. Additionally, through its Norsat Power Solutions Division, Norsat is a provider of power conversion and energy storage solutions for the communications, transportation and resource sectors. More information is available at *www.norsat.com* or via email at *investor@norsat.com*.

Hub site work begins

GEOINT: THE FOUNDATION FOR ALL INTELLIGENCE

by Derek Ireson, Vice President, Defense & Intelligence, Intergraph

The need for geospatial intelligence is stronger than ever. Across domains, experts are discussing better methods for collecting, exploiting and sharing geospatial information.

Look no further than the recent GEOINT 2012 event, where General *James R. Clapper*, Director of U.S. National Intelligence, discussed the value of intelligence integration. He highlighted new efforts to develop a cloud-based, enterprise model for sharing data, the Intelligence Community Information Technology Enterprise.

Similarly, **National Geospatial-Intelligence Agency** (**NGA**) Director *Letitia A. Long* discussed NGA's efforts to make its content available for everyone to use, on-demand, to help meet their mission needs. A core part of this program is the **NGA GEOINT Mobile App Store**, which is now up-and-running. Director Long's vision is to have the majority of the apps developed by NGA's partners.

As these intelligence leaders make clear that new innovations bring the "*power of GEOINT*" into the hands of the user are now a core focus for the defense and intelligence communities. By making GEOINT content that is discoverable, accessible and available across multiple domains, agencies are advancing the concept that GEOINT is the foundation of all intelligence efforts, community-wide.

For many in the trade, GEOINT is the common denominator that allows other intelligence disciplines to meet mission needs. That's because, ultimately, intelligence must be spatially related to become useful. Location awareness is the driver for instant access to accurate and detailed geospatial intelligence products, such as hardcopy and digital maps, generated from multi-source data, to meet mission requirements.

No matter what happens in the halls of government around the globe with regard to agency budgets, defense and intelligence organizations, on a global scale, will always require access to the correct geospatial data to aid in protecting populations against terrorist threats and deploying military units for multi-national operations. In fact, the challenges for defense and intelligence organizations have never been greater.

General *Clapper* said the U.S. is facing the most demanding array of threats he has ever seen—the needs only increase as agencies take on new challenges. For instance, access to imagery and analysis capabilities provides the visual insights needed to propel civil disaster management and humanitarian efforts, which has become a core mission of the NGA.

Increasing efforts to bring GEOINT to the hands of the user coupled with more global challenges yields a need for further innovations that support the whole life cycle of geospatial information management, from sensors down to soldiers. In fact, the theme of GEOINT 2012 was "*Creating the Innovation Advantage*," which is extremely timely as governments require the right creativity and innovations to address today's threats and in order to meet these real-time needs.

Innovation will be the driver for the new cloud and mobile efforts that General *Clapper* and Director *Long* discussed as well as many others. Innovations such as data capture and fusion in an integrated environment, on-demand geo-processing and rapid production of maps to specification are central to providing real-time intelligence to users whether they are on a desktop or mobile device.

GEOINT: THE FOUNDATION FOR ALL INTELLIGENCE (CONT.)

This is where the often-used expression "*real-time, actionable intelligence*" comes to light. By advancing technologies that enable organizations to discover, exploit and share—rapidly and securely—the wealth of information contained in data from any source, agencies can make those smarter decisions that protect military personnel and nations.

There are many useful innovations now available that can advance this goal. New solutions provide tools to enable easier, more thorough use of radar data resources, for example. Defense and intelligence organizations can now transform *full motion video* (**FMV**) from *unmanned aerial vehicles* (**UAVs**) into real-time intelligence at the strategic level or in the field at the tactical level for faster decision making.

The proliferation of data from these multiple sources—whether from UAVs, LiDAR or commercial satellites—requires defense and intelligence agencies to grapple with the challenge of processing data in near real-time. Advances in real-time, multi-sensor fusion are helping to overcome this hurdle. By fusing data from multiple sensors into an integrated geospatial environment, organizations can achieve true *multiple intelligence* (**Multi-INT**) capabilities.

Budget challenges also require organizations to think differently about their approach to both innovation and implementation. Many seek flexible, self-service capabilities in the form of off-the-shelf software for GIS, photogrammetry, remote sensing and data management and sharing, allowing them to develop customized geospatial solutions that meet their dynamic needs with greater control and agility. Others have opted for full-service capabilities that offer a full lifecycle of outsourced geospatial services, allowing organizations to meet mission goals within budget and on time.

These are but a few of the ways GEOINT innovations are aiding agencies in need. Based on the caliber of speakers and their core messages and the level of innovations showcased in the exhibition hall at GEOINT 2012, the defense and intelligence community is in good hands; hands that work passionately and tirelessly to advance the tradecraft.

In spite of budgetary concerns, complicated missions at home and abroad will only increase in number. So, too, will the role that GEOINT plays. GEOINT will remain the foundation for effective operations.

As defense and intelligence organizations face an increasingly complex world, new innovations will drive new capabilities, and new capabilities will drive mission success. In uncertain times, with threats increasing and budget decreasing, GEOINT will make their job a little easier. In the high stakes world of national security, it's no small thing to say: **GEOINT is there to help**.

About the author

Derek Ireson currently holds the position of Vice President, Defense & Intelligence Portfolio in the Security, Government and Infrastructure (SG&I) Division of Intergraph Corporation. As one of the five Product Centre Portfolio Groups within SG&I (the others being Public Safety, Security, Utilities & Communications and Geospatial Solutions), the D&I Portfolio Group is responsible for designing and developing high quality specialized Geospatial software solutions for the global Defense and Intelligence market.

DISA: 2000-2010 COMSATCOM INFO RELEASED TO STAKEHOLDERS...

The Department of Defense's (DoD's) Commercial Satellite Communications (COMSATCOM) Annual Usage Report is widely regarded as the authoritative source for information on DoD COMSATCOM expenditures and bandwidth usage.

The United States Strategic Command (USSTRATCOM) partners with the Defense Information Systems Agency (DISA) on an annual basis to report on the DoD's COMSATCOM prior year usage and expenditures, pursuant to Chairman Joint Chiefs of Staff Instruction 6250.1D. The fourth and latest of these annual reports covers DoD COMSATCOM usage and expenditures over the period FY 2000 through FY 2010 and was released in August of this year to the DoD stakeholders.

The Annual Report provides a detailed account of DoD's annual COMSATCOM bandwidth usage and expenditures, both in aggregate and segmented by various service profiles such as Combatant Commands (COCOMS), Services, and DoD Agencies (CC/S/A), frequency band, and coverage region. The report also analyzes DoD cost effectiveness in relation to general market prices of COMSATCOM bandwidth.

In FY 2010, DoD expended $972.1 million on COMSATCOM services ($655.3 million for Fixed Satellite Services [FSS], $12.7 million in Ultra High Frequency [UHF] satellite communications, and $304.2 million in Mobile Satellite Services [MSS]). Over the course of FY 2010, DoD FSS expenditures and associated usage increased 3.8 percent and 6.4 percent, respectively. The Army, Navy, and Air Force accounted for 75.8 percent of all reported FSS expenditures among all CC/S/As in FY 2010.

The legacy Defense Information Systems Network (DISN) Satellite Transmission Services-Global (DSTS-G) contract provided satellite bandwidth and services to meet the majority of DoD FSS requirements.

The DSTS-G FY 2010 average prices for COMSATCOM bandwidth exhibited superior performance compared with other DoD COMSATCOM contracts. However, the FY 2010 Report marks the first time the average DSTS-G price for leased bandwidth exceeded the relative global industry average. The report concludes this was likely due more to the fact that continued bandwidth supply constraints are in regions where DoD most relies on COMSATCOM (namely the Middle East/Africa, Europe, and North America). Within-region comparisons demonstrate DSTS-G offered more cost-effective solutions in relation to market averages (*See Figure 1 below*).

MSS FY 2010 expenditures totaled approximately $304.2 million, increasing by 14.9 percent from FY 2009. DISA's Inmarsat and Enhanced Mobile Satellite Services (EMSS) contracts were the predominant contracting vehicles among DoD components, accounting for 80.9 percent of DoD MSS expenditures. Broadband Global Area Network (BGAN) accounted for 33.0 percent of total Inmarsat expenditures in FY 2010.

From FY 2009 to FY 2010, EMSS expenditures grew 4.1 percent, from $78.6 million to $81.9 million. In FY 2010, a total of 70 million MSS airtime minutes were used, 8 million minutes for Inmarsat services and 62 million minutes for Iridium services. Army, Navy, and Air Force accounted for 88.2 percent of all reported MSS expenditures among all CC/S/As in FY 2010.

Efforts are underway at USSTRATCOM and DISA on the FY 2011 Annual Report, working on updating the format of the FY 2011 Annual Report to reflect changes in market and contracting realities (e.g., Future COMSATCOM Services Acquisition [FCSA]). The majority of on-going DSTS-G requirements began transitioning to FCSA vehicles in February of 2011. In the coming weeks, each CC/S/A will receive the data validation packages from USSTRATCOM/DISA.
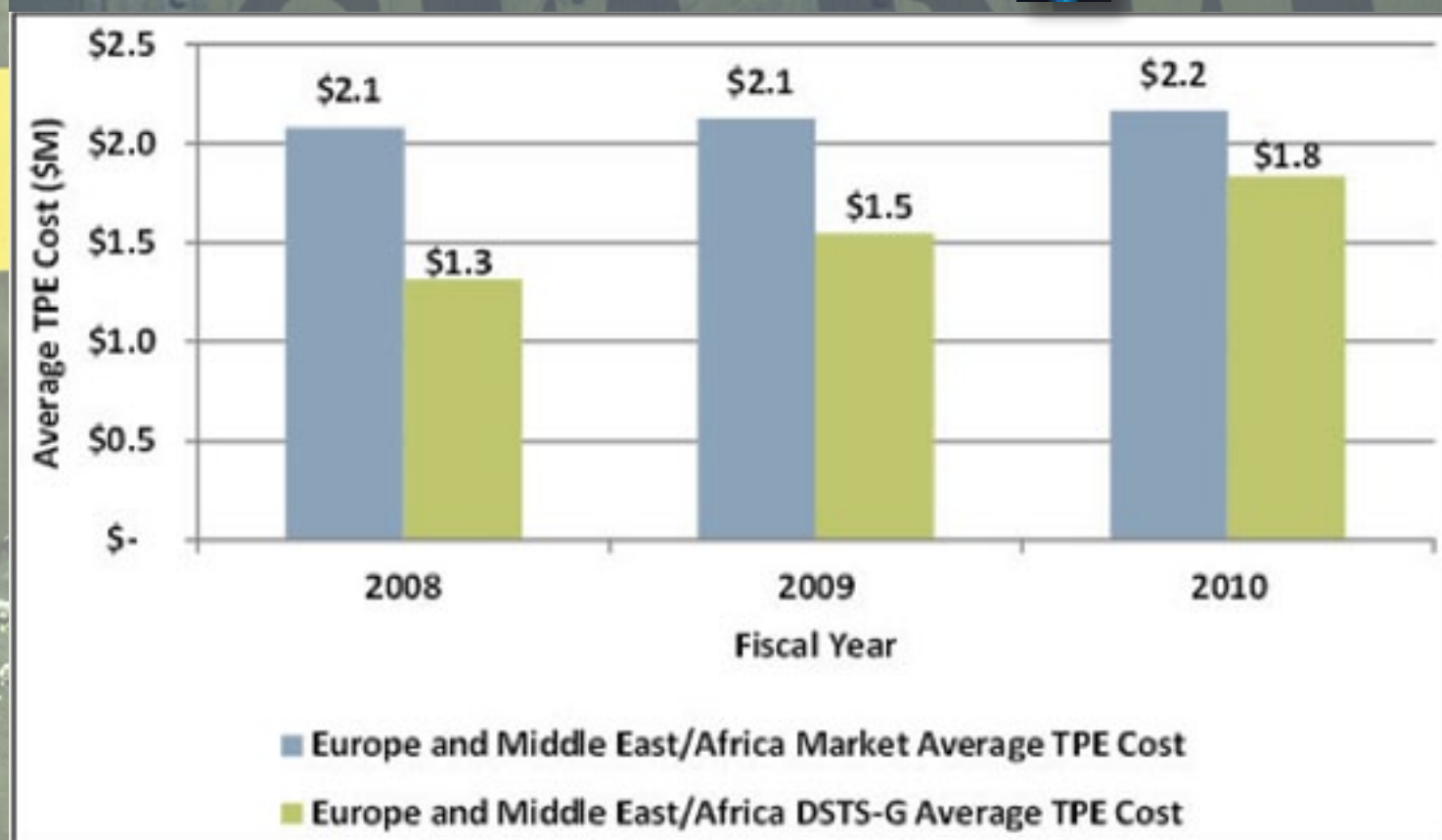
Source: FY 2010 Commercial Satellite Communications Usage Report

Figure 1: FY 2008–FY 2010 Europe and Middle East/Africa Average Transponder Equivalent (TPE) Cost Comparison

ADVANTAGE... SDR

by Claus Vesterholt, Technical Program Mgr.—SATCOM, GateHouse A/S

This is an introduction to the opportunities and advantages associated with *Software Defined Radio* (SDR), particularly within the field of satellite communication (SATCOM), and more specifically in relation to Inmarsat's currently most advanced IP-service, the *Broadband Global Area Network* (BGAN).

SDR (Software Defined Radio) is no longer a vision but an opportunity readily at hand for manufacturers of military terminals and radios, software developers and satellite communication (SATCOM) service providers. This article argues that:

- Rapid technological developments within the underlying hardware components have paved the way for SDR.

- In addition to the multiple generic advantages of SDR, SATCOM may be the only communication option available in many operational scenarios—and at present Inmarsat BGAN is an attractive option for achieving global commercial SDR-based satellite communication.

- Access to commercial SATCOM such as Inmarsat BGAN is expected to be a vital supplement to military programs also in the future, offering on-demand access and additional capacity.

- GateHouse has a long track record as a leading provider of the complete software package for Inmarsat BGAN terminals—the most recent offering is the BGAN Waveform developed for SDR and SCA-compliant military radio hardware.
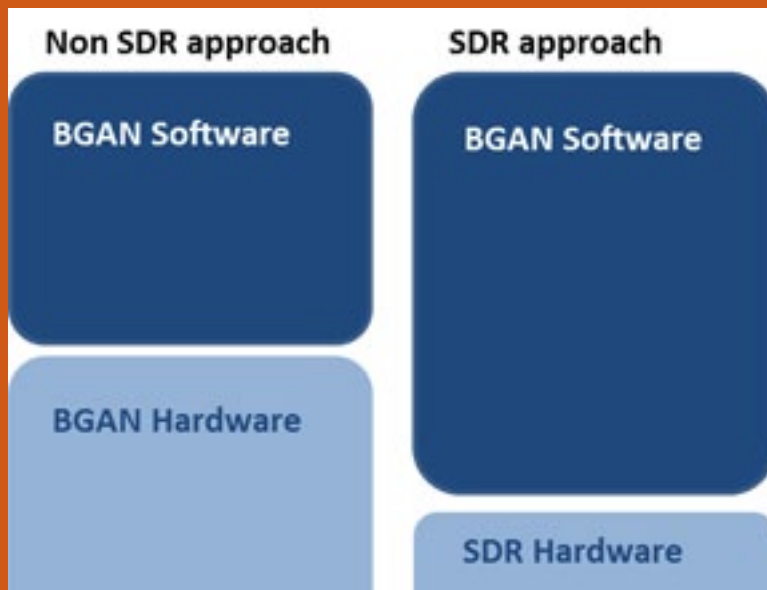

Figure 1. Using an SDR approach, the BGAN functionality is defined by software only, leaving the hardware platform generic. This is in contrast to the non-SDR approach where BGAN specifc hardware is incorporated in the design.

An Introduction
SDR as a term has been around for a long time. The technology has been the vision of a single wireless multi-purpose device that could seamlessly integrate multiple communication channels, including SATCOM... a vision no longer.

ADVANTAGE... SDR (CONT.)

Driven mainly by the military market and DoD/MoD's need for interoperability, flexibility in choice of communication means, reduced total cost of ownership as well as rapid functionality upgrades and repair, the SDR technology has experienced great advances and focus during the last decade.

With the increasing globalization on the military scene, (*i.e.*, participation of various countries in international conflict resolution and peace keeping missions) the need for communication and interoperability in remote areas of the globe has significantly increased.

SATCOM is an attractive option when the communication distance increases and direct radio links become unavailable in the scene of operation. SATCOM is used heavily by military entities and governments and operational needs can no longer be fulfilled by the military SATCOM (milSATCOM) solutions only. In fact, 80 percent of all U.S. government and military traffic in 2008 was already carried via commercial satellites[1]—commercial SATCOM is an established supplement enabling easy, flexible and on-demand access to extra capacity.

Inmarsat *BGAN* is the leading global commercial broadband mobile SATCOM service available and the company is a well-established SATCOM provider. BGAN is easy to set-up and use and has already been proven in military field operations. Moreover, BGAN is currently an attractive option for achieving commercial SDR-based SATCOM. This combination of BGAN SATCOM and SDR is enabled by **GateHouse** and is the company's most recent technological development.

Currently, militaries operate with dedicated hardware/software for each communication means, *e.g.*, one radio/terminal for SATCOM and one for VHF, UHF and so on. This is space demanding and sets a limit to the number of communication means that the soldiers in the field can use.

With an SDR platform, the number of communications means is limited only by the channels available on the terminal as well as the requirements of the individual mission. This operational benefit is complemented by the cost benefits mentioned above.

SDR does provide benefits for the end-users as well as for manufacturers of military radios/terminals. SDR provides each manufacturer with the opportunity to customize their offering to satisfy changing customer demands, with limited extra costs incurred and a reduced time to market.

With SDR, the manufacturers can produce the SDR terminal hardware and then wait to equip it with software waveforms when the customer requirements have been defined. This saves the manufacturer significant development and waveform porting costs. In other words, the manufacturers are enabled to deliver greater customer value at lower cost.

GateHouse acknowledges the needs for, and benefits of, SDR and is focused on initially delivering the Inmarsat BGAN SATCOM SDR waveform to the military market.
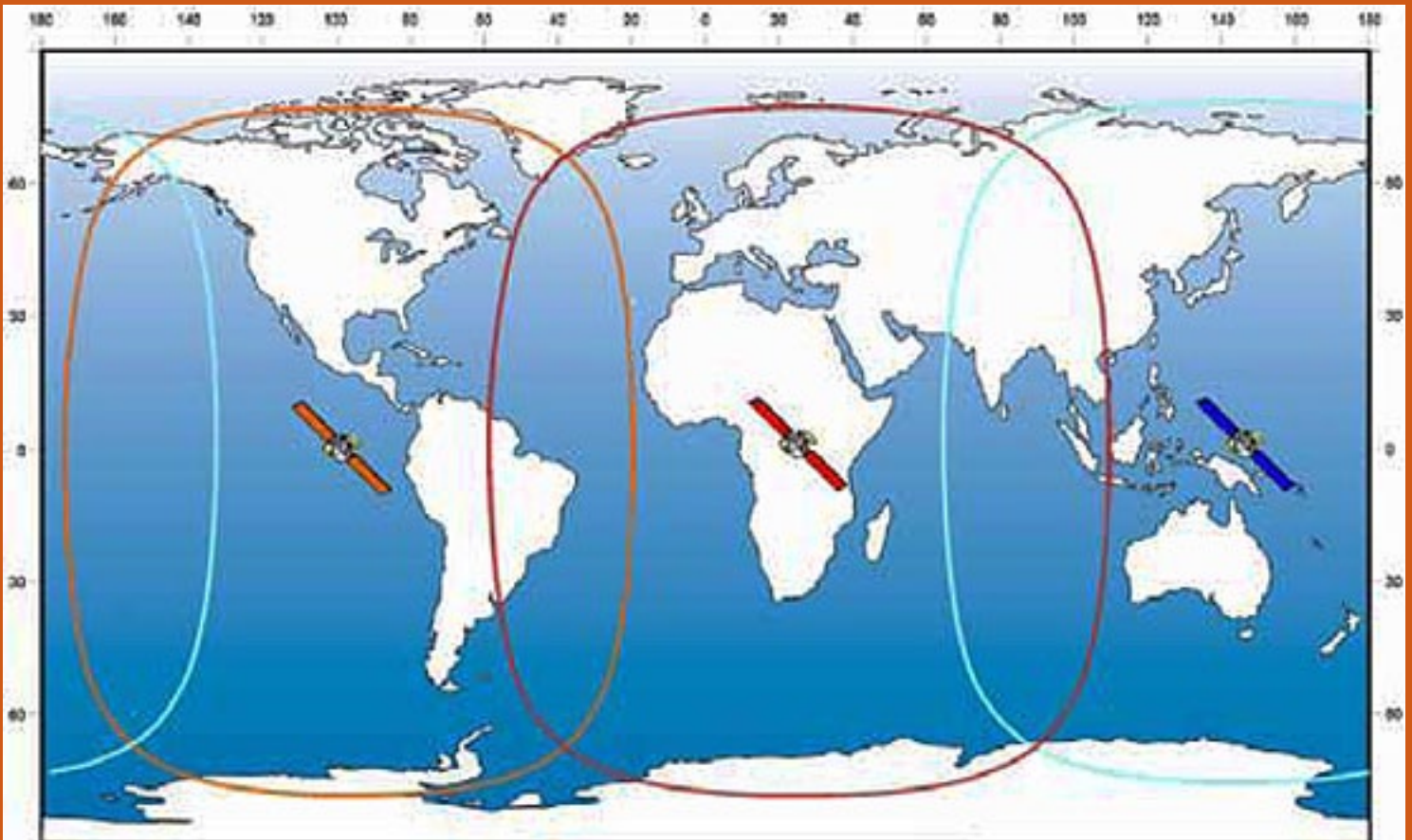

Figure 2. Inmarsat BGAN coverage map

BGAN @ A Glance

Inmarsat is a recognized pioneer and market leader in the field of global *Mobile Satellite Services* (**MSS**), and the IP-based BGAN (the acronym for *Broadband Global Area Network*) service is the most advanced of Inmarsat's current offerings.

The service is provided globally via three satellites placed in geostationary Earth orbit. System specifications provide for terminals operating from ground vehicles, ships and airplanes.

While the Inmarsat BGAN system is a commercial system, it has been adopted by military forces for *Beyond-Line-Of-Sight* (**BLOS**) communication, primarily because it is easy to set up and use, and provides an on-demand 492kbps data service on the surface of the Earth, with exception of the Polar Regions.

The government sector is a major revenue generator for Inmarsat. The airtime is generated from an installed terminal base provided by manufacturers of commercial equipment for government aircrafts, ground vehicles and ships. The shift to SDR based terminals is expected to enable BGAN on tactical radios, as it provides an opportunity for an instant BLOS capability, at limited extra cost.

SDR Technology

Over the last 30 years, radios have changed from purely hardware-based to containing more and more software. The term Software Defined Radio is used for a radio where the essential functions are implemented in software and which, as a consequence, can be reconfigured for different communication standards.

An SDR contains generic processing elements, namely, *General Purpose Processors* (**GPP**), *Digital Processing Processors* (**DSP**) and *Field Programmable Gate Arrays* (**FPGA**). These processing elements are loaded and configured during startup of the modem to make the unit perform as required to implement a particular communication standard. The term Waveform refers to the software loaded during startup of the modem which performs the communication functions.

The development of SDR technology has been encouraged by the rapid development over recent years in *integrated circuits* (**ICs**), where size and power consumption has decreased and performance and flexibility has increased, enabling very high performance generic platforms.

The U.S. DoD has invested in SDR through the *Joint Tactical Radio System* (**JTRS**) program. The JTRS program has produced a number of SDR radios and waveforms. It has also produced the **SCA** standard (short for *Software Communication Architecture*) which specifies how radio platform and waveforms must be designed and implemented to ensure interoperability, and in particular that an SCA compliant waveform can run on different radio platforms as long as they are SCA compliant.

Solutions

The **GateHouse BGAN** waveform contains all the common functionality required to build a BGAN terminal with on-demand, beyond-line-of-sight (BLOS) communication capability.

The BGAN Waveform is developed for *Software Defined Radios* (**SDRs**) and can be made compliant with the SCA specification **version 2.2.2**. This means that the waveform can run on generic SDR hardware conformant to the SCA specification (the waveform can also run on non-SCA compliant hardware).
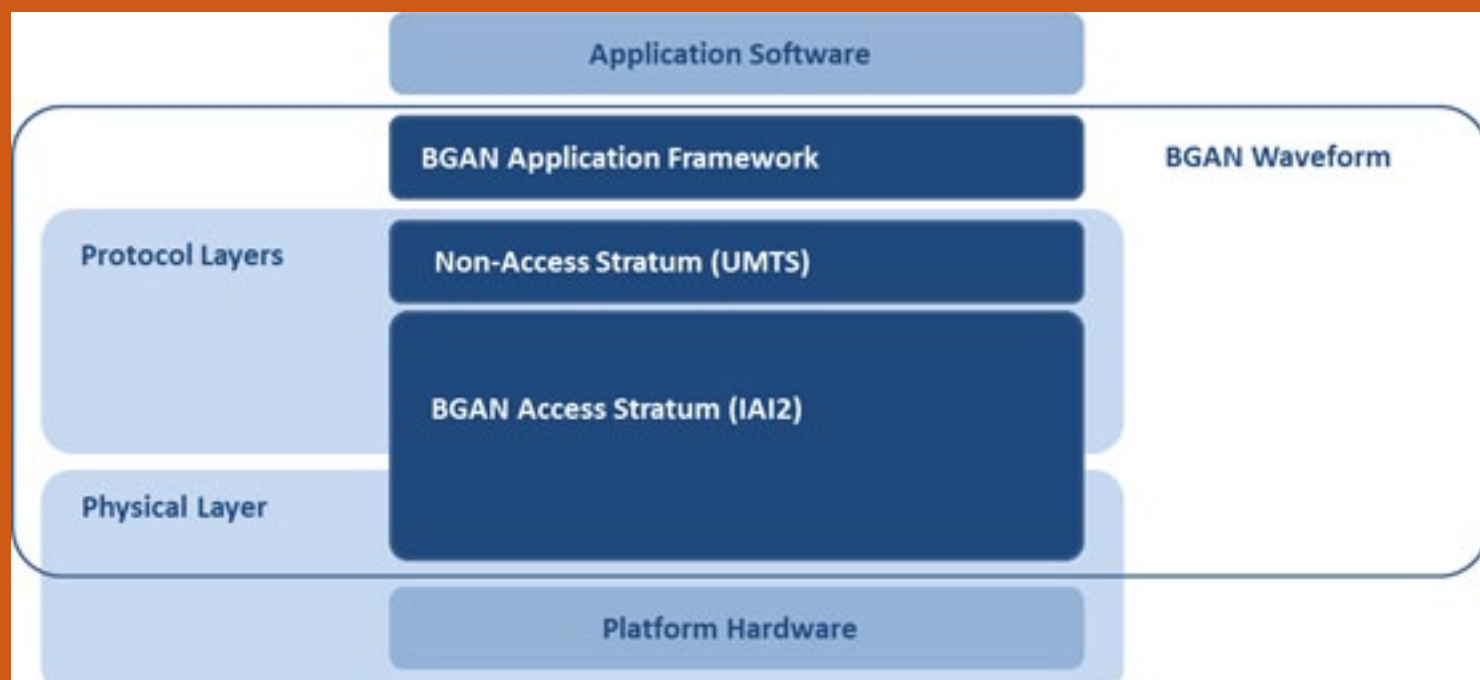
Figure 3. The BGAN Waveform is comprised of an Inmarsat proprietary access stratum (IAI-2), a 3GPP UMTS non-access stratum release 4, and an application framework

The BGAN waveform can run as the only waveform on the radio or as one of several waveforms on a multimode radio. Due to the SCA specification, the effort to port the waveform from one radio to another is considerably less than for a conventional radio design where the software typically interfaces custom designed hardware.

The traditional approach has been to develop inflexible purpose—specific hardware to implement a BGAN terminal, whereas by using the SDR approach, the complete functionality (waveform) is implemented in software, leaving the underlying hardware generic and fit for other purposes as well.

In addition to giving the advantage of reusing radio platforms and allowing for the coexistence of waveforms on a single radio, the SDR approach also allows for easy upgrades of the BGAN terminals as the BGAN standard evolves (*e.g.,* support of higher data rates).

The GateHouse BGAN waveform is structured internally according to the Inmarsat BGAN specifications and contains multiple layers of functionality as shown in *Figure 3*.

In a typical customer engagement process, the customer provides an SDR platform which is either already existing or a new development. In the case of new terminal development, GateHouse is involved early in the terminal design and implementation process to define software/hardware interfaces in cooperation with the customer and to ensure that the radio platform is capable of hosting the BGAN waveform. When Gatehouse receives the radio platform,

the BGAN waveform is then configured and built for the radio and loaded into the radio. A series of thorough tests is then conducted to ensure that the resulting BGAN SDR terminal is compliant with the BGAN specifications.

About the author

Claus Vesterholt is the Technical Program Manager for the Satellite Communication activities in the Danish software company GateHouse A/S. He has a Master degree in Electrical Engineering from Aalborg University and has taken various positions in the wireless communication industry over the last 18 years. He has been leading a number of programs and projects on the development of communication systems, mainly GSM/GPRS terminals and Inmarsat BGAN terminals. Claus has experience in developing and testing communication software for terrestrial systems and satellite systems. Currently, Claus is responsible for all technical activities in the SATCOM area of Gatehouse and leads the engineering team.

About GateHouse + SDR

Proven Core Technology—Single point of contact and access to a rock-solid, field-proven IPR platform based on more than 100 man-years of accumulated expertise from more than 10 completed BGAN terminal development programs across many different hardware platforms—for aeronautical, maritime and land mobile usage.

Reduced development costs and time-to-market—An attractive alternative to in-house development, which will bring BGAN terminal projects through to *Inmarsat Final Type Approval* faster, with considerably fewer risks and at a competitive and flexible pricing model.

Fully capable BGAN partner—GateHouse is able to take charge of the entire BGAN implementation process based on a customer supplied hardware platform up to, and including, the mandatory approval testing (Inmarsat Final Type Approval).

BGAN Software Defined Radio—provides the complete embedded software package for Inmarsat BGAN terminals, a competence center for SDR, and provider of a BGAN waveform that can be made compliant to the SCA specification.

Additional information is available at the GateHouse A/S website:
http://www.gatehouse.dk/

BGAN SDR Update

Northrop Grumman has become the first BGAN SDR Hardware Partner

Since the contract between GateHouse and Inmarsat on development of the BGAN waveform was entered into in 2009, the commercial goal has been to identify and contract with the first hardware partner to bring BGAN SDR to the market. The development project is now nearing completion and the first hardware partner has agreed to introduce BGAN SDR.

Northrop Grumman will be the first partner to introduce BGAN SDR to the market. In 2011, Inmarsat partnered with Northrop Grumman to port the BGAN SDR waveform to their SDMD platform (Software Defined Multi-Function Device), which is a JTRS product. This project enables delivery of flexible BGAN capability to the U.S. military market. Going forward several porting projects are expected and discussions are ongoing with other U.S. defense integrators.

Following the above, the waveform will initially form a basis for a range of BGAN products in government/military/defence markets in the U.S. However, the focus is not limited to military markets or the U.S.

The BGAN SDR waveform also presents a strong value proposition to global civil markets within land, maritime and aeronautical segments by enabling a fast, and cost efficient, road to reliable BLOS (Beyond Line Of Sight) broadband on the move.

Status on technical BGAN SDR waveform development project—The waveform development is nearing completion and the waveform is running all BGAN data services as well as the circuit switched voice service, ISDN and SMS. Once the development is complete the waveform will offer the exact same capabilities as a dedicated BGAN terminal, and will support all classes of operation in compliance with Inmarsat requirements.

KA-BAND FOR ENTERPRISE + GOVERNMENT CUSTOMERS

by Bob Gough, Founder, Carrick Communications

With a rapidly growing global market for satellite communications and an ever increasing demand for bandwidth, Ka-band is coming of age. Ka-band is being hailed as the next step for satellite communications as a Ka-band satellite can support significantly greater volumes of traffic than its C- or Ku-band counterparts.

The availability of small, affordable user terminals is a driver. New Ka-band satellites such as NewSat's *Jabiru-1* employ novel designs to provide the advantages of multi-spotbeams, yet with Ku-band-like coverage.

Ka-band is often identified with consumer broadband services. However, many industries across Europe, the Middle East, Africa, and South Asia are now becoming more and more interested in the benefits of Ka-band that include higher bandwidths and throughput capacity, smaller end-user antennas, and increased mobility. For this reason, demand for Ka-band satellite capacity is estimated to grow exponentially over the next decade. Already, new satellites—such as NewSat's Jabiru-1—employ innovative designs delivering "new" capacity in order to meet this ever-increasing demand.

The satellite industry sees Ka-band as the next frequency band for delivering communications solutions, as the availability of capacity at C- and Ku-band is being outstripped by demand. In light of the growing need for large amounts of high-throughput capacity to support the next generation of communication applications, Ka-band unlocks a whole world of additional bandwidth where C-band and Ku-band alone cannot accomplish. Communication applications including trunking and cellular backhaul services, broadband access, enterprise networks and government communications will demand more Ka-band capacity, opening up new satellite possibilities.

Enterprise, defence and military organizations have also expressed the need to upgrade the capability and capacity of their satellite communications.

As an example, several years ago the U.S. Department of Defense initiated the **Wideband Global Satcom** (**WGS**) system, a network-centric, Ka-band system consisting of up to nine geostationary satellites, four of which are already in orbit. To illustrate the superior capacity of Ka-band: Just a single WGS satellite has as much capacity as the entire **Defence Satellite Communications System** (**DSCS**) constellation which preceded it.

In addition, prices for Ka-band fixed user terminals as well as mobile terminals for land, maritime and airborne use are decreasing. This is being driven by the increasing use of Ka-band for commercial
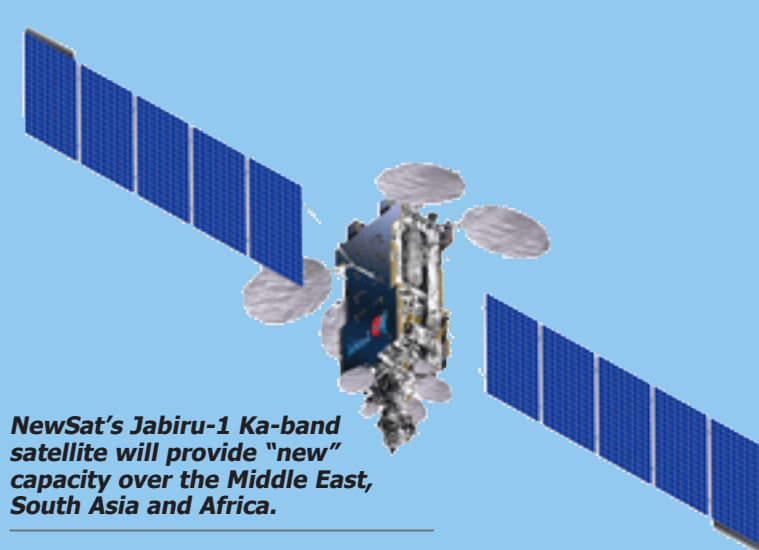
NewSat's Jabiru-1 Ka-band satellite will provide "new" capacity over the Middle East, South Asia and Africa.

and government communications. This in turn has given rise to a number of different Ka-band VSAT and other terminal suppliers in the market, contributing to a healthy and competitive supply situation around the globe.

Undoubtedly, Ka-band satellite capacity is an ideal solution for many industries, with its smaller end-user antennas, cost-effective network deployments, increased mobility and higher capacity, bandwidths and speeds.

As the communications demands of the modern world continue to impinge on older technologies which, at this pace will struggle to keep up, next generation Ka-band satellites like NewSat's Jabiru fleet offer a viable solution by providing the advantages of network architectures currently employed at Ku-band, but with all the benefits of Ka-band.

Ka-band the skyscraper

As frequency bands fill up, the allocation of new services and coverage areas from each orbital slot becomes increasingly difficult, and this is the case with C-band and Ku-band today given the congestion and spectrum scarcity that exists. An analogy can be made with a densely built-up city (the geostationary orbit) comprising many single and two storey buildings (C-band), plus a lot of multi-storey buildings (Ku-band) on the same sites.

Obtaining "planning permission" for similar new buildings becomes difficult, if not impossible.

The advent of Ka-band can be viewed as a new generation of cost-effective skyscrapers which can be built right on top of the existing city, and with minimal planning restrictions. Ka-band therefore opens the door for a dramatic increase in the population (capacity) of the city.
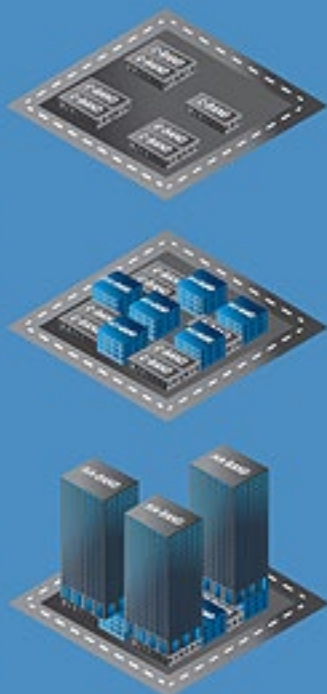
Scan the QR code below to download NewSat's Ka-band white paper, or go to newsat.com/ka-bandwhitepaper