SPECTRUM

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L3HARRIS™

The L3Harris portfolio of tactical radios, resilient waveforms and warfighter-enabling systems provide militaries the tools required to succeed in multi-domain operations. Read more on page 8.

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The U.S. Air Force Research Laboratory has awarded L3Harris a $5.7 million contract to integrate a low-Earth orbit terminal into rotary-wing aircraft to further advance aerial communications capability.

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L3Harris Communication Systems Publication | **Fall 2021**

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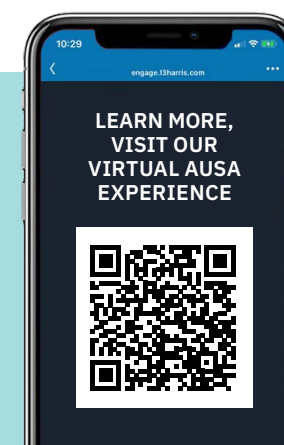
Explore our interactive virtual experience that highlights how L3Harris is a leader in connecting sensors, shooters and decision makers across all domains to advance the future fight.

NEWS BRIEFS

New L3Harris software add-ons broaden hC2 Battlefield Management System capabilities

Two new L3Harris Technologies add-ons to hC2 Battlefield Management System (BMS) software bring to bear expanded capabilities for military users.

The SHARK™ Situational Awareness (SA) Simulator adds a new training component to the system for seamless transition to operational use, and the Digitally Aided Fire Support System (DAFSS) solution provides users with an artillery call-for-fire capability.

"The hC2 add-ons are designed to enhance the capabilities of the existing product family," Kris Engel, L3Harris product analyst said. "The hC2 Suite is a field-proven BMS that has been deployed in more than 30 countries by L3Harris. The additional features and add-ons are designed to work with the hC2 suite of software products to support a wide range of integration protocols required by customers."

Michigan Selects L3Harris for Public Safety Communications Technology System

The state of Michigan has selected L3Harris Technologies to provide critical communications for more than 100,000 local, state, federal, tribal and private users on the second-largest trunked radio system in the world.

L3Harris will supply the Michigan Public Safety Communications System (MPSCS) with portable and mobile radios—designed to work in the most extreme environments and the most challenging situations—as well as L3Harris P25 Infrastructure and dispatch consoles. The company has five dedicated service channel partners available to support all regions of the state.

"This partnership will continue to improve interoperability and information sharing among public safety agencies across Michigan and bordering states," said Nino DiCosmo, president of the L3Harris Public Safety and Professional Communications business. "Our state-of-the-art technology is designed to meet the rugged needs and high-reliability demands of the MPSCS."

U.S. Army's Advanced HMS Radios Go Into Full-Rate Production

L3Harris Technologies has received its first full-rate production orders on the U.S. Army's HMS (Handheld, Manpack & Small Form-Fit) contracts to provide warfighters with advanced communications in the field.

The Army awarded L3Harris more than $200 million for the multi-channel Falcon® IV AN/PRC-163 Leader radios and AN/PRC-158 Manpack radios to support its Integrated Tactical Network.

"These awards further extend L3Harris' leadership in software-defined tactical communications and builds upon our proven ability to engineer and deliver advanced two-channel handheld, manpack and vehicular radios," said Dana Mehnert, President of L3Harris Communication Systems.

L3Harris Systems to Deliver Secure Communications Between U.S. Army Apache Aircraft and Ground Forces

L3Harris Technologies was selected by the U.S. Army to deliver advanced systems that will provide secure communications between manned and unmanned aircraft and ground forces.

L3Harris is the only company providing Manned-Unmanned Teaming (MUMT) Airborne Data Link Systems for the Army's AH-64 Apache attack helicopters, having delivered 256 systems to date. The systems allow forces to share real-time full-motion video and data between Apache aircraft and unmanned aerial systems, such as the Army's Shadow and Grey Eagle aircraft, and integrated battlefield networks, enhancing decision making and mission effectiveness.

"The MUMT system provides a unique capability for new warfighting strategies and tactics, combining multiple assets and platforms for multi-domain use," said Brendan O'Connell, president of the L3Harris Broadband Communication Systems business. "Adding new MUMT capability to the Apache fleet will provide greater situational awareness and combat effectiveness across the battlefield."
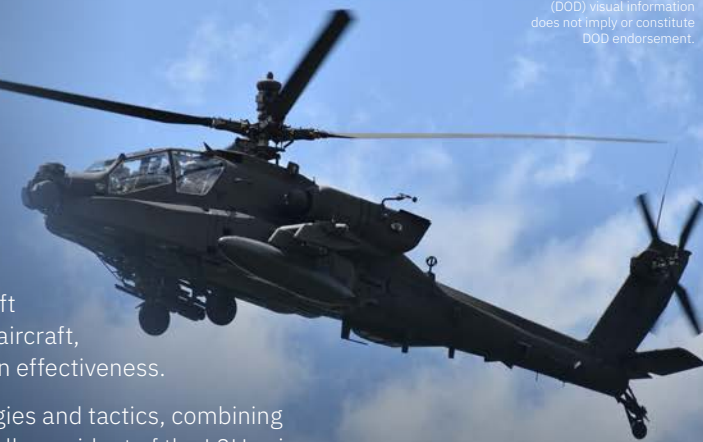
DOD Recognizes L3Harris with Highest Industrial Security Practices Award

The U.S. Department of Defense has recognized L3Harris Technologies with its highest industrial security practices award—the James S. Cogswell Outstanding Industrial Security Achievement Award—for the 17th consecutive year.

The DOD's Defense Counterintelligence and Security Agency recognized the L3Harris Communication Systems facilities in Rochester for establishing and maintaining the highest standards in security procedures and security program management. It was among 40 awarded facilities from a field of more than 13,000 cleared facilities nationwide.

"Receiving the Cogswell award highlights L3Harris' unwavering commitment to maintaining the highest security processes and safeguarding sensitive information, which is more critical now than ever before," said Christopher E. Kubasik, Vice Chair, President and COO of L3Harris. "Security is essential to L3Harris' operational performance and the company's role supporting our customers' critical missions. I am proud of our security team for this 17th consecutive year earning a Cogswell award."

New L3Harris Hawkeye Terminal Connects Warfighters Anywhere in the World

L3Harris Technologies has launched its new Hawkeye 4 Lite Very Small Aperture Terminal (VSAT), which connects warfighters virtually anywhere in the world.

The Hawkeye 4 Lite is a mobile satellite communications terminal that can rapidly deploy and maneuver across a complex battlefield, while providing high-speed data communications for Internet, C5ISR and video transmission. This terminal, which is small enough to fit into a suitcase, was designed for both mobile expeditionary teams and high throughput command posts that require mission flexibility and seamless upgrades to emerging capabilities.

"The Hawkeye 4 Lite is the only available VSAT solution featuring the latest technologies in a single, high-performance terminal with one-touch, auto-acquire and interference mitigation," said Jerry Adams, general manager of the L3Harris SATCOM business. "We've invested heavily into connected systems that enable the warfighter to make decisions faster, and the Hawkeye does just that."

USMC Awards L3Harris Full Rate Production Order for New Handheld Video Data Link Tactical Radios

The U.S. Marine Corps has awarded L3Harris Technologies a full-rate production delivery order for AN/PRC-165 Handheld-Video Data Link tactical radios that will enhance warfighters' situational awareness and battlefield connectivity.

The L3Harris Falcon® IV AN/PRC-165 is a software-defined radio that securely transmits and receives full-motion video and data with multiple manned and unmanned airborne and ground assets—improving the warfighter's ability to conduct close air support as well as command and control.

L3Harris to Deliver Enhanced Night Vision Goggle Technology to U.S. Army

The U.S. Army has awarded L3Harris Technologies a $100 million order for the Enhanced Night Vision Goggle — Binocular (ENVG-B) system that will enhance soldier situational awareness, mobility, survivability and lethality.

The ENVG-B delivers imagery and data from the battlefield directly to the soldier's eye. The complete system will interface with the Army's family of weapon sights, while enhancing interoperability and data sharing.

This marks the second delivery order L3Harris has received from the U.S. Army for the ENVG-B Program of Record, which has a total value of $442 million. Since 2018, L3Harris has delivered more than 7,000 ENVG-B systems to the Army as part of both the POR and Directed Requirements contracts.

See the Hawkeye 4 Lite in Action
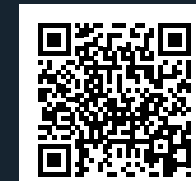
LASER FOCUS

The L3Harris STORM II Laser Rangefinder offers best-in-breed marking and illumination capabilities for elite sniper and vehicular-mounted targeting applications.

The U.S. Army will soon equip its ground forces with a new laser rangefinder capability that can "illuminate the battlefield."

The Small Tactical Optical Rifle-Mounted (STORM) II Laser Rangefinder—the latest addition to the L3Harris Technologies family of laser technologies—provides the modern warfighter a next-generation laser rangefinder that features a series of additional, forward-looking capabilities to enhance mission effectiveness at the tactical edge.

The company's solution gives warfighters heightened performance and enhanced visibility at extended ranges during field maneuvers, surveillance and engagement, all while remaining undetected during dismounted and vehicle-mounted missions.

"STORM II provides the shooter with an increased probability of first-round hit at extended range targets," Chris Feinauer, L3Harris Business Development manager, said.

L3Harris received an initial production order from the U.S. Army in July 2020 for more than 1,000 combat-ready laser rangefinder systems. The company built upon its legacy inventory of products to advance state-of-the-art laser rangefinder technology in coordination with its existing customer base, which includes the U.S. Army and Special Operations Command (SOCOM).

"We're continuing to move our technologies forward for critical defense applications," Lynn Bollengier, president of the L3Harris Integrated Vision Systems business, said. "Today, there is nothing else out there to meet the emerging requirements of the U.S. Army, and L3Harris has been able to own the footprint on the rail of the weapon for laser rangefinders."

The company leveraged technology it has developed for large, building- and airborne-hosted laser rangefinders and the latest in laser engineering to drive the same performance and efficiency these complex laser and receiver technologies deliver in a small and efficient weapon-mounted package, according to Ed Miller, L3Harris senior Systems Engineering scientist.

NEXT-GENERATION LASER RANGEFINDER TECHNOLOGY

STORM II's small form factor and solid-state laser technology provides the modern warfighter a high-performance solution to support a wide range of combat applications, including dismounted and vehicle-mounted operations.

Based on the company's Precision Aiming Laser, which was designed for SOCOM, STORM II benefits from reductions in size, weight and power over legacy L3Harris products, such as the Miniaturized Eye-Safe LRF (MLRF), STORM PI and STORM SLX.

Capable of measuring distance to a human-sized target at extended ranges, STORM II has already become a popular capability throughout the sniper community. The solution can also be integrated onboard remote-controlled weapon stations to support the target acquisition of tactical ground vehicles, be operated in any climatic conditions and withstand shock generated by heavy weapons.

"STORM II's solid-state laser technology gives the warfighter very high energy pulses in a single pulse, so they're able to send a single burst of energy in a very tight beam, confirming a range to target in several tenths of a nanosecond," Miller said.

Single pulses also provide STORM II with increased performance against moving targets as well as capability to penetrate battlefield obscurants—including smoke, oil and fog—particularly when compared to lower-power, multi-pulse, diode-based solutions also available on the market.

New combat-enhancement features include the introduction of an integrated ballistic calculator.

Additional features of the STORM II include an integrated digital magnetic compass, which provides operators with the ability to conduct azimuth and elevation measurements in addition to "rudimentary" target location, Miller said.

Further, STORM II features an integrated ballistic calculator capable of running a variety of algorithms available to the U.S. Army and SOCOM. The calculator measures temperature, humidity and pressure before autonomously calculating ballistic offsets for specific ammunition types being fired.

"In the past, soldiers might have entered ballistic data into a separate computer, but now we include that capability within STORM II," Miller said. "This is critical for long-range operations where the warfighter must account for bullet drop."

STORM II can also be connected to the Intra Soldier Wireless network—a U.S. Army concept designed to connect soldier devices wirelessly. Data generated by the device can be shared on the ISW network and displayed on-board any ISW-enabled device, including the L3Harris Enhanced Night Vision Goggle — Binocular (ENVG-B), which is currently in service with the U.S. Army. STORM II also has the option for Bluetooth capability.

CONOPS

Concepts of Operation for STORM II will vary and depend upon levels of capability demanded, according to Feinauer and Miller.

STORM II could also be an ideal candidate to furnish U.S. Army Stryker Infantry Fighting Vehicles and Next Generation Combat Vehicles with a state-of-the-art laser rangefinder for precise and long-range engagements, according to Feinauer. The Army's plan is to deploy the latest generation of laser rangefinders to snipers and squad leaders, cascading earlier solutions outward through the troops as more of the latest innovations enter into service, he added.

EYES TO THE FUTURE

L3Harris continues to enhance its family of laser rangefinders to stay ahead of future requirements.

Areas of interest include further improvements to STORM II and the U.S. Army's Advanced Transceiver Optical Module (ATOM) concept, which L3Harris is under contract to support.

ATOM prototypes aim to proliferate the technology across every multi-domain platform in the modern battlespace, and feature a transmitting laser, receiver module and IR pointer—all of which are integrated into a single module and controlled by a universal end-user device and software command set.

"ATOM is the I^2 tube of laser rangefinders," Miller said. "ATOM takes all the core laser rangefinder capabilities and combines it into a single module that's platform- and application-agnostic."

The U.S. Army is moving away from separate, standalone devices to provide laser rangefinder capability and moving toward a single system that can be integrated into other devices, Feinauer

added. This would allow the system to be modularized for various platforms and applications—including unmanned aerial systems, tactical ground vehicles and dismounted troops—and drive down cost by increasing production numbers.

L3Harris had already delivered 15 first-generation ATOM units to the U.S. Army with between 30 and 50 second-generation units scheduled to be delivered over the course of 2021.

"ATOM is the core of our future and will open up many different applications for laser rangefinder technology," Feinauer said. "Our intent is for L3Harris to be an original equipment manufacturer supplier of this ATOM module." ▮

> " Today, there is nothing else out there to meet the emerging requirements of the U.S. Army, and L3Harris has been able to own the footprint on the rail of the weapon for laser rangefinders.
>
> *- Lynn Bollengier,*
> *President, Integrated Vision Systems, L3Harris* "

> **Full-rate production of these radios across the force will provide our warfighters with the most advanced radio network capabilities available for enhanced situational awareness, which is critical for mission success.**
>
> - *Col. Garth Winterle, Project Manager for Tactical Radios, Assigned to Program Executive Office Command, Control, Communications-Tactical*

The appearance of U.S. Department of Defense (DOD) visual information does not imply or constitute DOD endorsement.

PUSHING THE ENVELOPE FOR MULTI-DOMAIN OPERATIONS

L3Harris embraces the total strength of its enterprise-wide inventory of solutions to develop full C4ISR systems for nations looking to take the next step in multi-domain operations.

U.S. and coalition forces alike stand on the precipice of an evolution in networked warfare. New threats are emerging from near-peer adversaries that can disrupt the way warfighters have communicated in recent conflicts.

"The future is about data—and accessing and protecting it across transport-agnostic capabilities," Brig. Gen. Jeth Rey, director of the Army Futures Command Network Cross-Functional Team (CFT), told *Army.mil* in June 2021. "Going from 5G WiFi, to terrestrial circuits, to satellite-based systems as an automatic transition will give us greater operational flexibility across the board."

When L3Harris Technologies began developing a new technical baseline for tactical radios several years ago with the Falcon® IV family of radios, the underlying strategy revolved around building a robust solution with a flexible architecture to adapt to the evolving needs of the U.S. Defense Department and allied militaries abroad.

L3Harris made a concerted effort to listen to those with the hardest jobs in the armed forces and understand their key challenges. The software-defined architectures present in Falcon IV multi-channel handhelds and manpacks create a complete communications network ecosystem with added power, resiliency and interoperability, while providing mission-specific configurations without disrupting how soldiers use their equipment.

"We pushed the envelope in handheld radio design by focusing first and foremost on the profile of the mission and the networking, data and voice needs relayed to us from real operators," said Bryant Henson, president of the L3Harris Tactical Communications business. "We continue to anticipate the complex mission needs that are associated with operations across domains. The AN/PRC-163 offers simultaneous capabilities in a single package. The user can carry a single solution, versus complicated cabling and user interfaces across multiple radio solutions."

Further, the business has maintained focus on high-performing, robust solutions that continue to be refined through software, added Henson.

L3Harris does not simply inherit evolving customer requirements but takes them and incorporates them into its own breadth of solutions. L3Harris Technologies designs solutions recognizing that general diversity of ground missions need agile, future-proof solutions to provide the flexibility required in multi-domain operations.

FLEXIBLE FOR DIVERSE MISSION SETS

Soldiers at the tactical edge of tomorrow's networked battlespace will need to be agile in conducting their missions when parameters could change at a moment's notice. As such, access to real-time situational awareness data, and the ability to communicate and relay such intelligence in kind across domains and echelons, is key to mission success.

With the soldier's needs in mind, the industry-leading AN/PRC-163 supports truly seamless and simultaneous networking for more than 300 users. Warfighters get mission-critical information at a glance with the AN/PRC-163's double-height LCD screen. Situational awareness is advanced through the ISR mission module's full-motion video capabilities. The AN/PRC-163 also incorporates a familiar yet enhanced user interface, providing critical status information at a glance and allowing access to basic functions without removing the radio from its holster.

"The nice thing about having a two-channel radio is that, if the primary channel is not functioning for any reason, you're able to drop down off your PACE plan and [switch channels] to move to that alternative form of communications," said 2nd Lt. Kyle Taylor, 3/25 ID Platoon Leader, in a service statement.

The radios provide the signal to the Integrated Tactical Network's Android Tactical Assault Kit handheld end-user devices to establish Position Location Information of blue forces and situational awareness of terrain. Soldiers can connect the radios to Falcon headsets under their helmets for seamless communication with higher headquarters and other units.

The L3Harris suite of Falcon radios and broad-ranging portfolio of resilient waveforms provide the secure communications necessary to enable the U.S. military and allies' vision of Joint All-Domain Command and Control. Incorporation of L3Harris' security architecture and capability-enhancing mission modules further increase the radios' utility and speeds tactical data dissemination from the tactical edge to battlefield commanders.

Built off the L3Harris multi-channel Denali® security architecture, the AN/PRC-163 provides secure network connections to computing devices, including Android™ smartphones. Plus, its expansion module interface secures L3Harris and third-party solutions that expand capabilities.

Denali leverages a modern commercial technology to deliver a high-grade

TOP SECRET-and-below encryption solution for a tactical environment and is scalable as a two-channel crypto system. Denali is NSA certified to protect against current and emerging threats from peer and near-peer adversaries, including anti-tamper protection and waveform protection.

Built-in capabilities and available upgrades easily connect dismounted soldiers and vehicles on the move with bi-directional Intelligence, Surveillance and Reconnaissance with full-motion video and a wide portfolio of waveforms, including SATURN and multiple Mobile Ad Hoc Networks (MANETs).
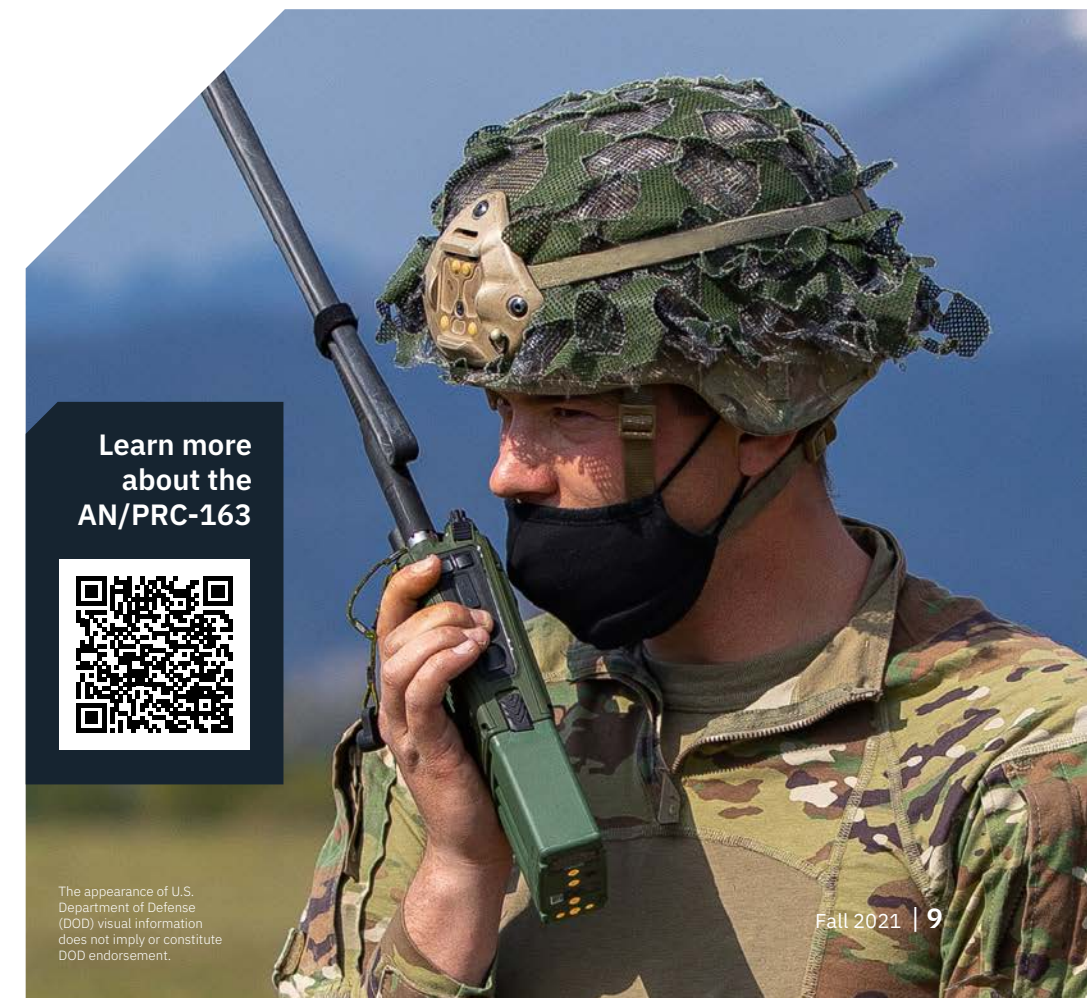
The AN/PRC-163 has direct plug-and-play capability with the KIV-700A ISR and Iridium mission modules, adding further versatility and ease-of-use to highly secure and truly resilient communications as complex mission environments continually evolve, according to Ryan McCarty, L3Harris vice president and general manager of DOD Tactical Communications.

INTEROPERABLE FOR COALITION OPERATIONS

Mission set requirements of the various branches of the U.S. military are diverse, while some overlap each other and those of militaries globally. The modularity of the AN/PRC-163 opens its capability to meet interoperability and sovereignty requirements for nations across the world.

The adaptability and flexibility of the AN/PRC-163's design empowers forces to maintain their use of existing communications capabilities and infrastructure as they migrate to more modern and resilient solutions built for 21st century warfare.

"The AN/PRC-163 is not simply a push-to-talk radio—in terms of interoperability, it's the most truly resilient and interoperable tactical radio available and should be the baseline for the world," said McCarty. "As emerging threats require more focus on true multi-domain operations, the AN/PRC-163's capabilities beyond push-to-talk, including data routing and system processing, enables Joint All-Domain Command and Control capabilities in one easy-to-use package." ▌

Learn more about the AN/PRC-163

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STAR-LINKED

The U.S. Air Force Research Laboratory has awarded L3Harris a $5.7 million contract to integrate a low-Earth orbit terminal into rotary-wing aircraft to further advance aerial communications capability.

L3Harris Technologies will test the feasibility of broadband communications capabilities on UH-60 rotary-wing aircraft as part of a U.S. Air Force Research Laboratory-funded effort to expand military information dissemination options in future operations.

The $5.7 million award is part of a larger Air Force Research Laboratory (AFRL) Strategic Development Planning and Experimentation (SDPE) Office effort to increase connectivity and throughput between fixed and mobile operating locations via constantly available, high-bandwidth, Beyond-Line-of-Sight (BLOS) communications, also known as the Defense Experimentation Using Commercial Space Internet (DEUCSI) program.

"The advent of wideband Low-Earth Orbit Satellite Communications brings a revolutionary change to the warfighter's connectivity," Ron Fehlen, L3Harris vice president and general manager of Air Force and Advanced UAS programs, said. "Data rates can go up from 2 or 3 megabits per second to over 100 Mbps – and even exceeding a gigabit per second. Access into LEO also brings increased transport diversity in an electronic warfare fight."

This comes at a time when the U.S. Defense Department is investing resources to modernize its communications networks by adding resiliency, capacity and convergence and enabling multi-domain operations against any adversary.

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L3Harris is supporting a U.S. Air Force Research Laboratory effort to provide connectivity between rotary-wing aircraft and low-Earth orbit communications satellites. The main challenge in maintaining communications for the aerial platforms is the helicopter's rotor, according to company officials, which acts like a "spinning tree" that intermittently blocks BLOS transmissions.

"Signal pathway diversity is one of the most-critical elements to a resilient network, especially in congested or contested network environments," said Lt. Col. Natashia Coleman, product lead for Unified Network Capabilities and Integration, Program Executive Office Command, Control, Communications-Tactical (PEO C3T), in a service statement. "Having that ability to leverage SATCOM in multiple constellations and orbits, seamlessly to the user, gives us more routing choices to enable uninterrupted data exchange on the battlefield."

The incorporation of commercial resources into tactical networks is increasingly appealing due to the sheer number of such satellite assets in orbit as well as the common standards, formats and translators many employ to enable interoperability. The DEUCSI approach is to develop terminals that connect all the battlefield information from disparate sources and orbits to single hubs to produce actionable intelligence.

"The last thing we want is a unique terminal for LEO, a unique terminal for MEO," Brig. Gen. Robert Collins, the Army's network acquisition chief, told *Breaking Defense* earlier this year.

For this 18-month experiment, the USAF SDPE office and Army PEO Aviation selected L3Harris and its partners, SpaceX and antenna providers Battelle and Ball, to determine the effectiveness of commercial space Internet connections when transmitting beneath or through a spinning helicopter rotor.

Overcoming obstructions, such as trees, is a general communications challenge, but transmitting and maintaining a connection through a spinning rotor adds a unique element, because it acts like a "spinning tree," Miguel Apezteguia, L3Harris senior manager of Program Management, said.

Further, due to the size of rotary-wing airframes, a key AFRL parameter is maintaining as small a profile as possible while still offering power necessary for the system's antenna to establish and maintain LEO SATCOM connections via Electronically Steerable Arrays, according to Apezteguia.

L3Harris is leveraging more than 10 years' experience supporting rotary-wing communications for the AH-64 Apache program, including long-range communications from the Long Bow Block III, Video from Unmanned Aircraft for Interoperability Teaming (VUIT) and Manned-Unmanned Teaming (MUMT) solutions. The company has proven success on previous DEUCSI experiments and is actively working other experiments with SpaceX and other key partners.

"The ability to leverage commercial technology and quickly modify it for military applications is critical to the future of Department of Defense tactical and strategic communications," Tom Kirkland, L3Harris vice president and general manager of Army and SOCOM programs, said. "It offers the ability to access high-bandwidth satellite networks on-the-move on multiple platforms."

PARTNERING FOR SUCCESS

By successfully connecting airborne military platforms to commercial LEO assets, L3Harris will provide higher data rates and improved communications for improved warfighter situational awareness, speed of command and information dominance on the battlefield.

"This effort will pave the way for superior communications and the utilization of advanced commercial technology for our warfighters," Fehlen said. "This has the potential to increase data rates by an order of magnitude from where they are today. New commercial SATCOM architectures will also provide more-resilient communications."

The DEUCSI program outlined six use cases pertaining to multiple scenarios within the U.S. Defense Department. Experiments for each use case are funded based on applicable customer need and funding.

"In the long view across the military, there's a huge market for adding commercial satellite capability to military communications," Apezteguia said.

The proliferation of LEO constellations is transformative in military SATCOM operations going forward. However,

Apezteguia said, the systems are proprietary, and the DOD and military contractors will need to work with each of the constellation providers to leverage the advantages their respective solutions provide.

That's where the L3Harris field-proven expertise in innovating for the warfighter comes in.

The company's vision is to establish a family of SATCOM assets that are interoperable with commercial systems as they come online. Integrating the capabilities of multiple companies into a single solution avoids "vendor lock" for government customers and provides enhanced resiliency, according to Kirkland. The resulting diversity of orbits, constellations and frequencies, combined with protection and encryption from L3Harris, adds flexibility in military operations and provides "resiliency in all of its forms."

In addition, L3Harris knows the challenges of molding commercial solutions into ones that work for the military.

"While the constellation providers are primarily focused on the consumer market, we bring the working DOD experience of platform integration and customization—as well as extending it to the tactical edge—and by leveraging the military's existing base, these new capabilities become 'force multipliers,'" Apezteguia said.

In other pursuits, the Defense Department is interested in the low-cost, high-throughput and low-latency benefits provided by the Commercial Space Internet constellations and the potential application to DOD platforms. A key aspect for the U.S. Air Force customer for that effort is link diversity and creating path-agnostic BLOS communications.

"There have been historical interoperability issues with disparate systems not being able to communicate, so this could be a common denominator that resolves a lot of interoperability problems and allows the DOD to efficiently share large amounts of data across various services and platforms," Kirkland said.

LOOKING FORWARD

Proving the feasibility of commercial SATCOM on rotary-wing aircraft presents L3Harris with the potential of leveraging the capability in other high-priority military programs, including the U.S. Army's Future Long-Range Assault Aircraft (FLRAA) and Future Attack Reconnaissance Aircraft (FARA) programs.

It's an exciting prospect to strengthen warfighter communication options across the spectrum, according to Apezteguia: "This effort can also pave the way to bring LEO communications to warfighters on the ground, both mounted and dismounted." ▮

COMPACT
+CONNECTED

SWaP-optimized to reduce warfighter burden and with extended battery life to ensure it keeps working when operators need it, the RF-9820S (AN/PRC-171) builds on technologies from more than 300,000 currently fielded L3Harris radios.

The latest offering in the L3Harris Technologies portfolio of integrated tactical communications systems, the RF-9820S, provides military ground personnel added flexibility and reliable communications options—from legacy Line-Of-Sight to next-generation Mobile Ad Hoc Network (MANET)—in contested and congested environments.

The radio was designed in close collaboration with the U.S. Army, who refer to it as the AN/PRC-171. The versatile radio provides soldiers an easy-to-use, compact communications solution. The single-channel AN/PRC-171 has been specifically designed to support dismounted end users conducting the full spectrum of mission sets at the tactical edge.

The RF-9820S provides forward-deployed units with multi-domain, on-the-move and robust voice and data capabilities and can also be operated in contested environments where highly capable peer and non-peer adversaries threaten to disrupt communications.

The RF-9820S is interoperable with the L3Harris Falcon® family of radios, including the AN/PRC-158, AN/PRC-163 and AN/PRC-167. The company has also networked the new radio to its own Enhanced Night Vision Goggle-Binocular (ENVG-B) solution, which is currently in

U.S. Army operation under a Directed Requirements program.

The new addition to L3Harris' Falcon family of radios entered low-rate initial production in July 2021 and provides greater flexibility and deployment agility for maneuver brigades as it is rolled out across four Infantry Brigade Combat Teams over the next year, with the aim of "improving expeditionary capability and making the network simple and more intuitive," according to the U.S. Army's Program Executive Office for Command, Control, Communications-Tactical.

"Ease of use is a strong requirement for the end users who use these radios, particularly when they are conducting complex mission types and have more than enough to worry about without concerning themselves with changing radio settings or programming the radio," Bryant Henson, president of the L3Harris Tactical Communications business, said of the RF-9820S being the "core" of the Army's Integrated Tactical Network Capability Set 2021.

The company also benefited from lessons learned from other products, including the RF-7800S Secure Personal Radio and RF-7850S Advanced Wideband Secure Radio. These insights created minimal training requirements and reduced logistics for the radio.

KEY BENEFITS
Designed to optimize the connectivity of ground-based tactical teams, the RF-9820S provides end users with multiple modes of operation, including wideband MANET and narrowband voice and Position Location Information (PLI).

Compact, light and operating at a power output of 3.2 watts, the radio relies upon a rechargeable Lithium-Ion battery providing an extended battery life of more than 20 hours.

Additional upgrades over RF-7800S/7850S radios include the introduction of a multifunctional end-user display and keypad.

An operator can also use the same accessories for the RF-9820S as any of the L3Harris family of Falcon IV tactical radios. This includes antenna systems, connectors, headsets and batteries, all of which contribute to a reduced logistics footprint.

The radio's talk group selector switch remains at the top of the radio, similar to other Falcon radios, allowing operators to change talk groups with a simple turn of a knob.

CONNECTING THE ECHELONS
The L3Harris suite of Falcon radios and broad-ranging portfolio of resilient waveforms provide the secure communications necessary to enable the U.S. military and allies' vision of Joint All-Domain Command and Control (JADC2).

The latest addition to the Falcon family helps speed the establishment of JADC2, as it is already configured for applicable networks. The U.S. and Canadian armies separately awarded L3Harris production orders for the radio, as the AN/PRC-171 and RF-9820S, respectively, in 2021.

The radio has already successfully completed a series of field tests with the U.S. Army to create a variety of operational concepts as part of the Integrated Tactical Network.

"Brigade Combat Teams deploy for a number of different operations," Melissa Daminski, L3Harris senior director of Product Management, said. "Platoons

and squads will go out on missions and will want to outfit every single team leader and potentially every squad member with a radio—and that's where the RF-9820S plays very nicely."

The solution provides reliable voice as well as PLI for every user operating within those different squads and infantry fighting platoons. The radio can be easily configured to meet the requirements of a variety of different mission sets and scenarios, from reporting to command and calling in fire support to reaching out directly to a battalion commander, amongst others.

"The ability to tie the RF-9820S into the same networks as AN/PRC-158s, -163s and -167s is a force multiplier for maneuver and combat commanders, because it enables communications from the brigade level all the way down to an individual company squad on a single tactical network," Henson said.

FUTURE UPGRADES
As nations prepare for emerging threats and modernize their networks, militaries for the short-term are striking a balance between optimizing their current assets and procuring next-generation solutions that can evolve with new challenges.

Network modernization "is going to be a continuous journey because the explosion of information technologies is only accelerating on us," Lt. Gen. John Morrison, the deputy chief of staff for the G-6, said on a September 2021 webinar hosted by *GovExec*. "And we need to be adaptive and set a foundation that allows us to continuously innovate over time so that we can bring in new capabilities as they emerge in a relatively seamless fashion."

L3Harris has identified a series of near-term upgrades that can further improve the RF-9820S with added capability as operational requirements continue to evolve.

Technology areas of interest include the addition of WiFi and Bluetooth connectivity, which would reduce the amount of cables carried by an end user and enable easier integration of accessories with the radio. Additionally, L3Harris is working on an embeddable variant of the radio that would allow it to be carried by small unmanned aerial vehicles.

"There's a ton of untapped potential still within the RF-9820S, like the hardware capability set," Daminski said. "What we're releasing this year meets the operational requirements of what we're seeing today. End users can pick it up, turn it on and they're ready to go." |
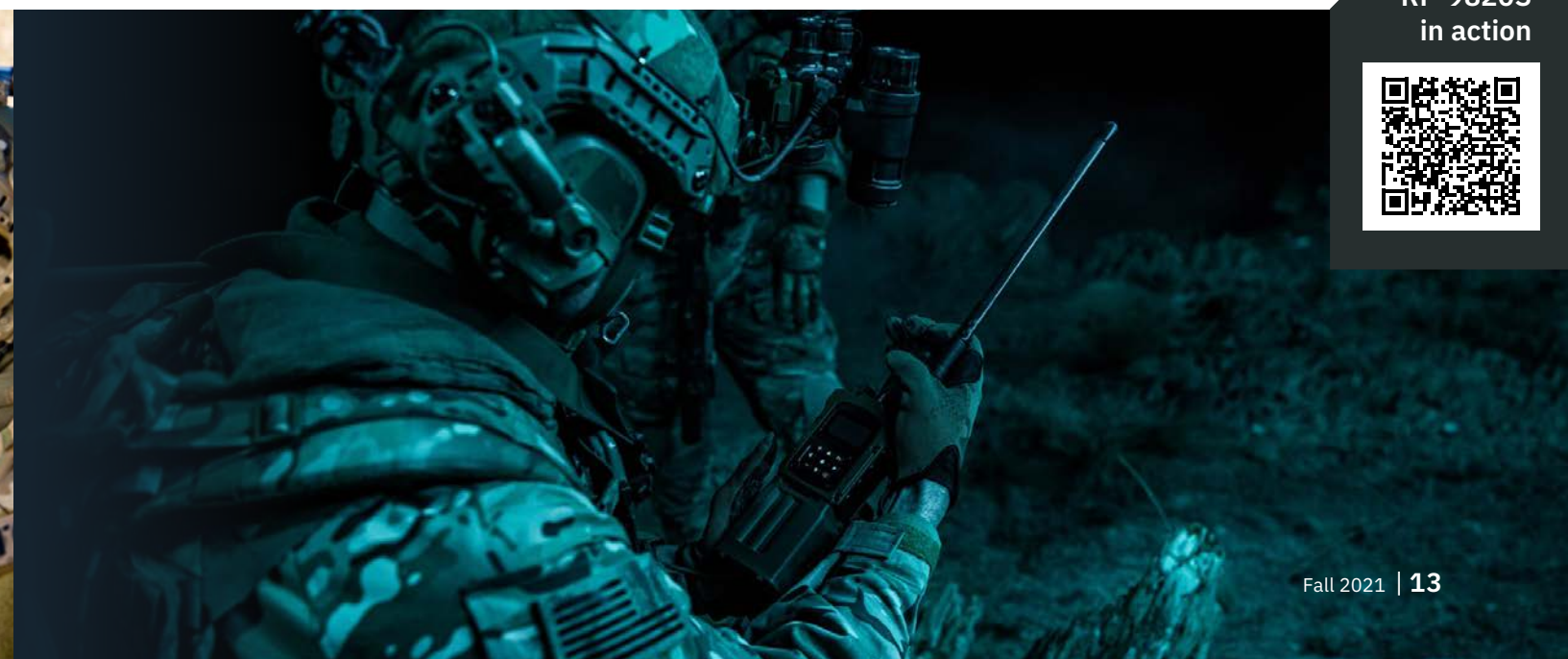
RF-9820S in action

CLOSING THE LOOP FOR NATIONAL SOVEREIGNTY

L3Harris embraces the total strength of its enterprise-wide inventory of solutions to develop full C4ISR systems for nations looking to take the next step in multi-domain operations.

The need to gather multi-domain data, analyze it and disseminate it across the battlespace as actionable intelligence is a growing requirement for European defense forces looking to modernize their militaries in the face of looming threats.

Modern warfare requires robust, resilient and uninterrupted communications networks to ensure tactical operators at the edge of the battlefield have the relevant information necessary to conduct their missions. As nations mature to the concept of multi-domain operations, the ability to fuse and enact data from space, air, ground and maritime—within a national agency or during coalition operations—becomes paramount.

As the Joint Air Power Competence Centre recently stated in a white paper: "The ability of NATO forces to be seamlessly interoperable, complementary, and harmonized will be required in order to prevail against our potential future adversaries... Even considering the rapid advance of technology and capabilities

across nations within the Alliance, all of the historical obstacles associated with multilateral operations remain, and will surely hinder the effectiveness of future Allied efforts if not addressed."

L3Harris Technologies leverages decades of experience providing leading-edge mobile, all-domain C4ISR (Command, Control, Computers, Communications, Intelligence, Surveillance & Reconnaissance) solutions, which include Falcon® and ROVER® families of tactical and ISR radios among other capabilities and offerings. To blend and integrate these capabilities to maximum effect for users, L3Harris established Global Communication Systems as a mission/system integration company that can deliver full systems—scalable and tailorable to specific use cases—that immediately provide multi-domain integration and interoperability with 21st century security capabilities.

ONE STEP AHEAD OF THE THREAT

L3Harris is a platform-agnostic and data-centric company. Its strength, as a market-leading provider of next-generation mission solutions for the U.S. military and allies, is integrating systems—bespoke and third-party—to connect and converge intelligence from disparate domains into one cohesive C4ISR ecosystem.

"Leveraging the breadth of L3Harris' enterprise-wide technological portfolio as one of the largest defense and security companies in the world, our Global Communication Systems business integrates today's stovepiped battlespace information systems into a synthesized and actionable real-time common operating picture across the echelons and domains," said Chris Aebli, president of the L3Harris Global Communication Systems business. "We combine products—from communication networks to radars, sensors and command-and-control systems—and develop usable mission capability that provides situational awareness in every step of engagement chain for soldiers, sailors and airmen."

Convergence, mobility, PACE (Primary, Alternate, Contingency & Emergency) and auto-PACE capabilities have become key enabling components as European nations and NATO determine future mission requirements. These very large systems combine numerous L3Harris-wide solutions, and the company is best-positioned to effectively integrate them into extremely cost-effective, capable and combat-ready all-domain C4ISR solutions that are always able to be on the move, added Jake Williams, L3Harris Business Development director.

Further, the company's decades of experience in platform integration and developing scalable systems has led to existing modular, future-proof solutions that can both modernize legacy systems without replacing the entire platform as well as provide open architectures for future growth.

"The ability to leverage existing technology to meet emerging needs through software-defined architectures is a massive force-multiplier, because of the additional data that can quickly be accessed and shared with others," said Williams.

THE FOUNDATION OF C4ISR

Developing a C4ISR system is complex. The basic building block is a strong communications architecture on which a nation can layer command-and-control systems, cybersecurity and ISR.

L3Harris has a variety of mobile solutions—shelter, vehicular and trunked—that comprise the Integrated Tactical Area Communications family of systems (ITACS). When requiring ISR, the more-robust Mobile Observation and Surveillance Solutions (MOSS) incorporates ground radar Electro-Optic/Infrared (EO/IR) sensors, cameras and Unattended Ground Sensors for expedited border security.

ITACS seamlessly integrates into tactical, public security and commercial radio networks and provides uninterrupted voice and high-speed data connectivity

L3Harris is committed to providing high-value, in-country technical jobs while delivering vital equipment for partner nations' national defense. In Australia, that has included the establishment a 9,300-square-meter facility to support classified work, allowing equipment to stay within the Commonwealth—and be brought back to the field quicker—for maintenance and repairs.

that can bridge strategic and tactical networks across great distances and permit instantaneous sharing of vital common-operating data.

"ITACS converges all of our end users' voice and data for their disparate missions;" said Williams. "Combing all ISR, voice and situational networks into one accessible ecosystem instantly gives nations a tactical military-grade high-speed C4ISR foundation with the high-performance encryption and frequency-hopping capabilities today's militaries require."

Battle management software, such as L3Harris' hC2 and hManager solutions, can be layered on top of the communications backbone to provide battlefield commanders a full picture of battlefield progress.

The hC2 battlefield management system allows users to create operations plans, logistics tracking, operational status

tracking, tactical position monitoring and execution of tactical operations at multiple operational tiers, from the dismounted edge to the upper-echelon joint force level. The Android-compatible dismounted soldier version, hC2 Dismount can be deployed, as well as the Windows-based vehicular hC2 Patrol and Headquarters hC2 Command variants.

As with the battle management systems, ISR data can be layered on top of the architecture, completing the C4ISR network.

MARITIME SOLUTIONS

As a global leader in C4ISR mission solutions, L3Harris owns and manufactures a broad portfolio of technologies and solutions that are integral to a nation's ability to patrol and protect their sovereign coastlines and maritime territories.

Operating across the entire electromagnetic spectrum, from sensing and communications to tracking and targeting, the company provides turnkey system solutions to meet a wide range of mission requirements.

"L3Harris is close to the end users and appreciates the operational needs of each country, which are unique and highly dependent on doctrine," said Williams. "Our network-enabled C4I architecture is designed to be modular, flexible, scalable and easily adaptable to meet each user's operational requirements and ensure mission success."

Further, the company seeks to work alongside users to ensure solutions effectively achieve mission objectives while incorporating existing processes and procedures.

For example, for an Asian customer, L3Harris' technical approach was to deliver a fully integrated system built upon proven, off-the-shelf components with L3Harris technologies at its core to meet maritime domain awareness mission requirements.

The company's solution was designed to not only have advanced sensors at the forward edge, but also ensure information was shared through secure datalinks and integrated into a common operating picture to enable decisive command and control.

AIRBORNE OPERATIONS
As nations look to better connect airborne reconnaissance with personnel on the ground—either in headquarters or dismounted in the field—L3Harris integrates modernized tactical High Frequency, multiband and ISR

communications systems to deliver robust voice, data and video connectivity required by Joint Terminal Attack Controllers in order to execute Close Air Support operations.

L3Harris' expertise accommodates a plethora of modular and scalable solutions to provide communications channels and video downlinks across the electromagnetic spectrum, connecting aerial and terrestrial forces.

For one customer looking to modernize their multiband radio capability, the system included four VHF/UHF channels, one HF channel and ISR video downlinks, leveraging L3Harris market-leading tactical radio offering and best-in-class ROVER family of ISR transceivers. All radio systems were interconnected and integrated into the host platform through the RF-7800I Tactical Network Intercom System and tactical networking gear. The company's hC2 Patrol battlefield management system provided vehicle commanders with the C2 capabilities they need to maintain the Common Operational Picture through a software suite optimized specifically for their needs.

The solution also included a JTAC Dismount Soldier Solution to provide mission-critical communications and situational awareness in a modular, Size, Weight and Power-Cost-optimized configuration.

"L3Harris has earned a worldwide reputation as the low-risk vendor of choice for all types of C4I systems," said Williams. "Further, our responsive program management, engineering and customer service organization delivers and supports highly capable solutions through rigorous testing, detailed

installation, effective training and ongoing support with our end users in their locations."

SUPPORTING GROWING IN-COUNTRY DEFENSE INDUSTRY
L3Harris aligns itself with partner nations' visions, hires local talent and creates local partnerships with existing in-country companies to meet customer needs today and support the development of sovereign intellectual capital into the future.

By hiring in-country talent, the company supports sovereign engineering evolution for nations to create their own software and product features to meet their specific requirements. Such modernization programs extend L3Harris' long-term partnership with national defense organizations, supporting mission needs for advanced solutions and leveraging its expanded technical support capability in country.

Across Europe, the company is already engaging and collaborating with countries to identify local partners to transfer technology and expertise in addition to building systems to meet customer requirements. The initiative leverages experience gained from similar investments and developments in Australia.

"In Australia, we made a considerable investment to ensure as much maintenance work as possible could be completed in-country," said Paul Buckingham, L3Harris Sustainment Programs director. "The customer sees the commitment and investment made by the company to develop and invest in domestic capability, which further builds confidence that L3Harris is a reliable and trusted partner." |

HC2 BATTLEFIELD MANAGEMENT SYSTEM

The hC2 solution allows users to create operations plans, perform logistics tracking, operational status tracking, tactical position monitoring and execution of tactical operations at multiple operational tiers, from the dismounted edge to the upper-echelon joint force level. The software is designed to work seamlessly with L3Harris tactical radio networks. The software is available for dismount soldiers in the Android-compatible hC2 Dismount version and for mounted and HQ users in the hC2 Patrol and hC2 Command operating in Windows-based systems.

"The core concept behind the software is blue-force tracking and enemy/other indicators on a map to allow us to share battle-tracking information across the network all the way from the soldier on the frontline all the way back to the joint force commander," Engel said.

The associated hManager product is a network communications manager, he added. The software provides a network planning, configuration, provisioning, monitoring and troubleshooting all from a unified, simplified graphical user interface. The software alerts operators to any interruption in network assets being managed by the system to initiate troubleshooting activities. A key feature of hManager is in terrain-based RF

propagation analysis when planning radio network deployments.

NEW CAPABILITIES
The SHARK™ SA Simulator now provides hC2 users the ability to generate simulated GPS situational awareness tracks that simulate movement of networked assets in the field. This can be used for training and practice scenarios as well as pre-deployment testing of functional Battle Management System network functionality, Engel said.

"This allows the customer to test out their hC2 deployments without ever having to deploy actual radios to validate configuration completeness," he added.

The hC2 Suite DAFSS add-on is specifically implemented into hC2 Patrol and hC2 Command variants for artillery call-for-fire operations. With this capability, a forward observer can identify a target on the map using the hC2 Patrol application and relay that call-for-fire request directly to the joint fire center using hC2 Command. Approval from headquarters is then automatically distributed back to both the forward observer and the gun commander, who can coordinate the final live fire.

"You're taking a system that previously would take voice commands over the radio network—potentially relaying the commands across different echelons— and implementing a digital system that allows us to talk directly from point to point in the matter of minutes," Engel said, noting this can reduce decision-making timelines in half.

GOING FORWARD
L3Harris will continue to extend its library of hC2 add-ons, as dictated by customer requirements, according to Engel. This includes a forthcoming release of an updated user interface along with the release of the product's version 3.0. |

TAKING COMMUNICATION TO THE EXTREME

Relentlessly reliable, all-in LTE enabled and built to the industry's toughest standards, the all-new L3Harris XL Extreme™ 400P multiband portable radio incorporates the best of the XL family with increased durability to withstand extreme temperatures and environments.

L3Harris' latest entry into its XL family of portable radios, the XL Extreme™ 400P, addresses the needs expressed by fire departments across the United States: "make it durable, make it usable, make it wearable."

The XL Extreme 400P and companion Extreme Speaker Microphone (ESM) are the result of years of engagements with firefighters and the incorporation of new national standards for radios used in fireground operations. The rugged, heat-rated devices provide a foundation for the L3Harris Mission Critical Alliance partners to provide incident command, GPS-denied location and biometric monitoring, according to Don Griffis, L3Harris principal product manager.

"The XL Extreme 400P was born out of addressing a new standard for the fire market; however, this solution is truly built for anyone that requires a tough, ruggedized radio," Griffis said. "We put a turnout coat and suit of armor on our hugely successful XL-200P multiband portable radio, which provides end users with VHF, UHF, 700/800 MHz, Wi-Fi and Broadband LTE connectivity."

RUGGED FORM FACTOR

Meeting the new national standards means that a radio and speaker microphone are capable of withstanding extreme temperatures, water shock and impact from elevated heights. The new standard also requires upgraded software features to enhance user safety.

"We leveraged technology across L3Harris divisions to meet all these tough requirements," Griffis said. "We reached out to L3Harris Space and Airborne Systems for recommendations on material capable of surviving the extreme temperatures and the shock that the XL Extreme must endure."

With Space and Airborne Systems' support, the radio and speaker mic incorporate material that can sustain orbital reentry, Griffis added.

The XL Extreme 400P and ESM both have larger buttons and knobs so that users can easily operate the devices while wearing protective gloves.

ENHANCED SITUATIONAL AWARENESS

Aside from the rugged design, the XL Extreme 400P has an embedded LTE modem providing 4G operation on any carrier. This "all-in" LTE capability means that the radio can supplement coverage with LTE as well as act as a transport to convey end-user data to those who need it.

"We have a Mission Critical Alliance partnership with many companies that specialize in public safety applications; together we are building a number of customer solutions to enhance situational awareness and also end-user safety," Griffis said. "We now have the ability to supplement on-scene situational awareness and user accountability."

Body-worn camera footage or user biometric data can automatically be streamed to dispatch or incident commanders to provide them situational awareness in other programmed scenarios, such as a service pistol being removed from its holster or detection of elevated heart rates, for example.

Future enhancements include GPS-denied location, live-stream body camera and biometric data, according to Griffis.

END-USER SAFETY

While the XL Extreme 400P's primary function is a communication device, L3Harris added a number of new enhancements based off new standards and customer engagements to provide firefighters additional safety features, according to Griffis.

"We're extremely excited about the advance of the XL Extreme," T.J. Martin, Communications Chief of the Parma, Ohio, Fire Department, said. "This is one of the first radios that was designed with public safety in mind. They have included many of the features that we've asked for and in addition made it fully compliant to new national standards, which is exceptional value to any fire department. It offers a lot of forward thinking and advanced technology that radios in this day and age don't have."

One such feature is the color tagging of channels. Now, end users operating the XL Extreme 400P can easily confirm whether all teams are on same communication channel with a quick glance at the microphone or the backlight on the top display of the radio.

"It allows the incident commander a quick way to verify that all users are indeed on the same channel," Griffis said. "This feature came directly out of working with the City of San Antonio Fire department."

Further, audible voice files are played, rather than "beeps" or "boops" that are the commonly used tones to indicate certain radio status, he added.

"Now, rather than having a user decode beeps or boops, the radio will simply tell the user the status," Griffis said. "Among many of the audible voice files, the radio will inform when the accessory cable is bad or if the unit is out of communication range by simply telling the user, 'Warning: failed accessory' or 'Radio is out of range.' This will definitely increase user safety and simplify use."

The all-new XL Extreme 400P and companion Extreme Speaker Microphone's advanced technology and embedded LTE, encapsulated within a rugged, thermal-rated design, provide an extremely durable radio with advanced user safety features to stand up against anything thrown at it. ∎

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All-In Coverage Video

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