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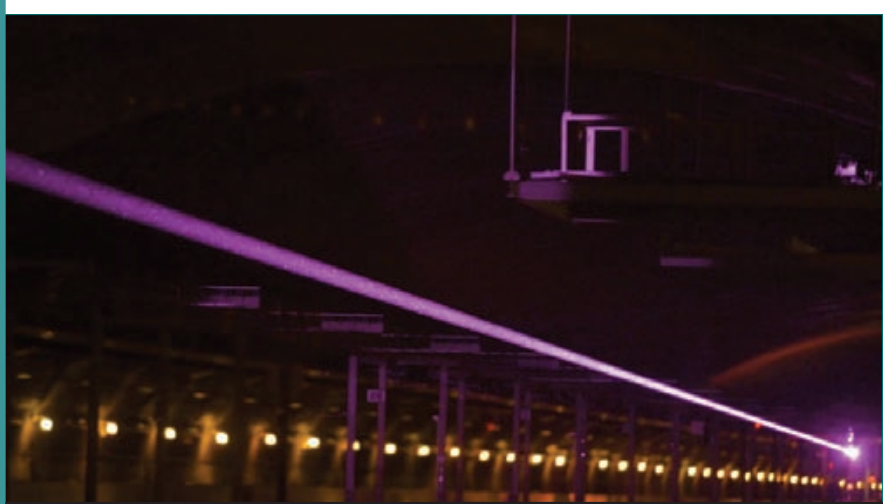

If you would like to supply information for future issues of GMC please contact Amy Saunders, Editor.

Photo courtesy of US Naval Surface Warfare Centre

Saab reveals new decoy missile for Gripen

Saab's offering to Finland includes advanced Electronic Warfare systems, comprising of a newly developed Electronic Attack Jammer Pod and a decoy missile system.

Saab's offering for the HX fighter procurement includes both the fighter jet Gripen E/F and the GlobalEye Airborne Early Warning and Control System.

As part of Gripen's E/F Electronic Warfare capability, Saab now reveals the development of a new decoy missile system, the Lightweight Air-launched Decoy Missile. The decoy missile and the new Electronic Attack Jammer Pod, which Saab started flight testing in 2019, will ensure that Finnish pilots will be protected from enemy radars and missiles.

The new decoy missile will be a highly capable stand-in jammer for the most demanding missions. It will act as a force multiplier as it reduces the number of missiles and aircraft required to complete a mission. The decoy missile can jam or create false targets for acquisition, tracking, fire control and airborne radars.

"Our offering to Finland, combining Gripen E/F and GlobalEye as force multipliers, will protect Finland's people and borders, by delivering both comprehensive situational awareness and a true deterrence effect.

"The decoy missile, that we present today, will constitute a strong addition to Gripen E/F's built-in electronic attack capabilities. The payload of the new decoy missile is to a large extent developed in Finland and this will strengthen our offer to Finland even further," says Jonas Hjelm, Senior Vice President and Head of Saab Business Area Aeronautics.

Photo courtesy of Saab

The development of the new decoy missile means that Saab will expand its Saab Technology Centre in Tampere, Finland with more highly skilled employees. Saab has already established a deep technical partnership with Aalto University, where more than 10 research projects are ongoing within the areas of advanced sensors and artificial intelligence.

GMC

Israeli Ministry of Defense statement on images taken by the Ofek 16 satellite equipped with a Elbit Systems high-quality camera

Defense Minister, Benny Gantz: "The State of Israel knows how to defend against its enemies both near and far, as well as to protect its citizens everywhere, from any given location. The technological means we develop in the Ministry of Defense together with our industries, are effective and significant tools in maintaining Israel's security. We will continue to work and promote Israel's technological advance and edge, an element that is essential in contending with the many challenges we face."

The engineering teams of the DDR&D and IAI are continuing their work in preparing the Ofek 16 satellite for operational use. For the first time, the Ministry of Defense is releasing images taken by the satellite in recent days. These images were taken over Syria and show the 'Tadmor' world heritage site, ancient ruins and the renowned Roman theatre.

Ofek 16, which was successfully launched into space last month, is an electro-optical reconnaissance satellite with advanced capabilities. It is equipped with a high-quality camera developed and manufactured by Elbit Systems. The camera has the best performance and weight characteristics available on the market.

Hundreds of millions of NIS were invested in the national infrastructure for the production of space cameras. Shared by the Ministry of Defense and Elbit Systems, it includes labs for the production of lenses and mirrors, as well as a vacuum chamber that simulates the conditions in space, and that is used to test the satellite camera before it is launched for its mission.

In the near future, and upon the completion of the 'in orbit testing' process led by the DDR&D, IAI, and the IDF's Intelligence Directorate, the Ministry of Defense will transfer the satellite to IDF Unit 9900 for operational use. **GMC**

Photo courtesy of Israeli Ministry of Defense

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AmeyBriggs secures £240 million MITER defence contract

AmeyBriggs has secured a new contract to maintain and manage the Ministry of Defence's (MOD) fleet of construction and materials handling equipment, and other key plant, until 2027.

AmeyBriggs is a new joint venture between infrastructure support service provider Amey plc and Briggs Defence, a specialist division of asset management and engineering services provider Briggs Equipment. AmeyBriggs has announced that it has been chosen as the preferred supplier to deliver MITER.

MITER is an important new MOD contract involving the deployment and maintenance of key equipment used by the UK's Armed Forces around the world as well as supporting military personnel in how to use it. The seven-year contract is valued at £240 million and brings together three separate contracts under one single fleet management and maintenance provision arrangement.

Photo courtesy of AmeyBriggs

The Defence Mechanical Handling Equipment (DMHE), Protected Engineering Equipment and C-vehicle Capability contracts now form part of the new consolidated MITER contract. This will support the MOD's requirement to ensure a sustained and consistent service for British Army, Royal Navy and Royal Air Force personnel on deployed operations at home and overseas.

Both Amey and Briggs have wide experience within the defence sector and a proven track record of delivering successful MOD contracts. Briggs Defence is a respected MOD partner and has been providing the UK's Armed Forces with logistics solutions across land, air and sea, including global equipment supply and engineering support, since 1997. With one of the UK's largest skilled engineering teams, Briggs Defence can provide unrivalled maintenance support plus military personnel training.

Amey has successfully delivered part of the previous generation of the contract through its joint venture, ALC, providing the construction and engineering equipment that UK service personnel need to carry out operations across the world. Amey also currently delivers the MOD's four Regional Prime contracts and the National Housing Prime facilities management (FM) contracts, providing a range of military infrastructure and housing services on behalf of the Defence Infrastructure Organisation (DIO), along with FM services to the MOD's Whitehall headquarters.

Around 180 staff and supply chain partners will be transferred into AmeyBriggs, a separate business, which brings together a wealth of knowledge, skills and experience. Its focus is to capitalise on the very best elements of both businesses, maximising technological developments to make continuous improvements to service delivery and provide innovative solutions. AmeyBriggs is also committed to ensuring the seamless provision of capability during the transition phase.

Gary Clements, Managing Director of Briggs Defence, said: "We are delighted that the MOD has recognised the value of the Amey and Briggs Defence proposition, in particular our ability to deliver high levels of service and maintain flexibility in supporting an end-to-end capability. We look forward to maximising our respective expertise and working with top UK equipment manufacturers to provide innovative solutions through a whole force approach that meets the complex needs of our Armed Forces."

Craig McGilvray, Managing Director for Secure Infrastructure at Amey, said: "Amey is proud to sit at the heart of the Armed Forces community, using data driven optimisation to maintain critical infrastructure nationwide. Our joint venture with Briggs Defence has an unrivalled breadth of knowledge and experience that makes us uniquely placed to deliver this contract for the MOD, but critically where the operational and training needs of serving personnel are put first. We look forward to working closely with Defence Equipment and Support (DE&S) to deliver on that commitment and to supporting our Armed Forces." **GMC**

US Air Force awards SRC IDIQ contract to support ABMS system development

SRC, Inc., has been awarded a $950 million ceiling indefinite-delivery/indefinite-quantity contract for the maturation, demonstration and proliferation of capability across platforms and domains, leveraging open systems design, modern software and algorithm development in order to enable Joint All Domain Command and Control (JADC2).

This contract is part of a multiple award multi-level security effort to provide development and operation of systems as a unified force across all domains (air, land, sea, space, cyber, and electromagnetic spectrum) in an open architecture family of systems that enables capabilities via multiple integrated platforms. In addition to this new contract, SRC continues to work with the Air Force to develop and enhance the delivery of intelligence mission data, protect warfighters with counter-UAS technology, and develop leading edge technologies for next generation unmanned aerial systems. **GMC**


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Aitech A191 is one example of a ruggedised high performance embedded computer for military applications. Photo Recab UK courtesy of Aitech

Processing data on the frontline

Information and intelligence have long been the backbone of successful military and defence operations. Increasingly, that intelligence is driven by data collected by devices and systems in the air, on land and aboard naval vessels, which requires reliable, rugged embedded systems capable of handling vast quantities of data.

Mark Jeffrey, Technical Director, Recab UK

Across all industries, we are experiencing a data generation boom. Every day, we globally generate a volume of data that would have been incomprehensible a couple of decades ago. However, with increased data comes the need for greater processing requirements in the growing armada of embedded electronic systems.

This is especially pertinent to defence applications, where embedded electronic systems are used for everything from communications to global positioning, in all applications from remote fixed systems to mobile vehicles on land, in air and at sea. These systems must process input data quickly and effectively, all in harsh operating environments, which involves an ever-increasing amount of processing power and careful design considerations.

As many applications have become more data-intensive, there has been an increase in computing techniques such as graphics processing unit (GPU) accelerated computing to improve system capabilities. This has led to wide use of general-purpose calculation on graphics processing unit (GPGPU) in many industry applications, with parallel computing platforms like NVIDIA's Compute Unified Device Architecture (CUDA) entering into embedded computing systems beyond the realm of gaming where it was originally used.

GPGPU is most readily used in applications that typically operate in a stable, and often temperature-controlled, environment, like telecommunications. The transition has not been as smooth for computing platforms that are to be subjected to extreme shock and vibration, or extreme temperature and humidity fluctuations that range from sub-zero to triple digits, in addition to supporting crucial, lifesaving and security-focussed applications.

Fortunately, Recab UK's experience is that these two ideas - of the high processing potential of GPGPU solutions with ruggedization for harsh operations - can easily be reconciled. We have developed hundreds of embedded systems for defence contractors that meet the regulatory, operational and processing requirements of the defence industry. From this experience, we can reliably say that the principles of ruggedisation for embedded systems can be applied to GPGPUs.

Our trusted industry partner, Aitech, recently published an application note entitled *Process High Volumes of Data in Rugged Embedded Systems, No Matter the Requirements*. This document outlines some of the steps that can be taken to ensure GPU accelerated computing systems are deployed in the most effective way for defence applications.

System requirements

The best first step is for system designers to take stock of the system. Today's military systems use far more resources in a much smaller footprint, typically referred to as optimised size, weight and power (SWaP). This needs to be achieved while keeping costs low. In addition, these applications function in extremely harsh environments, and carry with them the need to operate reliably all the time, every time.

As Aitech says: "This dichotomy has plagued many electronic engineers developing critical military, and defence systems for decades, but these challenges can not only be mitigated, but met as well."

Crucially, it's important to always balance system needs and processing requirements with the rugged aspects of the application environment. By relying on proven ruggedisation techniques as well as verified testing methodologies, GPU accelerated computing can offer unique advantages in system performance, even in the harshest of environments. There are three key areas where GPGPU computing provide significant value: Processing, memory and power consumption.

Data processing

In mission-critical applications, the accuracy, reliability and speed of embedded systems are essential to a real-time, decision-making process, whether it's a response required by an actual human or through artificial intelligence. This is especially true

Even carrier components, like Diamond Systems' Stevie carrier for NVIDIA's AGX Xavier, require extensive ruggedisation for military applications. Photo Recab UK, courtesy of Diamond Systems

of defence applications. Because it is based on a parallel architecture, GPGPU computing processes tens of thousands of data points simultaneously, versus only hundreds using serial processing. Even a typical multicore CPU-based architecture only offers a handful of cores running in parallel. When integrated into a ruggedised system, GPGPUs can meet the growing data requirements of today's military, defence and space applications.

Memory and storage

One of the challenges that many defence applications face that other industries often do not is the volatility of connections. Rugged and mobile systems may frequently be unable to access a network to communicate data in real-time. In such an event, we must consider where this data is stored until it can be transmitted. Once it can be, the data must then be communicated quickly and correctly.

Onboard storage capacities have been increasing, due to the variety of compact, high density Flash-based modules, high-speed non-volatile memory express (NVME) protocols and secure peripheral component interconnect express (PCIe) based interfaces now available. In addition, memory capabilities have been enhanced by GPGPUs, allowing processing closer to the edge where it is needed most. So, when the data is transmitted, it can already be pre-processed and actionable.

Power consumption

There are two aspects to power consumption that we consider when developing an embedded GPGPU platform for defence. First, managing power resources across compact, high density systems, and second, increasing the power-to-performance ratio of these systems. Some GPGPU boards are very power efficient—especially those based on NVIDIA's Jetson family, due to the CPU being ARM-based, such as those from Diamond Systems and Aitech—with some boards offering the same consumption requirements as CPU and GPU boards together.

However, GPGPU boards can process far more data using thousands of parallel CUDA cores, meaning a good power-to-performance ratio. More processing is available to the application for the same, and sometimes slightly less, power.

GPGPU computing is quickly becoming a platform for advanced computing intelligence, due to the hundreds of high-performance cores that provide unprecedented parallel processing capabilities, using general purpose programming languages, such as NVIDIA's CUDA API. With the proper ruggedisation techniques in place, military, and defence programmes can benefit from GPGPU computing systems.

To cite one example from Aitech's application note, a GPGPU system is invaluable in mobile land vehicles. Today, tanks and other ground military vehicles are often relied upon to send mission critical data from the battlefield to command centres, or directly to soldiers on the ground. As such, it's quite common for these vehicles to be fitted with multiple onboard cameras and data collection points.

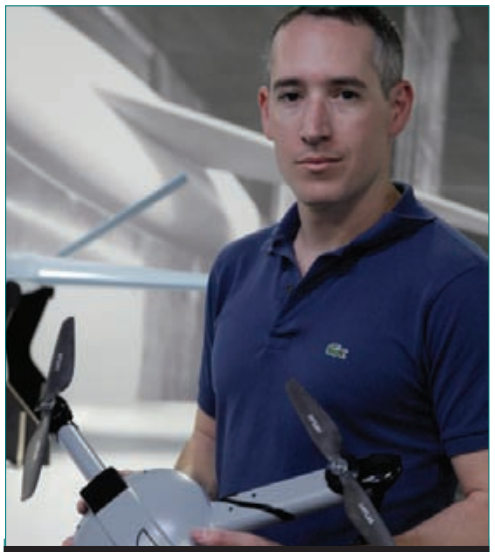
Here, a rugged GPGPU system might be responsible for capturing images from six cameras - four composite and two HD-SDI - and then performing simultaneous image processing applied to object recognition and classification, as well as situation awareness.

The system is using CUDA for image processing and saving sensitive data on internal fast NVME SSD that can be transmitted back to the command centre instantly and when needed. The multiple video inputs are processed simultaneously in a low-power, small form factor, rugged system, which provides a performance-per-watt factor that is critical in determining a go/no go for program deployment.

There is a lot to consider in GPGPU for rugged, defence applications. However, the benefits of these in embedded systems for processing and transmitting data is worth the layer of design complexity. It's why the design and development of such systems is often best tasked to embedded computing specialists such as Recab UK, who can ensure these considerations are part and parcel of an effective, certified solution.

As the volume of data produced on the frontline continues to increase, more powerful embedded systems will become a requirement. It's only by staying one step ahead that military and defence applications can maintain the advantage of intelligence.

GMC



Guy Cherni, CMO and Co-Founder of Atlas Dynamics

GMC Q&A

Unlocking the potential of automation

Atlas Dynamics is a manufacturer of unmanned aerial vehicles prominently invested in serving defence, security, and infrastructure use cases. They are committed to unlocking the potential of automation through the development of sophisticated unmanned solutions making use of cutting-edge artificial intelligence. Guy Cherni, CMO and Co-Founder of Atlas Dynamics, opines on all their latest technologies.

Laurence Russell, News and Social Media Editor, Global Military Communications

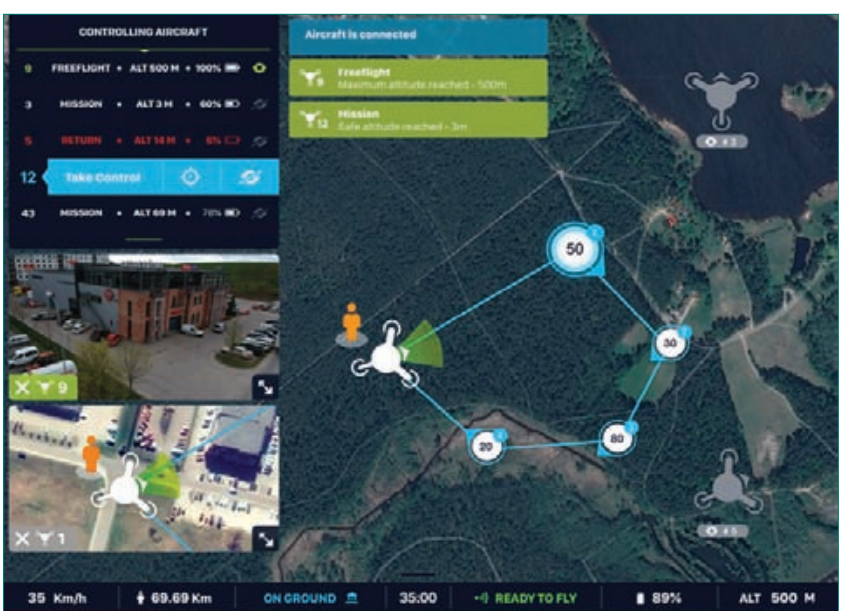
GMC: The AtlasPRO system gathers ISR data autonomously for a variety of purposes. Could you run us through some of its applications and features?
Guy Cherni: The AtlasPRO was designed with intelligence, surveillance, and reconnaissance (ISR) missions in mind; providing forces on the ground with data consistency and accuracy for hours, easily and cost-effectively, enabling them 'more trigger time, and less screen time.'

These unique features come into play in several ways, the first of which will be our proprietary, award-winning Tricopter aerodynamics design that enables this small 1.8kg UAV to fly up to 45 minutes and for 8km line of sight (LOS), withstand extreme weather (we just passed Arctic tests) and strong 50km/h winds, while creating very little noise, enabling the drone to see but not be seen. The UAV is operated using Atlas' seamless and easy to use user experience interface, which enables the operator to define an autonomous 'waypoint mission' and launch the drone while reserving the option to take control and operate manually when required.

On top of this unique platform, we integrate high-resolution sensors that can capture different kinds of data; HD zoom enhanced images, thermal information, radiometric measurement, and soon we will release several new payloads which will allow the forces to receive important and lifesaving data, which until now was not an option with any other micro unmanned aerial system (mUAS).

The data that is collected by the sensors is analyzed with Computer Vision capabilities delivered using our proprietary onboard AI, which is trained off-line using our machine learning algorithms. This capability enables the user to launch the drone and receive data, without the need to constantly search for information with their eyes, which consumes time and effort, preventing them from undertaking other essential battlefield tasks.

On top of the above capabilities, the most interesting technology we offer to our users is our award-winning AtlasMESH communication, which enables the



Using the Atlas GCS, automated patrols and ISR missions can be programmed and controlled manually at any time

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user to operate several drones from the same ground control station (GCS), sending them on different missions or dividing a mission between them. Our technology enables efficient operations on different frequencies without the need for Internet connections, and that is the real game-changer: By using several AtlasPROs meshed together, you can reach distant targets and get live imagery from beyond visual line of sight (BVLOS) locations, out to at least 16km. In addition, Pros are able to replace each other mid-air as battery power drains, essentially offering a persistent ISR capability with 'eyes on target' 24/7.

Altogether, our system represents the new generation of ISR working-tools, which we believe will change operational doctrine, and enable better, faster and more efficient life-saving operations. Essentially, our vision is to put our systems into the hands of every fire team, making it an everyday ho-hum capability that every SF operator, infantryman, tanker, recce soldier or combat engineer can benefit from.

40 years ago, it would have been almost unthinkable for every soldier to have night vision capability, today it is considered standard. In a few short years, we anticipate the issue and use of our systems to be considered standard.

GMC: The AtlasPRO UAV is durable and effective in extreme weather conditions and can stream data for up to 45 minutes. Does the system have any weakness?

Guy Cherni: As the system was designed to provide accurate data for ISR missions, it had to be in a size capable of carrying up to 500g of professional payloads. Despite the small foldable size and 1.8kg takeoff weight, this AtlasPRO cannot fit into a pocket, but in the very near future, we intend to address that need.

GMC: It's been reported that some Western militaries are seeing lower recruitment numbers. Does this create a natural window for automation to fill the gap in manpower?

Guy Cherni: At Atlas, we believe that smart unmanned systems are the working tool of the 21st century and following this belief, we created what we define as 'man-unmanned teaming.' Our systems are designed to serve as a force multiplier for the personnel on the ground, providing them with smart teammates they can trust to get the job done. These solutions complement emergent technological trends sweeping the sector and enable any operator to become better, faster and more efficient.

GMC: Using the MESH network, your drones can connect with one another and share data. With networked drones becoming increasingly relevant across multiple spheres, do you expect to see drone swarms becoming more ubiquitous solutions?

The AtlasPRO was recently certified for arctic conditions

"On top of this unique platform, we integrate high-resolution sensors that can capture different kinds of data; HD zoom enhanced images, thermal information, radiometric measurement, and soon we will release..."

Guy Cherni: Absolutely, and they will enable missions like never before. Our grounding principle is that we do what we do in order to assist our users to save lives and enable them to work better, speeding up the collective 'OODA loop' (observe–orient–decide–act).

Until MESH capabilities became a reality for mUAS, the ability to use drones was very limited due to short flight times that translate to short ranges and even shorter time above target (as the operator had to save battery for the flight back). The ability to use several drones together eradicates this problem and enables what we define as 'Persistent ISTAR:' Consistency above target using MESHED hot-swapping drones; consistency of communication beyond line of sight using Drone to Drone Relay, and consistency of data streaming to different GCS'/C4I stations using multi-stream enabled by our 'many to many' communication. MESH comms can also connect between UAS and UGV (unmanned ground vehicles), creating a system of systems for unmanned solutions.

GMC: Your AtlasPRO UAS isn't solely a system to support security and defence. What are some applications across the spheres of emergency response and commercial industry?

Guy Cherni: As I mentioned earlier, the AtlasPRO is the working tool of the 21st century, that provides the user high-end accurate data, in a fast, cost-effective and most of all – a safe way. As such it fits with numerous applications that range from security and public safety to first response and industrial inspections.

Besides defence, we currently work with first responders in different countries around the world in different climates such as deserts, forests and arctic conditions, providing them with the ability to locate missing people, in an easy and fast manner. We are also working with several industrial companies, providing them with perimeter security and volumetric measurement capabilities.

As we see it, this is just the tip of the iceberg. As we are constantly in touch with our users and learning about their problems, we have the ability to co-design and innovate with them, integrating additional sensors and opening up a new range of opportunities. Several new sensors that we intend to release soon are going to change the way first responder and special forces work in a changing and delicate environment; we'll have more about that in the next upcoming months.

GMC: As a manufacturer specialized in drones, do you have any predictions for what you expect to see from drone technology in the near future?

Guy Cherni: Next generation aerospace is all about smart and cost-effective aerospace, that is manufactured at scale. I believe we are going to see new kinds of aerodynamics features and new approaches for electric propulsion that will optimize UAS specs, but more importantly, we are going to witness an increased usage of AI and ML that will optimize operations, enabling more mission time and less screen time.

These AI capabilities combined with Swarm will enable optimized UAS missions. As a company that intends to redefine the unmanned industry while defining Next Gen Aerospace, we hope to continue and lead in the field of 'man-unmanned teaming' field, taking our customers down the path to full and safe autonomy, with our drones serving as merely the platforms to assist the operator to do his job, better and safer. **GMC**

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C-130 Hercules supplying mission critical humanitarian missions. Photo courtesy Marshall Aerospace

The new homefront - how military and security providers are defending against COVID-19

The fight against COVID-19 has been a war of its own, with very real sacrifices and hardships. Unlike the wars we have known, this conflict is one we all fight, in our own mundane little ways, and the role of businesses in that struggle is a considerable one. It's time we recognised the actions of those corporations who have fought to keep us safe.

Laurence Russell, News & Social Editor, Global Military Communications

During the great wars, there was a simple expression in Britain that went "I'm doing my bit."

It was a sentiment that quietly acknowledged the then seemingly impossible challenge of bringing peace to Europe and maintaining the sovereignty of its nations. A titanic effort for which every citizen, civilian and soldier held some small personal responsibility which they hoped would be added together to be enough to turn the tide. In the midst of one of history's most notable pandemics, we are reminded of that culture once again, in which every household must understand that doing the right thing in fighting overwhelming odds is not something that one can wait for others to shoulder, but rather a monumental shared burden. While individual efforts have an impact, there have been larger contributions made by the businesses around us. Across the world, we have seen the most responsible of our captains of industry recognising the need to leverage their resources for the greater good in a time of true crisis.

Marshall Aerospace fights pandemic by ensuring supply availability and resilience

In the UK, Marshall Aerospace and Defence Group have been working to maintain their C-130 Hercules transport aircraft fleets worldwide. The craft is known as a go-to platform for humanitarian missions, which have been rapidly prioritised as the COVID-19 pandemic grew in severity, including medevac repatriation missions and remote supply deployment.

At a time when transport and infrastructure have been so deprived that it has ground to a halt in certain regions, sophisticated humanitarian action is of the utmost importance. In times of crisis, it falls to charitable NGOs and conscientious militaries to confront the catastrophe and defend populations, which Marshall has been eager to assist with.

Chief Executive Officer Alistair McPhee explained: "We are always incredibly proud of the work that we do to protect people in critical situations and that has never been more relevant than right now. Armed forces are being called upon to support the capacity needs of health services across the globe. So, it is vitally important that we are able to stand ready to help in whatever capacity we can over the weeks and months ahead and I really want to take this opportunity to pay tribute to the team, in particular our frontline employees, who are doing an amazing job in very difficult circumstances to make sure we don't and won't let our customers down."

Marshall Aerospace and Defence Group have also been involved in supporting a taskforce of UK experts in developing and manufacturing the exovent, a type of non-invasive iron lung ventilator which safely aids respiration without compression of the chest.

The task force's leading clinician Dr Malcolm Coulthard said: "The team has been working flat out for days. We started out looking at negative pressure ventilator technology thinking that it would allow us to produce literally thousands of ventilators very quickly and cheaply to cope with the tsunami of people with pneumonia that may be upon us because of the Covid-19

virus. However, as soon as we looked into the science and the literature it immediately became apparent that this will allow us to produce less-invasive devices than the conventional units in current use, possibly better for patients' hearts, at a fraction of the price, using off-the-shelf parts."

While not all alternative ventilators boasted about in global news have shown favourable results, exovent continues to deliver on its promises, providing much-needed support to the critically strained NHS by addressing the ventilator shortage.

Marlink provides telemedicine equipment, fuelling further development

The pandemic has also motivated a surge in telemedicine technology. In the face of such a virulent global disaster, research and development of telemedicine technologies have rapidly increased. Allowing healthcare professionals to diagnose and treat from a remote location offers an ideal solution, not least because of rampant shortages of personal protective equipment (PPE).

As part of their #StrongerTogether initiative, Marlink had equipped the French Service d'Aide Médicale Ugente (SAMU) with its XChange Telemed healthcare diagnosis kits allowing medical teams to establish remote medical stations in rural environments, allowing for virtual treatment without the need to create a transmission vector.

This also allows SAMU to better measure the pandemic outside of urban centres by allowing responders to connect to remote stations around the country. Marlink is also able to supply blood pressure analysers and oximeters with the kit to give doctors more tools for diagnosis.

Tore Morten Olsen, President or Maritime at Marlink explained: "As the Coronavirus outbreak continues to cause serious health impacts and business disruption globally, XChange Telemed is helping to reduce risks through early detection and faster treatment."

With necessity likely to nurture further research into telemedicine technologies, presently available products such as the XChange Telemed kit acutely demonstrate the remarkable advantages to remote diagnosis and treatment.

Telenor offers a lifeline to struggling global infrastructure

The continued availability of lifesaving products is invaluable to holding the world together in this era of catastrophe, however some companies have exhibited an even greater degree of heroism.

One of the most startling responses to the pandemic has been that of Telenor, a telecommunications company with

XChange Telemed kits supplied to French emergency medical response. Photo courtesy Marlink

Inmarsat and Cobham Emergency PTT

expertise in network security. Telenor aids the Norwegian Armed Forces Cyber Defence division by sharing expertise and resources to better strengthen digital security to best protect and safeguard the operation of critical infrastructure, national security, and emergency preparedness.

The company has gone above and beyond in its contribution to initiatives to aid the fight against COVID-19. As business, education, and healthcare face terrifying new realities, Telenor has stepped in to invest 15 percent of its revenue into infrastructure and network stability, while offering mobility data to health authorities to aid their prediction and prevention of the contagion and providing online education and network security resources.

Sigve Brekke, President & CEO of Telenor Group stated: "As the pandemic spreads, it's now crucial to keep reliable network and services running. Everyone at Telenor takes this responsibility very seriously, and we are committed to keeping societies and the world connected. However, our social responsibility also goes beyond this. ... At these times, we all need to work together, and Telenor is ready to contribute where we can."

As cybercrime soars with the confusion of worldwide lockdowns and deprived communities begin to crumble under the strain of economic hardship, Telenor distinguishes itself as a shining example of how an organisation ought to respond to the tragedies left by global devastation.

Sustainable corporations in their finest hour, holding the world together in its time of need

It is our responsibility as members of a civilised society to take action to sustain the systems that keep our world turning, a responsibility which falls in no small part to businesses. The pandemic has shown us which companies are prepared to leverage their resources for the greater good, often in the face of certain economic sacrifices on their part.

When the world returns to business as usual, we should not forget which of these businesses have proved themselves as truly dedicated to the sustainability and safety of their customers.

The war on COVID-19 has been a true call to action for all of us, and though a very unconventional conflict, the battles that have been fought to reclaim our nations as we knew them have inspired examples of remarkable bravery, worthy of being remembered. **GMC**

The biggest threat to your communications? Your own applications

Cybersecurity is an ever-growing threat across all walks of digital life, for consumers, businesses, government and military alike. What often comes as a surprise is that the biggest threat to organisations could come from the applications their employees deploy.

Francois Rodriguez, Chief Growth Officer, Adeya

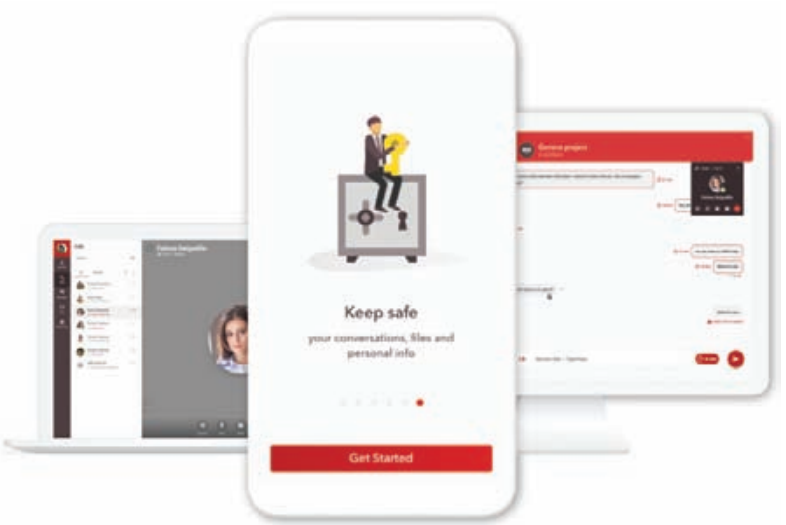
Most people think of cybersecurity as an external issue. That the focus is on keeping hackers (whether criminals, hacktivists or foreign governments) out of sensitive data and mission critical applications.

Yet so often the real threat lurks within. Even before the coronavirus pandemic, the issue of Shadow IT, where technology is procured and deployed outside of corporate IT oversight and processes, was a major issue for organisations in all sectors. How much of an issue? Some analysts put it at accounting for anywhere between 30 and 50 percent of IT spend in enterprises.

As organisations wrestle with the impact of COVID-19, the issue of Shadow IT is adding additional complexity to their efforts to secure their newly decentralised workforces – one study found that nearly half (47 percent) of IT security professionals felt that home workers using shadow IT solutions represented a major problem.

Identifying the threat

As highlighted, Shadow IT is the use of applications and services for work that have been acquired without using corporate IT. In the past, that might have been putting public clouds on credit cards to acquire compute resource quickly for development projects, or, more simply, using a messaging tool such as WhatsApp to communicate with teams.



All photo courtesy of Adeya

For those in the public sector, operating in sometimes stricter budget environments than their private sector counterparts, this could be a major challenge when faced with balancing the need to work with cost concerns.

Now, the threat has been compounded by the need for organisations across all industries, under prepared for mass remote working, to keep operating outside of the office. To that end, there has been the rapid deployment of free or freemium communication tools, with the likes of Zoom becoming a major trend and feature in lock-down life. While it may be fine for keeping in touch with friends and families, the fact of the matter is that these apps simply do not have the enterprise-level data privacy and security organisations require. Anyone looking for evidence only has to look at the security issues Zoom itself has faced as its popularity has exploded.

Why all businesses need military-grade encryption

For private sector businesses, this lax approach to security can have significant financial repercussions – for government organisations, whether in the military, healthcare or public administration, the consequences could go so far as to threaten lives. That is why all organisations handling sensitive or mission critical data should be deploying military-grade encryption.

It is evident that bad actors are seeking to capitalise on the chaos and confusion of the pandemic – the World Health Organization (WHO) has reported a five-fold increase on cyber-attacks targeting its staff and infrastructure, while Interpol has also highlighted how criminals are going after hospitals and other health providers with ransomware.

As such, it is critical that organisations have the ability to protect their data, devices, and applications. These break down into two areas – behavioural and technological.

The former is really a matter of education – making sure that employees understand what they need to be vigilant of, and how everyone is responsible for an organisation's cybersecurity. Just as they would not give out their physical credentials to allow a stranger into their place of work, so they should be applying the same rigour and consideration when it comes to their digital activities. That covers an understanding of social engineering and how to combat it (including not clicking on links and interrogating sources of emails and messages, particularly ones claiming too-go-to-be-true news and offers), to having better passwords, not using shortcuts and thinking about why the tools they want to use may not be officially sanctioned.

From a technology perspective, as with any procurement process, it is really about using the right tools for the job. The reason Shadow IT is such an issue is that the applications being used do not have the same policies, approaches and

requirements that enterprise-grade services do. Even when they claim to have the right features on offer, such as end-to-end encryption, it quickly becomes apparent that is not always the case when interrogated. Those that claim to have that level of protection often have a small window where data, rather than staying encrypted from device to device, is decrypted on a server before being re-protected and sent on to the receiving endpoint.

It is a small window, but enough for an attacker to get in and cause havoc. As discussed previously, for a private sector organisation, that could result in a significant business impact; for a public sector function, it could be worse.

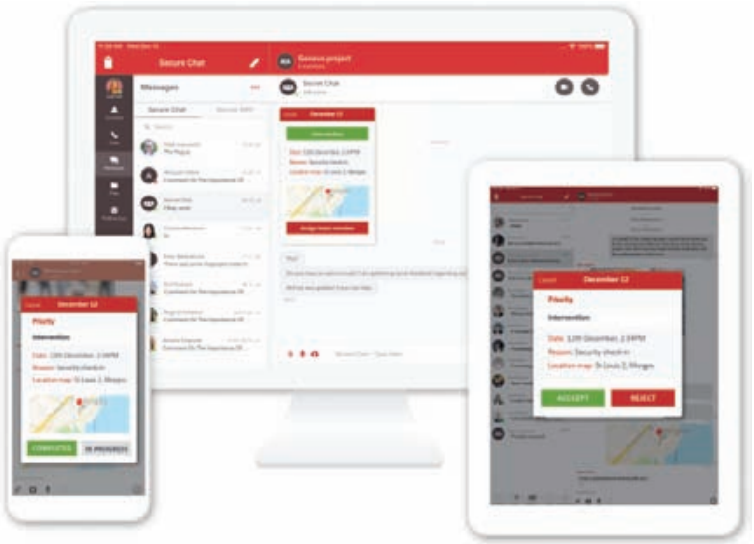
That is why, when considering tools, it is important to only choose those that meet the stringent requirements an organisation has. For end-to-end encryption, that means military-grade, with cryptography support that can be tailored to specific demands, in-built obfuscation to prevent the reverse engineering of code, public key generation and trusted identity as standard. These are all elements designed to frustrate attacks without compromising an organisation's ability to continue operating.

Countering an ever-present threat with sophisticated technology

Threats are everywhere, and the current confusion and chaos is perfect cover to cause significant damage to enterprises and institutions across all sectors. All organisations, no matter how small or how unsensitive they think their data is, have a responsibility to their customers, employees and other stakeholders to take the necessary steps to secure both themselves and their systems.

That means aligning the need to keep working with security requirements, and choosing tools that enable that, compromising on neither. It's the deployment of the appropriate resources, with security at the fore, rather than the ones that are easiest to get hold of.

GMC



Rob Andzik, President, AMERGINT

GMC Q&A

Remaining resilient to cyber threats

AMERGINT delivers software-defined signal and protocol processing applications. The company serves the satellite ground, test and data acquisition markets across defence, scientific and commercial sectors. Company President Rob Andzik talks about the emerging nature of electronic warfare (EW), and the company's efforts to help remain resilient to cyber threats.

Laurence Russell, News and Social Media Editor, Global Military Communications

GMC: Can you tell me a little about AMERGINT?

Rob Andzik: AMERGINT is a small company based out of Colorado Springs, up on the foothills at the base of Pike's Peak. We employ about 100 people, mostly engineers, and we focus on the space to ground satcom links that monitor and control the satellites.

Some of the key programs we've worked on include the International Space Station's (ISS) uplink and downlink video and Internet access through our work at the Johnson Space Centre. We run the monitoring and control for GPS constellations, and we are also running acquisition systems for some of the large rockets like Atlas and Delta which United Launch Alliance (ULA) is responsible for.

AMERGINT is a really exciting place to be because we get to do very important work processing mission-critical links. If we don't deliver, the point to the satellite may be lost, so it's essential we don't put a foot wrong. That's highly motivating, but it's also fun to work in a smallish, focussed company that can often feel very friendly.

GMC: What are some recent challenges AMERGINT has adapted to in the climate we find ourselves in?

Rob Andzik: Obviously, the pandemic has impacted world commerce. Everyone is affected at some level. We do have the benefit of being a software focussed

Pairing AMERGINT software architecture with transposable Abaco hardware was a perfect fit

company, which allowed the majority of our staff to pack up equipment and head home to connect safely.

So, there was a tiny hiccup, but AMERGINT managed to continue work as normal. Given the importance of what we do, that's a necessity as a critical business. People may need satellite communication right now more than ever, after all. We're very fortunate to be able to comfortably support our staff family in the way we have.

GMC: You've partnered with Abaco Systems to develop electronic warfare capabilities. How will a combination of your technologies offer unprecedented sophistication?

Rob Andzik: To start, one of the key things to know about AMERGINT's technology is that it offers a very modular software architecture which allows us to develop agile and responsive systems which can be adjusted to meet precise customer needs.

Pairing our software architecture with transposable Abaco hardware was a perfect fit. It has provided the ability to deliver to customer demand with even further accuracy around a sharper schedule and evolve or scale that as their requirements change.

GMC: We've spoken to defence developers who argue that militaries supplying via a private model are preferable because the developmental risk of the project is borne by the commercial sector, removing the costs of state research from the taxpayer, and the constraints of long development cycles from government research bodies. Do you agree with that?

Rob Andzik: Absolutely. It is an interesting concept because usually militaries need very specific systems and the commercial industry is so habitually focussed on commodity consumer products, so at face value, the two don't necessarily gel.

But by utilising private companies like AMERGINT, we're able to develop mission-critical systems from the ground up in defence and science with a certain unique efficiency. It's not another project for the government to juggle, it's work being outsourced to a devolved organisation which can focus its energy better.

A strong part of this is the capacity for sustainment. We possess a set of engineers with a wide variety of specialisations, which we can keep gainfully employed and fully occupied because of the extent of our operations. In a government type program, you wouldn't necessarily be able to offer those specialists much more than a limited contract without the benefits of full employment.

By leveraging the strengths of the private sector, we can retain better talent, cost-effectiveness, and quality, and while offering more activity in the American economy than a government division would be able to create.

GMC: AMERGINT has been clear about the need for the armed forces to invest in electronic warfare resilience. Just how critically has our reliance on electronics become?

Rob Andzik: Someone could be reading my words using electronics right now. I think it's hard to imagine what a cyber-attack would really look like. The world hasn't become aware of it in the public eye. But everything from key processes like agriculture down to something as personal as daily communications are reliant on electronics, and therefore at risk of this emerging threat.

That's doubly so when you're talking about military entities. The resilience to tolerate an attack and continue operations in the event key electronics have been targeted is currently vital and will only become more critical as EW technology continues to become more sophisticated. It's something we simply cannot afford to ignore.

GMC: Does the movement towards RF countermeasures herald a less lethal, less destructive form of force?

Rob Andzik: I would say so. Obviously, a weapon is a weapon, it's designed to subdue. There are certainly ways of using these technologies to the same lethal degree as conventional 21st century weaponry, but that shouldn't discount the value of disrupting, silencing, misdirecting, and negating a combatant's efforts, to reduce their functional level of threat, minimising, or potentially even ending hostilities.

This is still a set of developing technologies and applications, so we can only speculate on the logical extent of their use, but we are certainly seeing a set of functions that would allow for a strong deterrent without involving lethal force.

GMC: The cyber domain is a very new category and one that seems to be rapidly taking shape. At present, there are those relatively unaware of it. Which capabilities do you foresee will become synonymous with the domain in the near future?

Rob Andzik: The cyber domain is one which is often associated with protecting money, a frontier primarily revolving around banks detecting and resisting cyber theft.

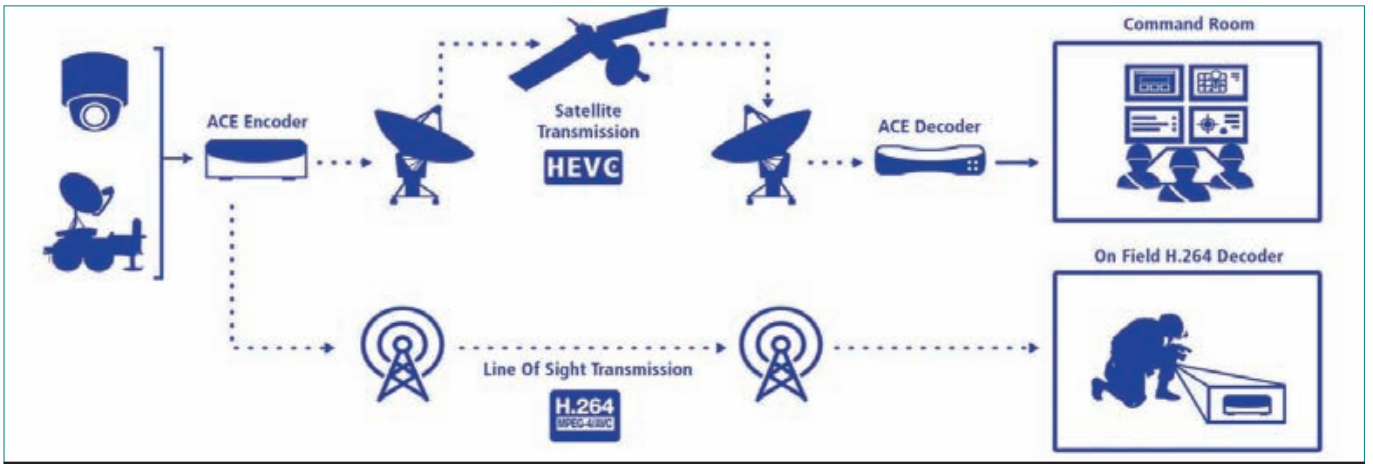
But that's just the tip of the iceberg. With so much communication online, the ability to disrupt or spoof those lines of contact can have devastating effects. Cyber-attacks are all about information and misinformation, which has the potential for incredible power.

To disrupt your ability to produce results or response allows for massive capability, and the potential for confusion or even chaos is obvious. The strength of cyber is often in its subtlety. The most damage can be done without you even noticing.

They say the pen is mightier than the sword because the weaponization of information has the potential to be so much more affecting than an individual's destructive power, but in the future we see, we could certainly see the mouse becoming mightier than the gun, so to speak.

Though as I've said, much of this is still to be discovered. What I can assure is that AMERGINT is a shield against these new threats, and we're committed to forming reliable partnerships to ensure our customers' safety. What we do is to ensure our products and systems are entirely secure. We protect some of the most essential links in the world, which is a critical job growing in priority, and we couldn't take that responsibility more seriously to keep our clients safe. **GMC**

AMERGINT is a shield against these new threats. Photo courtesy of Shutterstock



ISR terrestrial encoder. Image courtesy VITEC

ISR video: The critical equation

Embracing video over IP can transform mission critical operations. Video in the field has advanced from a nice-to-have to a must-have, while technology has marched on to dizzying new heights.

Mark Rushton, Business Development Director, VITEC

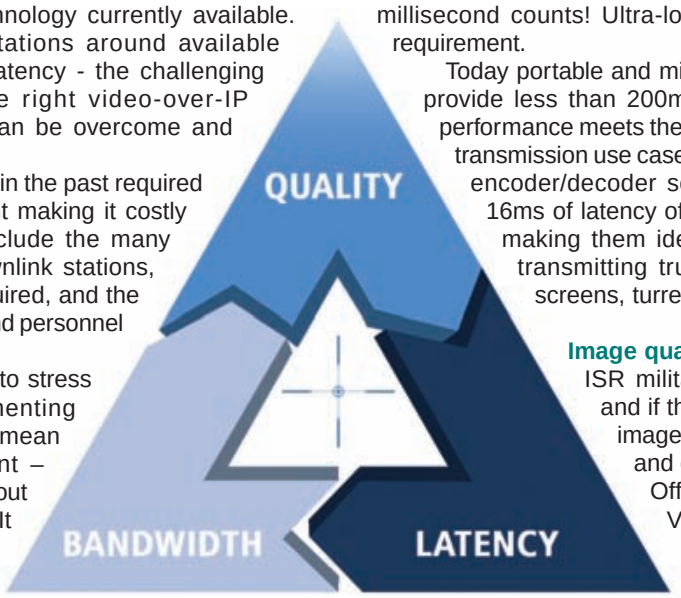
Delivering live, real-time, video in the ISR arena is challenging for many reasons, not least because the timely delivery of critical imagery can be a matter of success or failure. Alongside this, there are many practical issues to be overcome in these environments; equipment vibration, extreme temperatures and humidity, as well as the unique demands that are thrown up when unmanned units are involved. Taking all this into account, the task is how to deliver the best image quality in a timely fashion, on limited communication bandwidth, while solving interoperability issues - on board at forward operating bases, as well as at HQ and beyond.

Video-over-IP

In the main, mission critical ops are carried out using some of the most advanced sensor technology currently available. However, there are often limitations around available bandwidth, image quality and latency - the challenging 'Video Triangle.' By using the right video-over-IP equipment, these constraints can be overcome and achieve the correct balance.

Distributing video information in the past required specialized, dedicated equipment making it costly and cumbersome to deploy. Include the many different types of cameras, downlink stations, sensors and display devices required, and the management costs in both time and personnel can quickly escalate.

One of the important factors to stress to anyone considering implementing video-over-IP, is that it doesn't mean legacy equipment is redundant – there's no need to throw the baby out with the bathwater, so to speak. It is possible to use existing technology and retrofit video-over-IP equipment to reap the benefits of superior image quality and improved workflow. The benefits unleashed include an improved video quality that stands up to global dissemination, transmitted images no longer being constrained by local networks, and a new, more efficient workflow and decision-making process. Furthermore, there is a simultaneous reduction in operating costs whilst at the same time providing more detailed information which is available for delivery in real-time to locations that are local, LoS (line of sight) and BLoS (beyond line of sight).



Latency

Latency is the delay between what the camera sees and what is then viewed on a remote display anywhere in the disseminated sensory grid. Historically, this delay has prevented localised encoding and streaming of high-quality imagery from the field environment. Latency is critically important as it affects:

- Gimbal operation;
- Cursor on Target;
- Tactical decision making;
- Correct navigation; and
- Accurate Observation.

All the above require accurate and real time video with minimal or no delay. It can be a particular challenge when, for instance, military personnel in an armoured vehicle are operating with the assistance of video transmission alone. In this type of operation, decisions must be made in real time to be effective. An example could be a military vehicle driving at 60km/hr and covering 16m/s. Physically, things are moving fast and every millisecond counts! Ultra-low latency is therefore a vital requirement.

Today portable and mini encoders are engineered to provide less than 200ms of end-to-end latency. This performance meets the criteria for a variety of onboard transmission use cases. Further still, ultra-low latency encoder/decoder solutions will deliver less than 16ms of latency of high definition 60fps streams, making them ideal for navigation, vehicles or transmitting true real-time information from screens, turrets, or radars.

Image quality

ISR military operations are expensive and if the cost is to be justified, quality imagery is essential. Images with jitter and other artifacts offer a poor ROI. Offering full 1080p60 Full Motion Video (FMV) is more than just desirable, it is paramount to successful missions. Being

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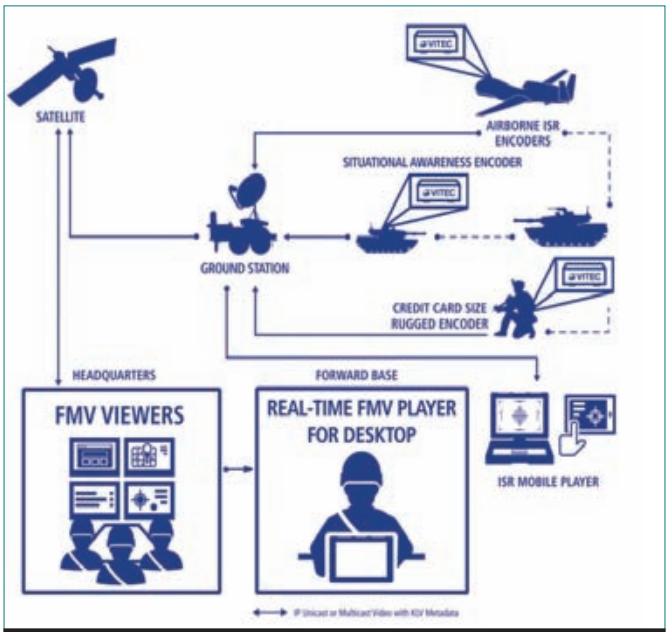

Image courtesy of VITEC

able to compare imagery and FMV from previous missions and sharing it between internal and external partners throws up details that have been elusive in the past. Quality imagery combined with no loss of FMV due to communication constraints, leads to effective and productive missions.

Likewise obtaining an image with less definition in modern ISR is less than useless, considering the capabilities of today's modern sensors and the move towards deeper and richer imagery such as 4K.

Bandwidth

Pushing Video across IP requires the RAW video to be encoded and compressed into a data stream, typically using standard codecs. In the past, legacy codecs, many of which are still in use in today's encoders, relied on a linear relationship between quality, latency and bandwidth utilisation. This resulted in having to compromise on all three elements of the 'video triangle'. Advances in codec optimisation enable the video over IP of modern encoders to compress the video even further, resulting in lower need for bandwidth, whilst increasing quality and reducing latency – all vital in improving performance.

Interoperability

STANAG is the standard dictated by NATO, and it is an enabler for communication of video and tactical data. This standard provides a common video language standard that is critical for sharing data between coalitions. The challenge here is to choose products that enable secured video streams to the operator without compromising on latency, whilst also ensuring STANAG 4609 compliancy, providing additional tactical metadata.

Fortunately, this is now commonplace on most Commercial off the Shelf (COTS) encoders and decoders designed for the military marketplace. This harks back to the need to not change the complete workflow but instead backfill technology into legacy systems, and if necessary different codecs, whilst maintaining the uninterrupted metadata and FMV flow.

An example of this could be the utilisation of highly efficient codecs from UAS to command, but then transcoding the same FMV to operate on field equipment such as mobile devices, which typically don't support the High Efficient Video Codec used to minimise bandwidth communications from air to ground.

Middleware solutions designed for ground exploitation of STANAG 4609 streams, enabling video streams to be recorded, played back, analysed, annotated, and indexed based on metadata are perfect for image analysts working on drone or ISR imagery. A general-purpose IPTV solution, on the other hand, will allow streams with or without STANAG 4609 enabled, to be deployed to any device, PC, tablet, or display, but it should still be capable of complete and automated control of encryption and user monitoring.

Applications

Military operations require field-proven solutions that enable personnel to easily disseminate live feeds and recorded video assets in various bitrates optimised for the specific network link available. Streaming solutions should be designed to overcome the major military video streaming challenges for the major use cases within operations, whether onboard a vessel or vehicle, from and to the theatre.

ISR Video is an operational requirement, and in fact a necessity, *not* a nice-to-have. Its demands now reach beyond the first user and so it is critical that:

- Sharing is in real time;
- User access rights to control video access are maintained;
- Video is available on multiple displays/devices; and
- Recording content can be enabled for future use.

Conclusion

Today's modern ISR requirements need a finely tuned balance between quality, bandwidth utilisation and latency. Technology today allows the end user to redefine the balance, honing the equation to suit their needs whilst experiencing better, compliant FMV. Video specialist companies such as VITEC strive to provide leading edge, technologically superior video solutions for onboard transmission with low and ultra-low latency video streaming. These include HEVC, FEC, and STANAG 4609-enabled solutions for fluid transmission of tactical videos, and transcoding and video management solutions for video streams distribution, enabling modern ISR communities to concentrate on the mission at hand. **GMC**

Photo courtesy Specna Arms from Pexels

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Energy transmission laser captured by special camera. Photo courtesy US Naval Surface Warfare Centre

The dawn of lasers - the fastest assets imaginable

Laser technology has long stood as a mainstay of science fiction, often manifesting in reality in relatively mundane ways, but it seems that will not remain the case forever. Lasers offer the capability of the fastest transmission known to physics, as well as no real limitation in range. Potential mankind has scarcely dreamed of. Brave new science is structuring emergent capabilities by the month, turning out promising news at an increasing rate.

Laurence Russell, News and Social Editor, Global Military Communications

On the 17th of May, the US Air Force launched X-37B, a reusable, unmanned space plane, from Cape Canaveral. While not all information about the launch has been released, it is known that the craft carried the Photovoltaic Radiofrequency Antenna Module Flight Experiment (PRAM-FX), the apparatus needed to experiment a bleeding-edge in-orbit capability that could result in 'remote power generation and long-endurance aircraft propulsion.' This capability is known as 'power beaming,' a practice that can utilise lasers to transmit power over great distances with no adjoining infrastructure.

Also known as Wireless Power Transfer (WPT), power beaming has been theorised as early as the 20th century when Nikola Tesla assembled several experiments around it in order to prove the viability of intercontinental transmission of energy.

The applications for that kind of science is dizzying, spanning all manner of fields. Military research specifically sees value in the ability to remotely refuel deployed assets. Dr Paul Jaffe of the Naval Research Laboratory (NRL) explained: "If you have an electric drone that can fly more than an hour, you're doing pretty well. If we had a way to keep those drones and UAVs flying indefinitely, that would have really far-reaching implications. With power beaming, we have a path toward being able to do that."

It is known that last year the China Academy of Space Technology completed power beaming tests, which led them to conclude that a Chinese orbital microwave beaming power station will be in situ and functioning by 2050. It is likely that other countries are conducting very similar experiments.

This is of course one application of particular interest to the armed forces in the world of lasers, of multitudes of others. More futuristic applications include the generation of endless solar power or unlocking new answers for the construction of the space elevator. As the power of laser technology becomes more advanced, applications like this will continue to become realistic, allowing for new methods of peacekeeping and deterrence across the globe, and could potentially lead to revolutions within civil and military infrastructure.

Laser in satcoms

Perhaps the most visible of these innovations is that of optical satcom, an application which has seen strong investment since the nineties. Laser communication technology allows for the establishment of high-performance backbone networks, high volume data transmissions from aerospace to the ground, and highly secure communications.

On the 11th of May, the Australian Department of Defence announced that it was experimenting with laser-based optical and RF communication technologies within a single satcom terminal which possessed the "potential to significantly enhance military capability" by integrating with vehicles across the domains.

This project is known as CHORUS, the Compact Hybrid Optical RF User Segment, and concerns a multi-disciplinary team of defence, industry, and academic scientists alongside experts from Defence Science and Technology (DST), EOS

Space Systems, EM Solutions, Lyrebird Antenna Research, and Shoal group, besides the Australian National University and the University of South Australia.

The first phase of the project has been funded at a value of AUS$1million over a 12-month cycle, and the first collaborative work to be launched by the SmartSat Cooperative Research Centre (CRC), which opened in February this year as the largest space industry R&D collaboration in Australia with a AUS$12 million contribution in funds over the next seven years.

The project is expected to improve the resilience of military satellite communications, offering the best of both worlds solution which combines high data transfer rates and enhanced security with the reliability of traditional RF communications. Such breakthroughs could potentially create opportunities for use by the commercial sector.

Andy Koronios, CEO and MD of the centre said, "By combining optical and RF communications, satellite operators will have more options to provide high-availability, high-capacity and high-resilience satellite communications services without requiring additional access to scarce and expensive radio spectrum."

Northrop Grumman's proposed technology - Skyguard Tactical High Energy Laser (THEL). Photo courtesy Northrop Grumman

Directed energy weapons

But lasers don't hold all the solutions. For years, it's been colloquially thought a directed energy weapon such as a laser could prove an effective method of missile defence. The theoretical extreme long-ranged nature of lasers combined with their supposed accuracy and suitability for detonating ordinance with extreme heat led many to think they would make effective tools for targeting missiles. This was galvanised by a notorious test in 2010 by the US Air Force's Airborne Laser program, which successfully intercepted a ballistic missile under test conditions, before being discontinued. However, Mike Griffin, the Undersecretary of Defence for Research and Engineering recently all but dismissed the concept of laser missile defence.

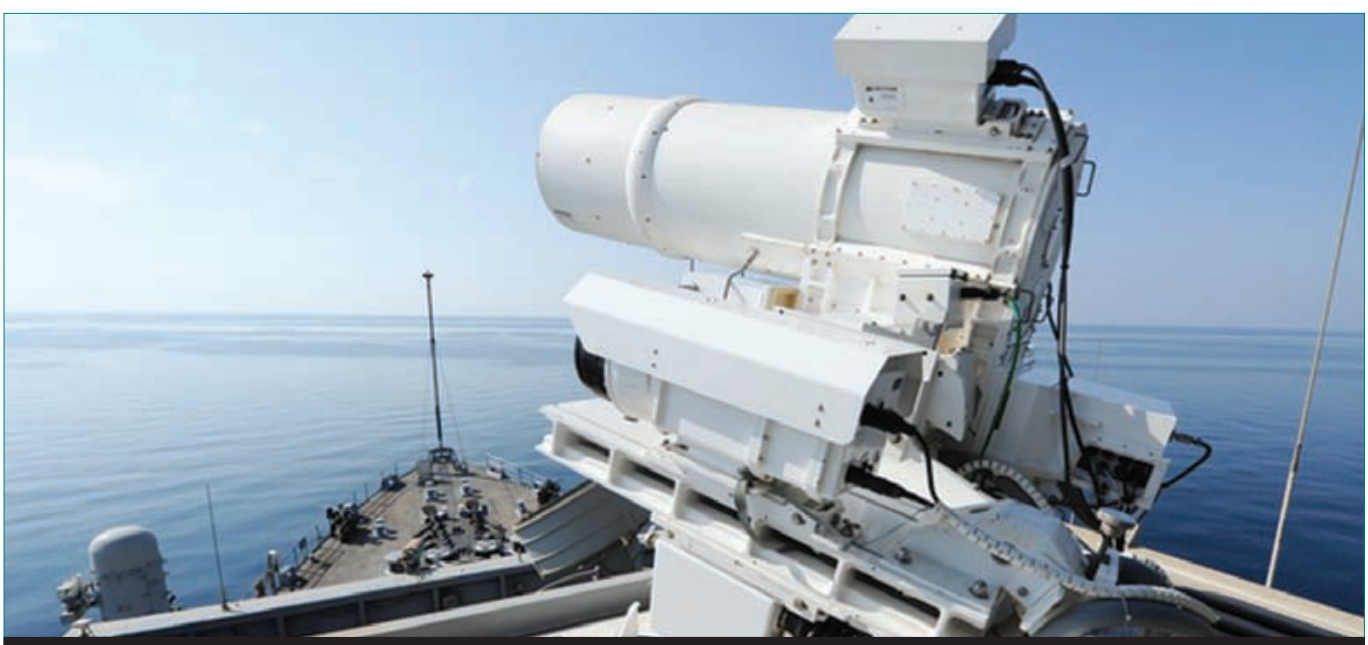
"I'm extremely sceptical that we can put a large laser on an aircraft and use it to shoot down an adversary missile, even from fairly close," he explained. "It has been done as an experiment, but as a weapon system — to equip an airplane with the kinds of lasers we think necessary, in terms of their power level, and all their support requirements, and get the airplane to altitudes where atmospheric turbulence can be mitigated appropriately — that combination of things doesn't go on one platform."

Griffin's comments seem to be voiced at a 2019 policy document from the Missile Defence Review, which called for investments into testing laser weapons on airborne drones intended to detonate missiles in their early boost phase. The undersecretary did note that "[directed energy] for space platforms that could well be quite productive [for missile defence]" and went on to clarify that research into directed energy was far from done with in the US.

Present, not future

Ultimately laser technology is a frontier that very much stands with us in the present, though its exact applications are still being explored. In the case of directed energy, Mark Lewis, Director of Research and Engineering for Modernization at the Department of Defence (DoD) said, "The key is they're not going to be replacing things we can already do with kinetic weapons. If the gun already does something and it does it better than the laser, there's no point."

The same can be said of satcom and energy transfer. While the agility that lasers offer is unmatched, conventional technology is usually cheaper and reliable. Until lasers can do something our tried and tested machines can't, they may continue to remain a novelty for decades to come. **GMC**



The Laser Weapon System (LaWS) performing a demonstration aboard a US ship. Photo courtesy Office of Naval Research

The military as a first responder - even virtually!

The coronavirus pandemic has grabbed the world by the throat, crippling normal day-to-day life, and business operations globally. For those of us accustomed to attending trade events and conferences, life is looking very different; many organisers have gone digital, hosting webinars and other online events to keep activities going, including Pacific Endeavor.

Martin Jarrold, Vice President International Programme Development, GVF

In commenting or writing about humanitarian assistance and disaster response (HADR) topics from the point of view of the satellite industry, my usual starting-point is to refer to the unique position that GVF holds in respect to the operations of the HADR relief agencies of the United Nations, and the role in HADR performed by the militaries of a geographically extensive part of the world – the Indo-Pacific, from the Maldives in the Indian Ocean, eastwards across the International Dateline, to Hawaii.

However, now my starting point is different, given that just about six months ago the world first began to take note of news reports out of China about a new viral infection. This 'novel' virus, which – like bird 'flu (Avian Influenza, H5N1), Swine 'flu (H1N1), SARS-CoV, and MERS (EMC/2012) – was 'zoonotic,' having jumped the interspecies gap from an animal species to humans. It was from that point, though the world didn't yet know it, that this other novel coronavirus (SARS-CoV2) was to cause human disease which would soon change the world.

Pandemic

COVID-19, as the disease had come to be named by the UN World Health Organization (WHO), was declared a pandemic by the WHO on 12 March 2020. By this time, the geographic spread of the disease via human-to-human transmission – aided by international passenger airline routes – of the virus had reached Europe. From here, the story must, by now, be familiar to much of humanity, and as I write the epidemiology of COVID-19 is showing us how both the world's more developed nations continue to be affected, including showing some signs of second waves of infection, whilst those of the least developed world are in the earlier stages of this catastrophic public health crisis.

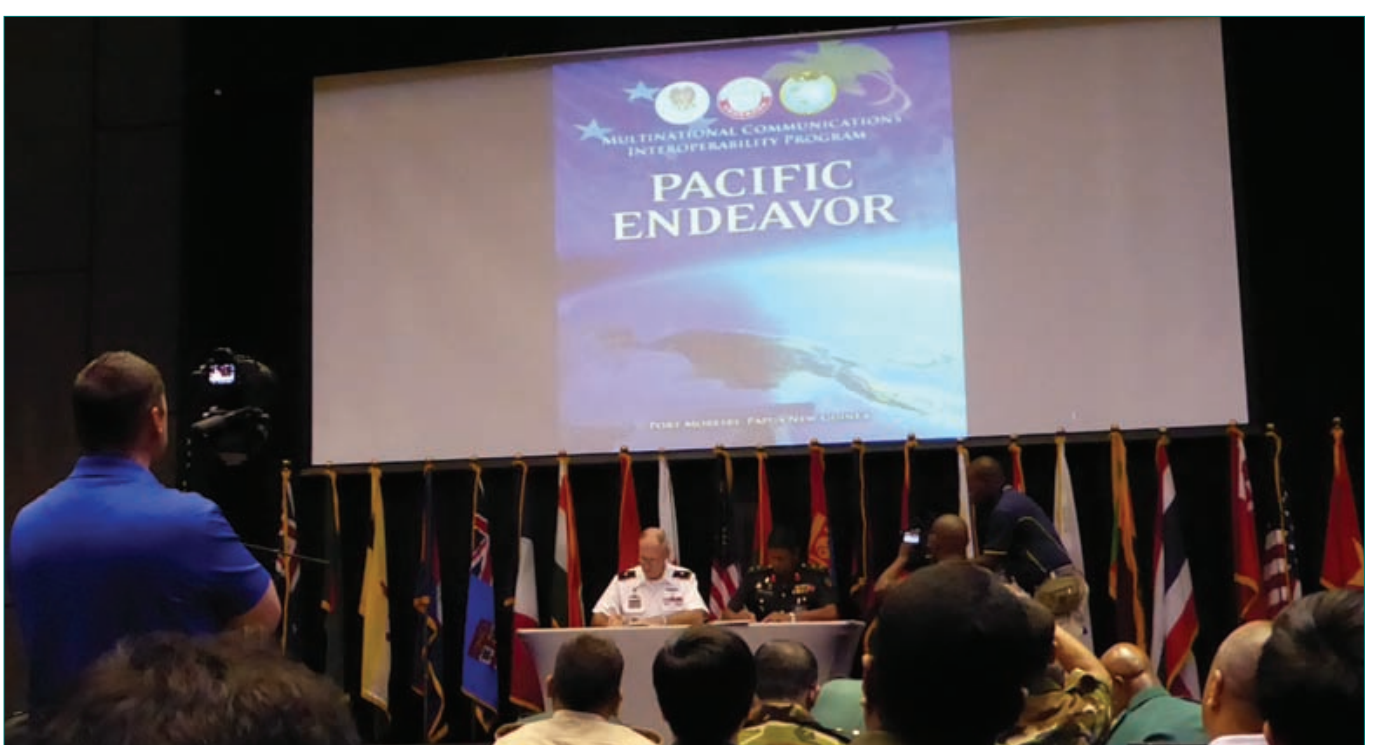
My taking this new starting point is not simply for reasons of topicality. COVID-19 has impacted the industry which GVF represents, it has impacted the ways in which GVF works to represent the interests of the industry, and in the context of GVF's HADR initiatives with militaries as first responders, it has impacted one of the world's most important annual HADR preparedness programmes – about which, more below.

The ways in which the satellite industry has been affected by, and how it has, in turn, responded to the pandemic, is one of the threads running through a series of Webinars which GVF is producing in partnership with Satellite Evolution Group – the publisher of this magazine.

Satellite and COVID-19

During April, prior to the launch of the Webinar Series, GVF researched the industry's responses to the pandemic (publishing as a summary of these findings the article 'Satellite Industry Response to COVID-19' at https://gvf.org/news/satellite-industry-response-to-covid-19/. This has now been followed by four webinars in the GVF-Satellite Evolution Series which directly addressed pandemic-related issues affecting the satellite industry. The latter turned attention away from directly addressing the impact on the industry of the pandemic, to the impact of one of its consequences – the social distancing policies of governments and their science advisers. Welcome to working from home, a.k.a. WFH!

The fundamental theme for discussion and exploration was Will Working from Home Render the Cloud a Different Animal? This focused on the interrelationship of satellite and the Cloud, and asked whether the social distancing-related/public health



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crisis phenomenon of a mass migration to WFH has impacted satellite, has impacted the Cloud, and more precisely has impacted this developing satellite-Cloud interrelationship.

The role of satellite communications in HADR is long-standing, and that of Earth observation (EO) new technologies and applications is fast expanding. GVF's direct engagement with the industry's HADR endeavours has a powerful linkage with the military in its first responder role, and it is this which brings me back to the subject of one of the world's most important annual HADR preparedness programmes – the United States Department of Defense IndoPacific Command (INDOPACOM, formerly Pacific Command, PACOM) Multinational Communications Interoperability Program (MCIP), Pacific Endeavor.

GVF and Pacific Endeavor

GVF's partnership with *Pacific Endeavor*, going back as far as 2012, parallels its other HADR work with the UN, briefly cited above. GVF, along with a number of its member companies, is signatory to the UN Crisis Connectivity Charter, and also is a member of the World Food Program-administered Emergency Telecommunications Cluster (ETC).

There is irony in the fact that it has taken the global public health crisis – one that has required the activation of HADR resources and capabilities even in some of the wealthiest developed countries – to disrupt *Pacific Endeavor*, not through postponement or cancellation, but in its transitioning into a virtual event. Preoccupation with pandemic human disease unsurprisingly occupies the media and public attention, but other disasters – arising from the forces of nature, or resulting from human action, malign or otherwise – still happen. During the months of pandemic the world has witnessed parts of Africa, the Middle East and south Asia facing a 'plague' of locusts, Super-Cyclone Amphan has wreaked havoc in Bangladesh and north-eastern India, some Pacific Ocean islands were hit by Typhoon Harold. It is this type of disaster that requires the kinds of solutions for immediate response logistics operations and longer-term recovery programmes that only satellite can provide. In the context of pandemic the occurrence of these other disasters exacerbates both the instance and effects of the coronavirus, as infection takes hold in lower-income countries, affecting communities with weak health systems, affected by conflict, comprising displaced peoples, or spreading through permanent, high-density slums.

The Flags of Pacific Endeavor

Pacific Endeavor in cyberspace

Since Pacific Endeavor 2012, GVF has variously conducted presentation sessions, and hands-on practical training workshops to certify J6 military officials of the MCIP participating nations in the installation and maintenance of satellite terminals to ensure that, during crisis or disaster, GVF-certified first responders are on the ground. Communications capacity building for these militaries and their civilian partners remains the goal in 2020.

The annual Pacific Endeavor programmes follow an approximately triennial subject cycle, alternating the focus between "Wireless Endeavor," "Cyber Endeavor," and "Satcom Endeavor." This year was a Satcom Endeavor programme, with the contextually appropriate title of Virtual Distributed Satcom Endeavor 2020. Whereas the non-pandemic norm for a Satcom Endeavor provides GVF member companies and others with the opportunity to showcase new solution innovations, equipment and systems, and share case studies and best practices (as well as GVF providing hands-on practical training) on a face-to-face basis, cyberspace has this year instead provided the platform for GVF-managed remote technical sessions, mentored online training modules with voice calling support, and discussions about the industry's solutions.

Despite the current pandemic, it is not the only disaster now, or in the future, to befall the world's population, and Pacific Endeavor – in the form of an innovative and responsive-to-circumstances Satcom Endeavor 2020 – has still gone ahead, further contributing to the first responder preparedness of many nations' militaries in the use of critical satellite communications solutions.

GMC

Riaz Lamak, GVF Lead on HADR, interview for US INDOPACOM

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UK MoD awards contract to demonstrate electric-drive Foxhound and Jackal vehicles

NP Aerospace has been awarded a £3m contract by the UK Ministry of Defence (MoD) to demonstrate hybrid electric-drive systems on Foxhound and Jackal vehicles, with the project being delivered in collaboration with General Dynamics Land Systems UK, Supacat and Magtec.

The contract award is part of the Protected Mobility Engineering & Technical Support (PMETS) programme which is being led by NP Aerospace as the Engineering Authority for the vehicle fleet. General Dynamics Land Systems–UK and Supacat are the partner vehicle OEMs, and Magtec is the electric drive and battery technology partner.

Developed by Magtec in the UK, the hybrid electric e-drive solution for Foxhound and Jackal is intended to deliver multiple technical and operational enhancements, including (but not limited to);

- Silent mobility;
- Enhanced Silent Watch capabilities;
- Off-board electrical power; and
- Increased onboard power for the insertion of the latest technologies.

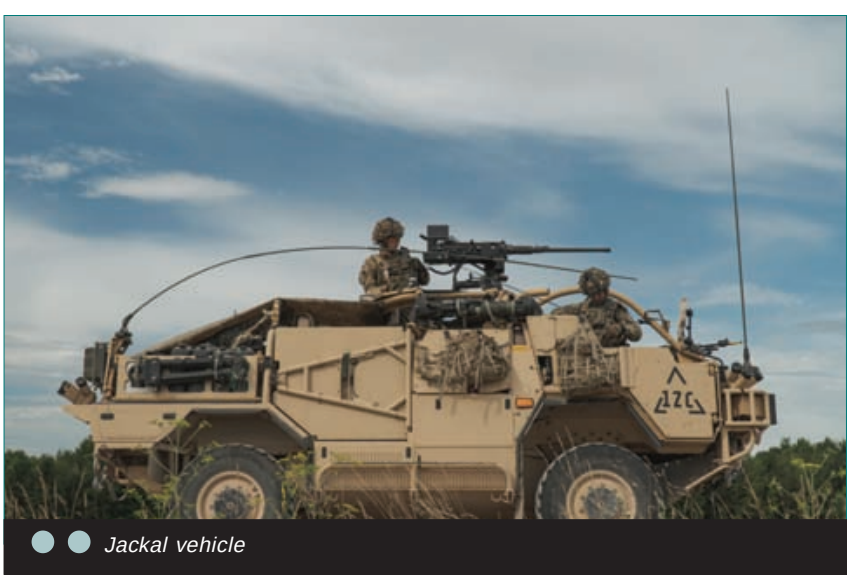
This is the first time that this type of technology system has been applied to vehicles covered under the PMETS programme. The production of demonstrator vehicles will enable the MoD to analyse the operational impact of new technical capabilities.

Foxhound vehicle

David Petheram, Chief Operating Officer, NP Aerospace, said: "The Protected Mobility Engineering & Technical Support (PMETS) programme delivers safety, efficiency and innovation activities across a variety of vehicle platforms, via a collaborative approach. The hybrid electric drive project is a significant development that will further extend the technical capabilities of the vehicles and is an important advancement in the incorporation of new technology. It will provide a greater understanding of what hybrid technology could achieve, whilst also looking to the future in terms of integrating additional sophisticated electronics across the PMETS vehicle fleet."

Carew Wilks, Vice President and General Manager of General Dynamics Land Systems–UK, said: "As technology develops to meet the future operating needs of the British Army, the demand for onboard power only increases, and electrification of land vehicles offers an innovative solution. Foxhound, the British Army light infantry vehicle of choice, already has an architecture that enables electrification and is a natural choice for this demonstrator. We look forward to demonstrating our e-drive Foxhound in the coming months."

Nick Ames, SC Group-Global CEO, said: Following the work we have done with Exeter University on the All-Terrain Military Platform (ATMP) to give it electric drive and associated control, this piece of work is the natural follow on for us. We have the skills and knowledge to work with our project partners in making the well-respected Jackal vehicle "hybrid drive" and thereby offer enhanced silent watch, stealth operation and improved power export capabilities for soldiers and their equipment. This is a very exciting project and clearly shows the British Army moving towards a non-hydrocarbon future as signalled by Chief of the General Staff at DSEI in 2019. This fits perfectly with our current and future strategy."



Jackal vehicle

Andrew Gilligan, Managing Director, Magtec, said: "Magtec is a UK leader in the design and manufacture of electric vehicle drive systems and is proud to be supporting the British Army in the development of new technology to protect British troops when they are on the move. Magtec has a strong track record in delivering drive systems for the most demanding applications. We are creating high-quality engineering jobs in the North of England and strengthening the UK's position at the forefront of the global transport sector." **GMC**

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