

Next Generation Space Defense

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DISPATCHES



DISPATCHES

SYRACUSE 4B successfully launched by Ariane 5's final space push

This satellite is to serve France's sovereignty needs by connecting the nation's armed forces that are deployed on operations



co-contract, Airbus is responsible for the SYRACUSE 4B satellite. Thales Alenia Space was responsible for SYRACUSE 4A satellite, as well as both payloads with key component provided by Airbus.

The satellite, a true example of pan-European industrial cooperation, will guarantee French sovereignty, while also being able to support operations led by NATO and other allied nations.

As a payload passenger with the recent and final launch of the Ariane 5 on July 6th., the SYRACUSE 4B communications satellite, built by Airbus and Thales Alenia Space, has been successfully sent to orbit from the Guiana Space Center, Europe's Spaceport in Kourou, French Guiana – this was the last launch of Ariane 5, the European heavy launcher.

SYRACUSE 4B, along with SYRACUSE 4A already on-orbit, constitutes the space segment of SYRACUSE IV, the fourth generation, secure, MILSATCOM system for the **French Armament General Directorate (DGA – Direction Générale de l'Armement)**, the **French Air and Space force** and the **French Space Command**, built by the industrial consortium formed by Airbus Defence and Space and Thales Alenia Space.

SYRACUSE 4A and 4B will deliver increased capacity and enhanced functionality for the French Armed Forces, including higher throughput and flexibility, along with a broader coverage area.

The increased flexibility will ensure the satellites can meet the needs of forces deployed anywhere in the coverage area, while also efficiently managing its X- and Ka-band resources.

SYRACUSE 4B, built on **Airbus' Eurostar E3000 platform**, in its full-electric variant and equipped with on-orbit proximity surveillance, is embarking the same payload as SYRACUSE 4A, built by Thales Alenia Space with key components provided by Airbus.

SYRACUSE 4B features critical technologies such as anti-jamming, to guarantee service continuity and resilience, cyber-defense and data encryption technologies. In the frame of the global SYRACUSE

“Observation, signal intelligence, space situational awareness, and of course secure communications across key theaters of operation, are paramount for a nation's autonomy and freedom of action. Airbus is proud to be a trusted partner of the French Armed Forces: thanks to SYRACUSE 4B, and other programs, we support our national ambitions and capabilities in all these fields, today and in the decades to come.” – Jean-Marc Nasr, Head of Space Systems, Airbus.



DISPATCHES

Aurora develops adaptive control architecture for USVs



Aurora Flight Sciences, a Boeing company, is developing and testing machine learning-based, introspection technologies aimed to enable physical systems — in this case ships — to adapt their control laws as they encounter uncertainties or unexpected events.

The work is part of a seedling program titled “Fast Adaptation and Learning for Control Online” (FALCON) to support the [Defense Advanced Research Projects Agency’s \(DARPA\) Learning Introspective Control \(LINC\)](#) program.

Aurora’s FALCON solution is a platform-agnostic, computationally lightweight online learning and adaptive control architecture that delivers fast convergence for changing nonlinear, nonparametric dynamics in cyber-physical systems. It can detect destabilization quickly and reconstitute control online for safe and continued operation.

In response to changing circumstances, FALCON recalculates safe reachable operating limits in real time while providing guidance and situational awareness to the operator, whether that operator is human or an autonomous controller.

This spring, Aurora implemented their proof-of-concept control architecture on 1.5-meter-long *unmanned surface vessels* (USV) and began testing in the Charles River in Cambridge, Massachusetts. The USV compensates for the currents and waves, which are large relative to the size of the vehicle.

The first program demonstration examines the USV’s ability to reconstitute control after a significant reduction in control effectiveness of one thruster, similar to the disturbance induced by rudder lock in larger vessels.

The program team also includes the [Massachusetts Institute of Technology \(MIT\) Aerospace Controls Laboratory](#) led by **Professor Jonathan How**, and the [MIT Marine Autonomy Laboratory \(PavLab\)](#) led by **Dr. Michael Benjamin**.

The MIT PavLab, located in the MIT Sailing Pavilion on the Charles River, is providing the USVs, which serve as a

rapidly adaptable test platform for FALCON.

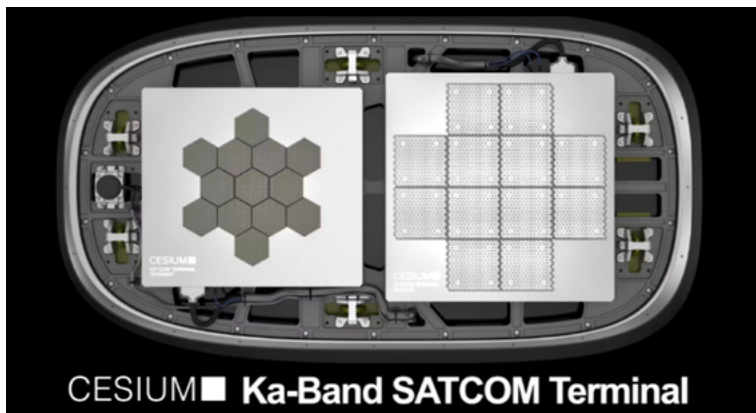
Work on the FALCON program is ongoing, with future demonstrations planned to investigate additional unpredictable disturbances, such as large wind loading and fuel slosh effects.

“The ability to test USVs directly on the Charles River enables a rapid development and test cycle that advances our program efficiently. With these types of resources and collaborations, we can apply the latest methods from the adaptive control, machine learning, and autonomy fields.”
— **Dr. Max Greene**, controls researcher, Aurora



DISPATCHES

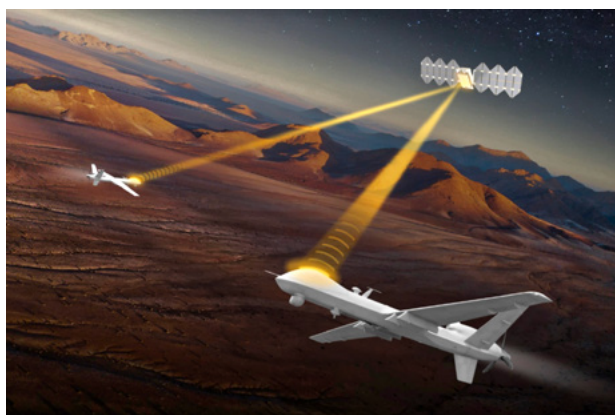
CesiumAstro awarded million\$ USAF contract to demo SATCOM on MQ-9A Reaper



CESIUM ■ Ka-Band SATCOM Terminal

CesiumAstro has been awarded a contract led by **AFWERX**, the innovation arm of the U.S. Air Force (USAF), through the **Tactical Funding Increase (TACFI)** program.

CesiumAstro will build, integrate and demo the company's satellite communications (SATCOM) terminal aboard a **General Atomics-ASI MQ-9A Reaper** remotely piloted aircraft (RPA).



Artistic rendition by CesiumASTRO of a set of MQ-9A Reapers integrated with CesiumAstro's SATCOM terminals.

The \$3.6 million award directly supports the **Department of Defense's** need for enhanced, higher throughput connectivity aboard airborne vehicles.

The news comes shortly after the company unveiled their industry-first, multi-beam, **active electronically steered array (AESA)** for commercial and defense

in-flight connectivity applications supporting multiple orbits. CesiumAstro's low-profile, SATCOM antenna provides *make-before-break* handover with no moving parts, enabling ultra-reliable communications.

Under this contract, CesiumAstro will scale its SATCOM terminal to fit the *size, weight, and power (SWaP)* requirements of a **Group 5 unmanned aerial system (UAS)**. The terminal will be integrated on a General Atomics MQ-9A capital asset to demo connectivity benefits with a commercial satellite network.

CesiumAstro's AESA is offered in multiple form factors, supporting commercial aircraft to small drones. The thin, tile-based approach allows the rapid scaling of the array to meet the needs of unique mission sets.

In March 2023, CesiumAstro announced plans to fly its in-flight connectivity SATCOM terminal on an Airbus commercial aircraft later this year.

This contract with the USAF will demonstrate complementary capabilities, showcasing the scalability and dual-use nature of CesiumAstro's AESA SATCOM terminal.

"Satellite communications are essential to ensure the warfighter remains connected in future operating environments. We're thrilled to continue working with our U.S. Air Force partners to demonstrate this critical communications solution."
— **Wayne Phelps**, retired Marine Corps UAS pilot and Director of Business Development, CesiumAstro

"We are excited to demonstrate the advantages that active phased array satellite communications systems will bring to our family of UAS. This technology is imperative for maintaining a tactical advantage." — **Douglas Hardison**, Sector Vice President for Navy and Marine Corps Strategic Development at General Atomics – Aeronautical Systems, Inc.

Headquartered in Austin, Texas, with offices in Broomfield, Colorado; El Segundo, California; and the United Kingdom, CesiumAstro builds high-throughput, software-defined, phased array communications payloads for airborne and space platforms, including satellites, missiles, UASs, and more. CesiumAstro's full-stack, multi-mission hardware and software solutions enable a range of commercial, civil, and defense objectives. CesiumAstro provides full in-house design, manufacturing, and testing capabilities based on the ISO AS9100 standard.

EM Solutions signs acquisition contract to deliver Naval SATCOM solutions

King Cobra



The Australian Commonwealth's Capability Acquisition and Sustainment Group (CASG) has selected EM Solutions to upgrade the Royal Australian Navy's SATCOM systems across the existing fleet of vessels.

This is, by far, the largest contract ever signed by EM Solutions and demonstrates how support for the Sovereign Defence Industry, particularly **Small to Medium Enterprises (SMEs)**, can deliver world leading capability and enhance sovereign capability. EM Solutions enters this contract as the Prime Contractor that will initially result in around 30 new positions, some of which have already been filled, at the company's head office in Brisbane.

EM Solutions is also expanding its local industry supply chain to support, develop and deliver programmatic, **integrated logistics services (ILS)** and training. The company will continue to work with existing partners and develop new sovereign component and subsystem suppliers for its Naval maritime SATCOM systems.

The acquisition contract is initially valued at approximately \$150 million over the next seven years and provides up to a further \$50 million in material and service purchases by CASG once the initial program deliverables are approved.

The goal of the contract is to modernize the Primary and Alternate SATCOM for the existing RAN Fleet using EM Solutions' **King Cobra** and **Cobra** SATCOM terminals. The development of each of these terminals has been supported by Australian Defence through the Defence Innovation Hub and earlier Concept Technology Demonstrator (CTD) programs.

This contract does not include ongoing support and sustainment services, however as previously announced in October 2022, EM Solutions already has an existing contract with CASG to support the deployed Cobra systems and those previously acquired for new ship builds.

While the future support of equipment provided under the **SEA1442 Phase 5** acquisition contract may lead to additional ongoing revenue to EM Solutions, it will be subject to separate procurement processes and decisions by Defence. EM Solutions has already achieved significant success securing export contracts for its Naval Maritime SATCOM solutions, and with this further vote of confidence from the ADF they are well placed to continue expanding their business with allied Navies, globally.

*"The signing of this contract is the result of a close collaboration between EM Solutions and CASG since the announcement in early 2022 that EM Solutions had been selected to respond to a limited release tender for Work Package 1 of the SEA1442 Phase 5 program. It has been a learning journey to ensure the delivery of optimised, cost-effective capability to our sailors in the future. Through a technology evolution program EM Solutions aims to support Navy in managing SATCOM technology evolution and obsolescence management continuously. The trust shown by the ADF in EM Solutions, transitioning from a component supplier to a prime contractor, is a credit to everyone who has contributed to our business to achieve this significant milestone, as with our previous contract negotiations with CASG." — **John Logan**, Vice President of Programs, EM Solutions*

DISPATCHES

EOS launches new “Slinger” Counter-Drone Capability



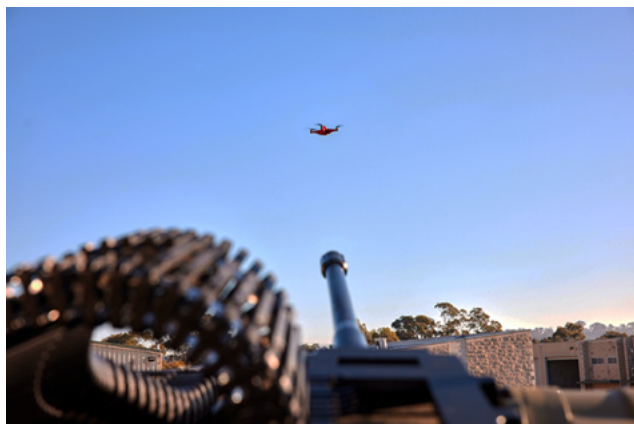
Electro Optic Systems (EOS) has launched their Australian developed and manufactured counter-drone capability named Slinger.

Assistant Minister for Defence, the Honorable **Matt Thistlethwaite** MP, who officially launched the innovative local technology, said that he continued to be impressed by the capabilities of Australia’s defence industry.

Executive Vice President of EOS Defence Systems, Mr. **Matt Jones**, said EOS was excited to launch

the Slinger in response to growing, international demand for advanced, counter-drone technologies.

“This is a big day for Australia, the Slinger is a cutting-edge capability that demonstrates Australian innovation can lead the world in response to global security needs”, said M.r Jones, who then continued, *“We have applied the hard-won lessons from the battlefields, including Ukraine, to our Slinger system, ensuring it will give real edge to those looking to hit back against the growing threat of drones.”*



The Slinger incorporates a radar, a 30 mm. cannon with specifically designed ammunition, and EOS’ proprietary stabilization and pointing technology for counter-drone operations.

Slinger can track and discriminately engage moving drones at a range

of more than 800 meters, with unique ammunition making the UAS suitable for use in a variety of built-up environments.

The Slinger has been designed and developed in Australia specifically for export markets.

The product focuses on addressing contemporary and emerging threats based on lessons learned in recent conflicts, such as Ukraine.

EOS announced in April that the company has secured two separate conditional

contracts worth up to \$80 million (approximately ~A\$120 million) and \$41 million (approximately A\$61 million) respectively to supply its industry-leading weapon systems to Ukraine.

Under the first contract, EOS will provide as many as 100 **Remote Weapon Systems (RWS)**, while the second contract entails up to 50 RWS units.

To fulfill these orders, EOS will leverage its extensive support network and supply chain, which comprises more than 100 suppliers from Australia and other, international locations.

EOS is Australia’s largest, sovereign, defence industry exporter and a trusted provider of advanced military technology to the Australian Defence Force. The company employs approximately 300 staff across Australia, with more than 100 Australian companies in the firm’s supply chain.

DISPATCHES

GuardianSat™ secures patent for satellite-based automated countermeasure system

GuardianSat™ has been awarded patent number 11662183 for an integrated countermeasure system on satellites that autonomously neutralizes ground, air and space-based, anti-satellite (ASAT) attacks.

Since GuardianSat's launch in 2020, the company has continued to pursue solutions for *space domain awareness* (SDA) and defense.

The new technology aligns with GuardianSat's founding principle of protecting and preserving space by eliminating threats to satellites with space domain defense systems.



The expansion of space commerce has made satellites an essential component of commercial and military infrastructure. However, adversarial nations pose a threat to these satellites as they are valuable targets that can disrupt the Intelligence Community and Space Economy.

The development and testing of ASAT weapons have gone mostly unchecked, making it difficult to defend against them due to the short time between deployment and impact.

GuardianSat is responding to these growing threats by developing a self-contained anti-satellite weapon countermeasure system that can neutralize hostile attacks from the ground, air, and space leveraging this patented technology.

GuardianSat is a generational company founded by **Mr. Robert D. Briskman** and **Mr. Christopher Rohe** with indispensable patented technology focused on the protection of orbital assets from growing threats and the improvement of space domain awareness to **"Keep Space Open."**



King Cobra

Cobra

Naval Maritime SATCOM

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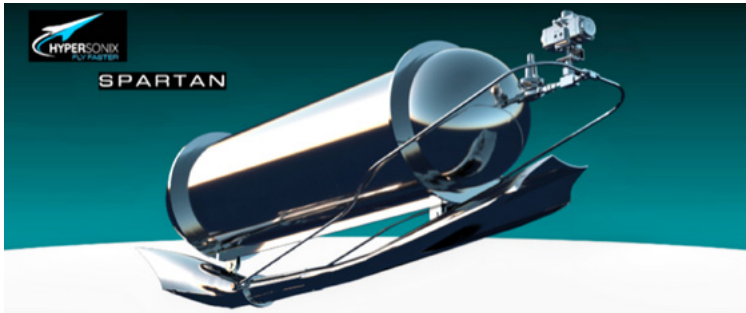
Also from EM Solutions:

- X & Ka Band RF Subsystems
- Build to Print and Engineering Services
- Support and Sustainment Services



DISPATCHES

Hypersonix U.S. patent issued for SPARTAN scramjet



Hypersonix has been awarded a U.S. patent for technology used in the company's SPARTAN scramjet design.

U.S. Patent Number US11639700B2 protects, for close to 20 years, some key features of an “Airframe integrated scramjet with fixed geometry and shape transition for hypersonic operation over a large Mach number range.”

The air breathing and self-igniting scramjet engine invented by one of Hypersonix’s co-founders, **Michael Smart**, is able to accelerate between Mach 5 and Mach 12, depending on the selection of materials and manufacturing process chosen. This patent grows Hypersonix’s portfolio of patents to three, the other two being Australian innovation patents. Other features will also be covered as work progresses on the firm’s family of **Unmanned Aerial Vehicles (UAVs)**.

Hypersonix’s design is fueled by hydrogen, which has a higher ISP than other fuels used in Aerospace, such as RP1 Kerosene. Clean burning hydrogen allows the engine to switch on and off several times during the flight, enabling a non-ballistic trajectory that cannot be achieved with conventional rockets, and also offers a longer range than other scramjets.

SPARTAN’s fixed geometry is another unique feature which lends itself to rapid, advanced, manufacturing techniques.

The first SPARTAN prototype was 3D printed in high temperature alloy material in December of 2021 as part of an **Accelerating Commercialisation Australia (ACA)** grant awarded to Hypersonix.

Hypersonix also recently announced the completion of a manufacturing demonstrator using **ceramic matrix composite (CMC)** material for the SPARTAN engine that will allow the engine to withstand the higher temperatures expected at its top speed of Mach 12.

High cadence flight and reusability are important aspects of the Hypersonix strategy. Hydrogen fuel is making this a reality as it burns cleanly, unlike other fuels such as Kerosene that leave residue, making it difficult to reuse quickly if at all. While reusability is not a priority for other scramjet-powered hypersonic systems, it is a cornerstone of the Hypersonix product strategy.

Hypersonix’s ambition is to provide commercial solutions to the market for access to space and high-speed travel. Along the way Hypersonix has capitalized on the significant interest shown by Defence circles for the **DART AE** demonstrator flight vehicle in providing an advanced hypersonic test platform for collecting valuable data at hypersonic speeds.

Thanks to the SPARTAN design and the advanced manufacturing

techniques and materials it uses, Hypersonix was selected for the **Hypersonic & High-Cadence Airborne Test (HyCAT)** program, a solicitation by the **Defense Innovation Unit** in the U.S., part of the **U.S. Department of Defense (DoD)** to deliver the DART AE flight vehicle.

While working with **Australian Defence** as the first customer for Hypersonix, the company will pursue their commercial vision to apply their scramjet technology to develop a low cost and high cadence access to space solution for smallsats using green hydrogen, and in the longer term a hyperliner that may transport cargo and passengers from Sydney to New York City in just a few hours.

*“We are grateful for the DIU’s confidence in Hypersonix as our first customer so early in our history. Many technologies have found their first success in the Defence market before getting applied in the commercial world. And if there is one way for Hypersonix to grow the team faster in the current environment, the answer has to be to provide US Defence with unique capabilities.” — **David Waterhouse**, Managing Director, Hypersonix*

*“We are thrilled to have our original ideas recognised by a US patent for our SPARTAN scramjet design. Our team has already integrated my inventions and fresh ideas into various additional features that cement our technological leadership in hypersonic propulsion and flight.” — **Michael Smart**, Co-Founder, Hypersonix*

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DISPATCHES

IAI's newgen AESA/SAR reconnaissance system



IAI has released their ELM-2060PES, a new generation AESA SAR/GMTI Pod for fighter aircraft.

This new systems was developed by IAI's defense systems subsidiary, **ELTA Systems Ltd.**

The ELM-2060PES builds on the legacy of the combat proven ELM-2060P system, in service for decades with Air Forces worldwide.

The **ELM-2060PES Pod** is a self-contained, **Active Electronically Scanned Array (AESA) Airborne Radar System**, providing state-of-the-art **Synthetic Aperture Radar (SAR)** and **Ground Moving Target Indication (GMTI)** capabilities.

Those capabilities include: **Bi-directional Line-of-Sight (LOS)** wide band Datalink that is Interconnected with a **Ground Datalink and Exploitation Station (GES)**.

The airborne system is housed within a fully autonomous, detachable centerline pod that mirrors the aerodynamic envelope of certified Fighter Aircraft fuel tanks and is operated by aircraft avionics or via the Datalink from the Ground Station.

The ELM-2060PES produces radar images that approach photographic quality, for Operative Reconnaissance, Surveillance of **Time Critical Targets (TCT)**, **Precision Strike** support and **Battle Damage Assessment (BDA)**, and operates as a true, day and night sensor capable of penetrating clouds, rain, smoke, fog and smog.

The ELM-2060PES has advanced radar modes for **High Resolution Target Classification** and precision Geo-location against fixed and moving Ground Targets, providing the operational users with quality actionable intelligence.

The ELM-2060PES extended-range and ultra-wide swath capabilities provide real time, all-weather and visibility, stand-off reconnaissance and surveillance mission capabilities, while operating in most challenging scenarios.

"ELTA's new AESA SAR/GMTI system delivers powerful, real-time reconnaissance capabilities by incorporating our latest technological developments, including full AESA and unique processing techniques. The high-quality data of this system enables interpretation and extraction of critical Image Intelligence essential for operating in the modern battlefield." — Yoav Turgeman, President, ELTA, and Executive VP, IAI



DISPATCHES

iDirect Government names an interim President

iDirect Government (iDirectGov) has announced that Tim Winter has been named interim president by the iDirect Government Proxy Board, replacing John Ratigan, effective April 3rd.



opportunities. Prior to joining ST Engineering iDirect, Winter managed businesses across the defense industry at L-3 Communications and Northrop Grumman. Before transitioning to industry, Winter flew P-3 Orion aircraft as a Naval Flight Officer on active duty for eight years. He continued his service in the United States Navy Reserves, flying P-3 aircraft and the BAMS-D UAV through 2022.

He retired from the U.S. Navy with the rank of commander in 2022. Winter is a Naval Academy graduate and has a master's degree in business administration from Georgetown University.

Ratigan served as president of iDirect Government for 20 years, managing the U.S. Department of Defense business and was instrumental in the company's growth, bringing advanced satellite communications used for voice, video, Internet, imagery and data to military, homeland security, first responders and other government users.

"I am both honored and grateful for this opportunity and look forward to building upon the strong legacy of iDirect Government," said Winter. "I am excited to lead our team with a continued dedication and service to the most important customers in the world."

Previously the Vice President of Global Accounts and Global Government and Defense at ***ST Engineering iDirect***, the parent company of iDirect Government, Winter managed its strategic global account engagements and captured pursuits for international defense



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DISPATCHES

Innoflight officially announces CyberDog™ Space Cybersecurity Suite



Initially funded under Small Business Innovation Research (SBIR) government contracts to cyber-harden advanced sensor payloads, [Innoflight](#) is officially announcing the CyberDog™ Space Cybersecurity Suite and offering it with the company's family of secure space networking and processing products.

These products include the **Compact Flight Computer (CFC)** family and derivative products for advanced high-performance **Mission Networking Electronics (MNE)** and **Mission Processing Electronics (MPE)** — CyberDog™ will be included in **CFC/MNE/MPE** reference designs starting this year.

CyberDog™ offers “security-in-depth” rooted in the [NIST SP 800-53 RMF \(Risk Management Framework\)](#) controls and leverages Innoflight experience with **High Assurance (HA)** systems and [National Security Agency \(NSA\)](#) space crypto certifications. More recently to address the [Department of Defense \(DoD\) Zero Trust Reference Architecture \(ZT-RA\)](#), prepared by the [Defense Information Systems Agency \(DISA\)](#) and the [NSA Zero Trust Engineering Team](#), CyberDog™ addresses all seven **Zero Trust Pillars**.

Some of the applicable CyberDog™ components include: **TBU (Trusted Boot and Update)**; **NMS (Network Monitoring Service)**; and **DMS (Device Monitoring Service)**. These services are specific to the functions/applications running on the flight computer and are integrated currently through the **CyberDog™ Trusted Linux Platform (TLP)** or **Trusted Xen Platform (TXP)**.

The [CFC-400X](#) has flown on multiple LEO and GEO missions and is awarded on multiple MEO and lunar missions. The CFC-400X provides on-orbit re-programmability, high-performance networking and processing to demonstrate advanced capabilities, like: on-orbit autonomy, secure space mesh networking, edge processing for sensor data, and **Rendezvous, Proximity and Docking (RPOD)** operations.

The CFC-400X can be bundled with multiple networking personalities to support line-rate Ethernet switching, IPv4 routing and/or **Multi-Protocol Label Switching (MPLS)** routing. Combined with customer-supplied software and gateware, the CFC-400X can provide a full networking stack for dynamically networking satellites to fixed ground, mobile ground, airborne and other space assets.

Providing CyberDog™ into these avionics provides a “secure networking processing core” to address cyber resiliency into networking and data routing subsystem and edge-processing payloads, such as an on-orbit **Battle Management Command, Control &**

Communications (BMC3) module, both of which Innoflight is providing for the [Space Development Agency \(SDA\) Proliferated Warfighter Space Architecture \(PWSA\) Tranche 1 Transport Layer \(T1TL\)](#).

A key feature of CyberDog™ is its expandability and flexibility, supporting integration with third-party cyber security solutions, which for example might specialize in the data layer protection or **Network Intrusion Detection/Protection Systems (NIDS/NIPS)**.

In addition, CyberDog™ can be integrated with virtualized or containerized environments. As a Space Cybersecurity Suite of design solutions, CyberDog™ will be included and/or offered with all of Innoflight's avionics and will be available for third-party avionics.

“More than 15 years ago, Innoflight was committed to bringing modern networking and security to space links, and now that capability is very much needed in space. Over the last five years, our focus has been defense-in-depth to those links all the way through to the core processors that generate the C4I that goes over these links.”
— **Jeff Janicik, Founder and CEO, Innoflight.**



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Iridium proposes a new model for monitored BVLOS UAS integration



Iridium Communications Inc. (NASDAQ: IRDM) has announced the results of an Uncrewed Aircraft System (UAS) flight trial highlighting Beyond Visual Line of Sight (BVLOS) capabilities in the National Airspace System (NAS), with a published a whitepaper entitled “Monitored BVLOS: A New Model for UAS Integration in the National Airspace System.”

The whitepaper highlights and solves for challenges faced in enabling a safe, scalable, and efficient adoption of UAS in the NAS, including how to maintain safe separation of aircraft and what supportive Commercial Off-the-Shelf (COTS) avionics are readily available.

As part of the flight trial, a ***Remote Pilot-in-Command (RPIC)*** drone equipped with ***Iridium Connected®*** COTS avionics, identified an intersecting aircraft at five ***Nautical Miles (NM)*** of separation with a closure rate of 300 knots. The RPIC successfully performed a BVLOS evasive maneuver in less than 18 seconds from detection to completion, maintaining two NM of separation with non-idealized operations.

Based on this flight trial conducted in partnership with ***American Aerospace Technologies Inc.***, Iridium confirmed that a simplified ***Minimum Equipment List (MEL)*** could enable an RPIC to safely monitor a mission, communicate with air traffic control, and ensure

safe ***Instrument Flight Rules (IFR)*** separation from other aircraft.

The results also showed that BVLOS

operations are ideal for ***Class E airspace***, as it presents a greatly reduced risk of encountering other crewed ***Visual Flight Rules (VFR)*** aircraft. The analysis was completed following the trial flight of a 220-pound, medium altitude, fixed-wing aircraft, known as the ***AiRanger***, over agricultural land near Bakersfield, California.



Photo of the AiRanger in flight, courtesy of American Aerospace

During the test flight, the team also studied latency, ADS-B distribution, and continuity of communications between satellite, LTE and 900 Mhz ***Line-of-Sight (LOS)*** radio links. It was found in this specific location – 1,500 feet above ground level. The reliability of Iridium® satellite communication was superior to the LTE link and the RPIC preferred the aircraft command responses over satellite communication versus the 900 Mhz LOS radio.

Expansion of this flight trial using a broader range of equipment and scenarios that further enhance an MEL – as well as a more efficient waiver submission process – could present certification agencies and operators with a scalable path

forward for monitored BVLOS operations. The results of the test flight demonstrate that a segment of the drone market could successfully scale in linear inspection with fixed-wing aircraft in rural and remote regions, bringing faster innovation in technology and realized efficiency to the respective industries they serve.

The flight trial provided needed data regarding how RPIC operations and procedures inform decision-making, how long maneuvers take to complete over BVLOS communication links, and as a result, the ability to maintain safe separation. With these points in mind, the whitepaper suggests a simplified, ***Federal Aviation Administration (FAA)***, BVLOS waiver process inclusive of the recommended MEL and provides a proposed template for consideration.

“With a standardized and simplified BVLOS waiver process, we are confident the drone industry could take advantage of the proven and now recommended MEL. Applying a BVLOS MEL in Class E airspace when flying in low-density population or rural or remote areas would be a great step toward dramatically increasing innovation and operational efficiency.” — ***John Peterson, Executive Director of Aviation, Iridium***

“The Iridium network opens the door to a variety of new use cases for UAS that can be remotely piloted from a distant command center.” — ***David Yoel, Founder and CEO, American Aerospace***



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DISPATCHES

L3Harris awarded hypersonic missiles detection/tracking contract by SSC



The [U.S. Space Force Space Systems Command \(SSC\)](#), through the [Space Enterprise Consortium \(SpEC\) Other Transaction Authority \(OTA\) vehicle](#), has awarded [L3Harris Technologies \(NYSE:LHX\)](#) approximately \$29 million for a sensor payload design contract to deliver a digital model for the MEO – Missile Track Custody (MTC) Epoch 1 program that will support the detection and tracking of hypersonic missiles.

To inform the Space Force's future missile warning and tracking constellation, L3Harris will conduct an infrared sensor payload critical design phase that will support realistic cost, schedule and performance predictions.

The L3Harris **MEO-MTC** contract will conclude its critical design review phase in May 2024. The work will be performed at the company's Fort Wayne, Indiana, and Melbourne, Florida, facilities.

"L3Harris is proud to be an integral part of the Space Force Space Systems Command's Missile Track Custody program, which will provide groundbreaking missile warning and tracking capabilities that are at the forefront of our national defense. We are committed to leveraging our extensive work within our nation's integrated missile defense architecture to provide resilient, low-risk and affordable solutions for both Epoch 1 and future Epochs." — Ed Zoiss, President, Space and Airborne Systems, L3Harris

"I'm very excited the next generation of Space Force missile tracking satellites will be built right here in Fort Wayne. These satellites are crucial to defending our homeland and a great example of the groundbreaking innovation going on in Northeast Indiana. As a member of the House Armed Services Committee, I'm proud to have helped secure this investment that will support hundreds of high-paying jobs in our region." — Congressman Jim Banks, who represents Indiana's 3rd Congressional District where L3Harris' Fort Wayne facility is located.

DISPATCHES

Lockheed Martin to collaborate with U.S. Army to improve space-enabled defense systems



Lockheed Martin has signed a Cooperative Research and Development Agreement (CRADA) with the [U.S. Army Combat Capabilities Development Command's Aviation and Missile Center \(AvMC\) to advance Beyond Line of Sight \(BLOS\) connectivity.](#)

Under this CRADA, Lockheed Martin and AvMC will jointly develop and demonstrate space-enabled defense systems.

Through this CRADA, Lockheed Martin and the U.S. Army will conduct design, development, integration, and test risk reduction activities using AvMC's [Redstone Arsenal](#), Alabama-based, System Integration Lab (SIL) to identify and develop concepts of operations for linking ground-based platforms to the space domain.

The team will investigate capabilities that improve satellite communications (SATCOM) to defense systems, identify overlapping capabilities that can facilitate connectivity, look for capability gaps, conduct hardware-in-the-loop tests, test the connectivity between platforms at various speeds, explore ancillary use of communications systems and more.

As work begins, the team will leverage the SIL for its integration, test and analysis tools to support evolving prototypes.

The SIL's advanced modeling and simulation tool suite will enable the team to accelerate the delivery of experimental prototypes and align technical performers across government agencies and industry.

"Lockheed Martin brings a legacy of experience in supporting our tactical warfighters, and we recognize the importance of providing them with next generation capabilities. Our collaboration with AvMC will assist in developing a more effective, survivable and affordable battlefield-connected 21st century security technology for our government customers and international allies by connecting platforms with space assets, helping deter future threats."

*— **John Schierling**, Lockheed Martin director for Tactical Space Programs*

DISPATCHES

Lockheed Martin's NexGen Interceptor Program



Lockheed Martin has entered into three, Mentor-Protégé Program agreements for their Next Generation Interceptor Program, to strengthen the defense industrial base — this is part of the [Department of Defense \(DoD\) Mentor-Protégé Program](#), which encourages prime contractors to serve as mentors in developing the technical and business capabilities of small businesses.

Through the program, the [Missile Defense Agency](#) awarded Lockheed Martin three contracts that will run up to two years.

Lockheed Martin will work with [Marotta Controls](#), [Space Information Labs \(SIL\)](#), and [Valley Tech Systems \(VTS\)](#) to support the maturation of advanced engineering and technology capabilities, such as model-based engineering and the digital thread.

Being a part of the program provides them with insights about how to grow their businesses.

“The Mentor-Protégé Program allows us to reduce barriers for small businesses; when small business wins, we all win. Lockheed Martin believes in the strength of this program, so we are mentoring three different companies and supporting them throughout our NGI development.”
— **Sarah Reeves**, Vice President, NGI, at Lockheed Martin

Marotta Controls is a family-owned small business specializing in sub-systems for the aerospace and defense sectors, based in Montville, New Jersey.

“Marotta Controls is privileged to join Lockheed Martin’s Mentor-Protégé Program. As a small business, Marotta Controls understands the importance of support from the premiere defense contractor. We look forward to our continued growth as an agile partner delivering on our mission to support the warfighter and our nation’s defense.” — **Patrick Marotta**, President and CEO, Marotta Controls

SIL is a woman-owned small business that designs, manufactures, and environmentally qualifies Li-Ion Intelli-Pack® Batteries, AFTU and Space Based Range flight units for multi aerospace platforms, based in Santa Maria, California.

DISPATCHES

*“SIL is honored to be selected by Lockheed Martin through the Mentor-Protégé Program to increase our capability to produce and deliver various critical technologies for national security programs.” — **Edmund Burke**, SIL President & Founder*

VTS, powered by Voyager Space, is a small business specializing in aerospace propulsion, based in Folsom, California, and Reno, Nevada.

“Valley Tech Systems is excited to be selected by Lockheed Martin as a protégé under the DoD Mentor Protégé Program. Lockheed Martin’s mentorship will add depth and robustness to our engineering,

*manufacturing, supply chain and mission assurance processes— enabling VTS to accelerate the application of our advanced controllable solid propulsion technology to enhance homeland defense and protect our warfighters.” — **Phil Csik**, VTS Program Manager*

Lockheed Martin is working with these businesses already as subcontractors to develop, mature, and field hardware in support of the NGI program from advanced technologies cultivated through the DoD’s [Small Business Innovation Research \(SBIR\)](#) and [Small Business Technology Transfer \(STTR\)](#) Programs.

NGI will be part of the current [Ground-based Midcourse Defense \(GMD\) Weapon System \(Northrop Grumman\)](#), which protects the U.S. homeland against intercontinental ballistic missile threats from rogue nations.

Lockheed Martin’s NGI program has assembled a strategic, agile, and innovative team, including small businesses, to provide MDA with this critical, national security capability.



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DISPATCHES

Northrop Grumman's new airborne GPS nav system achieves successful flight test

**NORTHROP
GRUMMAN**



Testing occurred in May aboard a testbed aircraft. Flight test data confirmed that Northrop Grumman's prototype EGI-M solution, the **M-Code capable LN-351**, performed at standards equal to the current LN-251 INS / GPS system, featuring modern fiber optic gyro technology.

Critical design review (CDR) for EGI-M was completed in 2020.

Launch platforms for Northrop Grumman's EGI-M are the **E-2D Advanced Hawkeye** and the **F-22 Raptor**.

Additional fixed-wing and rotary-wing platforms across **Department of Defense** and allied forces have selected Northrop Grumman's EGI-M as their future navigation solution to support mission-critical systems.

Northrop Grumman Corporation (NYSE: NOC) has conducted a successful flight test of the company's advanced airborne navigation solution, **Embedded Global Positioning System (GPS) / Inertial Navigation System (INS) Modernization, known as EGI-M.**

This is the first time that EGI-M, equipped with an M-Code capable receiver, has been tested in flight. M-Code technology enables missions to be conducted in GPS-contested and GPS-denied environments. The M-Code capable GPS receiver

is a core component of Northrop Grumman's EGI-M program, engineered to quickly transmit **positioning, navigation and timing (PNT)** information.

The fully operational EGI-M system will feature a modular platform interface, designed to easily integrate with current platform navigation systems, supporting advanced software and hardware technology upgrades now and in the future.

"This flight test is a major step forward in developing our next generation airborne navigation system. The EGI-M capability developed by Northrop Grumman enables our warfighters to navigate accurately and precisely through hostile and contested environments." — **Ryan Arrington**, Vice President, navigation and cockpit systems, Northrop Grumman

Ryan Arrington, Vice President, navigation and cockpit systems, Northrop Grumman



Pictured: Left—Northrop Grumman's E2D Advanced Hawkeye | Right—Lockheed Martin's F-22 Raptor.

DISPATCHES

U.S. DoD awards million\$\$\$ to SES Space & Defense



The Global X-Band BPA is the first integration services agreement awarded to SES Space & Defense since the acquisition of DRS GES by SES was finalized in August of 2022.

SES Space & Defense is dedicated to delivering the most trusted end-to-end global communications through a fully integrated Information and Communications

Technology Ecosystem to the U.S. government and military.

Under the single Blanket Purchase Agreement (BPA), SES Space & Defense, in partnership with other companies, will provide highly-secure, Global, X-band SATCOM services to U.S. Department of Defense (DoD).

DRS Global Enterprise Solutions (GES), acquired and now part of SES's wholly-owned subsidiary SES Space & Defense, has been awarded a five-year, X-Band, *Blanket Purchase Agreement* (BPA) with an estimated value of \$134 million in support of the U.S. Department of Defense (DoD).

Organization (DITCO) by the U.S. Space Force (USSF).

To deliver a near-global solution, SES Space & Defense has partnered with several industry-leading players, including integrators, SATCOM and teleport operators.

Together, the contracted satellite operators will deliver Global X-Band satellite capacity, teleport and network services over a highly secure global terrestrial network, and other ancillary services to meet enduring and emerging DoD requirements.

*“SES Space & Defense believes the BPA is one of the foundation blocks in accelerating MILSATCOM-COMSATCOM integration for the space enterprise. The US Space Force established this contract as a mechanism to enable access to commercial X-band capacity globally for the DoD. We have partnered with industry-leading, X-Band owners and operators as we understand the demand for secure, non-preemptible, mission-assured capacity for critical operations. By combining satellite capacity, SATCOM services can achieve the highest availability with redundant X-Band coverage and diverse gateway connectivity within sovereign space.” — **David Fields**, President and CEO, SES Space & Defense*



The single award BPA was awarded through Defense Information Systems Agency's (DISA) Defense Information Technology Contracting

To provide secure satellite communications service, SES Space & Defense will leverage the multi-mission GovSat-1 satellite, which

features high-power X-band and Military Ka-band beams. GovSat-1 is a satellite operated by GovSat and is entirely dedicated to government and military missions.

DISPATCHES

U.S. Ambassador to Japan visits the QZSS-HP site



U.S. Ambassador to Japan, Rahm Emanuel, greets Mr. Yasuyuki Kasai, director general, Japanese National Space Policy Secretariat, Cabinet Office, Mr. Tomonori Sato, group president, Defense & Space Systems, Mitsubishi Electric Corporation, and Lt. Col. Brian Fredrickson, Quasi-Zenith Satellite System Hosted Payload (QZSS-HP) program manager, Space Systems Command, during a site visit to QZSS-HP in Japan.

Photo is rovided by the Government of JapanMs. Asako Ueno, executive director, Quasi-Zenith Satellite System, Japanese National Space Policy Secretariat, Cabinet Office, briefs U.S. Ambassador to Japan, Rahm Emanuel, regarding the status of the Quasi-Zenith Satellite System Hosted Payload program, a pathfinding national security space cooperation initiative between the U.S. and Japan. Photo Credit: Provided by Government of Japan.

The Japanese Quasi-Zenith Satellite System (QZSS) is sparking interest across the space enterprise.

Rahm Emanuel, the U.S. Ambassador to Japan, recently visited the Kamakura, Japan site of the **Quasi-Zenith Satellite System Hosted Payload (QZSS-HP)**, the unique pathfinding national security space cooperation initiative between the United States and Japan.

He met June 20 with Mr. **Yasuyuki Kasai**, director general, **Japanese National Space Policy Secretariat (NSPS), Cabinet Office (CAO)**; Ms. **Asako Ueno**, executive director,

QZSS Strategy Office (QZSO), NSPS, CAO; Mr. **Nozomu Takaki**, technical advisor, **QZSO, NSPS, CAO**; Mr. **Tomonori Sato**, group president, **Defense & Space Systems, Mitsubishi Electric Corporation**; and **Lt. Col. Brian Fredrickson, QZSS-HP program manager for Space Systems Command (SSC)**.

Space Systems Command recently delivered two sensor payloads to be integrated into two, new, Japanese QZSS satellites that will be launched on a Japanese-developed launch vehicle as part of the **U.S. Space Force (USSF)-Japan mission**.

“International partnerships are important to the United States because that’s where our strength lies,” said **F Schnell**, director of acquisition, SSC Space Domain Awareness Delta.

He continued, *“It lies in the U.S. and partner nations sharing the full brunt of accomplishing tasks and missions, and having diversity of thought, capabilities, and requirements. Additionally, allied participation allows us to defray costs, incorporate different perspectives and different capabilities. It also makes our adversaries have to look at situations differently. That is truly the benefit of having allied, like-minded partners coming together*

and saying, ‘This is what’s best for our mutual defense and assurance.’”

The visit took place at **Mitsubishi Electric Kamakura Works** where the first payload was integrated with the first host satellite, QZS-6, followed by a briefing on the mission.

“We greatly appreciate Mitsubishi Electric Corporation hosting director general Kasai and Ambassador Emanuel,” Fredrickson said. *“Space Systems Command, the U.S. Space Force and NSPS are pleased to showcase QZSS-HP’s contribution to the broader U.S.-Japan Alliance as it extends to the space domain.”*

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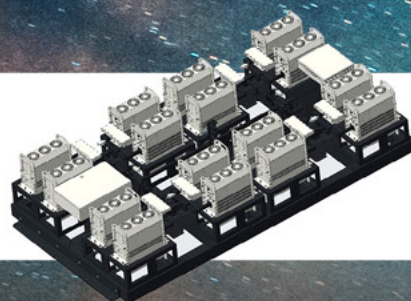
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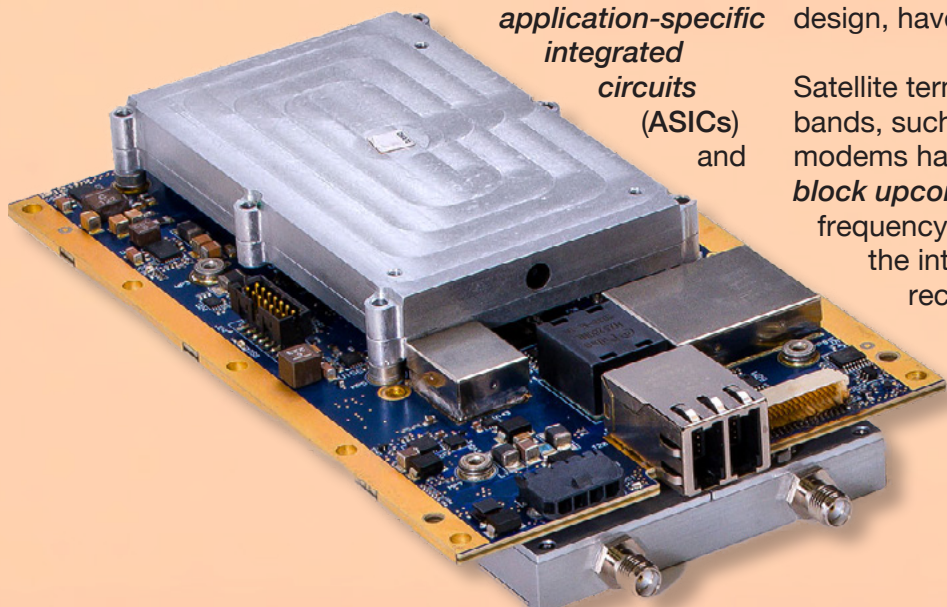
CONSTRUCTING BETTER SATELLITE TERMINAL SWaP



Author: Karl Fuchs, Senior Vice President of Technology, [iDirectGov](#) + MilsatMagazine Senior Contributor

Satellite systems continuously strive to reduce the size, weight and power (SWaP) consumption of remote terminals. The evolution of satellite terminals, from parabolic to flat-panel antennas, and the adoption of advanced meta-materials in electronically steerable antennas (ESAs), has led to significant progress in satellite system design.

Modem vendors have embraced advanced digital technologies such as **application-specific integrated circuits (ASICs)** and



The 450mp, photo above, features a modular, three board design: RF module, common compute (digital) module and carrier board. The software defined radio (SDR) capabilities will enable support of multiple waveforms via a single compute platform. The waveforms are not limited to transponder satellite links but include Common Data Link (CDL) and other point-to-point links. The 450mp SDR focuses on security, resiliency and mobility and supports GEO, MEO, HEO and LEO orbits as well as a variety of waveforms that are essential for network resiliency for voice, data and video defense communications. Photo is courtesy of iDirect Government.

field-programmable gate arrays (FPGAs) system on a chip (SoC), resulting in the achievement of single-chip encryption for advanced military applications. These advancements have been made possible due to the benefits of **Moore's Law**, which inherently aids in improving SWaP.

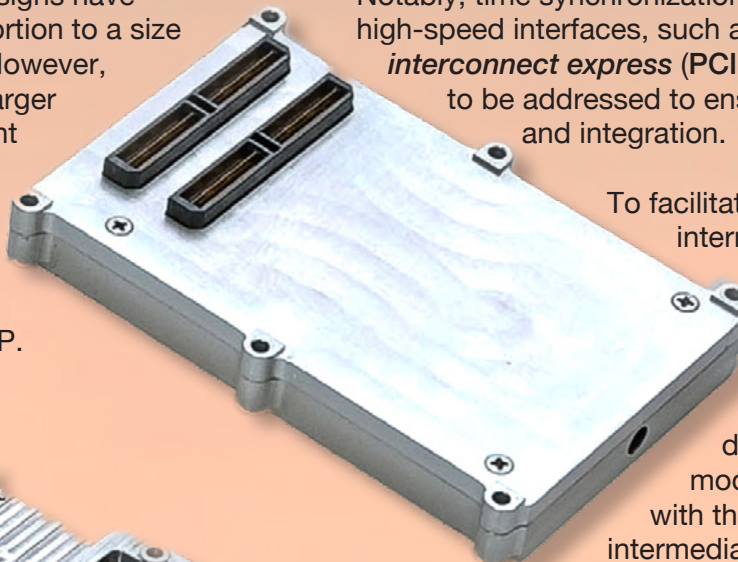
While antennas and modems have experienced remarkable advancements, **radio frequency (RF)** components, which are fundamental to satellite terminal design, have lagged behind in terms of innovation.

Satellite terminals need to operate on multiple satellite bands, such as X-, Ku- and Ka-. Traditionally, generic modems have used an L-band interface and relied on the **block upconverter (BUC)** and **low-noise block (LNB)** for frequency conversion. However, the effectiveness of the intermediate L-band interface is currently under reconsideration in terminal design.

Analog systems, unlike digital systems, do not benefit from Moore's Law and present challenges when it comes to miniaturization.

The interference caused by densely packed components and the complexity of RF circuit design limit the potential for size reduction in analog systems.

In contrast, the latest modem designs have successfully shrunk the digital portion to a size no larger than a business card. However, the L-band RF section remains larger in size and consumes a significant amount of power. Therefore, eliminating the intermediate RF circuitry between the modem and *RF transceiver (RFT)* would be a major breakthrough in enhancing satellite terminal SWaP.



Notably, time synchronization and support for multiple high-speed interfaces, such as *peripheral component interconnect express (PCIe)* and *Serial RapidIO*, need to be addressed to ensure seamless compatibility and integration.

To facilitate the transition to digital intermediate frequency terminals, modems are being designed with multiple levels of modularity.

The first level involves developing a satellite modem that is compatible with the existing L-band intermediate frequency. This modem can be deconstructed and implemented in various ways to accommodate different terminal designs.

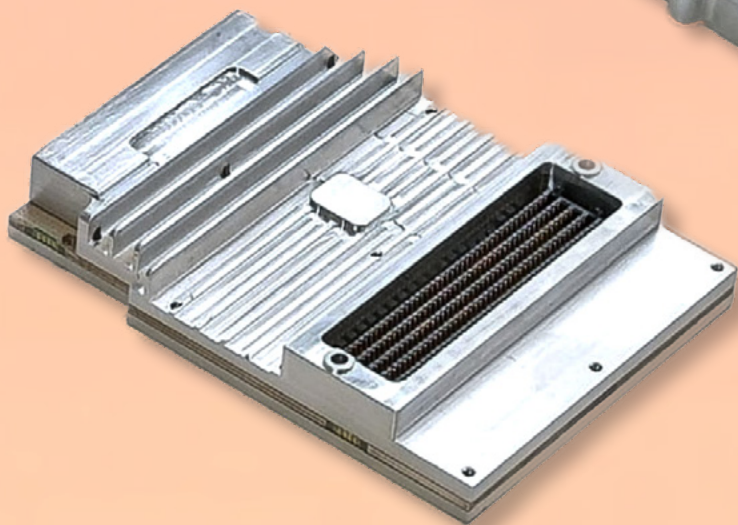


Photo of two pieces of iDirect Government's 450mp multi-waveform, multi-orbit software defined radio (SDR) modem, courtesy of the company.

In the second level of modularity, the modem's digital and analog sections are separated, allowing terminal designers to develop their carrier boards. This configuration provides flexibility for integrating antenna control units, beacon receivers and single-board computers and also requires the addition of intelligence to enable automatic calibration and verification of signal quality. This intermediate step serves as an ideal configuration until fully digitalized RFT becomes widely available.

The proposed solution to address the SWaP challenges is the implementation of an all-digital interface between the modem and the RFT.

Extensive research has been conducted on digital intermediate interfaces, but commercially available modems, LNB downconverters and digital RF transmitters are still in the early stages of development.

The third level of modularity aims to eliminate the need for the intermediate L-band and transition to a fully digital interface. At this stage, the SWaP of the satellite modem is reduced by more than half.

The achievement of plug-and-play equipment for terminal development remains a challenging task that necessitates close collaboration among all stakeholders involved.

The modem communicates with the RFT through a digitized waveform, resulting in improved efficiency and reduced power consumption. This transition not only offers SWaP advantages but enables the evolution of the entire terminal configuration.

The transition to digital intermediate frequency terminals has compatibility issues at the physical layer.

The digitized RF signal requires a significant amount of data bandwidth, and although interface standards, such as [VITA 49.2](#), exist, several aspects of these standards are subject to interpretation.

With a digital RF interface, it becomes possible to physically separate the modem from the antenna and replace the *intermediate frequency link (IFL)* cable with *Cat 6 Ethernet*, allowing for greater physical separation with reduced signal attenuation.



Man Portable

The shift toward a purely digital realm for the modem opens possibilities for waveform virtualization. In this context, the modems transform into true *software-defined radios* (SDRs).

When considering SWaP from a broader perspective, merely miniaturizing a modem terminal by 30% does not adequately address the SWaP challenges that end-users face when multiple terminals are required to support various mission-specific waveforms.

Porting waveforms to different modems is a complex task that often proves challenging. However, by decoupling the analog from the digital domain or eliminating intermediate frequencies altogether, virtualizing and porting waveforms become simpler and more efficient.

Significant advancements have been made in antenna and modem technologies to reduce SWaP in satellite terminal design. However, the RF component innovation has remained relatively stagnant.

The adoption of an all-digital interface between the modem and RFT can be a solution to address the remaining SWaP challenges.

Collaboration among stakeholders, including modem vendors, LNB manufacturers and digital RF transmitter developers, is crucial to the development of commercially available modems, LNBS and digital RF transmitters for digital intermediate frequency terminals.

The transition to digital interfaces offers SWaP benefits as well as unlocks opportunities for waveform virtualization and portability, enabling greater flexibility and efficiency in satellite systems.

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Karl Fuchs

Karl Fuchs is the Senior Vice President of Technology at iDirect Government (iDirectGov), a U.S. corporation that is a trusted partner of the U.S. government and has been for more than 18 years. All of the company's employees are U.S. citizens, with a third being U.S. military veterans with more than 60% holding U.S. security clearances.

Fuchs leads iDirectGov's team of federal systems engineers and serves as chief architect for new product integration and specialized technology, including transmission security (TRANSEC), Communication Signal Interference Removal (CSIR™) anti-jam technology and Open Antenna Modem Interface Protocol (OpenAMIP). All Defense-grade products sold by iDirectGov are designed, developed, assembled, programmed and verified within the United States.

Fuchs has more than 20 years of experience in the areas of technology and the federal government and is a Senior Contributor to MilsatMagazine.

Contact Karl at kfuchs@idirectgov.com.



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SPACE SYSTEMS COMMAND (SSC) LEADING THE WAY



Author: Lisa Sadders, Space Systems Command

*Space Systems Command leads USSF-Japan partnership for improved Space Domain Awareness (SDA) for both countries
Pace-setting, path-finding Quasi-Zenith satellite system hosted payload is first in emerging Affordable Layer acquisition strategy*

Space Systems Command (SSC) has delivered two, U.S. Space Force (USSF), sensor payloads to Japan, as part of a unique partnership agreement – using the field command’s new and emerging Affordable Layer acquisition strategy – that will lead to improved space domain awareness (SDA) for both nations.

The first sensor payload was delivered in January and successfully integrated with the Japanese host satellite (**QZS-6**) in April.

The second was delivered in May and will be integrated onto a second host satellite, **QZS-7**. Both payloads were developed by **MIT Lincoln Laboratories (MIT LL)** and will be hosted on Japan’s GEO-based, **Quasi-Zenith Satellite System (QZSS)**.

Simply put, the U.S. is integrating U.S.-developed sensors into a Japanese-developed satellite and ridesharing on a Japanese-developed launch vehicle.



Artistic rendition of Japan’s Quasi-Zenith satellite system on-orbit.

“International partnerships are important to the United States because that’s where our strength lies,” said **F Schnell**, director of acquisition, **SSC Space Domain Awareness Delta**. “It lies in the U.S. and partner nations sharing the full brunt of accomplishing tasks and missions, and having diversity of thought, capabilities, and requirements.”



F Schnell

“Additionally, allied participation allows us to defray costs, incorporate different perspectives and different capabilities,” Schnell continued. “It also makes our adversaries have to look at situations differently. That is truly the benefit of having allied, like-minded partners coming together and saying, ‘This is what’s best for our mutual defense and assurance.’”

About QSZZ-HP

- Demonstrates ability of the U.S.-Japan alliance to extend to space.
- Contributes to the U.S. Department of Defense’s broader integrated deterrence posture against shared adversaries in the Indo-Pacific
- Extends Space Domain Awareness capabilities
- Foundational for future space cooperation opportunities with Japan

Working shoulder-to-shoulder with Japanese satellite builders, testers and integrators on a near daily basis, **Meredith Drennan**, MIT LL program manager, added, “It has been a very rewarding experience to work with our partners at Mitsubishi Electric Company (MELCO) to define, develop and test two hosted payloads for this first-of-a-kind program. As engineers, our technical achievements and the spirit of collaborative success binds us together.”

QZSS is a Japanese, regional version of the **Global Positioning System (GPS)**. The current constellation consists of four satellites with plans to expand to 11 in number, as recently announced by **Japan’s National Space Policy Secretariat (NSPS)**.

“The quasi-zenith orbit of QZSS is a unique ‘figure-eight’-shaped orbit with a north-south asymmetry and, in this case, optimized for regional coverage over Japan,” said Lt. **Col. Fredrickson**, QZSS-HP Program Manager.



Lt. Col. Brian Fredrickson, Space Domain Awareness Delta program manager of Space Systems Command’s Quasi-Zenith Satellite System Hosted Payload (QZSS-HP), Capt. Alex Woodard (left), deputy program manager and Capt. Jacob Schneider (right), chief engineer, Hosted Payloads, along with representatives from the Japanese National Space Policy Secretariat, mark the successful delivery the second of two Space Domain Awareness sensors at Yokota AB Japan that will be hosted on Japanese satellites to build SDA capacity and resiliency System Hosted Payload. U.S. Air Force photo by Airman 1st Class Jarrett Smith.

In addition to deepening the U.S.-Japan Alliance, as well as bolstering the allied integrated deterrence posture, the USSF payloads launched via the QZSS-HP will have concrete, operational benefits. Once on-orbit, both USSF payloads will augment and provide resiliency to the **Space Surveillance Network (SSN)**. The HPs will enhance the USSF’s ability to conduct persistent, time-dominant, volume search at geosynchronous orbit (GEO).

“One of the challenges of SDA is the large amounts of data that must be transmitted, processed, and disseminated in a way that can be effectively used by the warfighter,” Schnell said, adding that QZSS-HP will assist with this challenge as “the hosted payloads will be on satellites with dedicated communications links that will significantly reduce latency, or lag time. “What it highlights is that with senior leader engagement on both sides, anything is possible. It was a high-level interest item for both the U.S. and Japan, and it made going fast a reality.”

SSC has supported the QZSS-HP program as a rapid acquisition and pacesetter partnership effort with Japan since inception in 2018, and the historic, December 2020 **Memorandum of Understanding (MoU)** between Japan’s NSPS and the USSF that allowed the two countries to break ground and begin execution.

Delivery of the sensors involved USSF’s partnership with **Air Mobility Command** for safe transit from **Hanscom Air Force Base’s 66th Air Base Wing** to **Yokota Air Base’s 374th Airlift Wing** in Japan.





Quasi-Zenith Satellite System components are securely loaded on a transport vehicle inside the 66th Logistics Readiness Squadron facility at Hanscom Air Force Base, Mass., Jan. 5, 2023. U.S. Air Force photo by Todd Maki.

USSF **Lt. Col. Ammy C. Cardona**, materiel leader of the **Air Force Research Lab's (AFRL) Aerospace Systems Directorate Rocket Demonstration Branch**, was one of the first program managers for QZSS after she arrived at SSC in 2018, and also credits leadership support for the success of the program.

"The collaboration started at home, with the SSC International Affairs team all the way up to the SAF (Secretary of the Air Force) and OSD (Space Policy) — everyone coming together and understanding the point of this mission and enabling a small team at SSC to challenge the standard way of doing business," Cardona said. "Our success in getting approvals to launch on a Japan-led satellite and launch system and our success in partnering with our Japanese counterparts are why we are here today."

Cardona said establishing the relationship with their Japanese counterparts early in the mission and working to overcome the language barriers also helped tremendously in the subsequent global pandemic, which cut down on in-person meetings.

Currently, USSF and MIT LL personnel are in Japan to support the integration and test efforts with their Japanese partners, Schnell said. However, improved SDA isn't the only benefit the USSF will gain with the pioneering partnership with Japan.

"From a technology acquisition perspective, QZSS-HP is a proof-of-concept, a prototyping effort, our first step in an emerging acquisition strategy known as 'the Affordable Layer,'" Fredrickson said. "Prototyping efforts such as QZSS-HP are intended to drive maturation and confidence of requirements and design for future systems."

*"At present, [space surveillance sensor provider] **GEOST** is under contract for a QZSS-HP follow-on technology demonstration effort called Oculus. After Oculus, SSC is considering pursuing a follow-on sensor called Sentry. QZSS-HP, Oculus and Sentry all fall under the Affordable Layer umbrella, so QZSS-HP is helping inform the requirements and design for follow-on systems."*

"As a Federally Funded Research and Development Center (FFRDC), MIT Lincoln Labs is known for building cutting-edge prototypes that advance various technology areas on behalf of government sponsors; typically, it's not an FFRDC's role to stand up a production line to build 10, 20, etc., units," Fredrickson said. "Therefore, the tech transfer from the laboratory to industry is an important step. In the instance of QZSS-HP, SSC has been very deliberate and forward leaning in "transferring MIT LL tech design to industry."

"At the end of the day, QZSS-HP is food for thought for U.S. policymakers and USSF leadership," Fredrickson said. "This cooperative program with Japan demonstrates an option for scaling integrated deterrence in the space domain with our allies and partners. Concurrently, we can use lessons learned from QZSS-HP to advance and accelerate options for sovereign Free Flier and Hosted Payload concepts with similar payloads and missions. It shows our senior leaders what is in the realm of the possible, but more importantly begs the question... what's next?"

Space Systems Command is the U.S. Space Force Field Command responsible for acquiring and delivering resilient war fighting capabilities to protect our nation's strategic advantage in and from space. The Command manages an \$15 billion space acquisition budget for the Department of Defense and works in partnership with joint forces, industry, government agencies, academic and allied organizations to accelerate innovation and outpace emerging threats. Our actions today are making the world a better space for tomorrow.



Contact Space Systems Command at SSC@spaceforce.mil and also follow on [LinkedIn](#).



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Intelligent, multi-orbit ground solution set to transform warfighter mobility and mission agility

Author: John Lane, Chief Sales Engineer, ALL.SPACE

Robust, Beyond-Line-Of-Sight (BLOS) communications are a must to meet the connectivity requirements of today's warfighters — however, the military has long struggled with the need for interoperability between disparate communications systems, let alone coordinating a mission while operating on more than one frequency band or satellite.

Depending on the operation, military commanders may need to coordinate operations with hundreds of aircraft or vehicles and thousands of soldiers, often in difficult terrain with limited line of sight to satellites.

Given these battlefield realities, it's no surprise that satellite terminals have struggled to provide assured connectivity. As far back as 2019, the General Accounting Office reported that the [Department of Defense \(DoD\)](#) maintains some 17,000 satellite terminals with more than 100 designs, all operating across multiple platforms and with differing system requirements.

During [SOF Week 2023](#) this past May in Tampa, Florida, [David Breede](#), [U.S. Special Forces Command's](#) new *Tactical Intelligence Systems Program Executive Officer*, said the most difficult technical problem he faced as head of the *Special Reconnaissance PEO* was networked, collaborative communications — “*getting individual systems to talk to each other and provide a common operating picture.*”

He said operators need to push timely and relevant information “*at the time of need*” over their networks, and, in the face of jamming by adversaries, “*there can't be a single point of failure,*” emphasizing the need for “*multiple options in the same theater.*”

Breede isn't alone in acknowledging the challenge of interoperable comms for soldiers in the field. [Major General Robert Collins](#), currently deputy for [Acquisition and Systems Management](#), told *Breaking Defense* in May of 2021, when he was the *Program Executive Officer for Command, Control and Communications-Tactical (PEO C3T)*, “*The last thing we want is a unique terminal for LEO, a unique terminal for MEO.*”

But with challenging data demands, Maj. Gen. Collins stated that the Army wasn't likely to get a single terminal to satisfy the requirements of all users, but it nevertheless wanted to move to a compatible terminal family able to communicate over LEO, MEO and GEO.

An agile, interoperable ground infrastructure is key to the U.S. military's vision for a [Joint All Domain Command and Control \(JADC2\) framework](#). This strategy calls for a common operational picture to better connect sensors to shooters in the future battlespace.



Photo of the ALL.SPACE SMART TERMINAL, courtesy of the company.

JADC2 promotes agility and adaptability by enabling rapid decision-making and the ability to dynamically allocate resources. In the context of connectivity challenges, JADC2 helps identify and prioritize communication requirements, allowing for flexible deployment of communication assets to address connectivity gaps.

Fulfilling JDAC2's Connected Sensor-to-Shooter Vision

Fortunately, innovative multi-orbit, multi-link terminal technology will soon give warfighters a new level of assured communications and agility on the battlefield.

With a solution that encompasses both hardware and software capabilities, ALL.SPACE's **SMART** range (encompassing five key components – **SATELLITE, MULTI-NETWORK, AI, REAL-TIME** and **TERMINAL**) will help the military realize its vision of JADC2 at a time when geopolitical tensions in the space domain are at an all-time high.

ALL.SPACE Vision: At the heart of global connectivity, ALL.SPACE unites networks, space and ground, redefining seamless communications with secure, dependable and intelligent insights.

Founded in 2013 and led by O3b veteran **John Finney**, ALL.SPACE has successfully raised more than \$100 million in funding and is about to close its C-round as the firm prepares for the global launch of its multi-orbit terminal this year.

ALL.SPACE's connectivity capabilities, tailored to global defense needs, are resonating with the defense community, from the U.S. DoD to the Royal Air Force and NATO in Europe as well as allies in the Indo-Pacific region.

*"A lot of the features we are looking to include in the future will help you streamline and continue missions despite enemy capabilities," said **Emil Reynolds**, a former warfighter who served multiple tours in Afghanistan and Iraq and who is currently ALL.SPACE's United States Government (USG) Business Development Executive.*

The terminal supports resilient communications because, even if an adversary jams or disrupts one network, another link can still support the mission. Being able to communicate in a contested environment ensures the warfighter's real time or near real-time decision-making ability.

ALL.SPACE's terminal features plug-in components, software-defined modems, edge compute modules and intelligent software overlays to provide unprecedented flexibility and resilience in the face of evolving threats. The scalability of the terminal design offers new pathways to gather, analyze and disseminate data to better understand what the data means and getting the data where it needs to go quickly.

Partnering Smart

Satellite operators, including [SES](#), are an important ecosystem partner for ALL.SPACe. SES operates the only multi-orbit constellation consisting of 70 GEO and MEO satellites, delivering global coverage and high-performance connectivity services. Leveraging SES's global satellite fleet, [SES Space & Defense](#) provides mission assurance connectivity to government customers operating at the tactical edge.

*“Pairing multi-orbit operations with a terminal that can access multiple orbits unlocks powerful benefits. In conjunction with our next-generation MEO system, O3b mPOWER, and ALL.SPACe’s smart terminal, we will unlock connectivity for the U.S. military and government, unleashing the full performance and flexibility of SES’s global fleet.” — **David Fields**, President and CEO of SES Space & Defense.*

SES's upcoming MEO constellation, [O3b mPOWER](#), is set to deliver high-throughput, low-latency, and resilient communications designed specifically for government mission partners. In addition, O3b mPOWER is easily scalable and provides an automated solution, giving government mission partners more control of their satellite service. Similarly, ALL.SPACe's terminal is plug and play, and includes a user-friendly terminal interface and advanced automation.

Embracing Digital Modem Standards

In addition to partnering with satellite operators to serve defense users, ALL.SPACe is also working with industry associations to push for open digital standards that will benefit military and commercial SATCOM consumers.

As the ground segment continues to evolve, modem vendors must embrace a common digital IF standard. Fortunately, the satellite industry has started to come together through efforts like the DIFI Consortium, which counts the U.S. Navy as a founding member.

John-Paul (JP) Szczepanik, Chief Technology Officer of ALL.SPACe, was recently named co-chair of the Consortium's *Specification Working Group*. He said, *“DIFI has gotten a lot of the right player involved who are showing a commitment to standardization, which is key to achieving interoperable and highly resilient space architectures.”*

One way of preventing ground terminals from getting stovepiped is having flexibility with the modem — that is, not requiring a different physical modem every time one needs to switch networks.

*“Even if you can swap modems, it’s time consuming and difficult for the military to go into the field and get those new modem cards out to the edge. But if you have the hardware to run virtualized modems on general purpose compute, then using the multi-link capability, you can push new virtualized modems or software updates over one of the satellite links in the background without affecting primary communications to access different networks or new security features as they evolve.” — **Eric Clague**, Director of Product Management for the U.S. Government, ALL.SPACe.*

Driving New MILSATCOM Multi-Orbit Requirements

To take advantage of digital transformation of the ground segment, ALL.SPACe and other industry partners are pushing for new procurement practices to fuel faster deployment of breakthrough technology.

For instance, if simultaneous, multi-link connections were included in future MILSATCOM program requirements, it could accelerate how quickly advanced capabilities get deployed, ensuring safer, more resilient comms for U.S. and allied militaries.

For additional information about ALL.SPACe's breakthrough smart terminal capabilities for the defense and government market, visit www.all.space

Author John Lane is Chief Sales Engineer at ALL.SPACe and he supports Product Development, Sales and U.S. Government Programs. John spent 25+ years supporting PEO C3T's tactical SATCOM efforts. Prior to John's retirement from the government, he was PdM SATCOM's Technical Management Division Chief.



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NAVAL RESEARCH LABORATORY (NRL) 100 YEARS STRONG!

Author: Megan Gilliland, Head, Public Affairs, U.S. Naval Research Laboratory

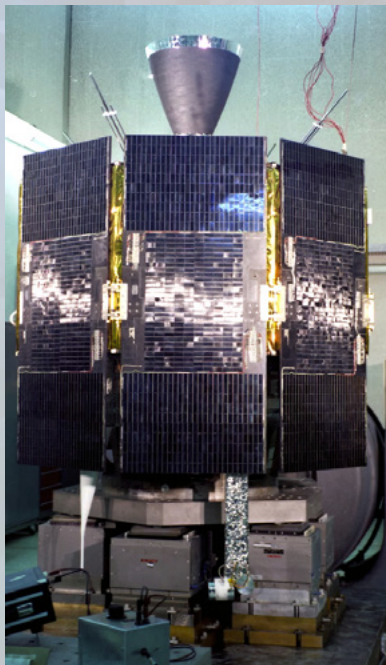
NRL engineers ready the Robotic Servicing of Geosynchronous Satellites (RSGS) payload for launch. The RSGS program is a public-private partnership between DARPA and Northrop Grumman's SpaceLogistics subsidiary, with NRL developing the robotic servicing payload. Photo is courtesy of NRL.

The U.S. Naval Research Laboratory has now celebrated 100 years of service as the Navy's corporate laboratory with a rich history of performing advanced scientific research and making significant contributions to U.S. military forces on, under, and above the seas.

"For nearly a century, NRL employees have been at the forefront of innovation and research, and we are excited to honor this Centennial as we look to the next 100 years." — Peter Matic, Ph.D., NRL's Centennial Celebration Coordinator

A Vision Realized

Commissioned on July 2, 1923, as the Naval Experimental and Research Laboratory — later shortened to the Naval Research Laboratory (c.1926) — NRL has changed the way the U.S. military fights, improved its capabilities, prevented technological surprise, transferred vital technology to industry, and tilted the world's balance of power on at least three occasions; with the first U.S. radar, world's first intelligence satellite, and first operational satellite of the Global Positioning System (GPS).



The first satellite in the GPS system, Navstar 1, was launched on 22 February 1978. The photo above is of NAVSTAR 2 — NTS-2 is the first satellite completely designed and built by the U.S. Naval Research Laboratory (NRL) under GPS Joint Program funding—a working model was launched June 23, 1977, aboard an Atlas E/F rocket from Vandenberg Air Force Base, California

In 1873, the U.S. federal government purchased 90 acres of *Bellevue* in southwest Washington D.C. and added this land to the adjacent Naval Gun Factory.



View of the Navy Yard and its vicinity, looking westward from over Anacostia, circa 1947-1950. Photo is courtesy of Naval History & Heritage Command.

This land was known as the *Bellevue Annex* to the Naval Gun Factory until 1923, when the federal government opened the U.S. Naval Research Laboratory on the site. The Laboratory remains on this tract of land to this day.

In a 1915 *New York Times* article, **Thomas Edison** suggested that the U.S. government should maintain a “*great research laboratory.*” With this interview, and with the progression of World War I, the idea of a central research facility for the Navy began to take shape.

Secretary of the Navy, the **Honorable Josephus Daniels**, seized the opportunity created by Edison’s public comments to enlist Edison’s support. Edison agreed, serving as the head of a new body of civilian experts — the **Naval Consulting Board** — to advise the Navy on science and technology.

The Board’s eventual recommendation was “*for the: establishment of a research and experimental laboratory, whose investment for grounds, buildings, and equipment should total approximately \$5,000,000, and which should be located on tidewater of sufficient depth to permit dreadnought [class battleships] to come to the dock ... near, but not in, a large city, so that labor and supplies might be easily obtained.*”

The Board’s most ambitious plan was the creation of a modern research facility for the Navy. Congress allocated \$1.5 million for the institution in 1916, but wartime delays and disagreements within the Naval Consulting Board postponed construction until 1920. On December 6, 1920, Daniels broke ground for NRL’s Building 1.

Radio Silence

In September of 1922, nearly eight months prior to the grand opening of the newly created laboratory, two Navy radio engineers — **Albert Hoyt Taylor** and **Leo Clifford Young** — who were stationed at the **Naval Aircraft Radio Laboratory** at Anacostia, just north of Bellevue, began to

seek new frequencies for radio communication. Building a high-frequency transmitter and portable receiver, the two set out to ‘field-test’ their device.

As Taylor and Young were testing their new equipment across the half-mile stretch of the open Potomac, the steamer *Dorchester* was cruising up the *Potomac* from *Alexandria*. As the vessel steamed toward the Anacostia, the researchers took note to the discernable fluctuations and peaks they were observing on their equipment.

After somewhat tweaking the efficiency of the signal, the scientists were soon able to more effectively identify approaching vessels along the river, some as far off as three miles.

It was soon after this discovery the team truly believed they could further develop their device for practical military use in modernizing the efficiency of detecting enemy warships.

Unfortunately, neither the Navy nor the Bureau seemed interested, and Taylor and Young, in lieu of other demanding priorities, shelved the project before being moved slightly down river to the newly commissioned Bellevue lab several months later.

At NRL, Taylor became chief radio scientists of the Laboratory’s **Radio Division** and Young his top assistant. During the greater portion of the 1920s, the division was tasked with advancing high-frequency radio technology for service to the Navy fleet.

1923 + Beyond

After opening its doors, the laboratory’s two original divisions — **Radio and Sound** — pioneered in the fields of high-frequency radio and underwater sound propagation. They produced communications equipment, direction-finding devices, sonar sets, and perhaps most significant of all, the first practical radar equipment built in the U.S.

Nearly a decade after Taylor and Young’s breakthrough in detecting distant moving objects via radio, a patent for “**System for Detecting Objects by Radio,**” was approved on November 27, 1934.

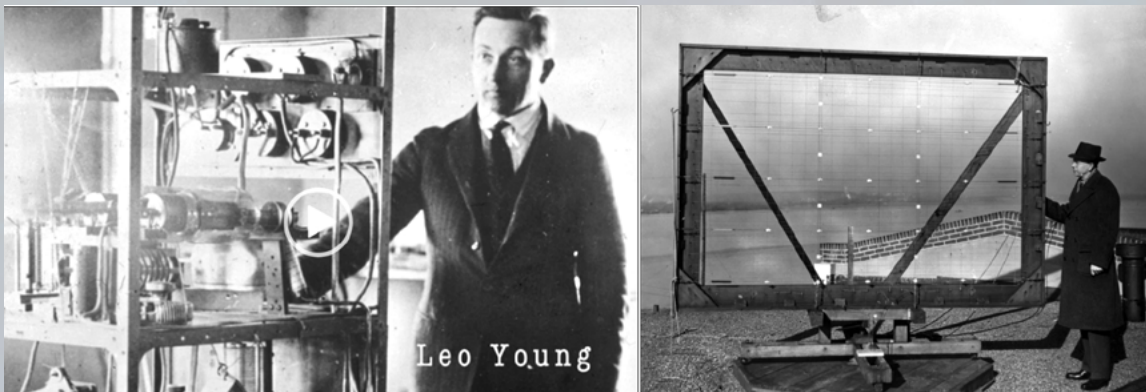


Photo of radio engineer Leo Clifford Young and an early radar test installation.

Later referenced as **radar** — for ‘*radio detection and ranging*’ — the technology contributed to major Naval victories in battles at the *Coral Sea*, *Midway*, and *Guadalcanal* during World War II.

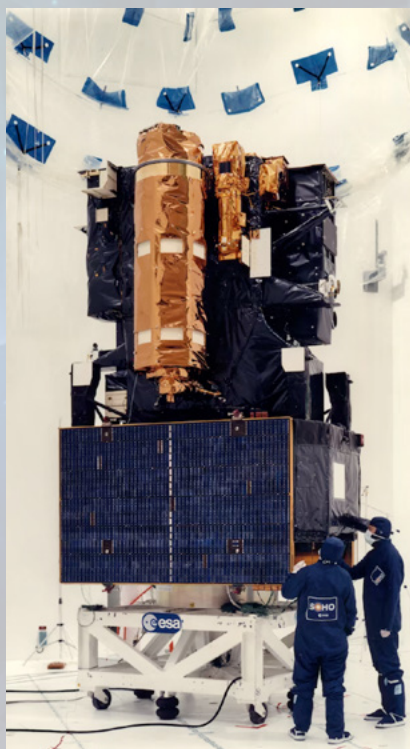
During the war, scientific activities necessarily were concentrated almost entirely on applied research. New electronics equipment — *radio*, *radar*, *sonar* — was developed.

Countermeasures were devised. New lubricants were produced, as were antifouling paints, luminous identification tapes, plus a sea marker to help save survivors of disasters at sea. A [thermal diffusion process](#) was conceived and used to supply some of the uranium-235 isotope needed for one of the first atomic bombs.

During the years since World War II, the laboratory has conducted basic and applied research pertaining to the Navy’s environments of Earth, Sea, Sky, Space, and Cyberspace. Investigations have ranged widely — from [monitoring the sun’s behavior](#), to [analyzing marine atmospheric conditions](#), to measuring [parameters of the deep oceans](#).

Laboratory researchers also performed basic research, participating for example, in the discovery and early exploration of the ionosphere.

Moreover, the laboratory was able to work gradually toward its goal of becoming a broadly based research facility.



European Space Agency (ESA) engineers building the Solar and Heliospheric Observatory (SOHO) spacecraft at Matra Marconi Space in Portsmouth, England, November 22, 1995. The SOHO spacecraft was prepared for launch at the SAEF-2 facility of the Kennedy Space Center before being fueled and encapsulated on top of the Atlas-Centaur AC-121 on pad 36B. The SOHO and LASCO consortium celebrated their 25th anniversary of international cooperation between European Space Agency and NASA on December 2, 2020. Image is courtesy of ESA and NASA.

By the start of World War II, five new divisions had been added: *Physical Optics*, *Chemistry*, *Metallurgy*, *Mechanics* and *Electricity*, and *Internal Communications*.

Detection and communication capabilities have benefited by research that has exploited new portions of the electromagnetic spectrum, extended ranges to outer space, and provided a means of transferring information reliably and securely to stare down massive jamming tactics.

Submarine habitability, lubricants, shipbuilding materials, firefighting, and the study of sound in the sea have remained steadfast concerns, to which have been added recent explorations within the fields of virtual reality, superconductivity, [biotechnology](#) and nanotechnology.

The laboratory has pioneered naval research into space — from atmospheric probes with captured V-2 rockets, through direction of the *Vanguard* project (*America’s first satellite program*) and development of the world’s first intelligence satellite (*GRAB-I*), to inventing and developing the first satellite prototypes of the modern day GPS.



Photo of the Vanguard launch, courtesy of the U.S. Navy.

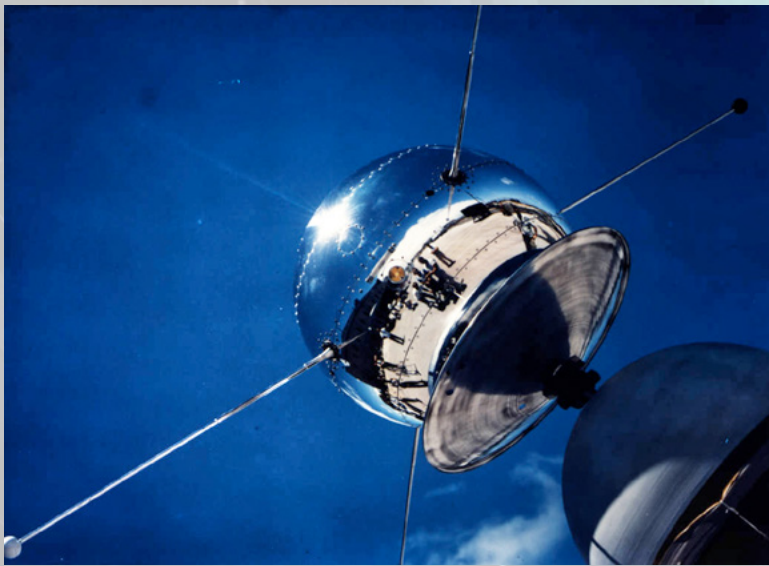


Photo of the Vanguard satellite, courtesy of NRL.



Due to the major scientific accomplishments of the war years, the United States emerged into the post-war era determined to consolidate its wartime gains in science and technology and to preserve the working relationship between its armed forces and the scientific community.

While the Navy was establishing its Office of Naval Research (ONR) as a liaison with and supporter of scientific research, it was also encouraging NRL to broaden its scope. Placement of NRL within the Navy Secretariat allowed it to pursue long-range high-risk projects and serve the Navy in the broadest sense.

Commissioned on August 1, 1946, there was a transfer of NRL to the administrative oversight of ONR and a parallel shift of the laboratory's research emphasis to one of long-range basic and applied investigation in a broad range of the physical sciences. However, rapid expansion during the war had left NRL improperly structured to address long-term Navy requirements.

One major task — neither easily nor rapidly accomplished — was that of reshaping and coordinating research. This was achieved by transforming a group of largely autonomous scientific divisions into a unified institution with a clear mission and a fully coordinated research program.

The first attempt at reorganization vested power in an executive committee composed of all the division superintendents. This committee was impracticably large, so in 1949 a civilian *Director of Research (DOR)* was named and given full authority over the program. Positions for associate directors, or ADORS, were added in 1954.

Leading Naval Research Into The Future

Today, NRL leads advances for the Navy in space systems development and support, as well as in fire research, tactical electronic warfare, microelectronic devices, and artificial intelligence (AI). The laboratory now focuses its research efforts on new Navy strategic interests in the 21st century, a period marked by global terrorism, shifting power balances, and irregular and asymmetric warfare.

NRL scientists and engineers strive to give the Navy the special knowledge, capabilities, and flexibility to succeed in this dynamic environment. While continuing its programs of basic research that help the Navy anticipate and meet future needs, to include innovations in wireless transfer of solar energy; hypersonic technologies and quantum information science.

NRL also moves technology rapidly from concept to operational use when high-priority, short-term needs arise. Some past examples are pathogen detection, lightweight body armor, contaminant transport modeling, and communications interoperability.

The interdisciplinary and wide-ranging nature of NRL's work keeps this "*great research laboratory*" at the forefront of discovery and innovation, solving naval challenges and benefiting the nation as a whole.

Author Megan Gilliland is the Head of Public Affairs for the U.S. Naval Research Laboratory.



NRL is a scientific and engineering command dedicated to research that drives innovative advances for the U.S. Navy and Marine Corps from the seafloor to space and in the information domain. NRL is located in Washington, D.C. with major field sites in Stennis Space Center, Mississippi; Key West, Florida; Monterey, California, and employs approximately 3,000 civilian scientists, engineers and support personnel.

COMMAND CENTER: LUCIANO GIESO HEAD OF SALES GLOBAL GOVERNMENTS SATELLOGIC



Luciano Giesso

Luciano Giesso serves as Head of Sales, Global Governments at Satellogic.

He is a multinational executive with more than 20 years' experience in technology & services. Mr. Giesso has led multi-country teams of 100+ employees in many countries occupying several management and sales positions in technology companies, including a 14-

year tenure in IBM. Fluent in English, Spanish, French, Portuguese and German, Mr. Giesso holds an Engineer's Degree from UCA and an MBA from San Andrés University, both in Buenos Aires, Argentina. He has completed executive programs in Harvard Business School and MIT Sloan School of Management.

Mr. Giesso, where does Satellogic reside within the landscape of Earth Observation (EO) data providers?

LUCIANO GIESO

Satellogic is well positioned to meet customers at the intersection where the need for scalable capacity, high-quality imagery, and lower prices converge. We operate the largest commercial fleet for advanced sub-meter imagery.

Our vertical-integration of design, manufacture, and operation of our satellites provides customers industry leading cost savings and enables them to focus on their

mission and make more informed decisions. Our most recent mission, **SpaceX Transporter-8**, enabled us to expand our constellation to 38 microsattellites on-orbit.

The invasion of Ukraine is considered one of the first conflicts in history to truly leverage commercial EO technology. How has Satellogic participated in these new-age intelligence tactics?

LUCIANO GIESO

Satellogic was able to activate a simplified interface to access, analyze, and share daily image collections over the region. Humanitarian organizations operating in the area were offered free access while commercial stakeholders could subscribe and purchase timely data.

Satellogic recently announced a new offering, Space Systems, specifically aimed at sovereign nations. How does this differ from your Constellation-as-a-Service product?



The Satellogic team, photo courtesy of the company.

LUCIANO GIESSO

Space Systems is a direct satellite sale opportunity for nations that require ownership of the spacecraft and/or are interested in global tasking autonomy.

Constellation-as-a-Service is designed for sovereign territory monitoring, delivering guaranteed tasking capacity over a defined area of interest, usually leveraging the capacity of two or more satellites for increased coverage and frequency.

Space Systems was introduced as the solution to a challenge that had been long out of reach for many: owning a sub-meter resolution satellite and developing a national EO program.

Starting at less than \$10 million and including ancillary costs for launch, commissioning and the operation of a satellite, Satellogic can deliver a national asset in as little as three months.

Custom satellites are also available, with proprietary payload development and existing ground segment integration support.

Why is Space autonomy so important for a government?

LUCIANO GIESSO

Governments seek access to data relevant to objectives. While there may be shared interests in geospatial data for global security, such as activity in the South China Sea or events such as the invasion of Ukraine, most sovereign missions may require monitoring of sovereign territory, remote assets, and other interests specific to each nation.

Access to EO data has become more widespread through the growth of geospatial marketplaces and resellers, but these channels cannot guarantee capacity and/or delivery for all mission requirements.

Whether it's a matter of avoiding data release delays caused by foreign controls or increased demands limiting the tasking capacity of EO satellite operators, governments can face many barriers to gain access to exactly what data the nation needs and when.

Beyond monitoring global points of interest, what other applications is Satellogic uniquely positioned to support within the government sector?

LUCIANO GIESSO

As the scope of national security evolves and expands, so does the need for EO data. Our EO data provides situational awareness not just from a traditional defense perspective but also environmental health and resource management.

This requires increased capacity, and that's why Satellogic continuously expands and enhances its constellation.

Paired with our low-cost and industry-leading capacity, we enable governments to collect timely information for analysis and research, as well as catalog data for historical research such as richer insights around the changing ground conditions associated with prolonged droughts that may impact food security or fire risks, change detection in remote regions with growing populations, illegal encroachment near government assets, conservation planning and management, public safety and urban expansion — all of which can contribute data for more effective decision making, positive outcomes and significant cost-savings.

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GOVERNMENT SATELLITE REPORT

General Thompson: U.S. Space Force transitioning to combat-ready phase

Author: David Pesgraves



Since its inception in late-2019, the U.S. Space Force’s primary focus has been to carefully design the blueprints for a resilient space architecture, while also laying the groundwork for the training and retention of a capable military force. As the Space Force’s fourth birthday approaches, senior military leadership are actively making the transition from branch establishment to a new phase – presenting a combat-ready force that has the offensive and defensive space capabilities required to protect the domain.

During a recent [Mitchell Institute Schriever Spacepower Forum](#), [General Kevin P. Chilton](#) (Ret.) pointed out to [General David D. Thompson](#), Vice Chief of Space Operations at the [U.S. Space Force \(USSF\)](#), that space has shifted away from being a benign domain to an extremely competitive operating environment.

In response to how the force is maturing as an organization and responding to the level of activity in the domain, Gen. Thompson said, “*We are very much clearly in the next chapter of the Space Force...[Now] the mission of the Space Force is to deliver on the capabilities and the promises that we’ve made as part of the establishment.*”

Gen. Thompson explained that the USSF is indeed responding to the changes in the space domain by having a combat-ready force with advanced testing, training, and the ability to deliver warfighting capabilities. Gen. Thompson attributes a lot of this forward momentum to the *Assistant Secretary of the Air Force for Space Acquisition and Integration*, [Frank Calvelli](#), who was appointed to his position last year.

“*He has brought us perspective and insight, and [has driven] a real change to how we look at space acquisition,*” said Gen. Thompson. “*[Calvelli is] focusing on simplifying, delivering, and meeting our promises in terms of the capabilities we deliver on time and on cost.*”

Part of delivering those capabilities is the continuous development and deployment of a resilient space architecture, a key priority that Space Force leadership has been focusing on since the branch’s founding.

Gen. Chilton asked Gen. Thompson about how the Space Force has been approaching the development of its architecture in a way that can withstand a possible “*first-mover*” strike by an adversary. Gen. Thompson explained that a proliferated architecture is where the answer resides.

“I would say distribution and proliferation in all of its elements,” said Gen. Thompson. “We certainly think about proliferated architectures in a very narrow sense, like having a large number of satellites in one orbital regime. [We must] distribute those capabilities across multiple regimes, which means that an adversary — if they’re going to attack you in space — has to have a very sophisticated and synchronized means of attack.”

Another approach that Gen. Thompson believes can eliminate strategic surprises from adversaries is to adopt a “new understanding” of space domain awareness.

“[We must be] truly thinking more carefully about what it means to fully understand what’s happening in the domain, especially a direct-focused perspective on space domain awareness,” said Gen. Thompson. “As the human race continues to expand out into the solar system, the moon, and beyond, we believe our responsibility is to understand what’s happening in the domain.”

A critical component of being one step ahead of an adversary in the space domain, according to Gen. Thompson, is having a level of resiliency that will ensure that warfighters — across all services — can continue their operations in cases of degradation or denial in the space environment.

“I’m not one who believes that degradation or denial of use of space will occur broadly and over a long period of time,” said Gen. Thompson. “But understanding where the reliance is, and how [the military services] might operate in that environment, is the first piece of it.”

This rapidly changing threat environment that Gen. Thompson describes is something that the industry has taken notice of and has been testing services and solutions specifically designed to promote military resiliency in the space domain.

As Gen. Thompson pointed out, there is currently a need among all military branches to have continued and uninterrupted delivery of space-based services, especially during adversarial attempts to degrade or deny space capabilities. For example, if an adversary were to successfully jam or degrade a satellite’s ability to provide connectivity to warfighters on the ground, it is imperative that the military be able to roll connectivity and services over to another satellite, in order to have uninterrupted and unaffected operations.

In March of this year, [SES](#), [Hughes](#), and [ThinKom](#), came together to test space capabilities that could transform how the military strategically leverages SATCOM services. The three companies held a demonstration that effectively illustrated the ability of an end satellite user to seamlessly roam between satellite services originating in different orbits and leveraging different frequency bands. This verified capability speaks directly to the DoD’s need for the distribution of services across “multiple orbital regimes,” as Gen. Thompson described.

According to [Ben Pigsley](#), SVP of Defense Networks at [SES Space & Defense](#), “The military is facing near-peer adversaries that have demonstrated their ability to disrupt, deny, and degrade our communications networks. In today’s environment, government networks are both congested and contested with deliberate and directed jamming, cyberattacks, and kinetic attacks.”

When asked about SES Space & Defense’s successful multi-orbit testing and how the DoD could leverage those capabilities, he said, “Both multi-orbit and multi-band network solutions offer an elevated level of resiliency and increase availability to government customers. Higher availability is critical to the command-and-control networks operated by the DoD... The military’s industry partners are ready to support both multi-band and multi-orbit operations.”

Select the image below to watch the Spacepower Forum video in its entirety.



This article first appeared in [Government Satellite Report](#) and is republished with permission of [GSR](#) and [SES Space & Defense](#).



Author David Presgraves is a Staff Writer for GovSat Report, in addition to several other online publications dedicated to defense, military, and federal government agency technologies.