

SATCOM For Net-Centric Warfare December 2015

MilsatMagazine

2015 YEAR IN REVIEW



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ADVERTISER INDEX

Advantech Wireless.....	7
Agile MILCOMS, an ACS Company.....	13
AvL Technologies	3
Bartington Instruments	5
Comtech EF Data	15
Comtech Xicom Technology, Inc.	23
CPI Satcom Products	11
IDGA Military Radar Summit.....	25
iDirect Government.....	cover + 9
L-3 Narda-MITEQ.....	17
NAB — National Association of Broadcasters	39
Satnews Publishers Digital Editions	29
SmallSat Symposium.....	4
Teledyne Paradise Datacom.....	21
W.B. Walton Enterprises, Inc.	19

DISPATCHES

A Danish Evolution... From iDirect.....	4
IGC To Support AFCENT	5
ETL Systems Amps Up For The Military	5
More Than A Half Decade Of Vandenberg Launches.....	6
XCOR Develops Lynx Simulator With AFRL + Protobox.....	8
USAF Satellite Control Network Support To Harris.....	9
STPSat-5's CDR Completed By Sierra Nevada Corp.	10
New J.V. Debuts From NSSLGlobal + Eclipse.....	11
45th Space Wing Reinforces ULA's CRS-4 Launch.....	13
Kratos Celebrates A 2nd Successful Flight For UTAP-22	14
Lockheed Martin's On Orbit Testing For MUOS-4	14
General Dynamics To Support NORAD + PACAF Comms ...	15
30th Contract Squadron Acquisitions	16
RPA Maintenance Training Taking Place @ Creech.....	17
New ATOM 25 Watt BUC Debuts From Norsat.....	18
New Milestone Reached By Global Hawk	18
NSR Reports: Soul Searching For Nexgen SATCOM	20
Foxcom DSA Debuts.....	21
Hughes DISD Teams Up With The Aussies	22
Integrasys GEOBEAM + Search Ops	22
Improving North Canadian Region Monitoring	23
RPAs Prove Themselves Vital Versus ISIL	24

YEAR IN REVIEWS

Advantech Wireless	26
CPI Satcom Products.....	30
DataPath	32
EM Solutions	34
ETL Systems.....	36
Globalstar.....	38
Hughes Defense.....	40
Inmarsat	42
Intelsat General.....	44
Interorbital Systems.....	46
Keysight Technologies	48
Newtec.....	50
Quintech Electronics + Communications	52
Ultra-Electronics, GigaSat	54

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DISPATCHES

A Danish Evolution... From iDirect

VT iDirect, Inc. (iDirect), a company of Vision Technologies Systems, Inc. (VT Systems), has signed a framework agreement with specialized procurement center and logistics authority Danish Acquisition and Logistics Organization (DALO) to deliver hardware, software, and services to the Danish Armed Forces.

Using the iDirect defence portfolio, the Danish Armed Forces can ensure high quality support for multinational missions quickly and efficiently at all times and in any location.

In order to carry out a wide range of missions, the Danish Armed Forces require a communication system that can deliver secure, effective Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR). The



iDirect Evolution portfolio enables the Danish Armed Forces to leverage the Wideband Global SATCOM (WGS) program, along with partner nations defence satellites, and commercial satellites.

The advanced Quality of Service (QoS) capabilities of the iDirect platform allows the Danish Armed Forces to dynamically balance traffic between operational and welfare requirements, and mobile and static deployments depending on the varying levels of priority.

iDirect's TRANSEC capabilities will help to build added security into their networks, and the technical expertise of the 24/7 iDirect Technical Assistance Center (TAC) provides a high level of reliability to the Danish Armed Forces.

The rollout of new products in the iDirect defence portfolio will provide the Danish Armed Forces with a highly efficient and resilient portfolio of remotes, designed to lower operating costs.

idirect.net/

DISPATCHES

IGC To Support AFCENT

Intelsat General Corp., a wholly owned subsidiary of Intelsat, has been awarded a contract to provide satellite services to the U.S. Air Force Central Command (AFCENT).

The one-year contract calls for 144 MHz of Ku-bandwidth to support U.S. military operations in the Central Command (CENTCOM) Area of Responsibility (AOR). The service, which began in September 2015, has three one-year renewal option periods and one six-month renewal option period.

Under the previously disclosed contract, Intelsat General will provide coverage all across the Middle East as far eastward as Afghanistan and Pakistan, including reach-back to European teleport facilities.

"The deployed Airmen are operating satellite ground terminals supporting C4ISR networks at numerous remote and expeditionary locations requiring a single-satellite solution that was not readily available," said Skot Butler, Vice-President, Satellite Networks and Space Services, Intelsat General.

"With our vast global network we had the ability to re-groom capacity, creating a unique solution that precisely accommodates the customer's single-satellite requirement."

intelsatgeneral.com/

ETL Systems Amps Up For The Military

ETL Systems has launched a new range of RF power amplifiers for military use.

The range is designed for electronic warfare applications such as broadband frequency jamming or EMC testing. These can be on mobile or fixed terminals and used in terrestrial point-to-point and point-to-multipoint. It offers a broad range of operating frequencies, including 20-500 MHz, 500-2700 MHz and 2500-6000 MHz.

The design of the amplifiers is based on advanced Gallium Nitride (GaN) high electron mobility transistor (HEMT) technology for high efficiency, good thermal conductivity, high breakdown voltages and low energy consumption.

The modules benefit from high efficiency and gain, with 20, 35, 40, 60, or 100W saturated power options. Each amplifier module is integrated into a compact housing, designed for easy integration, to a broad range of transmit antennas, filters and multiplexers.

The high power RF amplifier products are available as standalone components or mounted in a 2U high 19" rack chassis, which offers dual redundant hot-swap power supplies, local and remote control and monitoring.

www.etlsystems.com/

DISPATCHES

More Than A Half Decade Of Vandenberg Launches



December 16 will mark the anniversary of the very first launch from Vandenberg, when a Thor Intermediate Range Ballistic Missile, nicknamed "Tune Up," departed Launch Facility 75-1-1, in 1958.

Demonstrating operational capability, the successful test was conducted only a year after the base was activated—and ignited a launch legacy spanning more than five decades.

"That launch represented what can be done when a group of dedicated professionals choose to find solutions to problems and overcome adversity, even when there are no standards to guide the way," said Jay Prichard, 30th Space Wing curator of Vandenberg's Space and Missile Heritage Center.

"That's the difference between leadership and management. It was all new and they were literally figuring it out as they went."

For some, the anniversary of such a momentous occasion is an opportunity for current space and missile Airmen to pause and reflect on their occupational origins.

"Air Force Space Command has always had such an eye to the future, and sometimes I fear Airmen can forget that," said Shawn Riem, 30th Space Wing historian. "The Air Force got involved in the space business within ten years of its creation, and long before AFSPC was even activated."

Although technology has made great strides in the years since the first launch, much of the processes, procedures and hardware are still used today.



A Thor Intermediate Range Ballistic Missile, nicknamed "Tune Up", prepares to depart from Launch Facility 75-1-1, December 16, 1958, Vandenberg Air Force Base, California. Demonstrating operational capability, the successful test was conducted only a year after the base was activated—and ignited a launch legacy spanning more than five decades.

Photo courtesy of USAF.

"There are many elements of that original launch that are still present in current operations," said Prichard.

"Physics hasn't changed, but our understanding has, as well as the evolution of materials and material processes. I think we are at the beginning of a new public space renaissance that will normalize the space dialogue into our human evolution.

"In reality we aren't separate from the subject—we are part of it. We are ever-present on a piece of space as we spin through it, so we shouldn't be thinking of the space enterprise like it's something unachievable—or out of reach."

As space and missile operations from Vandenberg continue into the future, a firm grasp on how, and why, it all started is imperative.

"If we don't have a working understanding, not just a familiarity, but a comprehension of our past and history, we cannot understand why we are where we are today," said Riem. "It's that comprehension of the past that provides a link to our present."

With nearly 2,000 space and missile launches from Vandenberg since it all started, remembering the past in order to understand the present and preserve the future—is a priority for Vandenberg and its Space and Missile Heritage Center.

"When people talk about heritage, or museums, they often think it's just about something that 'was' but sadly they have missed the point," said Prichard. "Heritage is something that 'is' and it's yours. It is the foundation upon which every bit of our Air Force culture is built.

"Museums are not just collections, they are about inspiring people and that is the continuing mission at Space Launch Complex-10, just like the early days, we keep pushing forward. We just happen to use the past to do it."

DISPATCHES

XCOR Develops Lynx Simulator With Protobox + AFRL

XCOR Aerospace announced today that it has completed work on its Lynx simulator system, built by Protobox LLC in conjunction with the Air Force Research Lab (AFRL) at Wright Patterson Air Force Base in Dayton, Ohio.

"Dedicated aerodynamic modeling of the vehicle in the LAMARS (Large Amplitude Multi-Mode Aerospace Research Simulator) at AFRL (Air Force Research Laboratory) in Dayton, Ohio has provided XCOR with valuable insight into Lynx spacecraft performance and handling qualities," said XCOR Chief Executive Officer Jay Gibson. "As a result, we contracted with Protobox to provide an in-house version of the simulator at XCOR's Hangar 61," in Mojave, California.

AFRL-developed modeling and simulation software, including a Government Open Source Image Generation (IG) software package known as "SubrScene, was integrated into a mockup Lynx cabin and nose at Hangar 61.

Protobox provided integrated flight and engine controls, along with a representative pilot's instrument panel.

Four 80-inch, high-resolution LCD screens that mimic the pilot's expected field of view throughout the mission profile provide a 180 degree field of view.

A control station behind the simulator can create many different flight scenarios. It also has the ability to alter a variety of vehicle performance parameters that will help train the crew in hypothetical emergency situations.

Besides validating the simulation model of the Lynx vehicle, writing operational procedures and performing flight test rehearsals, our pilots are giving feedback on the pilot vehicle interface (PVI) during their flights in the simulator. Through this, engineers can optimize the interface design based on true pilot insight and simulation experience.

"The sim is a great asset and has awesome graphics," remarked XCOR Experimental Test Pilot Harry Van Hulten. "I thought I was flying an F-16 test mission in the skies over Mojave and Edwards AFB again. This will significantly accelerate development of modeling and simulation and operational procedures."



XCOR's Experimental Test pilot Harry Van Hulten in the Simulator.

The simulator was made possible through a Cooperative Research and Development Agreement (CRADA) that allowed XCOR test pilots and engineers to utilize AFRL's unique simulator.

The LAMARS is maintained and operated by the Aerospace Vehicles Technology Assessment & Simulation (AVTAS) Branch of AFRL.

The day-to-day maintenance and operation of the LAMARS simulator is supported by Protobox LLC, which then built XCOR's in-house version.

"We look forward to further collaboration with AFRL, AVTAS and Protobox. This is just the beginning," Gibson noted.

xcor.com/



XCOR's senior test pilot Brian Binnie and senior engineer Erik Anderson performing a Lynx mission in the Simulator.

USAF Satellite Control Network Goes To Harris Corporation

The United States Air Force has awarded Harris Corporation (NYSE:HRS) a \$40 million, nine-month extension of the Network and Space Operations and Maintenance contract.

This support is for the Air Force Satellite Control Network at two network control locations in the U.S. and at antenna sites throughout the world—the contract was awarded during the first quarter of Harris’ fiscal 2016.

Under the contract, Harris will provide operations, maintenance and logistics support to Air Force satellite operations at the 50th Space Wing at Schriever Air Force Base, Colorado, and other worldwide locations, including:

- » *Colorado Springs, Colorado*
- » *Vandenberg Air Force Base, California*
- » *Diego Garcia Station; Guam*
- » *Tracking Station at Andersen Air Force Base*
- » *Hawaii Tracking Station at Kaena Point*
- » *New Boston Air Force Station, New Hampshire*
- » *Eastern Vehicle Checkout Facility, Cape Canaveral Air Force Station, Florida*
- » *Thule Tracking Station, Thule Air Base, Greenland.*

“We have helped the 50th Space Wing provide critical information to decision makers and those on the front line reliably and cost effectively for more than 19 years,” said Wayne Lucernoni, president, Harris Mission Sustainment.

“The Air Force Satellite Control Network is crucial to our national security, and Harris is committed to providing mission excellence.”

harris.com/

STPSat-5's CDR Completed By Sierra Nevada Corporation



Artistic rendition of the STPSat-5. Image is courtesy of Sierra Nevada Corporation.

Sierra Nevada Corporation (SNC) has successfully completed the Critical Design Review (CDR) of its STPSat-5 satellite for the Department of Defense's (DOD) Space Test Program (STP), confirming that the satellite will meet mission requirements and is sufficiently mature to begin fabrication.

SNC is the prime contractor on the STPSat-5 program, leading the design and integration of this next-generation science and technology demonstration satellite for the DOD. Since completing CDR, SNC has worked closely with its customer and payload providers to finalize key payload interfaces while maintaining a highly-modular design.

Adhering to the DOD's rapid development approach, SNC has already secured over 75 percent of the hardware needed to manufacture the satellite and has recently begun integration of several key engineering models, including the spacecraft avionics.

STPSat-5, which is administered by NASA's Ames Research Center, is a free-flyer spacecraft for the DOD STP office, hosting five Government furnished payloads provided by the Space and Naval Warfare Systems Command, the U.S. Air Force

Academy, the Naval Research Laboratory and Office of Naval Research and the Air Force Research Laboratory.

The science and technology payloads will be integrated into the satellite at SNC's Space Systems facility in Louisville, Colorado, home to SNC's small satellite production facility and Satellite Operations Center.

STPSat-5 is the first satellite to be designed using SNC's SN-50 modular microsatellite designed to fly in a range of low-Earth orbits and in multiple launch configurations

In providing the design and integration of the satellite, SNC also manufactured components for the mission including a low-cost gimbal solar array assembly and a new launch vehicle separation system.

The spacecraft is compatible with a variety of secondary payload launch options in addition to dedicated launch configurations, and is an ideal choice for DOD and NASA space science and technology demonstration missions.

"This successful CDR demonstrates the rapid maturation of the STPSat-5 design, based on our modular



SN-50 satellite bus, to support five key space experiments for the Space Test Program," said John Roth, vice president of business development for SNC's Space Systems. "We're pleased to have both completed this review and released a detailed Payload Interface Document for our mission partners."

"This EELV Secondary Payload Adapter (ESPA) ring compatible spacecraft incorporates many recent advances in microsat technologies, including incorporation of a modular green propulsion system. SNC is proud to provide a low-cost and highly-flexible solution for science, technology and commercial missions that can be satisfied with a small satellite."

"Completion of CDR for STPSat-5 supports the Space Test Program's charter to rapidly mature spaceflight opportunities for space experiments that provide high value to the Department of Defense," said Colonel Jason Cothorn, Air Force Space and Missile Systems Center, Advanced Systems and Development Directorate. "We look forward to moving into integration and test of this spacecraft in preparation for a 2017 launch."

sncorp.com/

New J.V. Debuts From NSSLGlobal + Eclipse To Focus On MAG Aeronautical Markets

AEROSATCOM, a new joint venture company formed in September of 2015 by aeronautical SATCOM specialist Eclipse and independent SATCOM provider NSSLGlobal, has been appointed as a Value Added Reseller (VAR) for Inmarsat's new Global Xpress (GX) service, focusing on the rapidly expanding commercial market for government aviation satellite communication services.

AEROSATCOM will resell Inmarsat airtime (L- and Ka-band) and work closely with Inmarsat on the design, delivery and certification of government aero solutions. The company was founded to meet the market need for an all-round aeronautical satellite communications company with the objective of bridging the gap between two complex industries; the Governmental Aircraft industry and government sector Mobile Satellite Services (MSS).

Eclipse has years of experience in the governmental Aeronautical Satellite Communications market, while NSSLGlobal has decades of experience, working with government and military end-users.

Andy Start, President, Inmarsat Global Government, said, "The government market for commercial satellite communications is, necessarily, a complex one. It comes with its own unique challenges, combined with the requirement for globally available, secure, seamless and flexible connectivity.

"To build business in this environment, especially for a completely new service such as Global Xpress, requires channel partners with the right experience, expertise and depth of resources. AEROSATCOM, which is able to draw upon the expertise of two established industry players, is aligned perfectly with our strategy to grow the military, V.V.I.P.

and Head of State aero markets, offering the unique combination of our L-band SwiftBroadband service and our new high-speed, Ka-band global broadband service."

Shaun Flanagan, Sales Director, AEROSATCOM, said, "We are excited to have been appointed as an Aeronautical Global Xpress VAR for Inmarsat Global Government. AEROSATCOM is a unique Inmarsat distributor focused completely on providing aeronautical solutions to the government sector. We provide our regional partners tools to address the aeronautical SATCOM needs of their government customers with the requisite technical and regulatory capabilities behind them."

aero-satcom.com/

inmarsat.com/global-xpress-us-government/

DISPATCHES

45th Space Wing Reinforces ULA's CRS-4 Launch To The ISS



The 45th Space Wing supported NASA's successful launch of Orbital ATK CRS-4, aboard a United Launch Alliance Atlas V rocket to the International Space Station from Space Launch Complex 41 on December 6, 2015, at 4:44 p.m. EST.

This was the first flight of an enhanced Cygnus spacecraft to the International Space Station.

Orbital ATK's fourth contracted cargo resupply mission with NASA to the International Space Station delivered more than 7,000 pounds of science and research, crew supplies and vehicle hardware to the orbital laboratory and its crew.

According to NASA, the Cygnus spacecraft carried hardware and supplies to support dozens of the approximately 250 science and research investigations that will occur during Expeditions 45 and 46.

Before any spacecraft can launch from CCAFS, a combined team of military, government civilians and contractors from across the 45th SW provide the mission assurance to ensure a safe and successful lift-off for their range customers.

Eastern Range instrumentation provides radar tracking, telemetry, communications, command/control sites, camera and optical sites, and other support capabilities such as meteorology.

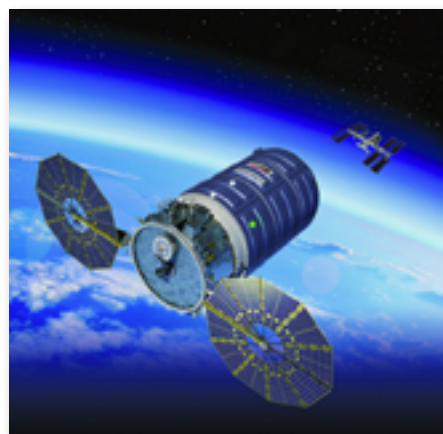


The 45th Space Wing supported NASA's successful launch of Orbital ATK CRS-4, aboard a United Launch Alliance Atlas V rocket to the International Space Station from Space Launch Complex 41 at Cape Canaveral Air Force Station, Florida, December 6, 2015.

Photo is courtesy of the U.S. Air Force + United Launch Alliance.

Instrumentation is necessary to safely and successfully conduct civil, commercial, and national security spacelift operations and ballistic missile tests and evaluation.

Eastern Range assets are based on dependable designs and technology and are arrayed in a highly efficient architecture designed to ensure safety of the launch environment and the public at large.



Artistic rendition of Orbital ATK's Cygnus spacecraft. Image courtesy of Orbital ATK.

"I am proud of the integrated team who made our 16th launch of the year successful," said Brig. Gen. Wayne Monteith, 45th Space Wing commander, who also served as the Launch Decision Authority.

"Additionally, the launch of this mission clearly demonstrates the successful collaboration our wing has with our partners at NASA Kennedy Space Center, the Space and Missile Systems Center and industry. Together we've shared a remarkable history of space exploration lasting more than half a century. In fact, since July 1950, this United Launch Alliance/Orbital ATK mission represents launch number 3,522 for this team.

"This launch success proves how decades of professional collaboration between the 45th SW, NASA, SMC, ULA and all of our other mission partners continues to shape the future of America's space operations. We are the World's Premier Gateway to Space."

Kratos Celebrates A Second Successful Flight For UTAP-22

Kratos Defense & Security Solutions, Inc. has successfully performed the second flight of its Unmanned Tactical Aerial Platform (UTAP-22) at the Navy test range at China Lake, California.

This was the second flight in the currently planned three-flight series and consisted of collaborative airborne operations with a manned fighter aircraft, an AV-8B Harrier; command and control through the tactical data link; execution of semi-autonomous tasks; execution of autonomous flight in formation with the AV-8B; transfer of UTAP-22 control between non-line-of-sight (over the horizon) operators in the tactical network; and transfer of control (handoff) from the tactical network to an independent dedicated control link.

UTAP-22, the Kratos Tactical UAS, is a high performance jet aircraft designed specifically for tactical payload operation/delivery and survivability in challenging and hostile environments.

The results from this demonstration flight validate the unprecedented ability for a low-cost, unmanned aircraft with fighter-like-performance, to operate collaboratively with a manned fighter/tactical aircraft through semi-autonomous tasking and autonomous formation/wingman modes.

Due to competitive and other considerations, no additional information could be provided related to Kratos unmanned combat aerial vehicle, UTAP-22, or this recent flight at this time.

Jerry Beaman, President, Kratos' Unmanned Systems Division, who was present at the test range facility for the UTAP's second flight said, "This flight demonstrated the utility of manned/unmanned teaming operations, providing the warfighter with new capabilities as a front line force multiplier. This successful mission, our first test of manned/unmanned operations was a major step forward in our unmanned tactical aerial system strategy and road map."

Mr. Beaman continued, "I firmly believe our UTAP-22 concept of a tactical manned aircraft teamed with unmanned aircraft capable of operating at tactical speeds, in a

hostile environment, will be an affordable, effective and valuable tool for the warfighter, addressing a critical need.

"UTAP-22 is a Kratos internally-funded initiative, and this successful flight achieves another important milestone in establishing Kratos in the tactical unmanned systems market, and additional flights, demonstrating simultaneous UTAP-22 operations are planned for the near future."

Eric DeMarco, Kratos' President and CEO, said, "Kratos UTAP-22 is the most important unmanned aerial system initiative that our Company is pursuing as related to the unmanned tactical aerial vehicle market.

"Mr. Beaman and his team have been successfully executing a detailed strategy and plan of action for Kratos' penetration into this new for Kratos market space, and we are now demonstrating the initial results of this currently internally funded initiative."

kratosdefense.com/

Lockheed Martin's On Orbit Testing Leads To MUOS-4 Acceptance By U.S. Navy

Following the completion of successful on orbit testing, on November 30, the U.S. Navy has accepted the fourth Lockheed Martin-built Mobile User Objective System (MUOS) satellite.

Launched September 2, MUOS-4 is the latest addition to a network of orbiting satellites and relay ground stations that is revolutionizing secure communications for mobile military forces. Users with operational MUOS terminals can seamlessly connect beyond line-of-sight around the world and into the Global Information Grid. MUOS' new commercial, cellular-based capabilities include simultaneous, crystal-clear voice, video and mission data, over a secure high-speed Internet Protocol-based system.



MUOS-4 will be relocated in Spring 2016 to its on-orbit operational slot in preparation for operational acceptance. The satellite joins MUOS-1, MUOS-2 and MUOS-3, launched respectively in 2012, 2013 and January 2015, and four required MUOS ground stations.

MUOS-5, an on-orbit spare, also will be launched next year.

Once fully operational, the MUOS network will provide 16 times the capacity of the legacy ultra high frequency communications satellite system, which it will continue to support, and eventually replace. More than 55,000 currently fielded radio terminals can be upgraded to be MUOS-compatible, with many of them requiring just a software upgrade.

"MUOS-4 completes the initial constellation, providing the MUOS network with nearly global coverage," said Iris Bombelyn, Lockheed Martin's Vice President, Narrowband Communications.

lockheedmartin.com/

General Dynamics To Support NORAD + PACAF Air Defense Comms

General Dynamics Information Technology, a business unit of General Dynamics (NYSE: GD), has been awarded a contract to support the U.S. Air Force Air Defense Communications Service 3 program.

The single-award, task order contract has a potential value of approximately \$80 million for five years, if all options are exercised.

Under the task order, General Dynamics will provide single system management, maintenance, lifecycle and logistics support of the existing communications systems and subsystems used in North American Aerospace Defense Command (NORAD) and Pacific Air Forces (PACAF) Air Defense missions.

The company will also deliver communications to enable sustained command and control (C2) for Air Defense of the United States.

For more than 30 years, General Dynamics has provided both First Air Force (AFNORTH) and PACAF with C2 enterprise communications solutions, services and logistical support.

Work will be performed at Hampton, Virginia; Rome, New York; Tyndall Air Force Base, Florida; Joint Base Lewis-McChord, Washington; Joint Base Elmendorf-Richardson, Alaska; and at Wheeler Army Air Field, Hawaii, along with support at additional locations worldwide.

"General Dynamics will continue to assist the Air Force by maintaining its existing systems and integrating current and new technology solutions for the air defense network," said Edward

Hudson, vice president and general manager of General Dynamics Information Technology's Advanced Technology Solutions sector.

"Our highly experienced team understands the unique challenges facing the Air Force and this program's significance in supporting critical national security objectives."

gdit.com/

Space Superiority Assured With 30th Contracting Squadron Acquisitions

The US Air Force maintains many different installations around the world, with many different operations.

These installations are all comprised of various individuals working together to achieve mission success. At Vandenberg Air Force Base (VAFB), a primary mission is achieving successful polar-orbital launches, which are often essential to upholding U.S. dominance in space and could not happen without dedicated personnel from various organizations, such as the members of the 30th Contracting Squadron.

"The squadron contributes to the overall mission at Vandenberg by obtaining the necessary supplies, services and infrastructure needed to ensure that we can achieve the mission," said Jeffrey Grelck, 30th CONS contracting officer. "We ensure that each organization has, or can get, the equipment, materials, work sites and assistance necessary to complete the mission."

In addition to overseeing contracts directly related to the launch business, 30th CONS ensures the smooth acquisition of all support facilities and amenities offered to Airmen and their families.



Jeffrey Grelck, 30th Contracting Squadron contracting officer, reviews a contract modification for compliance with regulations, Dec. 9, 2015, Vandenberg Air Force Base, Calif. At VAFB a primary mission is achieving successful polar-orbital launches – which are often essential to upholding U.S. dominance in space and could not happen without dedicated personnel from various organizations, like the members of the 30th Contracting Squadron.

Photo is courtesy of the US Air Force by Senior Airman Shane Phipps.

"We provide expert contracting and acquisition support and administration for range operations; maintenance and launch support contracts required for mission critical launch capabilities," said Jeffrey Powell, 30th CONS director of business operations. "We also support all construction and support services for base and tenant unit organizations that provide greater living standards, medical professionals, training capabilities and environmental support."

Within the Mission Support Group, the 30th CONS is made up of five primary sections—all with specialized responsibilities, respectively.

"The five sections are the infrastructure support acquisition flight, range and launch support flight, base operating support flight, plans and programs flight, and quality assurance flight," said Grelck.

With more than 50 personnel, the squadron operates with a strategic and cohesive mix of active duty Airmen and their civilian counterparts.

"Having both military and civilian working together is fundamental to the success of contracting," said Grelck. "When the military members get called away to perform various military specific duties, or go on deployment, the civilian personnel are able to step up and maintain continuous support.

"Likewise, when the civilians are unable to meet the mission requirements, the military are available to offer their support.



"A prime example of this was two years ago when the government went into furlough. Without having both the military and civilian team members working together, the contracting squadron could have come to a standstill as the civilians were unable to go into work."

Displaying their office motto of 'You got it, we bought it,' with pride—members of the 30th CONS remain focused and dedicated to their craft.

"The 30th Contracting Squadron has a very versatile contracting workforce with significant years of contracting experience," said Powell. "Our contracting professionals are here to support our customers and work through the rigorous contracting process needed to support their needs. We are 'One Team' working together for a common purpose."

*Story by Senior Airman Shane M. Phipps
USAF 30th Space Wing Public Affairs*

DISPATCHES

RPA Maintenance Training Taking Place @ Creech AFB In Nevada

Maintaining fully trained Airmen for the U.S. Air Force's remotely piloted aircraft enterprise is a daunting task.

For Detachment 13 of 372nd Training Squadron, providing follow up training for maintenance personnel of the MQ-1 Predator and MQ-9 Reaper enterprise at Creech Air Force Base, Nevada, is a top priority.

"Det 13 Operation Location A (OL-A) provides maintenance training to the remotely piloted aircraft initiative," said Master Sgt. Christopher, Det 13 OL-A section chief. "Crew Chiefs, Avionics, Weapons and Communications courses are offered from our staff of six Air Education and Training Command (AETC) instructors."

RPA maintainers begin training at the 372nd TRS, Sheppard AFB, Texas, where they learn technical aircraft maintenance using classroom and hands-on practical instruction. The detachment also offers training for Air National Guard, Air Force Reserve, allied forces and students en route to Pacific Air Forces.

Assigned instructors provide training on A-10 Thunderbolt, F-15C Eagle, F-15E Strike Eagle, F-16C Fighting Falcon, F-22A Raptor, HH-60G Pave Hawk and MQ-1 and MQ-9 aircraft.

The MQ-1 and MQ-9 systems classes enhance the RPA enterprise by training the caretakers of the aircraft. The MQ-9 communications class teaches students the basic system overview and the theory of operation of the aircraft systems.

In the mechanics class, the students perform hands on maintenance on the landing gear, propeller, and airframe components.

The avionics course teaches specialists theory of operation of electrical systems and electronics, as well as hands-on maintenance. The weapons course teaches troubleshooting and system specific knowledge.

Approximately 12 to 20 students come through each month; currently nine students are training in three classes.

The training implemented depends on the training that is produced this year for the 432nd Maintenance Squadron and also what is projected for the rest of the year.

*by Senior Airman Adarius Petty
USAF 432nd Wing/432nd Air Expeditionary Wing
Public Affairs*

New ATOM 25 Watt BUC Debuts From Norsat

Norsat International Inc. announces that the company has released their ATOM 25 Watt Ka-band Block Upconverter (BUC) and Solid State Power Amplifier (SSPA) to the market.

The ATOM Ka- dual-band BUC and SSPA are up to 70 percent smaller and up to 65 percent lighter than equivalent BUCs, making them a perfect fit for applications where size and weight are of concern, including airborne and land-based Communications-On-The-Move (COTM) applications.

ATOM Ka- products also provide ultra-high power efficiency, consuming up to 60 percent less power than other available BUCs and SSPAs on the market, another highly important differentiating feature that customers desire when it comes to various communication applications.

The 25W ATOM Ka BUC is software switchable between commercial and military Ka-band frequency (29-30 and 30-31 GHz, including WGS compliance) and custom variants are available from 27 GHz to 32 GHz.



Applications for the BUCs and SSPAs include portable VSAT terminals, RADAR, and CDL. The ATOM Ka- comes with selectable options, as well as customization capabilities to suit specific customer needs.

The ATOM Ka-band BUCs and SSPAs are also available in 1:1 redundant configurations.

Dr. Amiee Chan, chief executive officer of Norsat, commented, "We are pleased to commence offering the Ka-band line of BUCs and SSPAs from our expanding ATOM series. The introduction of the Ka-band line follows the success of our Ku-band ATOM product, and response from customers who desire integrating the next generation technology into their product solutions.

"Our research and development team has done an excellent job bringing this product to market in an accelerated timeline, highlighting the high level of expertise and commitment to serving our client's needs. In addition, we expect this new 25W product to be the first of several new Ka-band products, with expanding wattages to arrive in the coming months. We have high expectations for the success of this new product offering, not only for its differentiating features, but also due to the high inherent demand for applications using Ka-band around the globe."

Norsat's innovative ATOM series platform has shown great commercial success and the new ATOM Ka-band product already has considerable interest from several customers.

Earlier in 2015, Norsat shipped prototypes of the Ka-band BUCs and worked with its customers to ensure the Ka-band BUC and SSPA would meet military standards including shock, vibration, electromagnetic interference, as well as DO-160 airborne standards.

norsat.com/

New Milestone Reached By Global Hawk

As the morning sun beat down on its nearly 131-foot wingspan, the EQ-4 Global Hawk unmanned aircraft descended from its 60,000-foot perch for the 500th time, coming to rest at an undisclosed location in Southwest Asia on November 11.

The Veterans Day landing was a historic one for the Global Hawk. It was the first time that a single weapon system reached the 500-sortie milestone, and with nearly 13,000 flight hours logged, this weapon system is living up to the nickname "workhorse."

Staff Sgt. Bradley, a 380th Expeditionary Aircraft Maintenance Squadron tactical aircraft maintainer craftsman, said, "Reaching 500 flights is a pretty big accomplishment, especially for how new the fleet is."

Battlefield commanders rely upon several different configurations of the Global Hawk to provide the intelligence, surveillance and reconnaissance capabilities they require.

Three RQ-4 Global Hawks were converted to an EQ-4 relay configuration carrying the Battlefield Airborne Communication Node (BACN) in 2009 to enhance communications between the operators on the ground and air.

The 380th EAMXS lead production superintendent said, "There are three EQ-4s in the world, and they are all located here in support of Operation Inherent Resolve."

The Global Hawk helps fight the war against Islamic State of Iraq and the Levant by enabling U.S. forces on the ground to radio

in an airstrike to friendly aircraft by bridging the communication gap from the ground to elevations as high as 60,000 feet. The EQ-4 also provides connectivity between coalition partners, which is vital when attempting to deconflict airspace and prioritize targets on the ground.

Once the Global Hawk's mission is complete it returns home where maintainers are able to complete ground maintenance within five hours to return the aircraft to mission ready. However, these aircraft are usually able to have a day off in between their 30-plus hour missions.

*Story by Tech. Sgt. Frank Miller,
380th Air Expeditionary Wing*

NSR Reports On The Soul Searching For Nexgen SATCOM Networks

As we close the books on 2015, Government and Military planners are starting the process of designing next-generation government and military satcom networks—with many questions: how much commercial, how much jam protection and resiliency, and fundamentally, how much do we spend... or pay for it?

Among all of these plans, they almost all include a role for the satellite communications industry—be it from providing end-to-end managed services to ‘flying the birds.’

According to NSR’s *Government and Military Satellite Communications, 12th Edition*, there is a clear place for commercially-sourced capacity with upwards of 600 transponders of FSS capacity and 80 Gbps of HTS capacity demand across the market projected by the end of 2024.

Meanwhile, MILSATCOM capacity on key systems for key countries reaches slightly under 40 Gbps under currently planned systems. Most of this capacity will be from WGS to U.S. and partner countries.

Additionally, nearly all European milsatcom systems will require replacement by the mid-2020s. With only France making significant steps in determining components of their next-gen architecture, the role of commercial industry in these next-gen systems continues to be on the table and in discussions.

However, with all of the competing participation models within Europe and the U.S. (the “Skynet model”, XTAR-like, the U.S. Pathfinder programs, or the emerging LuxGovSat-style to name a few), it is highly likely we will only see more flavors coming into market.

All said, expect more variety in the manner or style of how governments and industry interact across the Gov and Mil satcom industry, not less.



Government and Military Satellite Communications 12th Edition

However, that is the “2.0” for gov’t/mil. satcom; for “1.5”, it is the ‘flying the birds’ outsourcing that has gained the attention of the satellite industry.

The attention has become so great that Intelsat General has an ad running that concludes with, “We can fly your satellites for less”; a bold statement indeed.

Yet, a recent interview by U.S. Gen. John Hyten hinted in maybe a slight shift in thinking in the ‘outsource-ability’ of some of these jobs as it relates to operating within a contested RF-environment for U.S. forces.

With a new focus on training-up and redeploying experienced personnel to the ‘front line’ positions of operating the satellites, does that throw another wrench into the commercial versus military debate? It would seem that if these statements are taken at face value, there is an acknowledgement that the current paradigm of (at least) U.S. satellite operations is not working.

In addition to a renewed focus on bringing experienced personnel back into operational roles, jamming and operating in a contested RF environment is amongst the top bullet points for next-gen system designers.

During the interview with Gen. Hyten, he said that as of today, the U.S. is its own ‘worse enemy’ when it comes to jamming of its satellites. Solving the training problem is far more straightforward than the technical challenge of deploying new ground and space infrastructure; yet it still points to a potential shift in thinking of getting service personnel more involved, not less.

However, operating within a contested RF-environment remains one of the ‘new differentiators’ for commercial capacity coming into the gov and mil markets.

With the likes of Eutelsat’s Quantum platform, or ground infrastructure developments from companies such as Thales or Hughes coming into the market over the next ten years (just to point out a couple of examples), commercial capacity will be able to ‘check more boxes’ on gov and mil planner’s list.

The main question will be: “if the mindset has changed enough to fully capture the value proposition some of these new commercial technologies are bringing to market, are we ready for GovMilSatCom 2.0?”

nsr.com/research-reports/satellite-communications/-government-and-military-satellite-communications-12th-edition/

DISPATCHES

Foxcom DSA Debuts

Foxcom, a Global Invacom Company, has launched their new division—Foxcom DSA (Defense, Security and Aeronautics).

Leveraging more than 20 years of RF-over-Fiber experience, Foxcom's new and innovative technology is designed to meet the most rugged and demanding needs of the military and aeronautics markets.

Foxcom DSA's new offering spans a wide range of applications, such as:

- ***Iridium & GPS Repeaters: This powerful solution enables users to stay connected to the world during an emergency while remaining indoors without requiring sky view to operate***
- ***Military Radio Links: This versatile, strategic radio transportation system employs a standard antenna port on any HF/VHF/UHF radio to transmit radio signals to remote locations via fiber***
- ***Timing and Reference Distribution: This system is an easy way to distribute timing signals from an accurate source, to various facilities using high performance, electrically-safe, fiber-optic media***

Foxcom's capabilities, which cover 1 KHz to 18 GHz, have been deployed around the world on numerous military platforms, whether fixed applications or mobile, land-based, airborne or maritime.

Since its establishment in 1993, Foxcom has positioned itself as the supplier of choice for leading satellite operators, broadcasters and integrators around the globe by constantly meeting the demand for high performance, increased bandwidth and reliability.

[**foxcomdsa.com/**](http://foxcomdsa.com/)



Hughes DISD Teams Up With The Aussies

Hughes Network Systems, LLC, announces their Defense and Intelligence Systems Division (DISD) has partnered with the Australia Defence Force (ADF) and the United States Military at Talisman Sabre 2015 to test its advanced TDMA waveform technology.

The Australian Defence Force used the Hughes HX System with advanced waveform technology during the exercises to deliver higher performance satellite connectivity than ever before and will also deploy it in future military exercises.

Hughes Defense and Intelligence Systems Division (DISD) worked with the Australian Army personnel from Battle Group Griffin during Exercise Talisman Sabre 2015 in northern Queensland.

"Hughes provided direct support to Army for the conduct of the US and Australian bilateral Exercise Talisman Sabre during the period March through July 2015," said Colonel Shaun Love, Director Land Network Integration, ADF.

"Australia is still maturing its understanding of deployed TDMA Satellite Operations, and the support from Hughes was fundamental to both the successful outcome of the exercise, and educating Army on planning and executing operations utilizing TDMA waveforms. Hughes provided Field Service Representatives to both the Barracks and Field COMDEX supporting exercise work up, engineering, and ultimately informing the SATCOM architecture deployed by the combined US and Australian Division."

Talisman Sabre 2015 was the sixth biannual joint training exercise with the Australia Defence Force and the United States Military in which 30,000 Australian and American forces participated in exercises that are the largest of the year for the Australia Defence Force. Hughes DISD spent a year participating in trials leading up to them.

"Advanced TDMA waveform technology is critical for efficient global military satellite communications," said Dan Losada, senior director at Hughes DISD. "Hughes is pleased to see the Australian Defence Force experience stronger battlefield communications with our advanced satellite waveform technology, and we look forward to continuing to support the Australian Army in the future."

defense.hughes.com/

Integrasys GEOBEAM Can Assist Rescue + Unmanned Search Operations

Integrasys GEOBEAM helps deployment and self-management of wireless networks for mission-critical disaster-relief organizations in the EU-funded project ICARUS, which develops integrated systems for assisted rescue and unmanned search operations.

Communications planning and management has become a key concern in large crisis events which involve numerous organizations, human responders and an increasing amount of unmanned systems which offer precious but bandwidth-hungry situational awareness capabilities.

As a member of the ICARUS consortium and leader of the communications provisioning work-package, Integrasys has extended the capabilities of the GEOBEAM product to support planning, monitoring and optimization of an integrated multi-radio tactical network designed in the project to fulfill the new demands of high-tech search and rescue teams.

The ICARUS tactical network offers interoperable communications for international crisis response operations with a focus set on cooperative, unmanned air, sea and land

vehicles. The network has been designed with rapid deployment, interoperability and performance-based real-time management & control (M&C) capabilities in mind. Building upon a cognitive spectrum layer for adaptive selection of radio channels, the framework uses standard datalink technologies (ETSI DMR, IEEE 802.11x and SATCOM) to transparently empower applications with an unified communication capability exhibiting high-granularity Quality of Service (QoS) while hiding low-level details of underlying datalinks.

Custom-built M&C procedures support rapid deployments in unknown spectrum occupancy conditions, harsh propagation environments and large throughput demands, taking into account varying platform constraints.

Integrasys has extended the capabilities of the GEOBEAM product to support planning, monitoring and optimization of an integrated multi-radio tactical network. The developed network planning and management tools fully exploit the GEOBEAM ability to accurately characterize communication components, propagation environments, interference conditions and vehicles platforms in order to assess the global network performance

over wide operation areas; as well as the performance of individual terminals along given mission routes.

GEOBEAM base capabilities have been complemented with key extensions needed in ICARUS; such as UHF/2.4GHz/5GHz propagation models in indoor, rubble and sea environments; capacity models for WLAN mesh networks; or proper graphical interfaces for tactical mission operators.

During the final project demonstrations conducted at the Roi Albert Camp of the Belgium Army in the first week of September, the extended GEOBEAM tools have shown to provide high-value support for mission commanders along different mission phases: as a key component of training tools for robot operators; as a deployment planning tool for RF channelization and localization of relay stations; and as a network optimization tool able to predict and mitigate coverage and throughput shortcomings by timely reallocation and reconfiguration of nodes.

integrasys-space.com/#!capacity-management/c1cq4

Improving North Canadian Region Monitoring For Emergency Ops

Based on the collaboration in space, the Canadian Space Agency (CSA) and the German Aerospace Center (DLR) have announced the funding of six major research projects in the domain of Emergency Response and Safety of Operations—DLR has awarded Airbus Defence and Space with two of them.

In collaboration with MacDonald Dettwiler and Associates, Ltd. (MDA), the first project will examine man-made changes on land using multi-frequency SAR satellite Data.

The methods developed throughout this project will monitor the changes' impact on the environment including new buildings, roads, forests, and surface movements due to industrial activities such as mining.

For the second project, Airbus Defence and Space will work with C-CORE to investigate the synergistic use of X- and C-band SAR-data for tactical ship route planning in Arctic Waters, its objective being to monitor the sea ice situation along shipping routes in the north. Both Canadian partners receive funds from CSA.

Taking benefit from combining both missions, the German TerraSAR-X and Canadian RADARSAT-2 satellites, these projects aim to support safe transportation, exploration, and monitoring.

Enfotec Technical Services Inc., one of the end users, believes that "satellite imagery plays a vital role in ensuring the safety and efficiency of navigation in ice covered waters. This project addresses how to best use different satellites concurrently in order

to increase the overall quality of the ice information provided to ships."

"With our experience in natural disasters and maritime monitoring, we are confident to support Canada in improving its emergency capacity readiness in the High North," said Simon Jacques, President of Airbus Defence and Space Canada Inc.

asc-csa.gc.ca/eng/

[dlr.de/dlr/en/desktopdefault.aspx/
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airbusdefenceandspace.com/

RPAs Prove Themselves Vital Versus ISIL



An MQ-9 Reaper performs touch-and-go flight patterns June 13, 2014, at Creech Air Force Base, Nev. The Reaper is an armed, multi-mission, medium-altitude, long-endurance remotely piloted aircraft that is employed primarily as an intelligence-collection asset and secondarily against dynamic execution targets.

U.S. Air Force photo/Senior Master Sgt. Cecilio Ricardo.

From August 2014 to August 2015, the 432nd Wing directly supported Operation Inherent Resolve, a U.S. Central Command and partner nation's campaign to conduct targeted airstrikes in Iraq and Syria as part of the comprehensive strategy to degrade and defeat the Islamic State of Iraq and the Levant.

"OIR has highlighted the strengths of (remotely piloted aircraft) operations, namely a single-weapon system that can (find, fix, track, target, engage, and assess) with flexibility, endurance and precision," said Lt. Col. Erik, the 15th Reconnaissance Squadron commander.

"In addition, we have the communications necessary to reach back to multiple supporting agencies, and disseminate our (intelligence, surveillance and reconnaissance) feed real-time to multiple end users. This builds situational awareness of the (area of responsibility), which is especially important due to the dynamic nature of OIR combat operations."

While the RPA mission in Iraq and Syria initially focused on information gathering and battlespace awareness, the 432nd WG's involvement quickly escalated as the demand for ISR grew to accurately capture real-time operations.

"Things progressed very quickly, we were playing a reactive part, now we are much more established and proactive," said Senior Airman Jeffery, a MQ-1B Predator intelligence instructor. "The nature of the mission is much more clear and precise than it was at the beginning which has allowed us to be as effective as possible."

In OIR, the 432nd WG/432nd Air Expeditionary Wing has contributed approximately 4,300 sorties, employed 1,000 weapons and conducted 400 'buddy lase.' A buddy lase is when aircrew from one aircraft uses a combat laser to guide weapons released another aircraft to a target.

A majority of the sorties and strikes were performed by the 432nd WG. The strikes are an experience Capt. Ryan, a 15th RS Predator pilot, knows all too well.

"I had the first RPA strike of OIR," Ryan recalled. "It was exciting to know what the threat was and to protect the guys on the ground was exhilarating. I felt like I was able to directly contribute."

Although many sorties were flown by RPAs, joint efforts capitalized on the capabilities of the joint warfighter thus

integrating manned and unmanned assets to assist friendly ground forces.

"This has been one of the biggest improvements to RPA operations in recent years," Erik said. "One of the strengths of RPA cockpits is the ability to use multiple means of communication (computer, phone and airborne radio) to integrate with other assets. The challenge facing our crews is how to leverage the strengths and weaknesses of these various communication means, and we have made great strides in OIR to optimize this."

As part of this integration process, manned aircraft like the Navy F-18 Hornets use RPAs to buddy lase targets.

To some, changing the misconceptions associated with this revolutionary aircraft is sometimes a mission in itself, but illustrating the platform's capability in combat is setting the stage to clear up misunderstandings associated with RPAs.

"Before OIR many people may not have known what an RPA was truly capable of," Ryan said. "Now before combatant commanders take the risk of potentially losing a manned aircraft they will come to us and ask if we've found them targets. We have 24/7 coverage, so we know what the battlefield looks like and how it has changed. They're using us for their situational awareness which improves their safety as well."

A unique aspect of the RPA enterprise is that these aircrew members will see sustained direct combat support very early in their Air Force careers, which is less common in other aircraft platforms.

"From the very beginning, I've felt I've had impact in the mission that we are doing," Jeffrey said. "I don't feel I would have had this experience and impact had I been in another career field. It's a great thing to be in the RPA enterprise as a brand new Airman starting out."

In the RPA career field today, the average age of Airmen flying combat missions is 18-24 years old, something rarely seen in traditionally manned aircraft career fields.

"I can't be more proud of our crews and the professional airmanship they exhibit on a daily basis," Erik said. "Due to the growth of the RPA community, we have a large percentage of relatively young crew members. Based on the nature of our combat operations, they build experience at a much faster rate than the norm. Their pride, motivation and discipline are unquestionable and directly lead to our success in combat operations."

As OIR passed the one year mark on August 8, Ryan said morale is high and the men and women of his unit are the most professional people he has had the pleasure of working with.

"Every day they surprise me with how they act and react to the changing environment of war," Ryan said. "I am extremely proud of what I do. Our motto is P2P, which is short for perform to prevent. The meaning behind it is

that we perform at our best to keep Soldiers from deploying into harm's way. It pushes us to do our jobs, which is to save American lives."

According to Defense Department as of Aug. 7, 2015, airstrikes have been responsible for damaging or destroying more than 10,684 targets that further deny the enemy the capability to inflict damage to America or its allies.

"It's an honor to know that we are able to lead the way, and rapidly execute missions in a new AOR based on orders from our national leadership," Erik said.

"It's also true that this is an honor shared by the entire RPA community. Collectively, we present unique and effective airpower options for our combatant commanders to achieve their objectives."

By Tech. Sgt. Nadine Barclay, 432nd Wing / 432nd Air Expeditionary Wing Public Affairs

ADVANTECH WIRELESS

By Cristi Damian, Vice President, Business Development

At Advantech Wireless, we have more than 25 years of experience in helping military, special forces and government agencies by delivering cutting-edge innovations in communications that solve mission critical communications challenges.

We understand the challenges that government and military forces face and our technologies bring them the freedom to communicate quickly, reliably and securely.

Advantech Wireless offers reliable solutions for the challenges of the Tactical communications environment. In 2015, we launched a new line of extremely powerful Second Generation GaN (Gallium Nitride) based SSPAs. These units exceed in RF power, linearity, and efficiency beyond any existing technology, either solid state, or TWT based.

In parallel to the improvements in Size, Weight and Power (SWaP), our Second Generation GaN technology brings enhancements in overall link performance and linearity. Extremely powerful SSPAs are manufactured by us for gateways as well as remote sites, all designed to work seamlessly with Advantech Wireless' Satellite Networking and Broadcast products. GaN systems with power levels over 6 kW in X-Band are in operation today in locations across the globe.

The company also builds extremely small power amplifiers, which are critical for Satcom-On-The-Move (SOTM), man-pack SATCOM, and flyaway Satellite Networking terminals. Using Second Generation GaN, a new generation of SOTM terminals was released in 2015, designed to work in extremely harsh environment, as defined by MIL STD 810G.

In 2015, Advantech Wireless received significant orders to provide GaN based SSPAs for SOTM solutions and flyaway terminals. These GaN based units are currently operating on the US Military's Wideband Global Satellite (WGS) terminals and can handle a wide operating temperature range, high levels of shock and vibration, while delivering very high linearity and efficiency.

This year, Advantech Wireless launched the Second Generation 350W/500W CL-Band SapphireBlu™ GaN based SSPA/SSPB for Troposcatter (TROPO) Applications. These new Solid State Power Amplifiers are designed to be used as direct replacement of older generation Klystrons or TWTs.

Tropo applications have certain advantages for strategic communication links, either for Military users, or for remote access in isolated areas with no satellite access. The Second Generation GaN 350W/500W SSPAs address this fast growing market, with a unique highly efficient and powerful solution.

Several Advantech Wireless tactical terminals were released in 2015. A 65 cm man-pack solution from Advantech Wireless includes an X-, Ku-, or Ka-band antenna reflector and feed, the corresponding Second Generation BUCs, and the ASAT-II™ triple access mode series modem. Integrated together, this is an ideal solution for intervention teams which do not have the option of traveling by a vehicle. The 65 cm terminal is

fully independent, with battery and battery chargers, including solar panels.

During 2015, Advantech Wireless completed the delivery of a multi-million-dollar order of the new 1.2 meter Engage™ class High Performance VSAT flyaway terminals.

This flexible and transportable VSAT solution is a fully integrated tri-band system designed for easy deployment and use and is based on a high efficiency, ruggedized, tri-band 1.2 meter, motorized auto-acquire antenna, which can cover X-, Ku-, or Ka-band, by replacing only the feed.

The new Engage™ class 1.2 meter Flyaway VSAT Solution from Advantech Wireless includes the most advanced SATCOM technology available today.

The RF section includes the award winning Second Generation GaN technology based SSPA/SSPBs. The system is equipped with a 50W X-Band SSPB, a 50W Ku-Band SSPB or a 20W Ka-Band SSPB.

These flyaway terminals allow much higher data rates and are ideal for remote tactical operations and command centers. The terminal is also equipped with ASAT-II™ modems and antenna controller and includes IP routers, a complete set of test equipment, location finding equipment, battery and chargers, all presented in ruggedized, military grade, transportable cases.

Advances in satellite networking technologies also bring tangible benefits to military and tactical users. Advantech Wireless' Compact Transportable RAPTOR Hub with ASAT-II™ (Adaptive Satellite Access Technologies) capabilities is a ruggedized, military grade, advanced multiple access wave form Hub, currently operating under the WGS constellation of satellites.

The hub incorporates key technologies that allow the unit to be at the heart of a typical SOTM network. This is the only hub in the world with built in triple access mode (ASAT-II™) and can operate as a STAR/MESH SCPC hub, TDMA hub, or Burst Mode FDMA hub. Each remote can switch from any access mode to any access mode, without user intervention, by analyzing traffic profile and data requirements.

Each remote can become a very high data rate SCPC terminal and switch to different classes of burst mode access when its traffic profile changes. This allows maximum bandwidth efficiency and standardization among all network users, without the risk of a wrongly assumed initial traffic profile.

Advantech Wireless has a long history of providing extremely reliable and secure systems to government, civil, and military users. With partners in more than 100 countries, government and military leaders trust Advantech Wireless to deliver fast, reliable and secure global satellite and wireless communication capabilities.



The company provides diverse and extensive technologies with proven flexibility to deliver video, voice and data transmissions to mobile groups of personnel anywhere and at any time.

advantechwireless.com

BULLETINS

Advantech Wireless Gains Points

LAN-COM-East GmbH, a privately held German company known for full-service terrestrial networking solutions and microwave links, has placed follow-on orders with Advantech Wireless for more than 100 point-to-point microwave links.

LAN-COM-East GmbH has an established reputation for Low-Latency network design and selected Advantech Wireless' Transcend 800 series of Microwave Products to provide secure high availability leased lines and private networks to their customers.

The frequency and power range of Advantech Wireless's microwave offering meets the required flexibility and specific applications of LAN-COM-East's customers by covering all bands from 5 GHz to 42 GHz. Advantech Wireless was able to meet an aggressive delivery and installation schedule in-part due to the flexible firmware based design of the Transcend 800. This unique capability gave LAN-COM-East a critical advantage in rapid deployment and efficient network rollout.

The Transcend™ 800 Microwave Radio from Advantech Wireless carries native video, IP and TDM traffic and is an affordable high capacity, high performance and flexible solution for demanding transmission, telecom and broadcast applications. It is available in a split-mount version and all-indoor configurations.

"Our long term partnership with Advantech Wireless has grown not only through top level products, especially we also appreciate the intensive and high-quality support," said Carsten Pueschel, Service Manager at LAN-COM-East GmbH.

"Advantech Wireless pays close attention to our customer's needs by selling solutions that lead to higher revenues and lower operational costs. We have ported our industry leading innovations and experience in satellite networking equipment into our microwave products. The Transcend 800 is a disruptive technology platform for the microwave industry and does not share the risk associated with typical leading-edge technologies," said Bojan Skulic, Terrestrial Microwave Communications Manager at Advantech Wireless.

A Longer Life

Advantech Wireless recently announced a substantial increase in bookings for their award winning line of Gallium Nitride (GaN) based Solid State Power Amplifiers (SSPAs) in the first half of the Fiscal Year 2016.

One example : The new Super Compact SG Series Ku-Band Rackmount SSPA/SSPB and BUCs provide highest power density in the industry. Combined with the traditional Advantech Wireless features, these new series of BUCs provide the ultimate in performance and convenience.

Introducing Advantech Wireless' second generation of GaN based units has opened new opportunities in market segments that traditionally relied on Traveling Wave Tube (TWT)-based amplifiers. This breakthrough in design—GaN-based units have vastly reduced size, weight and power consumption—along with the enhanced linearity of this state-of-the-art technology, make possible new applications in tactical Troposcattering communications, and scientific research facilities. GaN technology continues to offer dramatic cost reductions for teleport operators in the broadcast industry.

In early stages of technology development, Advantech Wireless researchers realized the potential of these GaN-based devices for high frequency satellite communication. An R&D program was begun in 2006 to design and manufacture a complete line of C-, X-, and Ku-band SSPAs that would meet the demands and requirements for commercial and government communications infrastructure.

In partnership with key technology providers, Advantech Wireless engineers have focused on technology transition to high frequency, high efficiency, and high performance, as demanded by the growing SATCOM-on-the-Move, Mobile, Manpack, broadcast and teleport markets.

Providing BLOS Security

Advantech Wireless has also been selected by Airbus Defence & Space to provide the Beyond Line of Sight communications solution as part of their successful Border Control infrastructure.

Advantech Wireless have successfully partnered with Airbus to provide A-SAT™ technology capable hubs and remotes delivering a realistic, affordable and adaptable SATCOM option where fiber or microwave links are unachievable in a Border Control and Security arena.

Advantech Wireless offers two-way, open standard (DVB-RCS), broadband satellite access system. Their hubs and terminals are highly flexible and several different network architectures are possible. The award winning A-SAT™ technology provided in this deployment is beyond dual mode DVB-RCS/TDMA-SCPC. It monitors channel utilization and switches the satellite access method and MODCOD for the return channel in real-time to dynamically maximize the space segment utilization efficiency. Additionally, by having TDMA and true DVB-S2 SCPC technologies in a single platform, the switch between traffic patterns is efficiently supported and all risks of equipment obsolescence are mitigated.

AvL TECHNOLOGIES

By Tony Wilkey, Vice President, Sales

2015 has been a dramatic year for the satellite communications industry—unexpected mergers and acquisitions, innovative new products, a continued battle over spectrum with the wireless industry, continued growth in HTS services, big announcements on new innovative satellite constellations, and mind-boggling demonstrations of the bandwidth of MEO systems.

For AvL Technologies, 2015 was a year of stability and transition—stability due to our success at launching new products into new industries to offset reduced spending from government and military customers, and transition as our footprint was expanded with a now-under-construction facility near company headquarters and new test range.

Though government and military agencies have slowed spending in general, investment in new communications technologies has continued. Many of government and military customers are actively transitioning from traditional commercial Ku-band service to HTS Ku- or Ka-band, which has required some antenna upgrades. However, the resulting improvements in service and throughput has initiated long-term cost savings for these government and military customers using commercial satellite networks and has enabled many to expand their applications for satellite communications.

HTS growth was also seen in the SNG market as end-users move from traditional C- or Ku-band services to HTS Ku- or Ka-band, included adding new antennas to their trucks—mostly 1.2 meter antennas—a size that enables smaller and smaller sized news trucks that are packed with more and more capability.

One such customer configured the bed of a standard pick-up truck with an AvL 1.2 meter Ku-band antenna mount. The reporting crew was able to easily access urban parking deck rooftops for live reporting in dense downtown locations.

The Oil & Gas market continued to feel the effects of depressed oil prices through 2015—many cut back dramatically on spending. Some AvL customers, however, continued to invest in HTS equipment and services in an effort to get “lean and mean” with real-time performance data and lower overall costs for the satellite communications technology investment.

Many in the industry expect oil prices to remain low through 2016, which equates to Oil & Gas communications spending likely to remain quite conservative for the foreseeable future.

With longer active deployments in Afghanistan and other rising threats in the Middle East, another trend that continued into 2015 for AvL's government and military customers was the requirement for smaller, lighter and faster-to-deploy systems. As a result, the company continued to refine its family of manual flyaway antennas and successfully launched new designs for the 60 centimeter, 1.2 meter and 2.4 meter antennas.

2015 also marked the introduction of new capabilities for AvL, including the new MEO tracking antennas for O3b. Launched were the 85 centimeter tactical tandem antennas at the SATELLITE show, and since that time, the company has supported O3b with numerous demonstrations of the network's capabilities—with mind-boggling results.

At a recent demonstration for the U.S. DoD, the 85 centimeter antenna system's throughput was an amazing 400+ Mbps down and 100+ Mbps up. Available early in 2016 will be the 2.4 meter tactical tandem antennas, which are now in final testing. At a recent test at AvL, the 2.4 meter system's throughput was nearly 600 Mbps down and 500+ Mbps up.

Another first for AvL in 2015 was the introduction of fixed Earth stations with carbon fiber composite reflectors. At the request of three customers, the company designed and produced Earth stations with 1.2 meter, 1.6 meter and 2.4 meter reflectors with carbon fiber's signature zero coefficient of thermal expansion and will remain stable in extreme heat and cold without losing shape, unlike aluminum and other materials.

AvL EXPANSION

Why is AvL expanding in this era of reduced spending by government and military, Oil & Gas and other key markets? Have we gone mad? Perhaps, but our culture has always been one of seizing opportunities when presented and pushing the innovation bar at every turn.

AvL is purposely headquartered in a community where nearly every car proudly wears a “Keep Asheville Weird” bumper sticker. AvL Technologies is not your typical tech company.

Ground was broken on a new 55,000 square foot facility in June, with the expectation that the new building will be move-in ready by the end of Q1 2016.

With the second building, AvL will officially become a “technology park” that will facilitate close working relationships with key customers who will be renting space in the new building.

Space will also be rented to local start-up technology companies, many of whom are working on technologies relevant to satellite communications.

The new building also enables AvL to expand our growing composites business, which has been busting at the seams for several years. As product lines have grown, so, too, have the sizes of carbon fiber and carbon fiber composite reflectors.

Antennas are now manufactured with reflectors that are sized from 60 centimeters to 5.0 meters, and the tooling and materials to make these reflectors requires an immense amount of space.



In the new building, the composites team will expand in to a new state-of-the-art 20,000 square foot production space with new tooling and non-contact laser scanning equipment to increase production levels, while also improving production efficiency and product accuracy.

In all, the actual goal for AvL's expansion is to continue to add high-value technology jobs to the Asheville community, most of which will be in the satellite communications industry.

Five years from now, the hope is that the new facility will be a "twin" of AvL today in terms of the number of employees (150+), innovation and capabilities.

In addition to the new building, AvL has been hard at work on a new test range that is located one mile from company headquarters. The range construction is complete and will soon be operational—expect a formal announcement early in 2016.

BULLETINS

Earth Station Antennas In The Works

Earlier this year, O3b Networks selected AvL Technologies to design and build the Transportable Terminal Antenna System for use with O3b's Medium Earth Orbit (MEO) Satellite Network.

AvL will develop and manufacture the hardware and software for a family of Earth station antennas with reflector sizes of 0.85 meters, 1.0 meters, 1.2 meters, 1.8 meters and 2.4 meters.

These Transportable Antenna Systems will enable O3b's customers to rapidly deploy systems to take advantage of O3b's "Fiber Speed with Satellite Reach."

The O3b network is unique in that its use of multiple satellites in MEO and Ka-band frequencies will allow for extremely wideband digital traffic with minimal latency, effectively doing away with the delay inherent in traditional satellite communications.

The AvL Transportable Terminal Antenna System will enable users to realize the benefits of this technology with the ability to move and rapidly deploy the network's capabilities to meet changing requirements and evolving needs.

The Transportable Terminal Antenna System is designed to be transported in durable transit cases and to be set up and on-the-air within two hours.

"These high performance transportable antennas are designed to acquire and track the O3b satellites as they move across the orbital arc. AvL Technologies was selected by O3b because of the high quality of our antennas and our engineering expertise to design and manufacture antennas that can work in tandem to accurately follow the satellites," said Mike Proffitt, President of AvL Technologies.

avltech.com/

CPI SATCOM PRODUCTS

By Doug Slaton, Marketing Communications Manager

2015 was another exciting year for Communications & Power Industries (CPI) with regard to both technical innovation and new product introductions.

The company answered the strong TWTA market need for higher output amplifier power at DBS- and Ka-band, implemented our LifeExtender™ technology into several product lines, and opened up an entirely new market for CPI's high-efficiency HPAs with the implementation of our patented "Dynamic Depressed Collector" (DDC) technology. Expanding CPI's already significant family of SSPAs, we continued to add to our Gallium-Nitride- (GaN-) based product line, including the introduction of a new lightweight X-band product.

2015 HIGHLIGHT: PATENTED DDC TECHNOLOGY

More than a decade ago, CPI introduced a simple, yet revolutionary, product: the SuperLinear® high power amplifier (HPA). As the only fully vertically integrated HPA manufacturer in the world, we were able to optimize the pairing of a CPI-manufactured traveling wave tube (TWT) with a CPI-manufactured HPA power supply; no one else has the capability to manufacture both of these products in house.

This integration has created significant power efficiency improvements, which in turn has led to advancements in the amplifiers' size, weight, reliability, and cooling structure.

For many full-time operators, CPI's technology has led to prime-power cost reductions of thousands of dollars per year per amplifier. HVAC costs and UPS requirements have also been reduced. For other operators, the smaller footprint of CPI's HPAs has allowed for more efficient and compact Earth-station designs. As a result, CPI SuperLinear TWTAs are a very popular choice for:

- *Fixed Earth stations with high energy costs*
- *Mobile uplinks for commercial and military where size and weight are a premium*
- *Systems driven by generators that consume valuable fossil fuels*

The CPI SuperLinear® TWTA is regularly chosen by many operators over other technologies because it simply makes good technical, financial and business sense to do so.

However, not all system operators have been in a position to reap the efficiency benefits that CPI's SuperLinear TWTAs offer. Because SuperLinear HPA technology sacrifices the ability to run at peak power (Psat) so that maximum efficiency can be achieved in the linear operating performance range, those operators who require occasional full peak output power have had to rely on traditional HPAs.

With CPI's new DDC technology, this has changed: no longer must operators choose between high efficiency and high power.

Thanks to CPI's patented Dynamic Depressed Collector (DDC) technology, operators can alternate between highest efficiency and CW modes on the same amplifier at the touch of a button.

For more autonomous systems, the HPA can automatically select the best mode of operation based on system requirements.

As with CPI's SuperLinear HPAs, the cost savings are quite dramatic when compared to traditional TWTAs operating at linear power. However, when breakthrough power is needed, the CPI DDC HPA delivers that as well.

DDC amplifiers are very appropriate for applications that require occasional operation at high output power levels, such as:

- *TT&C and IOT users who need max power regardless of linearity*
- *Uplinkers on the edge of a beam or in rain-fade conditions who rely on full power to make their links reliable*
- *Single carrier users who want to push higher than 3 dB backoff*
- *DDC technology is currently available on the CPI C-band 2.25 kW rack-mount TWTA, with more frequency and power options to follow in 2016*

NEW 1.25 KW DBS-BAND TWTA

CPI's new 1.25 kW DBS-Band SuperLinear ODU provides up to 552 W of linear output power at the flange, in the same mechanical outline as the company's 500 W and 750 W CW products. This allows for a form-fit-function upgrade in power.

The TWT in this new amplifier, while remarkable for its breakthrough power, represents a relatively low-risk development compared to other high power DBS-band TWTs on the market, as the amplifier and tube were the result of a collaborative internal effort between CPI's Microwave Power Products (MPP) and Satcom divisions. For facilities requiring quieter operation and improved MTBF, CPI's 1.25 kw DBS-band SuperLinear ODU is also available with liquid cooling.

CPI SURPASSES THE 700 W KA-BAND MARK

Continuing the expansion of its broad Ka-band product line, CPI recently introduced a 4 GHz bandwidth, 700 W Ka-band TWTA. This combination of power and bandwidth represents a real breakthrough for Ka-band uplinks. As with the 1.25 kW DBS-band amplifier, the TWT and amplifier are the result of a collaborative internal effort between CPI's MPP and Satcom divisions.

10 W X-BAND TRANSCEIVER

CPI entered the RF transceiver market this year with a 10 W X-band GaN device suitable for an ARSTRAT-certified "man-pack." It is highly efficient, requires no fan, and is extremely rugged. CPI has already delivered approximately 100 of these devices to the US military.

Among many other technical milestones and advancements, these four major accomplishments from CPI in 2015 are notable; they fulfill urgent market demands with new and innovative solutions. Because of these accomplishments, system operators and integrators now have options for higher power in DBS and Ka-band. Some markets that previously were not able to take advantage of CPI's industry-standard SuperLinear TWT offerings now have the option to realize similar cost savings with DDC technology.



These advances are not simply a repackaging of existing technology --- they are breakthrough solutions that keep CPI TWTAs and SSPAs at the leading edge of amplifier technologies used in ground-based satellite communications.

cpii.com/satcom

BULLETINS

On The Acquisition Trail

CPI acquired ASC Signal Corporation, a company that designs and builds advanced satellite communications, radar and high-frequency antennas and controllers.

ASC Signal's high-performance antennas are used in commercial and government satellite communications, terrestrial communications, imagery and data transmission, and radar and intelligence applications. Under the acquisition agreement, CPI acquired ASC Signal from Resilience Capital Partners. CPI expects to realize approximately \$50 million in annual sales, as well as positive contributions to its earnings, in the first year following the acquisition. ASC Signal will be operated as an independent division of CPI and will retain its current leadership and personnel, including its sales force.

ASC Signal's product portfolio includes SATCOM antenna systems with UHF to V-band capabilities; radar antennas in S- and L-band for air traffic control radar applications and in S- and C-band for weather radar applications; and high-frequency and specialty antennas in a wide frequency range for a variety of applications. ASC Signal's antennas are typically between 2.4 meters and 14 meters in diameter.

ASC will operate as its own division at CPI, separate from the Satcom Division.

SuperLinear® Integration In Africa

The Satcom Division of Communications & Power Industries LLC (CPI) has been awarded a competitive contract valued in excess of \$600,000 (at list prices) from an African integrator for the company's new, 1.25 kW, DBS-band SuperLinear® traveling wave tube amplifiers (TWTAs) and related system hardware.

CPI's products will be part of a primary uplink system in a well-established, DTH network in Africa. CPI's SuperLinear high-power amplifier (HPA) was selected over competing products in part because of its patented LifeExtender™/LifePredictor technology, which can result in an increase of up to 50 percent in tube longevity.

In addition, the customer chose CPI because CPI manufactures both the TWT and the amplifier and because CPI's SuperLinear® TWT high-power efficiency results in significant power cost savings for the end user.

CPI is one of the largest manufacturers of high-power communications amplifiers. CPI's broad line of HPAs includes solid-state power amplifiers (SSPAs), TWTAs and klystron power amplifiers (KPAs). CPI's amplifiers are used around the world in fixed and mobile gateways for both military and commercial applications. CPI offers amplifiers in frequencies from S-band to V-band and supports its fielded products through more than 20 service centers around the world.

Orange Teleport In France Obtains CPI's ASC Signal Ka-Band Capabilities

The ASC Signal Division of Communications & Power Industries LLC (CPI) has completed installation of two new antennas at the Orange Teleport in Bercenay, France, bringing Ka-band capabilities to the teleport that will enable continued growth in the face of saturation of Ku-band space segment—the teleport supports service to the enterprise market, principally oil and gas companies, in Francophone Africa and North America.

The new installation includes one 7.6-meter C-band and one 5.6-meter Ka-band antenna equipped with the Next-Generation Controller (NGC) and unique Sub-Reflector Tracking (SRT) system from CPI ASC Signal Division.

The NGC gives Orange Teleport a single, simplified, central device to control and operate multiple antenna systems. The NGC's advanced features include remote access and tracking capabilities built into the system, an internal spectrum analyzer, redundancy control systems, and many other high-performance controller features.

The SRT system provides Orange Teleport with the ability to track the Ka-band satellite to within 1/1000th of a degree, which eliminates the need to move the main reflector as any part of the tracking. By relying on the SRT for tracking, Orange Teleport will be able to capitalize on the reduced operating and maintenance expenses, as well as performance optimization, that will result when the main reflector can stay locked down.

"ASC Signal's patented technologies continue to drive installation of our high-performance antennas by the world's most demanding teleport operators," said Keith Buckley, president of CPI ASC Signal Division.

"We have worked with ASC Signal on antenna projects for years," said Patrick Meline of the Teleports & VSAT Maritime Group with Orange. "Their team is always available and extremely professional in their approach. The quality of their products and equipment perfectly answers our needs."

DATAPATH

By David Myers, President and Chief Operating Officer

For DataPath, Inc., 2015 was a rewarding year during which our commitments to premier customer care, product innovation and engineering quality lead to demonstrable growth.

DataPath has focused on investing in and repositioning the company to support a more comprehensive range of customer mission profiles. To that end, each of the company's primary business lines were challenged to enhance existing technologies and launch new products and services.

DataPath leveraged its 25 years of experience, along with innovations in satellite and cyber technology, to introduce new solutions that enhance network security, monitoring and management, as well as remote connectivity.

NEW INNOVATIONS + CAPABILITIES

At DataPath, we like to say the range of solutions we can provide spans from Terminals to Teleports to All the Tools in Between. The value proposition the company offers is being able to provide end-to-end remote communications and networking solutions accessible through one common interface and architecture.

We are especially proud that DataPath executed three major product and service launches in 2015 that represent very different parts of a total network solution.

Cyber Security Services

DataPath has been providing customized information assurance and cyber security services to the US government and military for many years. Historically the company's cyber security services have been primarily focused on protecting satellite and fixed wireless networks, which typically employ specific devices, such as RF units and modem technologies that present unique vulnerabilities.

DataPath's Cyber Security Solutions use state-of-the art tools to assess a communications network's infrastructure, identify vulnerabilities, and create a customized security plan. The services range from basic assessments, to supporting the customer's existing IT staff to ongoing 24/7 support and incident response. Additional services include network certification and accreditation, compliance assurance, and post incident investigation.

MaxView® Enterprise™—Network Monitor and Control Software

In September, DataPath launched MaxView® Enterprise™, a major enhancement of the company's renowned network monitor and control software. Hundreds of customers operating on all seven continents already rely on MaxView to monitor and control all of the disparate systems and multi-vendor devices on their network through a single user interface. Now, by employing a high-performance, mobile responsive web platform, MaxView Enterprise customers can securely manage their networks from virtually any web-enabled device.

Other significant enhancements include a cutting edge user-interface, enhanced analytics, customizable dashboards, interactive reporting, advanced scheduling capabilities, service task automation, and an expanded library of device drivers to support remote sensors and additional appliances.



QCT90—Man-portable Satellite Terminal

Another major milestone for DataPath in 2015 was the launch of its QCT90, a new lightweight, man-portable satellite terminal that is 90 centimeters in diameter, and weighs only 20.6 kilograms. The terminal was built to military specifications and allows for single person carry and quick set-up and deployment.

The QCT90 provides military units with reliable, high-performance satellite communications capabilities when their missions call for quick connectivity on the go—making it well suited to the special operations community. Users can take the antenna out of its backpack or case and establish network connectivity in less than three minutes while other products on the market might take half an hour.

EXPANDED SERVICE TO MILITARY + GOVERNMENT

DataPath has been a leading provider of remote communication solutions to U.S. and allied military and intelligence customers for over two decades. In addition to executing successful product and service launches in 2015, we were proud to achieve several milestones that extended our presence in the military and government market.

Early in the year, DataPath was awarded a Global Tactical Advanced Communication Systems (GTACS) contract for the U.S. Army's Assured Positioning, Navigation, and Timing (PNT) Pseudolite Technology Maturation and Risk Reduction program.

Under this award, DataPath has partnered with its former parent company, Rockwell Collins, to develop augmented global positioning capabilities for the U.S. Army.

In a separate award, a US military customer selected DataPath to provide MaxView® as the standard monitor and control software platform across a fleet of hundreds of remotely deployed satellite antenna systems, manufactured by both DataPath and other major hardware providers.

The software license and support services agreement brings the total assets under management by MaxView for this customer to more than 1,800 systems.

A few months later, the company was awarded a foreign military sales (FMS) contract to supply WGS satellite terminals with additional equipment and training to the Danish Defense Acquisition and Logistics Organization (DALO).

Through the contract, facilitated by the U.S. Air Force Life Cycle Management Center, DataPath delivered 30 DataPath CommuniCase® Technology 1.2 M (CCT 120) portable satellite terminals to the Danish Air Force and Army, which will help Denmark to maximize its investment in the Wideband Global SATCOM (WGS) constellation.

Finally, DataPath officially opened its new global field service and support facility at Aberdeen Proving Ground, Maryland. The office provides local representation and customer service for U.S. Army programs located at Aberdeen Proving Grounds.

This new office will also serve as DataPath's remote management center for its field service and support engineers and technicians, deployed on military bases and customer locations worldwide.

LOOKING AHEAD TO 2016

As new high-throughput satellites (HTS) increasingly become a reality, DataPath will continue to leverage its heritage of engineering innovation to develop products that enable satellite network providers to take advantage of the promise of next generation technologies.

The company has centered its thinking around developing products with a complete end-to-end architecture in mind. As a result, our customers will benefit from not just state-of-the-art products, but complete field proven communications solutions.

datapath.com/

BULLETINS

Aboard The GX Services Bandwagon

Earlier this year, Inmarsat Government executed a service provider agreement with DataPath Inc. to provide Inmarsat Global Xpress services in support of U.S. government expeditionary communications needs.

DataPath is a proven and trusted partner to U.S. government and military organizations, with nearly 25 years of experience providing advanced communications systems and services, for thousands of missions across more than 40 countries around the globe. The company specializes in developing complete communications solutions tailored to meet the unique demands of customers operating in remote and harsh locations.

DataPath's portfolio includes an extensive Wideband Global SATCOM (WGS) certified satellite ground terminal family with systems ranging in size from .9 meters, 1.2 meters, 2.0 meters, to 2.5 meters, and available in man-packable, transportable and vehicle-mounted form factors.

The company also builds highly customized mobile command vehicles, as well as large scale fixed earth-stations for teleport and network gateway facilities. Additionally, DataPath's comprehensive MaxView® network management software monitors and controls all devices within a network. Their solutions are backed by industry-leading cyber security and IT services, a 24x7 Network Operations Center (NOC), and global field support services.

DataPath will launch new end-to-end managed service packages combining its satellite terminals with the Global Xpress network, with general availability of military and commercial frequency band integrated services starting by the end of the calendar year.

End-To-End Agreement For Seamless Provisioning

DataPath, Inc. and ScheduALL are now engaged in an integration initiative that leverages their complementary strengths and expertise to offer an automated end-to-end broadcast transmission solution.

This collaboration creates seamless provisioning from the customer's occasional use (OU) business bookings in ScheduALL through transmission enabled by DataPath's MaxView® monitor and control capabilities, including back-up alternatives. The new integration will give broadcast operators the ability to set up a scheduled circuit.

Once the data is entered into ScheduALL, the solution will validate that there are no conflicts with the requested resources and confirm the reservation. At the designated time, ScheduALL communicates with MaxView, which configures the equipment according to the desired specifications. This allows for a hands-off, real-time execution, creating a cost-effective, easy-to-maintain workflow. Another key benefit of the combined technologies is the continual monitoring of full time circuits, which provides critical diversity failover in the event of primary circuit failure.

Broadcast network operations centers (NOCs) monitor hybrid, complex networks consisting of disparate systems, siloed software, multiple sites, and various types of equipment that do not communicate with each other.

DataPath's MaxView provides a single, consistent interface to manage all equipment, elements and service applications within your network across all locations. MaxView layers advanced functionality on top of basic monitoring and control capabilities allowing you to centralize control of your network, improve efficiency, decrease downtime and reduce excess resources.

ScheduALL's LINK system is used by major broadcasters, and transmission providers across the globe. LINK manages satellite, fiber and Ethernet inventories, from customer booking and operational management through to granular financial visibility and analysis.

This sophisticated OU booking system allocates capacity, configures and validate satellite and fiber transmissions, manage complex inventories and avoids conflicts and double bookings. LINK also provides unparalleled business analysis and reporting capabilities that interface with external ERP systems.

"The integration between MaxView and ScheduALL demonstrates DataPath's commitment to invest in innovative solutions for the broadcast market. The combination of monitor and control software with broadcast and transmission scheduling software, will enable broadcasters to streamline their workflow and improve operational efficiency," said David Myers, President & CEO of DataPath.

EM SOLUTIONS

By Dr. Rowan Gilmore, Chief Executive Officer

Plus ça change, plus c'est la même chose — (The more things change, the more they stay the same).

Going back in time is always interesting—to reminisce, to encourage, to learn, and perhaps even to long (for the good old days).

Public telecommunications in past decades was circuit-switched, organized hierarchically into groups and supergroups, analog in nature, and networked as either broadcast or point to point circuits.

The emergence of digital technology was a seminal change for the telecommunications industry, since it allowed massive improvement in spectral efficiency and saw the emergence of techniques like forward error correction, digital filtering and equalization that improved communications quality over poor lines.

The emergence of IP and then the Internet in the late 1990's was equally important, since packet switching has simplified multiplexing, improved accessibility, and expanded network architectures, while the connectivity of the Internet has provided the broadband applications that have massively driven the growth of global telecommunications carriers.

However, the physics of satellite communications has always kept it apart. Long hops and limited power budgets place much lower bounds on signal to noise ratio, and satellite practitioners look enviously at recent advances in terrestrial cellular networks (for example), where MIMO antenna systems, high order modulation schemes, and low cost terminals are meeting the ever growing demands for high speed data—where service is available.

However, the more things change, the more they stay the same—satellite still remains the only communications technology that is available any place, any time.

Recognizing early on that Ka-band solutions would be required to meet the growing data needs of the defence community, EM Solutions started to migrate many of its products to Ka-band in the mid 2000's and build them into more advanced systems.

Since 1998, the company had developed bespoke and customized solutions for its customers, which initially were the Australian Defence Force and local telcos. From its roots as a developer of solid-state power amplifiers, filters, and oscillators it progressed up the value chain to develop high speed receivers and transmitters for radios, and now on-the-move terminals, to become the partner of choice for several European systems integrators.

For example, the company's 50W Ka-band linearized BUC is the only airborne qualified solid-state BUC at this power rating on the market, and was first developed specifically for a customer in Europe.

EM Solutions has a long heritage of providing communications solutions to the military. It was in 2008 that EM Solutions won its initial sponsorship from the Australian Army to develop a land-mobile Ka-band terminal.



We were fortunate that we were able to test multiple prototypes over the Optus C1 satellite and to perfect our "monopulse" pointing technology before progressing to WGS testing. The development of this unique pointing technology has taken us on other fruitful journeys; for instance, we designed and manufacture E-band (80GHz) radios operating at 5 Gbps that now link the New York financial markets, offering double the speed, double the range, and an order of magnitude faster latency than our closest competitor.

In 2015, we showcased our WGS capable land-mobile 48cm Ka-band on-the-move terminal at a number of events around the world. In addition, we released our Ka-multiband Diamond series BUCs. These use GaN devices, cover an entire 3GHz of RF bandwidth, and are fully linearized, still providing the smallest form factor on the market.

We also released our new nanoBUC HUB, it provides the 3GHz linearized upconversion functionality on its own and can be used as a split system with a separate power amplifier.

2016 promises to be even more exciting. EM Solutions believes terminals should be able to roam between satellites in the same way as a mobile phone. For the Royal Australian Navy we will be in ship trials with a 1-m maritime terminal that operates simultaneously at X- and Ka-bands with the WGS satellite, and can fall back to commercial Ka-band when needed.

We are also under contract to supply 1 meter maritime terminals to an Australian Government customer that will provide access to both WGS and commercial Ka Band satellite systems. Our goal is to offer more robust and assured communications than can be achieved with just one satellite, by switching between bands and satellites all on the one platform automatically.

EM Solutions seeks to be a solutions partner with its customers. We are a highly collaborative company, and through partners in Italy and Spain for example are developing products to meet the emerging needs of defence forces in those and other countries around the world.

The company's new 1m X/Ka- maritime terminal is of interest to several WGS signatories who want to reduce their reliance on a single band and increase their on-air availability. Of course, we are also serving civil defence forces as well, for instance in Japan where the Fukushima disaster caused a re-evaluation of the country's communications infrastructure.

The growing demand for off-shore border protection is another emerging market for terminals that can cross over between military and commercial satellites.

History has shown that innovation never stops. EM Solutions best supports its customers by rapidly responding to their needs, for instance by customizing products to their specific requirements.

For example, we have been asked to add Ku-band capability to our X/Ka-maritime terminal, and we are looking at the quickest way to bring this to market. We also work with partners in Australia to help design and build other RF and microwave products for their defence customers, such as for radar and EW.

EM Solutions wishes to remain globally recognized for the level of our innovation, and we want to be the partner of choice for more multinational defence system integrators. With so many customized products, we hope that we can scale many of those into much larger production volumes.

Finally, we intend to carve an even deeper niche for ourselves in high end SATCOM-On-The-Move (SOTM) terminals and high speed telecommunications products.

emsolutions.com.au/

BULLETINS

Bonding With Inmarsat

Inmarsat announced a new partnership with EM Solutions to develop the world's first combined MilSatCom/Global Xpress (GX) maritime SATCOM terminal.

The new terminal is scheduled to receive full Inmarsat accreditation during Q2 2016 and will be submitted for Wideband Global Satcom (WGS) certification.

The new terminal, which is initially being created for an Australian Government customer, will contain a number of innovative features, including tracking via monopulse technology and easy switching between GX and MilSatCom systems.

The terminal will also be substantially lighter, lower cost and faster than any comparable MILSATCOM device.

Based on its land mobile terminal for the Ka-band, EM Solutions is also contracted to deliver a simultaneous X-/Ka-band maritime terminal for another customer, which provided the baseline reference for the new program in conjunction with Inmarsat.

EM Solutions adopted an innovative approach to the development of its satellite terminals, adopting monopulse tracking techniques that provide exceptional accuracy and stability in addition to reducing the demand on motors and other moving parts, which minimizes power, weight and operational stress.

As a specialized developer of RF components and subsystems for the Satcom industry, the new terminals will use EM Solution's Diamond Series Ka Multiband Block Up Converters, which use the latest in Gallium Nitride (GaN) technology and cover commercial and military Ka-frequency bands in a highly efficient, single package.

This family of maritime terminals is known as the COBRA series and will be further developed for other capabilities in the near future.

Andy Start, President, Inmarsat Global Government, said, "This announcement is a further example of Inmarsat's strategy of responding quickly and effectively to customer demands. In this instance, the Australian Government customer was looking to increase the operational capabilities of their satellite communications within significant budget constraints and the requirement to reduce the footprint of satellite equipment on-board its new vessels. We are seeing a growing understanding within government SATCOM circles of the important role that commercial satellite communications can play in augmenting existing MilSatCom capabilities. Partners, such as EM Solutions, play a vital role in helping us to develop new solutions, which are tailored specifically for government users."

Dr. Rowan Gilmore, CEO of EM Solutions, said, "We have been working on this product platform for a number of years and the opportunity presented itself to take a product through both Inmarsat GX certification and ultimately WGS certification to deliver a unique offering to an Australian Government customer. We believe this terminal will be the first jointly certified system to enable automatic switching between MilSatCom and Inmarsat GX satellite systems."

A Diamond In The BUC

Earlier this year, EM Solutions also started shipping their Diamond Series BUC Family.

The first commercial shipments of the EM Solutions Diamond Series BUC family are part of long-term supply agreements with customers that include leading defence suppliers in Europe, the Middle East and Africa. Since their release the Diamond Series Ka-Multiband have been applauded for their capability and the low power consumption and small size of EMS' new GaN technology is proving attractive for customers offering Ka-band services on land, aero and maritime platforms.

Available as single package integrated BUCs or stand-alone power amplifier units with separate nano BUC HUB, this new range of Ka-band Multiband GaN products can achieve output powers of up to 100W at any frequency in the Ka spectrum. This is the smallest form factor with the highest efficiency.

The Diamond Series features...

- » 1dB extra in linear power
- » Only product that offers up to 3GHz of bandwidth in a single unit
- » Up to 50 percent less DC power consumption
- » Up to 50 percent lower weight
- » Up to 50 percent less dimensional volume
- » First to Market with GaN technology at Ka-Band for these power levels

ETL SYSTEMS

By Ian Hilditch, Chief Executive Officer

ETL Systems, a UK-based global designer and manufacturer of RF distribution equipment, has had an extremely successful 2015, marked once again by solid revenue growth and expansion into new, international territories and crowned by the expansion of its RF range for military use.

EXPANSION + GROWTH

The satellite industry is steadily growing and always evolving. According to the 2015 SIA State of Satellite Industry Report, the world satellite industry has seen a four percent growth rate in revenues over 2014, led by growth in consumer satellite television and interest in satellite broadband.

ETL Systems is pleased to have contributed in part to this growth and, in turn, watched our business experience a revenue growth of 19.14 percent. This was aided by major contract wins in multiple regions and our presence at trade shows all over the world, including Dubai, Singapore, Amsterdam, USA, India and Brazil.

EXPANDING RF OVER FIBER

Following last year's launch of some exciting new products, including a new range of RF over fiber equipment and a compact Components Mounting System, this year was all about developing more flexible, efficient and reliable products to give our customers an even better solution.

ETL System's StingRay range has been designed to be as compact as possible, while offering reliability from dual redundant hot-swap power supplies, hot-swap fan and fiber modules. They are now available as standalone modules or 19-inch rack mounted chassis options, providing excellent module to module isolation, ideal for high isolation applications. The range now includes 1+1 and 4+1 redundancy configuration options, providing additional resilience for uplink and downlink transmissions.

For longer distance transmissions over fiber, the company introduced coarse wavelength division multiplexing (CWDM) modules which can transmit RF signals up to 35km distances with low loss.

This year, the company's matrix offerings were further expanded, enabling us to offer customers the best fit for their requirements. This includes new, fully hot-swap Enigma matrix models with enhanced features such as low noise, variable gain and high linearity options. Also developed was a model that operates up to 4 GHz, growing the Enigma range into wireless testing applications.

With a focus on flexibility, a new range of standalone units to power LNB's, the Piranha series, provides DC powering options in a compact 1U high, 19-inch chassis for a range of components and devices in satellite ground station RF and power distribution chains.

The units are compact, expandable and customizable. Piranha's modular approach means the customer can purchase the size that they want and then expand later as their LNB power requirements increase.

Additional new technologies include improved performance for carrier monitoring with even faster switching time, improved return loss and isolation on the upgraded LS series monitoring switches.



EXPANSION OF MILITARY-FOCUSED PRODUCTS

ETL Systems' range of RF solutions for military use was expanded during 2015. Launched was a new range of RF power amplifiers for electronic warfare applications, such as mobile frequency jamming. These can be on mobile or fixed terminals and used in terrestrial point to point and point to multi-point and offer a broad range of operating frequencies, including 20-500 MHz, 500-2700 MHz and 2500-6000 MHz.

The design of the amplifiers is based on advanced Gallium Nitride (GaN) high electron mobility transistor (HEMT) technology for high efficiency, good thermal conductivity, high breakdown voltages and low energy consumption.

In May, the company provided BAE Systems Australia, the largest defence contractor in Australia, with customized component amplifier units. The amplifiers form part of a new ground station that gives the Australian Defence Force the ability to communicate with their deployed units around the world. These amplifiers have been designed for X-and Ka-band antennas for a ground station in outback Australia that will receive signals from the Wideband Global SATCOM system.

The units are able to compensate for passive splitters and combiners and are supplied with waterproof N-type connectors, making it resilient against harsh weather. Two major US Government agencies were also provided with customized Vulcan matrix systems.

INTERNATIONAL CONTRACTS

In addition to expanding military sector products, this year new international contracts were signed with influential players in key markets. At the start of the year, an upgrade to the IPTV equipment for a Belgian telecommunications giant was completed and also installed were Matrix Routers for extra resilience in the IPTV network of Middle East telecom operator, du.

In March, the Dextra series of active splitters and combiners were used at the MTN Communications (MTN) teleport in Holmdel, New Jersey. ETL Systems was also selected by Intelsat to supply specialized RF equipment to monitor and control global satellite traffic at that company's teleports in the U.S. and overseas.

Our equipment—including Enigma matrices and several RF combiners and splitters—was also selected by CP Communications, a leading global provider of video and audio broadcast products and services, to outfit their new fleet of mobile production vehicles to allow them to deliver seamless transfer of live golf tournament feeds. This system debuted in Scotland at the Ryder Cup.

In May, another new and important partnership—this time with Canadian company Solutions Broadcast RF (SBRF)—saw the provisioning of Canada's major public broadcast network with an outdoor (ODU) StingRay RF over fiber chassis to create a reliable and top tier fiber system.

All of these new partnerships highlight the company's worldwide success and customer commitment.

A VIEW TOWARD 2016

With the technology involved in military operations rapidly advancing, the company must also evolve to keep up with these changes. At ETL, we understand this and pride ourselves on the flexibility and ability to respond quickly. This has been a very successful year for us and we look forward to developing our product range and grow even further in 2016.

etlsystems.com

BULLETINS

Amping Up The Power For The Military

ETL Systems has launched a new range of RF power amplifiers for military use.

The range is designed for electronic warfare applications, such as broadband frequency jamming or EMC testing. These can be on mobile or fixed terminals and used in terrestrial point-to-point and point-to-multipoint and offer a broad range of operating frequencies, including 20-500 MHz, 500-2700 MHz and 2500-6000 MHz.

The design of the amplifiers is based on advanced Gallium Nitride (GaN) high electron mobility transistor (HEMT) technology for high efficiency, good thermal conductivity, high breakdown voltages and low energy consumption.

The modules benefit from high efficiency and gain, with 20, 35, 40, 60, or 100W saturated power options.

Each amplifier module is integrated into a compact housing, designed for easy integration, to a broad range of transmit antennas, filters and multiplexers. The high power RF amplifier products are available as standalone components or mounted in a 2U high 19" rack chassis, which offers dual redundant hot-swap power supplies, local and remote control and monitoring.

Signing On

ETL Systems has become the latest member to join the the Satellite Interference Reduction Group (IRG) .

ETL designs and manufactures professional RF distribution equipment for Satellite Ground Stations and other Microwave users. ETL's heritage is in designing satellite signal routing solutions for broadcasters, who demand high levels of RF performance, as well as redundancy and resilience.

This expertise has been expanded to cover Government, Military, Marine, Private VSAT networks as well as global Satellite Operators.

"We are delighted to add ETL to our list of members," said Martin Coleman, Executive Director, IRG. "I have worked with ETL for many years and have always been impressed with their professionalism and technical know-how. Having them as a member will certainly be a great benefit to the group as a whole."

Ian Hilditch, Managing Director, ETL, said, *"Satellite interference is an significant challenge for the industry and it is something we are tackling with our range of products and solutions. We are pleased to join IRG to lend our support to the important global initiatives."*

An Enigma For Intelsat

Earlier this year, ETL Systems was selected by Intelsat to upgrade that company's teleport facilities.

Intelsat provides satellite services worldwide, and operates a fleet of approximately 50 satellites and the IntelsatOne® terrestrial network, featuring eight strategically located teleports and more than 36,000 miles of leased fiber.

ETL Systems has supplied Intelsat with specialized RF equipment to monitor and control global satellite traffic at its teleports in the U.S. and overseas.

Intelsat personnel at each teleport must be able to monitor the signal strength of each line of communication from the various satellites.

ETL Systems' Enigma routers give operators exceedingly quick switching time that allows continuous cycling through the various channels to prevent any outage going unseen.

The Enigma matrix also has alarms that customers set and thresholds, so that if a signal should weaken in one area, physical and virtual alarms will notify the network operations center that immediate action must be taken.

The equipment comes as a complete system with specially designed software that allows Intelsat's teleport operators to view up to 32 simultaneous open sessions for carrier monitoring.

The 32 x 32 matrix can be modularly expanded as large as 256 x 256 and features dual redundant power supplies. All RF components are fully hot-swappable.

GLOBALSTAR

By Jay Monroe, Chairman and Chief Executive Officer

During 2015, Globalstar has continued to collaborate with military and government customers in order to closely understand their needs and how they utilize our devices and services.

We have continued to listen carefully to learn about the operational challenges this important customer group faces as we continue to enhance our products and services with bespoke interfaces, software and other features to meet their specific requirements.

In 2015, disaster preparedness continued to be an important area in which militaries are increasingly involved. Earlier this year, we announced a reinvigorated partnership with Lt. General Russel L. Honoré, U.S. Army (retired), to raise awareness of the important role played by satellite communications in emergency preparedness and response.

General Honoré is a globally recognized expert on emergency readiness, having spearheaded the joint task force responsible for the massive search-and-rescue mission in New Orleans and the Mississippi Gulf Coast following Hurricane Katrina in 2005.

Then and now, Globalstar technology is playing an invaluable role in helping military organizations communicate when traditional terrestrial communications are unavailable.

A notable trend for 2015 has been the increased enthusiasm and uptake among military groups for communication via Globalstar Sat-Fi®, our high-performance satellite hotspot.

There is a growing momentum toward the use of satellite hotspot communications in remote or portable "office" or "basecamp" environments and in other locations outside the normal field of operation.

With Sat-Fi, as many as eight users can leverage the reach and reliability of our satellite system, particularly for non-classified communications, using popular off-the-shelf smartphones and tablets. Sat-Fi enables them to benefit from the Globalstar fleet while using their existing devices.

The next generation of Sat-Fi, scheduled to launch in 2016, will be portable, smaller and lighter than the first-generation, making it more usable in a wider variety of ways and locations.

We anticipate that, for both duplex voice and data, Sat-Fi will become an everyday tool for more and more of our military and government customers.

Of course, for other classified communications, we also provide tailored solutions which incorporate military-grade security and encryption protocols as appropriate. These enable users to have reliable connectivity, even when their activities take them well beyond terrestrial or cellular infrastructure.



Globalstar has been identified and compliance-accredited by the US government to deliver federal emergency communications requirements, meeting standards as documented in FEMA Safecomm and FEMA National Emergency Communications Plan (NECP).

This means that government agencies located all over the US can be assured they can rely on the Globalstar network for secure and capable communications support for public safety, domestic preparedness, emergency response and other military activities.

As Globalstar continues to provide communication solutions to customers across the globe, we continue to expand our reach with strong interest in the Latin American region as well as in Africa.

As we now offer pan-African simplex coverage, 2016 should see an increased number of users in that region, particularly for satellite-enabled asset tracking, which is another common need for government users.

The requirement for more data and faster throughputs grows continuously among military organizations.

Next year and beyond, the situations in which militaries need to carry out mission-critical operations will become ever more varied, demanding communications services and solutions that enable maximum flexibility, nimbleness and ease of use.

Anticipating these requirements, in 2015 the company made huge investments in land-based infrastructure.

Our next generation terrestrial network, combined with our second-generation satellite constellation, will deliver improved throughputs to military and government customers, enabling them to communicate more effectively and achieve their mission goals with greater efficiency.

As a direct result of this new infrastructure, all of Globalstar's solutions, including SmartOne (the popular transmitter that uses M2M / IoT capability for asset tracking and monitoring) and Sat-Fi will deliver even better performance with unprecedented data rates.

Globalstar will continue to offer new, highly capable, tailored, state-of-the-art satellite solutions to military and government customers in 2016 and beyond.

Meanwhile, as public/government finances are always under pressure, we envision that our ongoing commitment to competitive pricing for our offerings will resonate with fiscal managers.

Globalstar looks forward to continuing to collaborate with and serve this important sector and the people whose support we all rely upon every day.

globalstar.com/

BULLETINS

Affording Relief

Globalstar, Inc. and first responder communications specialist Disaster Tech Lab are working together to assist the victims of the European and Middle East refugee crisis by dispatching satellite communications solutions to the Greek island of Lesbos, which has received many thousands of refugees fleeing Syria, Iraq and other nations in recent months.

Globalstar products and services are also helping to keep the humanitarian aid specialists from Disaster Tech Lab connected and safe as they travel to and between deployment locations. Disaster Tech Lab is currently deploying teams of volunteers to refugee camps and arrival sites. The remote areas of Lesbos where Disaster Tech Lab works have virtually non-existent cellular coverage and a severe lack of terrestrial telecom infrastructure. Satellite networks provide the only reliable operable communications available.

Evert Bopp, Founder of Disaster Tech Lab, said, *"Globalstar satellite phones are the only way many of these refugees can make a quick call to family back home, letting them know they have arrived safely. We have seen people forgo medical treatment for the opportunity to use a satellite phone; these communications are really helping people in the most desperate need. Not only are affected individuals benefiting from Globalstar technology, but we have also helped other NGOs by providing reliable satellite communications from Globalstar. Both the satellite phones and SPOT trackers have improved our operational efficiency and coordination efforts. For example, just recently, we loaned the satellite phones to other relief organizations in Lesbos to call for additional medical aid and direct resources and manpower to the right locations on short notice."*

"Globalstar has proven essential in the aftermath of U.S. disasters like Hurricanes Katrina and Sandy, and we are thrilled to be working with Disaster Tech Lab to extend the reach of our international solutions," said Jay Monroe, Chairman and CEO, Globalstar. *"The refugee crisis is widespread and we will continue to look for opportunities to assist both the victims and relief agencies."*

Nexgen Upgrades

Globalstar signed an agreement with Squire Technologies for the deployment of a range of products and services that will enable Globalstar to implement a core IP network at their satellite gateway ground stations.

The convergent solutions provided by Squire Technologies will enable Globalstar to use Level3's fully meshed MPLS network and improve connectivity to the public-switched telephone network (PSTN) across various geographical locations.

The agreement represents the final significant ground network infrastructure component for Globalstar's next-generation of advanced IP-based satellite voice and data services.

ALAS, All Is Well

Globalstar, Inc. and partner ADS-B Technologies, LLC, completed their latest public flight demonstration showcasing their revolutionary Space-Based ADS-B Link Augmentation System (ALAS™).

This test, which embarked from Alaska to the Gulf of Mexico and back, marked the first time that a flight demonstration tested a dual-link Space-Based ADS-B system in all environments and for extended periods of time.

The flight proved that the 1090ES and UAT versions of the ALAS technology work continuously, reporting the aircraft's position every second during a flight of nearly 7,000 miles.

Jay Monroe, Chairman and CEO of Globalstar, said, *"With this test, we have proven that Globalstar can provide a very secure, reliable and low latency platform for space-based tracking of aircraft in real time. Further, with our unique architecture and scalable capacity, the ALAS system will eventually be able to track aircraft virtually anywhere on Earth. ALAS technology works in places where there are known gaps in flight tracking ability, such as the Gulf of Mexico."*

"This test shows that, once certification is received, ALAS can be easily installed as a peripheral to virtually any existing 1090 MHz or 978 MHz avionics source and used to track flights within our current and future global footprint down to the second. Recent aviation events have proven that this technology is needed now more than ever. ALAS may also be a more secure form of ADS-B, since the nature of the L-band transmission and the antenna pattern make the aircraft's ADS-B position reports extremely difficult to intercept, jam or deceive."

The 7,000 mile round trip flight was designed to highlight the capabilities of the ALAS technology to provide continuous tracking, even in areas where standard ADS-B avionics would not be able to report.

"This flight clearly demonstrated the robustness of the ALAS system, and its viability as an immediate solution for tracking aircraft virtually anywhere at any time," said Skip Nelson, ADS-B Technologies' President. *"We've been working tirelessly on tracking solutions since the loss of Air France 447 in 2009 in hopes that one day, missing aircraft will be a thing of the past. As our tracking map clearly demonstrates, we believe that day has finally arrived."*

Additionally, NASA Langley has selected ALAS space-based ADS-B technology for its two-way communications requirements relative to ongoing R&D work at the Langley Research Center.

HUGHES DEFENSE

By Rick Lober, Vice President + General Manager, Hughes DISD + MilsatMagazine Sr. Contributor

This has been an exciting year for Hughes Defense as we launched a new SATCOM product line directed towards specialized applications.

The new HM System utilizes software defined modems and advanced waveforms and coding to yield solutions to problems common to both Military and Commercial users.

These include airborne beyond line of sight (BLOS) communications for ISR applications on both fixed and rotary wing platforms, very small portable terminals, and systems that require features such as low probability of detection (LPI/LPD).

Our new HM300 portable terminal, packaged in conjunction with Tampa Microwave, utilizes advanced waveform and antenna technology to result in the world's smallest X band portable terminal which is being used in a service offering by Airbus Defence and Space for operation on their protected Skynet satellite constellation. This is the optimum and most cost effective solution for applications such as streaming video, which require long periods of connectivity on a daily basis.

The same modem technology has been packaged by Hughes for use in airborne, shipboard and ground based COTM applications as the HM200, which features a ruggedized enclosure that meets DO-160 and MIL-810 specifications.

A unique coding appliqué can be added to the modem to assure operation through rotary wing blades without utilizing outdated techniques such as blade timing or blade burn-through (higher BUC/PA power). As with all Hughes SATCOM products, the modem is antenna and network agnostic with configurations available for operation in the L-, Ku- or Ka-band.

The HM100 hub modem completes the network and utilizes advanced waveforms and network management techniques that enable bandwidth efficient operations using the terminals noted above over all new Ku and Ka-band high-throughput satellites, as well as WGS and existing L-band mobile satellite systems.

Hughes has also continued to invest in R&D to create very high-speed modems and the porting of protected communications waveforms to these software definable products. We are partnering with industry leaders to add crypto devices resulting in true open systems solutions for the upcoming needs of the military in this important area.

Finally, Hughes continues to support the Australian DND with the most advanced MF-TDMA systems available today and provided the SATCOM links to coalition forces in the recent Talisman Sabre exercises.

Looking ahead to 2016, Hughes will continue to enhance the HM series product line for specialized applications and will be introducing the new JUPITER™ HTS modems to the DoD for enterprise applications.

hughes.com

BULLETINS

Aeronautical Asset

Hughes Network Systems, LLC (Hughes) now has a full suite of aeronautical mobility features and capabilities for the company's award-winning JUPITER™ System—service providers will be enabled to offer industry-leading throughput performance and spectral efficiency in this demanding and rapidly growing market.



Coincident with this announcement, Global Eagle Entertainment Inc. signed an agreement with Hughes to use Hughes' JUPITER System HT Aero Modem, including the core router module and JUPITER mobility technology, to power GEE's next-generation, high-performance broadband aeronautical service.

This newest version of Hughes' HT Aero Modem incorporates significant technological advances that will enable GEE to deliver industry-leading aeronautical services on any Ku-band satellite, including both wide beam and HTS capacity. With the capability of the Hughes modem to support fast and seamless beam switchover, within a satellite or between satellites, users of GEE's service will enjoy superior broadband service on a global basis.

African Extensions Via JUPITER™ System

UAE-based satellite operator Yahsat and Hughes Network Systems, LLC (Hughes) have announced the award of a major contract to Hughes to deliver its JUPITER™ System and related network operations services in support of Yahsat's planned expansion across Africa in early 2017 with the launch of its new Ka-band satellite, Al Yah 3.

The multi-year contract calls for Hughes to supply its award-winning JUPITER System gateways and broadband terminals together with its Operating Support System (OSS) and Business Support System (BSS) solutions as a turnkey outsourced managed service. Yahsat's position as the world's eighth largest operator in terms of revenue will be further strengthened by the extended coverage of Al Yah 3 to wider parts of Africa.

Al Yah 3 will bring additional connectivity into 18 African countries for consumers, SOHO and enterprise segments. The procurement of the JUPITER platform is in preparation for the new satellite and is in line with Yahsat's strategy to widen and deepen its reach and continuously enhance its product offerings.

INMARSAT

By Rebecca M. Cowen-Hirsch, Senior Vice President For Government Strategy and Policy



This may be remembered as the year that the acquisition of satellite communications (SATCOM) took significant steps forward.

Government decision-makers and commercial SATCOM providers agreed to advance these processes, realizing that modern military and humanitarian missions require a “change of the rules”. Ground, air and sea units must stand ready to go anywhere, at any time. They rely upon mobile, data-intensive applications, such as streaming video for intelligence, surveillance and reconnaissance (ISR). In its 2014 “Satellite Communications Strategy Report,” the Department of Defense (DoD) acknowledged that it was consuming ten times more bandwidth than it did in 2001, and that a five-year plan should include a stronger commercial presence.

With this, Inmarsat began to confront what has become well established as the highly fragmented, dysfunctional procurement process. A process in which multiple DoD entities are responsible for multiple parts of the package, turning to private industry typically only “as needed” or to “fill the gaps.” Recent changes in policy and approach signaled a renewed emphasis to respond to the rapidly changing environment of operations and continuous budget constraints, hopefully leading to a new way of doing business.

This past year, the following developments offered promise for a meaningful transformation:

- In July, the Government Accountability Office (GAO) came out with the “Defense Satellite Communications” report, which recommended that the DoD conducts a spending analysis to identify SATCOM procurement inefficiencies and opportunities. It also called for the evaluation of whether greater centralization of commercial SATCOM (COMSATCOM) would benefit the DoD. Currently, a lack of awareness of what is spent on COMSATCOM and a resistance to the centralization of SATCOM acquisitions is hindering the procurement of military satellite communications (MILSATCOM), according to the GAO. Rather than continue the self-defeating argument of “fee vs. free,” considering the optimized use of commercial investments is a positive way forward.
- In the same month, General John Hyten, Commander of U.S. Air Force Space Command, issued an “Intent on (Ongoing Material) Decisions” memorandum stating that even the newest space systems “lack required resiliency and survivability. We must retool our entire space architecture to one that can be commanded through a robust common ground platform.” In addition, he called for the evaluation of all legacy satellite constellations operations for possible transfer to commercial operators and the commercial network, or to a common enterprise ground solution. “We must weigh both the impact of repurposing Airmen for mission operations and return on investment,” according to the memo. The senior leadership’s recognition of the benefits of commercial capability and the necessity of integration in such a definitive fashion is encouraging.

- In October, the DoD expanded the leadership role of Secretary of the Air Force Deborah Lee James, naming her as principal DoD space adviser (PDSA). Previously holding the title of executive agent for space (EA4S), Secretary James will seek to bring cohesion to space acquisitions, chairing the Defense Space Council (DSC) while delivering recommendations to the DSC on space issues. She will also provide independent assessments and proposals to Deputy Secretary of Defense Robert Work’s management action group when the DSC cannot reach a consensus on decisions. James is expected to emerge as the top advisor for space, ushering in a new era of strategic focus. Although it remains to be seen how this role will exercise its functions, the appointment of a single leader for ALL space is a significant move.

On the operational side, more rapid integration has occurred than in the policy and acquisition areas. Inmarsat and five other satellite operators are piloting the “Commercial Integration Cell” within the DoD’s Joint Space Operations Center (JSpOC). This cell will raise the military’s awareness of how commercial satellites function, lending insights as to how we can closely coordinate to enhance DoD space operations. “We are going to have a cell of commercial space operators that will reside at the JSpOC, sit side-by-side with us, and allow us to be able to share information more easily, plan together, and ... capitalize on the benefits and capabilities,” said Lt. Gen. John Raymond, at a Mitchell Institute for Aerospace Studies (event in April.

Through these collaborations, agencies can leverage the value of industry-launched innovations such as SATCOM as a Service, which integrates complex solutions within an end-to-end managed services architecture. Via SATCOM as a Service, servicemen and women access satellite on-demand with round-the-clock availability of bandwidth, terminals, services and other features.

SATCOM as a Service positions users to reap the unique rewards of Ka-band: Optimal reliability with ubiquitous global coverage and diversity of assets; availability to transfer high-speed data without degradation; complementarity with MILSATCOM; and flexibility, which frees commanders from estimating and pre-ordering bandwidth before missions, eliminating costly (and risky) “guesses.”

In 2016, we expect this positive momentum to build. Government leaders will see that industry simultaneously pursues innovation throughout the ground, terminal and space segments, leading to robust end-to-end capability. With this functionality, systems empower users with the most flexible, immediate technologies anywhere. In addition, agencies will take comfort in knowing that they do not have to commit any upfront financial investment to benefit from industry advancements. They will discover that Inmarsat is regularly investing R&D funding and internal talent into the engineering of solutions, which are increasingly innovative and affordable.

Thus, military missions will succeed through a robust augmentation of their bandwidth/data-driven capabilities. Users may—or may not—know that a dramatic overhaul in SATCOM acquisition is helping them communicate more effectively and transmit critical video more rapidly.

Mission success will result either way.

inmarsat.com/government

BULLETINS

Bonding With EM Solutions

Inmarsat has a new partnership with EM Solutions to develop the world's first combined MilSatCom/Global Xpress (GX) maritime SATCOM terminal.

The new terminal is scheduled to receive full Inmarsat accreditation during Q2 2016 and will be submitted for Wideband Global Satcom (WGS) certification.

The new terminal, which is initially being created for an Australian Government customer, will contain a number of innovative features, including tracking via monopulse technology and easy switching between GX and MilSatCom systems. The terminal will also be substantially lighter, lower cost and faster than any comparable MILSATCOM device.

Based on its land mobile terminal for the Ka-band, EM Solutions is also contracted to deliver a simultaneous X-/Ka-band maritime terminal for another customer, which provided the baseline reference for the new program in conjunction with Inmarsat.

EM Solutions adopted an innovative approach to the development of its satellite terminals, adopting monopulse tracking techniques that provide exceptional accuracy and stability in addition to reducing the demand on motors and other moving parts, which minimizes power, weight and operational stress.

As a specialized developer of RF components and subsystems for the Satcom industry, the new terminals will use EM Solution's Diamond Series Ka Multiband Block Up Converters, which use the latest in Gallium Nitride (GaN) technology and cover commercial and military Ka- frequency bands in a highly efficient, single package. This family of maritime terminals is known as the COBRA series and will be further developed for other capabilities in the near future.

Andy Start, President, Inmarsat Global Government, said, *"This announcement is a further example of Inmarsat's strategy of responding quickly and effectively to customer demands. In this instance, the Australian Government customer was looking to increase the operational capabilities of their satellite communications within significant budget constraints and the requirement to reduce the footprint of satellite equipment on-board its new vessels."*

Dr. Rowan Gilmore, CEO of EM Solutions, said, *"We have been working on this product platform for a number of years and the opportunity presented itself to take a product through both Inmarsat GX certification and ultimately WGS certification to deliver a unique offering to an Australian Government customer. We believe this terminal will be the first jointly certified system to enable automatic switching between MilSatCom and Inmarsat GX satellite systems."*

Tie In With Turksat

Inmarsat and Turksat have signed a Memorandum of Understanding (MoU) to explore opportunities through the formation of a strategic partnership, initially focused on the defence and aviation sectors.

Under the MoU, Inmarsat would be the preferred mobile satellite communications provider for Turksat. As an existing provider of VSAT services to the Turkish government and commercial sector, the addition of Inmarsat's portfolio of services will significantly enhance Turksat's offering.

Turksat's strong links across the Caucasus and Central Asia will enable Inmarsat to increase its penetration in this region of the world.

Rupert Pearce, CEO, Inmarsat, said, *"This is an excellent opportunity for both companies to explore new opportunities. We value all of our partnerships and hope to develop a long-lasting and mutually beneficial strategic partnership with Turksat in the coming months."*

Ensar GÜL, CEO, Turksat, said, *"We hope that with this MOU, Turksat and Inmarsat's partnership program will develop a long-term fruitful cooperation. The main objective of this partnership is to broaden product and service portfolio of both companies."*

Grounding Out The Stations

Inmarsat has also completed construction of the final four satellite access stations (SAS) for its Global Xpress (GX) fleet. This represents a significant milestone in the rollout of their Ka-band network, GX, which is scheduled for global commercial service introduction early in the second half of 2015.

GX will deliver high-throughput broadband connectivity on land, at sea and in the air; provided by a single operator with seamless access anywhere in the world. The network will also offer the only worldwide commercial satellite network that is interoperable with government military satellite communications (MILSATCOM) Ka-band systems. The new GX stations are located in Lino Lakes in Minnesota, USA; Winnipeg in Manitoba, Canada; with two sites near Auckland, New Zealand. Two further stations—in Fucino, Italy and Nemea, Greece—are already operational. The six GX SAS will act as gateways between the broadband traffic routed via the three Inmarsat-5 (I-5) satellites and terrestrial fixed networks. Each SAS delivers full ground segment redundancy for GX services, delivering highest quality resiliency, reliability and availability, for example at times of adverse weather, and offering a powerful differentiator to traditional regional Ku-band networks.

INTELSAT GENERAL

By Kay Sears, President

This past year, we finally saw signs that the government demand for commercial bandwidth and services is stabilizing after a steady decline resulting from reductions in U.S. military forces in Iraq and Afghanistan as well as the DoD budget challenges following sequestration.

At the same time, we were pleased to see continued acceptance of the key role that commercial satellite operators can play in supporting government operations both in the hot zones of North Africa and the Middle East and in "warm" locales such as the South China Sea between the Philippines and Vietnam. Fresh military leadership and the greater sense of urgency about maintaining U.S. superiority in space have created a climate of greater partnership between commercial operators and government customers, one Intelsat General is confident will continue into 2016.

The diminished communications needs tied to a decreased number of deployed troops are being somewhat offset by the increase in airborne intelligence, surveillance, and reconnaissance (ISR) requirements to cover extremist activities in Iraq, Syria and Northern Africa. Commercial capacity continues to be the workhorse for these missions as combat air patrols are routinely flown by both the Air Force and Army using various types of remotely piloted aircraft (RPA).

Following a recent trip to the region, Secretary of the Air Force Deborah Lee James returned with a clear message from the combatant commanders about the need for increased ISR. Intelsat General stands ready to support this with our existing widebeam capacity and upcoming, high-throughput Intelsat EpicNG platform.

Intelsat will be launching the first of seven announced EpicNG satellites in January, the Intelsat IS-29e. This series incorporates high-performance spot beams to deliver significantly more throughput per unit of spectrum, while retaining the coverage of a traditional wide beam satellite. Unlike Inmarsat GX-GSB and other closed systems, EpicNG can deliver SATCOM data rates of up to 50 Mbps, without requiring any hardware changes to the existing antenna/modem installed RPA platforms which continue to rely on Ku-band for both C2 and ISR data transport.

The open Intelsat EpicNG architecture also allows for any-to-any beam connectivity with one-hop, unlike other HTS star-topology architectures, which demand use of an operator designated and controlled gateway. This design allows dynamic re-configuration of network topologies, providing much greater network redundancy in the event of a cyber attack. The EpicNG satellites also have enhanced interference-mitigation and anti-jamming capabilities that are critical for support of RPA operations in areas controlled by hostile adversaries.

Progress was made this past year with the Pentagon's Pathfinder program, which seeks to define new space acquisition models that will then inform the future government space architecture and the role that commercial satellite operators will play. A number of new concepts are on the table, such as "reverse WGS," where the military would buy a single wideband commercial satellite, but then get access to an operator's global fleet of satellite capacity.

Such thinking will lead to new, affordable approaches for how the government acquires wideband communications capacity in the future and builds a resilient architecture.

Another development this past year was creation of the Commercial Integration Cell (CIC), established as a pilot program to improve information sharing and collaboration between DoD and commercial satellite operators. Personnel from commercial companies are assigned to sit alongside military personnel at the Joint Space Operations Center (JSpOC) as a means of enhancing the commander's situational awareness of the space domain and developing tactics and procedures for combined operations.

The CIC allows for collaboration to improve conjunction assessment and space object catalog maintenance; enhance rapid identification, diagnosis and resolution of RFI events; identify on-orbit anomalies; and increase overall resilience of government and commercial satellite operations. The value of the CIC was realized during a recent exercise, Global Thunder 2016.

Intelsat General's director of operations, and the only satellite operator assigned to the CIC pilot program, Tim Turk, said, "The value of our presence inside the JSpOC cannot be overstated. Beyond the obvious value of improved satellite catalog accuracy and faster, more secure coordination and resolution of interference events, the CIC pilot has laid the groundwork for sustained, combined operations and clearly paved the way for an enduring relationship as true mission partners."

With the primary intent of focusing critical operational resources on battle management, General John Hyten, Commander of Air Force Space Command, has directed the Space and Missile Systems Center (SMC) to consider ways of shifting routine operational tasks such as bus operations to the commercial industry. This year, Intelsat General responded to several RFI's that would clearly demonstrate the benefits to SMC of the company's five decades of satellite operations experience and the resulting delivery of efficiencies.

Flying the WGS fleet of satellite buses, for example, would fit extremely well into Intelsat's current operations process as we currently the exact same bus is flown with our own fleet. Other opportunities which are being explored for commercial off-load include single satellite missions and test satellites where the cost of standing up a separate operations center is not feasible.

SMC is also investigating how to augment the Air Force Satellite Control Network (AFSCN) with commercial ground stations, thereby increasing the resiliency of that network and potentially replacing older sites with commercial teleports.

Much of the change this past year was driven by a combination of very progressive thinkers who are in key leadership roles in the Pentagon, at Air Force Space Command and in Congress. These include Doug Loverro, Deputy Assistant Secretary of Defense for Space Policy; General



Hyten; and Congressman Jim Bridenstine of Oklahoma, a member of the House Science, Space, and Technology Subcommittee of the Armed Services Committee.

These leaders realize budget constraints require the government to be more thoughtful about space acquisition, but at the same time they understand that the space threat environment is changing rapidly. There is urgency in figuring out how to balance the increasing congested and contested threat environment with affordable solutions.

Satellites, like those in Intelsat General's new high-throughput Intelsat EpicNG constellation, will bring higher performance and capabilities at lower cost per bit to the government communications domain. Solutions that are cost-effective can be provided, freeing government resources to invest in critical military applications that leaders like General Hyten need to implement in the evolving threat environment.

As mentioned earlier, the launch of the first Intelsat EpicNG satellites, Intelsat 29e covering the Americas and North Atlantic in January, and Intelsat 33e (scheduled for a Q3 2016 launch) covering Africa, the Middle East and Asia Pacific regions, will provide up to ten times the throughput of existing generation satellites. The higher power will enable very small AISR terminals to transmit and receive at data rates not possible with current systems. In addition, these high data rates are provided more efficiently using less satellite resources.

The U.S. government is learning how to spend its money for space more effectively, in a period of unparalleled changes to the space environment. Intelsat General and the broader commercial industry are going to be a major contributor to those solutions enabling greater throughput, resiliency and reconstitution of capabilities in a much more congested and contested space.

intelsatgeneral.com/

BULLETINS

MILSAT SERVICES FOR AFCENT

Intelsat General Corp., a wholly owned subsidiary of Intelsat (NYSE: "I"), has been awarded a contract to provide satellite services to the U.S. Air Force Central Command (AFCENT).

The one-year contract calls for 144 MHz of Ku-bandwidth to support U.S. military operations in the Central Command (CENTCOM) Area of Responsibility (AOR). The service, which began in September 2015, has three one-year renewal option periods and one six-month renewal option period.

Under the previously disclosed contract, Intelsat General will provide coverage all across the Middle East as far eastward as Afghanistan and Pakistan, including reach-back to European teleport facilities.

"The deployed Airmen are operating satellite ground terminals supporting C4ISR networks at numerous remote and expeditionary locations requiring a single-satellite solution that was not readily available," said Skot Butler, Vice-President, Satellite Networks and Space Services, Intelsat General. *"With*

our vast global network we had the ability to re-groom capacity, creating a unique solution that precisely accommodates the customer's single-satellite requirement."

Sears Honored By NDIA

Earlier this year, President Kay Sears was awarded the 2014 Honorable Peter B. Teets Award, given annually by the National Defense Industrial Association (NDIA) for industry leadership in strengthening America's national security through space technologies.

Ms. Sears has distinguished herself as a strong and influential technology leader for more than 22 years in the satellite communications industry and has extensive experience in delivering rapid-response solutions to both military and civilian agencies of the U.S. government.

Peter Teets retired as Director of the National Reconnaissance Office in 2005 after a long and distinguished career that also included serving as Undersecretary of the Air Force and as president and chief operating officer of Lockheed Martin Corporate. Teets is credited with laying the foundation of the existing U.S. national security space enterprise and with improving the acquisition, operation, and effectiveness of national security space capabilities.

"Kay Sears truly represents the letter and spirit of the progress made by Peter Teets in seeking collaboration between government and industry on a space architecture that enhances our national security," said Steve Spengler, President and CEO of Intelsat, parent company of Intelsat General. *"Kay works tirelessly with our government partners to provide the men and women stationed around the world with the most advanced and reliable communications networks available."*

In addition to Sears, the NDIA honored Air Force General John Hyten, head of Air Force Space Command, with the Teets award in the government category.

Also earlier this year, Intelsat S.A. completed a series of tests demonstrating the compatibility of the Intelsat EpicNG digital payload with existing ground equipment platforms. The digital payload is one of many unique design features on the company's Intelsat EpicNG satellites, the first of which, Intelsat 29e, is scheduled to launch in the first quarter of 2016.

As part of the tests, completed in cooperation with Boeing, Intelsat General Corp. successfully validated protected tactical waveform (PTW) modem performance on the Intelsat EpicNG digital payload, demonstrating our commitment to providing commercial capacity optimized for secure tactical communications. The PTW test was done to further the joint services effort, led by the United States Air Force, to develop a new PTW modem standard and hardware that will provide cost effective, protected communications over government and commercial satellites in multiple frequency bands.

INTERORBITAL SYSTEMS

By Randa Milliron, Co-Founder and Chief Executive Officer



Over the past few years, organizations such as SMDC, NASA, and DARPA took a path of including commercial space companies in the quest to create a dedicated nanosat launcher.

The now-defunct SWORDS (Soldier-Warfighter Operationally Responsive Deployer for Space) program is a prime example of unmet promise. These high-profile programs were scuttled by bad choices in propellants, in vehicle architecture, and in con-ops.

The only way to reduce the massive global traffic jam of pico- and nanosats-on-hold for launch and to provide the long-awaited paradigm shift toward a ten-fold reduction in launch-costs is to create a radically different rocket that exclusively serves the smallsat community.

Even though the government was well-intentioned, SWORDS failed to produce a low-cost, quick-launch rocket system. Two of the main reasons SWORDS did not succeed were inadequate simplification of systems and reliance on propellants that were not user-friendly enough for field use, nor sufficiently dense enough to yield a smaller-profile launcher than could be achieved with use of cryogenics.

As many of the new space companies go extinct and others enter shatter-mode, Interorbital Systems (IOS) continues the rocket research and development program at MASP, with the express intent of changing the industry with the firm's own, SWORDS-style launcher.

NEPTUNE: THE PRIVATE-SECTOR PREQUEL TO "SWORDS"

Since 2005, a private sector project that at inception already read like the SWORDS program performance and promise characteristics—with the exception of propellant choice—has been in development at Interorbital's rocket lab in the Mojave Desert of California.

In 2014, IOS achieved flight status for its main modular component (and upper stage) of its NEPTUNE modular rocket system. Interorbital announced the availability of the phase I single-module version of the ultra low-cost, rapid-response launcher that will deliver the performance characteristics originally sought by the creators of SWORDS: the IOS SR 145.

To create a vehicle that truly results in launch-on-demand performance, IOS uses storable propellants. These are a green, clean-burning combination of nitric acid and turpentine instead of using the inefficient and needy cryogenic propellants of liquid methane and liquid oxygen.

Interorbital presents a robust high-density propellant pairing that frees soldiers in the field from the duties of babysitting cryogenics and hauling along unnecessary cryogenic storage support infrastructure.

The SR 145 and its bundled orbital variants, are easy-to-use iterations of the much anticipated (but never produced) SWORDS rocket. Depending upon the configuration used, the SR 145 can cost from \$350K to \$2 million.



The single-module sounding rocket is designed to loft a 145 kg payload to an apogee of 310 km, providing a variety of smallsat observation/communication lift and/or strike capability based on payload size and altitude required.

For orbital missions, these CPMs can be bundled to form variants of the NEPTUNE orbital launch vehicle series, a dedicated naNosat launcher that can be configured to meet any mission requirement—including lunar orbit or impact.

IOS is engaged in licensing the rockets for both land launch and ocean-based operations. Land launch is conducted with a completely mobile tilt-up trailer unit; ocean-based launch uses a specialized vertical tilt-up ocean deployment system. The rockets fit into a 40 ft cargo container and can be shipped—fully fueled—to the most rugged of launch zones for clean-pad deployment

LOFTING FOUR + COMMERCIAL LAUNCH SERVICES START

Fifty years ago this past November 26th, the propellant set—nitric acid and turpentine—proved its worth by successfully lofting France's first satellite (ASTERIX), which was launched aboard a Diamant rocket, into orbit.

In the early 1970s, Lutz Kayser and OTRAG partners Wernher von Braun and Kurt Debus used nitric acid and a hydrocarbon as their propellants of choice.

After years of experimentation with LOx and Methanol, Interorbital followed the OTRAG and French path of using high-density storables—specifically using the French combination employing the greenest of the green propellants, turpentine.

Interorbital felt that the acid/hydrocarbon propellant combination bore another critical look as the key to enabling the dreams for a dedicated smallsat launcher that would allow for the creation and deployment of such a launcher to aid our military on the field.

IOS first flew an acid/hydrocarbon sounding rocket, the Neutrino, in 1999. Following the success of that early flight, the company selected that propellant set as the basis for the transformational rocket fleet—the family of NEPTUNE launch vehicles.

These launch vehicles are based entirely on a single building-block or module and bundled to meet every mission requirement. They are able to provide fast response, cheap enough to be expendable, and robust enough to loft tiny to heavy orbital payloads on demand—within an hour of removal from storage.

The NEPTUNE Series is totally mobile; so compact as to be transportable in a standard cargo container; cheap as dirt when compared to existing launchers at under \$350,000 for the single module sounding rocket/SR 145/ building-block for all clustered NEPTUNE launchers.

Prices for orbital missions start at well under \$1 million for the 3-module (N3), for 25 kg multi-sat payloads through N5 (40 kg for \$1.5 million), N9 (75 kg for \$2 million) and N36 (1 metric ton to LEO/240 kg to TLI).

The NEPTUNE launch land and ocean-launch configurations are able to operate in clean pad locations with No existing infrastructure, and are deployable from an ocean-launch system that is essentially a mobile private spaceport. All these characteristics nearly meet or exceed the old SWORDS program requirements.

This main difference between the SWORDS program and NEPTUNE system is that the N-Series launchers are part of a purely commercial venture that is funded entirely by Interorbital Systems.

SYSTEMS SIMPLIFICATION

Interorbital launch vehicle design criteria are the direct result of the application of subtractive design combined with a minimum cost design manufacturing approach. This produces breakthrough, game-changing technology that will alter the price and launch scheduling structure of the global space launch industry.

The best way to reduce cost and failures of components and subsystems is via *elimination* or *subtraction*. In comparison with conventional rocket technology, an IOS CPM-based launch vehicle has increased reliability and reduced cost. The following are the rocket design and operational conventions that Interorbital Systems has eliminated or subtracted in order to create a more reliable, less expensive rocket:

1. *No expensive and unreliable pumps to feed propellants into the combustion chambers*
2. *No expensive and unreliable gas turbines to drive the pumps*
3. *No catastrophic pump explosion at propellant depletion*
4. *No hold-down requirement causing Stage-1 performance loss and expensive launch pad adds*
5. *No expensive and unreliable regenerative cooling of the combustion chamber*
6. *No failure-prone electrical or pyrotechnic engine ignition*
7. *No limitation to fuel-rich mixture ratio due to regenerative combustion chamber cooling*
8. *No unreliable hydraulics*
9. *No low-density liquefied gas cryogenic propellants causing large tank volumes*
10. *No expensive and unreliable sealing, insulation, and vent valves required by cryogenics*
11. *No limit of fueled launcher hold-time caused by cryogenics*
12. *No slow fueling of cryogenics*
13. *No defueling need in case of launch delay*
14. *No need for stage-separation auxiliary propulsion*
15. *No limit of payload diameters allowing for the design of less expensive payloads*
16. *No long and slender launchers requiring expensive launch towers*

17. *No payload reduction by Non-optimal staging for varying mission objectives*
18. *No economic reason for stage-reuse caused by overly expensive engines*
19. *No expensive retooling for manufacture in case of changing performance requirements*
20. *No expensive oversize transport for large propellant tanks or stages*
21. *No expensive ground support for launcher assembly on pad*
22. *No tank pressurization during transport*

Application of all of the above criteria result in the lowest-cost orbital launcher in the world.

The SWORDS concept was a good idea that should have allowed offerors to field more open solutions in terms of propellant, architecture, and con-ops choices that could have achieved the programs desired results: an ultra-low-cost launch vehicle that could be rapidly deployed by a small team; launch cost to orbit for \$1 to \$1.5 million with radically simplified systems for lower parts count; capable of suborbital space-altitude apogee ballistic sounding rocket operations and multiple orbital spacecraft delivery.

The program could have been presented to industry as a free-form exercise in creative problem-solving, an innovative approach that could deliver a launch vehicle with the desired performance characteristics. The program could have been presented without hard and fast rules for a propellant combo that was doomed from the start in terms of enabling 'rapid response.'

Luckily, Interorbital continued its work on what actually is a "SWORDS"-type launch vehicle and now announces the upcoming space-altitude single-module suborbital demonstration launch (now booking) scheduled for mid-2016 and the company's first orbital mission set for late 2016 (sold-out).

Military and Government clients are invited to join the 123 payloads already booked on Interorbital's first five orbital launches and explore the variety of uses the agile NEPTUNE series launchers can offer for specialized warfighter applications.

For more about the NEPTUNE launcher and Interorbital Systems, please see SatMagazine's October 2015 issue story "A New Gun for Hire" at satmagazine.com/story.php?number=377842322

interorbital.com

KEYSIGHT TECHNOLOGIES

By Mario Narduzzi, Communications Measurement Solutions Marketing Manager

The infinite promise and perplexing obstacles of space were once again evident in 2015.

While the trials and tribulations around the mechanics of getting into space are dominating the headlines, the underlying revolution in satellite enabled communications and earth observation continues to attract investment dollars, crossover design approaches, and technologies leveraged from consumer markets.

Keysight's leadership position in electronic measurement provides a unique lens into this rapidly changing market. Let's take a look at the space technology trends we've seen this year along with the emerging needs moving forward.

The overwhelming growth of global data is driving the satellite industry to focus on increasing system capacity. In parallel, the recent dynamics in geopolitics is putting additional pressure on the industry to quickly deploy new sensing and communications capabilities. As a result, in 2015 there was a renewed and noticeable focus on electronic design automation, wider RF bandwidth, phased array antenna, and interference protection.

In order to increase data capacity, the satellite industry is continuing to move to higher frequency and higher bandwidth communications schemes. This trend can specifically be observed in the continued development of satellite links operating in Ka-band (26.5 to 40 GHz).

While tens of megabytes of bandwidth transmitted at centimeter wavelength's (typically, RF frequencies below 18 GHz) were the norm for a decade, 2015 has seen more interest than ever in modulated signals that occupy hundreds or even thousands of megabytes of bandwidth transmitted at millimeter wavelengths (mmW) or RF frequencies between 30 and 300 GHz.

Another benefit of deploying new satellite infrastructures is the opportunity to design-in interference mitigation. In general, the radio frequency bands above 26.5 GHz are much less crowded than the lower frequency bands.

Wide bandwidth signals allow for adaptive modulations that can trade-off between speed and reliability. Wider bandwidth systems also allow developers to employ frequency agile techniques, where transmitted signals can be dynamically relocated to work around interference.

One of the challenges of moving to higher carrier frequencies is the directionality of the signal and atmospheric absorption. This necessitates improvements in antenna technology. While spot beams can be an effective solution for GEO satellites, they may be less practical in LEO constellations.

In response, we have seen significant efforts to reduce the size, cost and complexity of phased array antenna, which can provide beam steering without mechanical systems. Phased array antennas enable directed transmit and receive functionality, potentially combining the benefits of mechanical antenna steering and spot beams. The small wavelength also shrinks resultant antenna size, another benefit of higher carrier frequencies.

Another challenge is the increased pressure to rapidly bring new capabilities on line. There is now more openness to leveraging Commercial Off-The-Shelf (COTS) capabilities and approaches, from components to high volume manufacturing techniques. As commercial ventures into space grow, the electronics industry responds to the larger demand, in turn generating more COTS choices.

In order to shorten development, there is also increased focus on more simulations in the early stages of R&D. For example, we've noted use of Advanced Design System (ADS) software for the simulation of highly complex interdependencies unique to space platforms integrating more signal processing within significant power constraints. The rich simulation environment allows engineers to experiment with new components, modulations, interference mitigation before making significant investments in hardware.

More capability being pushed into ASIC's and FPGA's has also been witnessed. These designs often contain a mix of time and frequency domains, which necessitate connectivity to both digital and analog instrument interfaces.

Performing design simulations in Keysight's ADS software and dropping those results into Keysight's RF generation and analysis test equipment allow for rapid system development even before all the final components are available.

In response to these trends, Keysight added a wide range of new test equipment in 2015, including the industry's first 50 GHz handheld analyzer and 50 GHz PXI vector signal analyzer, to give aerospace, defense and wireless designers the ability to update their capabilities in the Ka-band. Keysight also introduced the industry's fastest modular arbitrary waveform generator to support leading edge, high data rate communications research.

With the 2015 acquisition of Anite, Keysight now offers Anite's Propsim Aerospace channel emulator, a critical tool for reproducing realistic satellite link impairments in a lab environment.

Keysight views its role, as a test and measurement company, to enable its customers to reduce development time and risk. It has assisted designers in the satellite industry by providing simulation software and test instruments to enable emerging COTS options for the space segment, as well as fifth generation (5G) wireless data and emerging network technologies, which can be leveraged for satellite communications.

Looking back at 2015, Keysight Technologies celebrates its one year anniversary as a new company, while carrying on the more than 75 years of electronic test and measurement experience of Hewlett and Packard's legacy. This is much like the space industry, energized by new investment, blending advances in consumer electronics and building from the more than 55 year history of space.



We can all look to the combined advancements in communications, semiconductor and aerospace/defense to drive that future.

keysight.com/

BULLETINS

Intuitive Tools For Dynamic Views

Keysight Technologies has extended their IntegraVision family of power analyzers, the first in the industry to combine high-accuracy power measurements and touch-driven oscilloscope visualization in a single instrument.

The Keysight IntegraVision PA2203A 4-channel power analyzer gives R+D engineers working on three-phase power devices an intuitive tool that delivers the dynamic views they need to see, measure and prove design performance.

Similar to the Keysight IntegraVision two-channel power analyzer, the four-channel entry provides 0.05 percent basic accuracy and 16-bit resolution measurements critical to identify and characterize incremental improvements in highly efficient electronic power conversion systems. While the two-channel version has proven ideal for design and test of common home and office devices that use single-phase power, devices used in commercial and industrial settings frequently require three-phase power.

The new IntegraVision PA2203A provides three-phase power measurements and analysis. The PA2203A has four power channels in the same space-efficient package for fast, accurate design and validation of grid-connected devices, motors, and other high-power devices.

In addition, the instrument lets users visualize transients, in-rush currents and state changes with a 5-M samples-per-second digitizer that captures voltage, current and power in real time with 2.5 MHz bandwidth. By eliminating the need for a scope to view power-line phenomena and time-varying performance, the IntegraVision streamlines measurement setup and reduces configuration time.

Engineers can observe power consumption under dynamic conditions on the IntegraVision's 12.1-inch capacitive touchscreen with twice the viewing area of competitive models.

The IntegraVision PA 2203A streamlines three-phase device analysis with several unique capabilities:

- » On-screen wizard for step-by-step visual guidance to set up complex three-phase wiring
- » Choice of a delta (triangle) connection that wires between phases or a wye (star) connection that wires from a phase wire to a common neutral point
- » Phasor diagram to verify connections and analyze phase relationship

In addition, the IntegraVision PA2203A offers external sensor inputs and 2-Arms and 50-Arms direct current inputs standard on all four power channels. The external sensor input supports current probes and transducers up to 10-V full scale. Wide-ranging, isolated inputs up to 1,000 Vrms (Cat II) enable engineers to address multiple test scenarios. The integrated data logger provides data capture for up to one year for offline analysis and archiving.

Keysight Technologies, Inc. has introduced multi-module synchronization for its M9703B AXIe high-speed digitizer/wideband digital receiver—increasing the total number of streaming and recording channels available with the M9703B.

The new bundles options (-CB1/-CB2) enable multi-channel phase coherent digital down conversion (DDC) which has applications in 5G, Radar and SATCOM, and Aerospace & Defense.

With up to 320 MHz instantaneous bandwidth (IBW) with tunable intermediate frequency, this high-speed digitizer meets the needs for new technology development in 5G wireless mobile broadband. Used with the recommended host computer configuration, the new options allow guaranteed recording time, storing all I/Q samples for later analysis. A command line software application is included in the bundle for an easy launch and control of the streaming and recording.

As a component of the Keysight solution, the M9703B AXIe high-speed digitizer/wideband digital receiver (bundles -CB1/-CB2) allows customers to quickly characterize the channel behavior in these frequency bands and enables researchers to develop the necessary channel models for designing and validating air-interface alternatives.

For other applications where gapless streaming and recording is not required but there is a need to simultaneously read while acquiring, the new signal processing firmware (-TSR option) enables simultaneous capture and transfer of triggered acquisition data to the host computer.

"In dense urban RF environments where an interoperability and compatibility challenge may exist, the functionality of the -CB1 and -CB2 options allows users to capture and record a long duration of large frequency bands on multiple phase coherent channels," said Pierre-François Maistre, R&D project manager for the Wideband Digitizer Components group of Keysight's CMS Division. "This new capability allows users to characterize all emitters and distortions in the RF environment, including their timing relationships to other RF systems and enable an accurate post data processing, which is used in 5G channel sounding applications."

By Koen Willems, Market Director, Government and Defense

A quick overview of news stories confirms 2015 has been a turbulent year for Europe, the Middle East and Africa.

In January, Charlie Hebdo was attacked, while November saw fresh terrorist attacks on Paris and the Brussels lock down. In between, there were terrorist attacks on the Bardo Museum, the Sousse beach and a military bus in Tunisia, as well as a series of massacres in Baga, Nigeria, and the surrounding villages of Boko Haram. There was a mass shooting at the Garissa University College, in Kenya, and, of course, we cannot forget the conflicts in Yemen, Iraq, Syria, Mali, Chad, Ukraine and many more.

These events tell us that conflicts are not only fought in theaters far away from our homes, but that the battlefields have now been extended to our very own doorsteps.

As a result of the conflicts in the Middle East and Africa, Europe is seeing a huge increase in migration. Entire families are traveling across the Mediterranean and risking their lives to flee the conflicts. Criminal organizations are exploiting the situation, asking the migrants for large fees and setting-up people-smuggling routes toward Europe. The conflict refugees are accompanied by migrant flows from Africa (through Libya), with people seeking better living conditions and an improved economy.

THE ROLE OF SATELLITE

Our SATCOM community has a big part to play in supporting governments, Non-Government Organizations (NGOs) and Departments of Defense (DoDs) in their proactive approaches to resolving and managing conflicts and humanitarian crises. The crises management will be a combination of ad hoc and longer-term measures.

Ad hoc, governments, NGOs and DoDs will try to temporarily solve the humanitarian problems, fight terrorism at its root in the conflict areas and stop people-smuggling criminal organizations. For these operations, government agencies need assets on land, sea and in the air.

Whether these assets are fixed, on-the-move, on-the-pause or nomadic, the need for communication is crucial. In many cases, satellite communication will be the only medium to connect the remote operations with (local) headquarters due to destroyed or absent terrestrial communications or due to the mobile nature of the asset. The flexibility of the space and ground SATCOM segment will allow crisis management operations to react quickly to the situation.

However, an ad hoc approach is not sufficient. A longer-term solution requires nations subject to conflict to become stable again at political, social and economical levels.

By tackling the root of the problem, we prevent conflicts and terrorism infecting other nations and create a safer environment. World organizations (UN, NATO, World Bank), NGOs and governments need to partner with industry organizations to introduce programs that will help develop and stabilize nations.



These programs will focus on an integrated approach. In other words, education (for example, an educational network connecting 4,000 schools in Morocco based on Newtec Dialog), elections, health care, human rights and economical development will go hand-in-hand with installing border security networks and training police and defense agencies to maintain security.

The SATCOM industry can contribute to this by partnering with government, NGO and DoD programs. This comes down to providing satellite coverage, offering affordable and flexible SATCOM services and deploying efficient and CAPEX-friendly ground infrastructure.

New High Throughput Satellite (HTS) constellations are already bringing the bandwidth price down and delivering global coverage. In order to offer flexible and affordable services, a multiservice VSAT platform is required.

ENTER NEWTEC DIALOG

The Newtec Dialog Multiservice VSAT platform is exactly what Newtec focused on in 2015.

If 2014 was the Newtec Dialog® launch year, 2015 has definitely been the year where the company witnessed the first large projects being deployed on the multiservice VSAT platform.

A significant number of Newtec Dialog projects have been dedicated to government and defense programs. In this changing world, a VSAT system that embraces the complexity of government and defense networks over satellite is needed.

The platform was involved in multiple government, NGO and DoD projects to deal with different programs and crises. Newtec Dialog allows various agencies to combine ad hoc and long-term programs on the same platform. The multiservice element allows agencies to mix data, video and voice satellite services from a single hub in a flexible and efficient way.

Newtec Dialog has been deployed in programs, ranging from Intelligence, Surveillance and Reconnaissance (ISR) to border security networks, peacekeeping, humanitarian, educational, digital divide and police and defense training support networks. The flexible, efficient and scalable nature, combined with Newtec Dialog's innovative technologies, meets the requirements of agencies and NGOs.

For example, a peacekeeping mission needs to react quickly when it receives the mandate to intervene in a local conflict. ISR and situational awareness data and video will be exchanged and the first logistics set-up. When the peacekeeping operation is fully deployed, other mission support services (reporting, administration, video conferencing), tactical data, field hospitals, local force training and welfare services are connected.

Once the conflict is resolved, the emerging democracies will need political support and organized elections (for example, the recent elections in Burkina Faso were based on Newtec Dialog). With Newtec Dialog, the peacekeeping mission can connect all these services on a single platform, offering flexibility and reducing CAPEX.

The onboard innovative technologies, such as Newtec Mx-DMA™ (Cross Dimensional Multiple Access; part of the Newtec Dialog platform) return technology, FlexACM® and DVB-S2 extension technologies (or the new DVB-S2X standard), provide an efficiency gain of 50% compared to legacy SCPC or MF-TDMA VSAT solutions. Additionally, operational efficiency is increased as maximal service availability can be assured for mission critical data.

Newtec has also seen interest from different government and defense agencies in its modems and receivers during 2015. All Newtec SCPC modems already have the DVB-S2X standard implemented. Combined with the onboard FlexACM end-to-end efficiency and bandwidth cancellation technologies, Newtec customers can achieve very high efficiency rates above 10 bits per second per Hertz.

For example, aggregated ISR data coming from multiple sources and sensor platforms (e.g., UAVs) can be relayed via a high-speed satellite link towards the strategic headquarter for further analysis and dissemination.

THE YEAR AHEAD

Going forward, 2016 will be a continuum of 2015—but more intense and turbulent. The growing coalition and military activities against ISIS and other terrorist groups will make their reactions even more violent and unpredictable.

As long as Syria, Iraq and African nations are thwarted by conflict, repression and famine, more migrant flows will move towards more developed nations. The government, DOD and NGO agencies must be ready to face these threats and crises.

Newtec will continue to develop the Newtec Dialog Multiservice VSAT platform and other SATCOM solutions to meet stringent government and defense requirements. Through company expertise and cooperation with government and defense customers, Newtec remains committed to achieving a safer, informed and more connected world.

newtec.eu

BULLETINS

A Focus On Africa

Newtec has announced that Liquid Telecom has selected the Newtec Dialog® multiservice platform to enlarge and improve the company's current VSAT services with more applications and features for current and new customers.

Extending its current relationship with Newtec, Liquid Telecom will use the Newtec Dialog platform to expand its service portfolio towards new markets. The first Newtec VSAT platform with Liquid Telecom became operational in early 2014. Since then, Liquid Telecom has been able to deploy thousands of Newtec VSAT terminals.

Liquid Telecom will operate the Newtec Dialog hub alongside its current Newtec Sat3Play® broadband hub, allowing it to expand its current satellite services to more advanced business-to-business applications and deliver reliable cellular backhaul connections for mobile operators throughout Africa.

As a multiservice platform, Newtec Dialog guarantees optimal modulation and bandwidth allocation, whether it is being used for enterprise, consumer broadband, cellular backhaul or mobility in all network. It features Newtec's patented return link technology Mx-DMA™, which combines the best features of MF-TDMA and SCPC technologies, making Liquid Telecom's VSAT services more bandwidth efficient for larger customers and enabling services to run more efficiently and reliably than before.

Additionally, SES Techcom Services will be expanding its Astra Connect broadband service in Africa for the Enterprise and Oil & Gas markets via the Newtec Dialog® multiservice platform on SES's ASTRA 2G satellite.

SES is extending its current relationship with long-term partner Newtec by the new platform, which is due to be launched in Q1 2016 and will use the West Africa Ku-band beam of the ASTRA 2G satellite, located at 28.2 degrees East. The platform will broaden SES Techcom Services' current portfolio and flexibly support different services, as well as Newtec's Mx-DMA™ technology, increasing bandwidth efficiency and service reliability for enterprise applications and enabling those services to run more cost-effectively and reliably than before.

A Brazilian Bond

UAE-based satellite operator Yahsat announced a contract award to Newtec for the delivery of service platforms and operating systems in support of the company's planned extension across Brazil in 2017.

The new contract to Newtec is for their Newtec Dialog® multiservice VSAT platform, including VSAT baseband hubs, user terminals, as well as the Operating Support System (OSS) and Business Support System (BSS). The contract also caters for the supply of various types of Customer Premise Equipment (CPE). The turnkey solution provided by Newtec, in partnership with Tech Mahindra, is integrated with an Oracle platform, bringing Tier-1 capabilities to the OSS/BSS layer. Tech Mahindra comes with more than 20 years of experience in delivering OSS/BSS solutions to global telecom operators and has a strong presence in Brazil.

This partnership intends to maximize flexibility and innovation and will allow Yahsat and its customers to benefit from a broader product range and wider implementation, better serving the needs of its various markets—from consumer and enterprise broadband customers, to the provision of backhaul services for telecom operators and ISPs.

QUINTECH

By Frank Elling, President

Quintech Electronics and Communications, Inc. (Quintech), is a leading manufacturer of RF signal management communications equipment and, since 1989, the company's field-proven products have met the highest standards of quality and reliability, delivering unmatched uptime, even after as long as 25 years of continuous use.

Quality RF Matrix switching systems for Government and Military requirements are integral to global C4ISR applications, such as satellite Earth stations, Command and Control Centers, and Geospatial Intelligence.

Quintech RF signal management products are used for test and measurement, monitor and control, signal replication, backup and protection, and legal surveillance.

For more than 15 years, Quintech, along with the firm's DEV division, have been manufacturing RF matrix switching systems as well as RF-over-fiber solutions for government and military requirements. Quintech RF matrix switching systems provide great flexibility while handling high RF input power levels and providing industry-leading gain flatness. These RF designs provide reliable modular and high-density RF signal management solutions.

2015: EXPANSION BY REDUCTION

During 2015, the concept of "Expansion by Reduction" gained industry wide acceptance. In today's environment, C4ISR organizations continue to face ever-increasing demands for bandwidth, content distribution, monitoring and data processing.

Convergence of all forms of content delivery and communications is at our doorstep and available to all. All government agencies are feeling pressure to manage operating expenses while demanding increased energy efficiency and decreased equipment footprint.

The capabilities and flexibility of RF Matrix Switches, such as Quintech's XTREME 256 Matrix, define the next generation of L-band matrix switching systems and features 256 ports in a compact 12 RU chassis. The system is a full fan-out, non-blocking L-band RF Matrix Switch, where any input can be routed to any or all outputs.

This system provides expansion by reduction, minimizing rack unit (RU) space requirements. The company's flexible matrix architecture (patent pending) supports a variety of large symmetric configurations up to 128x128 or Industry Exclusive Asymmetric configurations such as 64x192, 96x160 or 160x96 all in a single chassis with seamless further expansion capabilities as the need for additional capacity grows. This product was designed and engineered with both up and downlink capabilities. This flexible architecture has allowed the company to quickly respond to government and military customer's requirements with agility and speed.



In 2015 Quintech and DEV introduced the XTREME 256 as well as several other next level switching products. The RF and Fiber Optic family of products offer a full range of next generation RF systems, all designed to meet a variety of needs and requirements for both small and large configurations alike.

The sales of the L-Band XTREME 256 Port Matrix in 2015 topped our internal expectations. Many Defense/Intelligence organizations have already begun the upgrade cycle of their NOCs, Earth station and ground segments in 2015 with plans to further expand their facility's capabilities.

During 2015, Quintech and subsidiary, DEV-Systemtechnik, continued to innovate and extend the company's global reach and reputation in satellite ground segment transmission and wireless test and measurement. As the need for increased awareness of RF and broadcast communication in all formats becomes more important by the day, requirements from governments to more actively and effectively monitor signals is being seen.

From this perspective, Quintech's contributions have been aimed at driving productivity and efficiency for customers and partners, as they face greater challenges and as new complexities in all platforms of communications are scrutinized. To counter the chaos of a rapidly changing media landscape and the sheer amount of information exchange, the firm's agile and innovative RF matrix designs are engineered to provide quick configuration changes, greater energy efficiency, and to easily scale in order to provide cost effective counter measures to meet the challenge.

GLOBAL COLLABORATION + AWARENESS IS KEY

"OPTIMIZED RF TRANSMISSION SOLUTIONS FOR A CONVERGED NETWORK"

Surveillance and Monitoring

Quintech's Defense and Intelligence industry customers demand superior high quality products and they rely on Quintech's highly skilled and experienced team with a deep knowledge base in satellite communication, telecommunications, and RF signal-handling domains to address technical challenges. During the last 12 months, the company has launched new products and solutions to help customers better manage the burgeoning requirement for information exchange and continued exponential growth into the future.

Wireless Test and Validation: NEXUS

Another challenge Quintech has been addressing during 2015 is the testing and verification of converging networks and mobility. The Quintech NEXUS product line provides an ideal solution to create test setups, incorporating an ever increasing number of base stations, access points, phones, and tablets using multiple antennas and technologies. These include 2G, 3G, 4G, LTE-A, LTE-U, WiFi, satellite, and wireless mesh networks.

Proprietary software solutions, which accompany the NEXUS products, allow for remote and automated control providing even more flexibility and efficiency. This family of products enables wideband switching used for validation of battlefield network scenarios, as well as many public safety concerns both at home and abroad.

REDUNDANCY: MAXIMIZING NETWORK UPTIME

System reliability, network resiliency and availability is important in both battlefield and peace time situations. Quintech's RF-over-fiber technology including DWDM transmission, combined with the wider availability of fiber infrastructure today, now make it more feasible for geographically diverse satellite Earth station antenna sites to have direct RF connectivity to a single data center. This eliminates the need for duplicate baseband data equipment at both sites. Therefore, significant cost-savings are provided as well as operational ease of use when compared to complete redundant antenna and baseband equipment at both sites.

Ka-band networks can also achieve higher resiliency using RF-over-fiber antenna diversity. In the Ka-band, where the high level of rain attenuation can impact availability during adverse weather conditions, this kind of RF-over-fiber technology and redundancy switching from Quintech can also provide higher network uptime through the re-direction of the signal from the main site to a diverse site using a redundancy switch and RF-over-fiber transmission system.

In addition, if scaled across multiple gateway sites, this solution increases overall usable satellite network capacity by allowing traffic be routed to less utilized satellite sites during challenging conditions. This helps Ka-band network operators to maximize use of available resources, and provides the ability to address a broader range of customer requirements.

GEOSPATIAL INTELLIGENCE

Satellites are essential in gathering imagery intelligence and geospatial information for use in policymaking, on the battlefield and by humanitarian and disaster relief first responders. Quintech's QRM / QFM product line increases reliability, flexibility, and efficiency in remotely located satellite terminal locations in both the downlink and uplink RF chain by routing a single antenna to multiple modems or combining multiple modems to a common uplink antenna.

A single 1RU unit can be configured as an 8x8, 8x16, 16x8 or 16x16 and is easily expanded to a maximum size of 32x32 with additional modules.

The QRM/QFM line features Quintech's latest Q-ROUTE™ and Q-SENSE™ technology, which provides maximum reliability by signal path redundancy and auto re-route. The matrix provides a solution at IF, CATV, and L-band frequencies. Automatic and manual gain control allows balancing of input and output signal levels.

As 2015 comes to a close, Quintech Electronics and Communications and subsidiaries are more committed than ever to the vision of continued innovation and toward delivering a new generation of RF products that will meet evolving customer challenges in 2016 and beyond.

The company is eager and determined to be the premier engineering partner of choice. Quintech invites contact in order to learn more about the benefits that the superior RF solutions Quintech and DEV Systemtechnik products can deliver to organizations.

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BULLETIN

A Winner

Earlier this year, Quintech Electronics and Communications, Inc. announced the company had delivered 125 of their QE3 systems.

This made the QE3 L-Band Matrix Switching System for broadcast, cable, and satellite operating centers the most-selected product in its category, with three times the number of customer shipments as its nearest competitor, according to published reports.

The QE3, Quintech's third-generation RF (radio frequency) matrix switch, is deployed around the globe as part of the core infrastructure in large broadcast Network Operations Centers (NOCs), satellite facilities, Command and Control Centers and other installations where large configuration matrices are used for RF signal management. The QE3 is a modular matrix that can be configured from 32x32 up to 1024x1024.

"Quintech's products have met the highest standards of quality, and delivered unmatched uptime, even after as long as 25 years of continuous use," said Dan Prushnok, CEO of Quintech Electronics and Communications, Inc. "The QE3's milestone achievement as the most-selected L-band matrix switch is thanks to its unmatched track record of rock-solid performance meeting the needs of our broadcast customers."

The QE3 is a Quintech third generation matrix design and has become the top selling RF L-Band Matrix. QE3 supersedes its 2nd generation predecessor, the Quintech XRM matrix switch, which has a comparable number of worldwide installations.

Quintech also introduced its fourth generation line of matrices that include the Xtreme 256, a 128x128 12RU switch and the compact 4RU Archimedes 64x64 matrix switch, which are designed to meet the RF signal switching needs of a variety of commercial and government customer applications.

ULTRA-ELECTRONICS, GIGASAT

By Tom Cross, Managing Director



This year has been an exciting and challenging one for Ultra GigaSat, and, indeed, for the entire SATCOM industry, which is undergoing unprecedented change.

Part of the Ultra Electronics Group, GigaSat is a SATCOM ground-segment systems integrator and supplier of deployable fly-away and drive-away terminals to both government and commercial customers. The company provides customers with multi-band solutions that meet their exact needs and manufacture virtually all of the non-RF and base-band components in-house.

This vertically integrated business model, together with careful supply chain management, allows us to be very responsive to our customers' needs and ensure the exceptional quality they rightly expect.

Since becoming part of the Ultra Electronics Group more than three years ago, GigaSat has adopted a strategy that emphasizes the expansion of both the firm's product range and geographical market footprint. 2015 has seen significant developments along both of these strands.

PRODUCT DEVELOPMENT

In terms of product development, the opportunities afforded by the drive towards High-Throughput Satellites (HTS) is exciting as well as the increasing migration of many users to Ka-band as an addition to more traditional services. The achievement of FOC on Inmarsat GX is a great achievement and a key milestone on this path.

The company also sees a lot of further potential in the expansion of X-band services for government users, and, in particular, the continued growth in terminal requirements across the WGS community. There are, of course, many other exciting trends across the industry, including the convergence of numerous bearer technologies, which will drive the need for hybrid multi-bearer terminals in the future.

However, the key trends surrounding HTS, increased Ka-band capacity and WGS expansion has driven the development of the GigaSat offering during 2015.

These trends are driving customer expectations relentlessly in the direction of smaller, lighter terminals that deliver data throughputs currently associated with larger, heavier and more power hungry Very Small Aperture Terminals (VSAT). The firm's response to this has been the development of our Micro-VSAT range of terminals.

The Micro-VSAT is a terminal that typically incorporates an antenna that has the equivalent parabolic size of less than 65 centimeters. The first of the Micro-VSAT terminals (using a custom flat panel design) has already achieved GX Mil Ka Type Approval.

That's just the beginning. Last year, Dr. Andrew Slaney, the company's Technical Director, published an excellent article "*The Challenges Of Micro-VSAT Design*" (*SatMagazine*, September 2014 issue) in which he explained the multiple considerations and trade-offs that have to be accommodated in any successful small terminal design.

This development work has been a key focus for the company and technology partners during 2015—the Flat Panel Micro-VSAT has already been successfully delivered to a NATO customer.

Further development of this range, together with the parallel development of the FA100 VSAT man-pack range, has been underway for some time and will remain a focus for 2016, as the trend toward ever smaller, lighter, more powerful, type approved terminals continues to accelerate.

GEOGRAPHIC EXPANSION

As well as expending significant time and resource on the development of hardware offerings, the company has also sought to expand an already large geographic footprint. GigaSat has a global sales presence and customer base, selling into more than 80 countries,.

However, this year GigaSat enjoyed significant success in extending reach into a number of countries and markets for the first time. These areas ranged from LATAM to Asia as well as within a number of NATO nations and have included both government and commercial customers.

With the rapid growth in Ka- capacity, and the increasing use of cellular technologies for network access and ENG in North America and Europe, regional variations in SATCOM requirements will increase further in the next few years. Customers will require region and application specific solutions to meet their particular needs.

Asia is a good example of this growth, being a market where GigaSat proven system integration capabilities allow the firm to successfully meet the exacting needs of customers.

The terminals multi-band design helps with this and customers always know that if they purchase, say, C- or Ku-band systems in the first instance, they have a clear and cost-effective upgrade path to Ka- and X-band in the future.

This flexible, customer focused approach has also paid dividends in LATAM and among NATO and WGS users. As catalogue products are not provided, GigaSat takes pride and huge enjoyment from providing the exact solution to address a customer's needs.

This has resulted in a number of large multi-terminal orders for drive-away and fly-away systems and is an expected continuing trend over the coming years as the company extends both direct and indirect sales channels. Agents and resale partners are continually being added solid distributors across the globe are always being sought.

THE YEAR AHEAD

Looking to 2016, we are likely to see a combination of 'more of the same,' in terms of product development and geographic expansion. Expect the further development of GigaSat offerings to include the provision of bandwidth and network services to customers, working in conjunction with market leading global service providers.

The company will increasingly offer wider value-added capabilities from the Ultra Electronics Group to customers. These could range from multiple levels of encryption to cyber protection, deployable wireless networks (including mobile mesh), point-to-point and point-to-multipoint multi-band radio links, M2M and SCADA.

However, how the company moves offerings forward will be driven entirely by customer requirements. The SATCOM market is evolving in ways that are quite exciting and not entirely predictable.

Company activity will be heavily influenced by how adjacent communications technologies develop and how customer applications are served by these multiple bearers and platforms. This rapidly changing market will demand rapidly changing, bespoke solutions that meet exact customer needs.

Agility will be key to market success and it is the companies who can provide differentiated, cost-effective solutions—across hardware, bandwidth and services—that will reap the benefits of future sector growth.

At GigaSat this challenge is relished and the company looks forward to working with customers and industry partners during the exciting year ahead.

ultra-gigasat.com

BULLETINS

Simplicity + Increased Throughput

Earlier this year, Ultra Electronics GigaSat developed a family of small MicroVSAT terminals to meet the needs of High Throughput Satellites (HTS) and the explosive growth in Ka-band services.

HTS offer a far greater throughput than traditional FSS satellites, for the same amount of allocated orbital spectrum. The increase in capacity that HTS offer is a result of high-level frequency re-use and spot beam technology. This enables multiple, narrow, focused beams. In contrast, classic satellite technology uses a single beam or a few beams.

As satellite broadband continues to expand across the globe, Ka-band technology is at the forefront. The Ka-band revolution began in North America in 2007 and expanded to Europe in late 2010. Now, Ka-band technology is spreading across the globe to the Middle East, Russia, LATAM and Australia. Increasing demand for broadband is rapidly using up the available capacity of existing Ku-band satellites. Meanwhile, both large and small organizations rely more and more upon media rich content to increase the communications.

Governments require high-bandwidth applications to deliver services across all their functions, while consumers want to watch movies, make VoIP phone calls and use the Internet—all simultaneously.

Ka-band technology makes all of this possible via satellite, giving access to government users, households and business across the globe. The high bandwidth available in the Ka- spectrum and frequency re-use capabilities across multiple beams enables more capacity at faster speeds to small dishes.

GigaSat's family of MicroVsat terminals use a mix of custom flat panel and elliptical arrays. Their rugged construction and compact form factor offers the simplicity of a BGAN terminal with the increased throughput of commercial and military satellites.

During 2015, GigaSat received a follow-on order from a European customer bringing the total number of flyaway antennas purchased by this customer to more than 60 in number.

Then, a prestigious contract from a significant government end user in Asia for more than 40 antennas systems from the company's DA Lite Antenna range was signed.

All of the company's antennas are designed, developed and manufactured, from our bespoke factory in Tring. This growth across Europe means that GigaSat remains a key driver and enabler for economic growth and jobs, leading innovation and providing rugged solutions for faster, smoother communications in the most demanding environments.