

# GMC

December 2019

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# Global Military COMMUNICATIONS

Mission critical tech in the  
modern military

Q&A Ayala Pinhasi, Get SAT

Q&A Andrew Thomis, Cohort Group

Space commands



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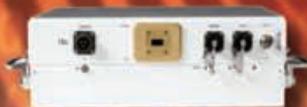
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Photo courtesy of Get SAT

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

# Misawa Air Force Base's Draughton Range fires up on Northrop Grumman's distributed mission operations network ••

Joining a scalable and cyber-secure network of over 300 simulator integrations in 85 sites around the world, the Draughton Range, with F-16C simulator, at Misawa US Air Force Base in Japan, is the latest connection to Northrop Grumman's Distributed Mission Operations Network (DMON).

As the provider of DMON capabilities, Northrop Grumman delivers the virtual-constructive backbone for the US Air Force's Live, Virtual and Constructive (LVC) training technology. It's a core enabler for the Air Force to achieve its LVC vision of worldwide training.

The new connectivity of the Draughton Range to the DMON enables Misawa Air Force Base to join on-demand training events with other DMON participants around the globe. These events include daily small team training missions, as well as large force exercises like Red Flag Alaska, Northern Edge and Distant Frontier. The connection of local simulators, threat generation systems, live range threats and live aircraft add significant training complexity to daily events.

## DMON: Critical for LVC Success

DMON, a fully-functioning collective training solution, allows different aircraft simulator platforms located across the globe to seamlessly interoperate and train together in a realistic virtual environment via a secure network. DMON provides on-demand, inter-team training for the US Air Force's Combat and Mobility Air Forces on a daily basis.

Mobility Air Force Distributed Mission Operations (DMO) utilizes the Distributed Training Center Network (DTCN) to interconnect its training sites. The DMON and DTCN can connect on-demand to allow the platforms to train together.

## LVC: Training for All

By joining on DMON, Misawa Air Force Base is a part of an expanding global LVC blended training network meant to mimic the growing complexities of real-world battlespaces. Along with the flying hour cost of live platforms, the training needs for the real-world battlespace is the driver behind bringing the "L" and the "VC" training domains together into a seamlessly integrated LVC training environment. Northrop Grumman is the only technology provider to achieve an on-demand, global LVC training solution, which connects the live environment to actual warfighter simulators.

Northrop Grumman's LVC solution operates to ensure a repeatable training solution is always readily available to prepare warfighters for their missions across air, land, sea, space and cyberspace.

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•• Misawa US Air Force Base in Japan, is the latest connection to Northrop Grumman's Distributed Mission Operations Network (DMON)

# Kongsberg announce contract to deliver Counter Unmanned Aerial System (C-UAS) to Germany worth 250 MNOK ●●

Kongsberg Defence & Aerospace AS (KONGSBERG) has entered into a contract with Federal Office of Bundeswehr Equipment (BAAINBw) to deliver a Counter Unmanned Aerial System (C-UAS) based on the PROTECTOR Remote Weapon Station. The contract worth 250 MNOK was won in an international bidding process.

Germany is the first country to acquire a C-UAS solution with the PROTECTOR as a kinetic effector. The emergence of inexpensive, small unmanned aerial systems (UAS), also referred to as drones, poses a relatively new threat to both military units as well as civilian infrastructure and events, such as airports, government buildings, power plants, political gatherings and sporting events. The PROTECTOR RWS C-UAS has a rapid deployment and reaction time, and is highly mobile.

KONGSBERG has studied the growing threat posed by UAS and developed technology and solutions for detection, tracking and defeat of drones. There has also been a close cooperation with the Norwegian Defence Research Establishment (FFI) to evaluate possible technologies and solutions. The combination of the operationally proven PROTECTOR RWS with advanced sensors, tracking algorithms and rapid engagements provides an innovative and cost-efficient solution.

For Germany's PROTECTOR RWS C-UAS project, KONGSBERG has cooperated closely with Hensoldt and is integrating the Hensoldt Spexer 3rd generation radar for UAS detection and tracking. The solution utilizes a 40 mm Automatic Grenade launcher with airburst ammunition, - but the PROTECTOR RWS has a variety of weapon integrations up to 30 mm and air defence missiles that can be employed against UAS.

Germany is the 22nd country to select KONGSBERG's PROTECTOR RWS, adding to the almost 20,000 systems delivered to our customers around the globe.

"KONGSBERG is very proud to win this first C-UAS competition, and we look forward to a long-term close cooperation with the German Army. With this contract, KONGSBERG combines existing and new technologies entering a new growing market niche", says Pål E. Bratlie, Executive Vice President Protech Systems, Kongsberg Defence & Aerospace AS.

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## Satellite communications for national security: Don't fight the white!

Border security is a challenging matter for every nation across the globe, however, in recent years, satellite capabilities have greatly increased border security of many countries. Paul Boshier, Director of International Business, XTAR, outlines the opportunities afforded by satellite in securing a nation's borders, and the futility in trying to "fight the white."

**For those like me who went through training** at our military college in Sandhurst, or really any training establishment, you may understand the phrase, "Don't Fight the White." The white referred to instruction sheets with model answers in regards to a particular task or mission we were attempting. Debating or trying to alter these instructions was nearly always futile as it was the Directing Staff answers; hence the phrase "Don't fight the white."

Fast forward to my days now in the satellite industry, when I was recently embroiled in a conversation regarding the definition and uses of MILSATCOM, COMSATCOM and GOVSATCOM. While my erstwhile colleagues did a good job defining each, it left me wondering – does the definition really matter? As a past military user I certainly did not consider or debate the *type* of SATCOM I utilized. My concern was rather, was it fit for purpose and did it meet my commander's mission needs?

Across the globe, security can take many forms, ranging from combating terrorist activity, illegal immigration, refugee flight and transnational crime, to more general concerns over national security and defence. Denying or slowing our enemy's ability to act can effectively undermine their ability to respond which can present nations with a position of significant advantage. National security relies on having effective, available resources with the right capability to protect against rapidly evolving security threats

that have increased over the past decade and are now considered to be within, at and beyond any national borders.

We are all too aware that shrinking budgets and a need to 'do more with less' stretches any nation's ability to meet the myriad of national priorities; in fact, securing a nation has become a much more complex and dynamic problem that without the appropriate resources, becomes ever more susceptible to the threats it faces. Solutions to these dilemmas can differ widely; at the very core of national and thus global security is the pressure on nations and organisations to monitor and control activities and mitigate threats across borders, from terrorism to illegal fishing, to control the movement of weapons, drugs and people as well as direct incursion from expanding neighbours. As these national challenges have increased, satellite communications have become an indispensable tool for governments and militaries alike.

### Space-based capability

A space-based capability such as satellite communications can mitigate natural disasters, crisis situations or kinetic action that have rendered primary ground-based systems (such as fibre, cables or mobile phone networks) unreliable, disrupted or even non-existent. Add to this the vast nature of national boundaries, remote inhospitable areas and a lack of infrastructure, and satellite communications become a viable alternative. SATCOM delivers solutions to enable governments to control integral assets to defend their borders, whether they are airborne, maritime or land based. While satellite imagery is adding another dimension to the intelligence, surveillance and reconnaissance suite, the ability to communicate securely, either by voice or data, remains the force enabler that allows commanders and politicians the situational awareness to make well-informed and timely decisions.



● ● Photo courtesy of XTAR

Having established the critical need for satellite communications and noting the ever-increasing government applications that are more and more bandwidth hungry, selecting the best solution can be a daunting task, but it does all go back to meeting the needs of our satellite operator in the field. Without doubt the current and future satellite fleets (both commercial and government owned) offer new technology, increased capacity and an opportunity for the user to meet all their space-based demand forward into the future. But unlike commercial users, our governments and militaries can take strategic, operational and tactical advantage by using the X-band frequency, which has been reserved specifically for their use only.

Technically, its advantages are numerous; X-band is less susceptible to rain/dust attenuation and does not suffer adjacent satellite interference like its commercial counterparts (Ku-band and Ka-band). This combination allows the user to experience increased performance availability, better data rates in all

weather conditions, no downtime and greater reliability resulting in the delivery of critical communications on both military and commercially available satellite fleets. Using X-band to meet the demands of national security, linking land, maritime and airborne assets in a coordinated approach to combat wide-ranging threats gives our governments and war fighters available, secure and robust communications that ensure reliable command and control functionality: Critical in times of crisis.

The rate of technology growth is well-known and will be adopted by our governments as they protect us from emerging threats, but the common, underlying requirement is the need to transport and exchange that information to command centres to enable effective and timely decision making by our leaders. Satellites provide the range extension, security and vital communications channel that give government users the flexibility to pull information from anywhere in its region, mobile or static sources and deliver it to multiple locations in real time. X-band is a tried and tested solution, dedicated for government and military use and must be part of every nation's SATCOM capability. Not every nation has its own national MILSATCOM or access to another's, but there are commercially available SATCOM providers that can meet their requirements and provide a flexible, affordable solution. One such provider, XTAR, delivers X-band as a dedicated military/government resource.

For an issue as vital as national security, countries require a robust satellite solution that can cover vast terrain, access remote locations using small antennas and hold up in any weather. These characteristics allow the user to connect the decision makers instantly with problems as they occur, enabling fast, effective and decisive action to address the issues. The X-band frequency has been reserved solely for government and military use, in part because it has these distinct advantages. Don't "fight the white," or debate what type of SATCOM you are using, but instead utilize the solution that will provide optimum border security.

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● ● Cohort's CEO, Andrew Thomis

## Leading edge technical innovation ● ●

Cohort Group is the parent company of five SMEs providing defence and security solutions for UK and international customers. Global Military Communications' Laurence Russell spoke to Cohort's CEO, Andrew Thomis, to break down the nature of each business, and the role he sees them playing in meeting defence challenges in the years ahead.

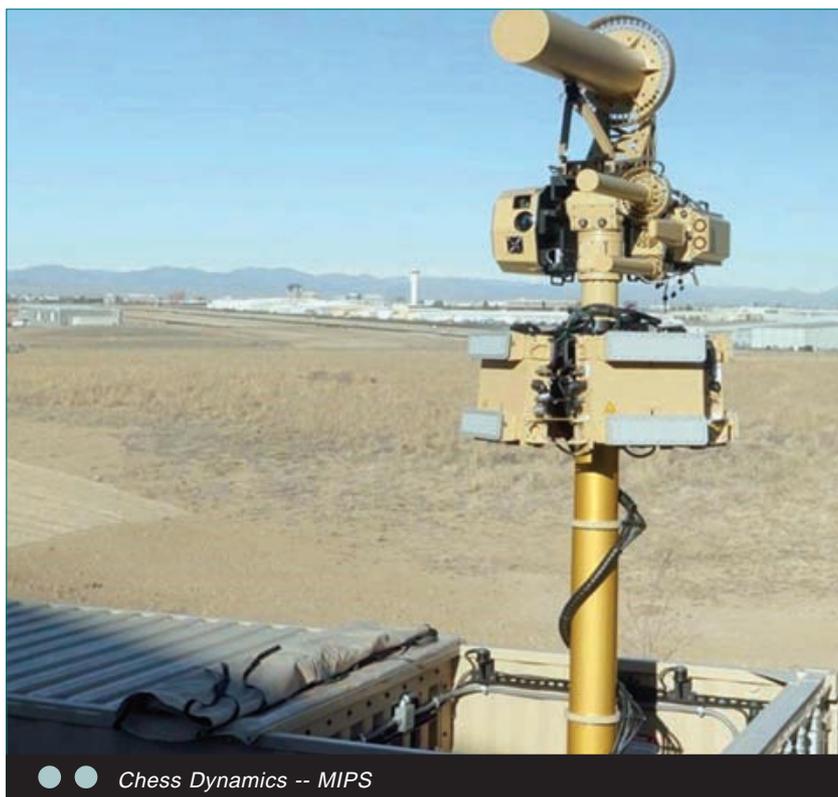
**Question: One of your business units - Chess Dynamics - was recently praised by a Government Defence Minister for its work at the leading edge of technical innovation. How are Chess' systems being used by the British and Allied Forces?**

**Andrew Thomis:** Chess is Cohort's most recent acquisition, and we're delighted to have them in the Group. They develop systems to detect, localise, identify and track targets, chiefly in the land and maritime domains. In a military context, the systems can also be used to calculate a fire control solution.

In the maritime space, Chess uses its engineering expertise to develop new and innovative security systems to provide surveillance for surface ships. The systems are being used extensively across the Royal Navy in river-class patrol boats as well as the Type 23 and Type 26 frigates. In addition to its remarkable success at home, Chess is also seeing growth in export markets, especially in Southeast Asia, and also in France - which is quite an achievement for a UK company. Chess' surveillance systems are also used by border forces to enable long range identification, which has become increasingly important to rescue vessels having difficulty in the channel during the recent migrant crises.

On the land systems side, Chess provides the Hawkeye family of sensors used on a range of military vehicles to support surveillance operations and air defence. Chess works with partners around the world, for example Rheinmetall Air Defence, to deliver its next generation of firearm-based air defence systems.

Another recent key area of focus for Chess is counter-unmanned aerial systems (C-UAS). For a while now Chess has been collaborating with other UK providers to offer a C-UAS solution developed specifically for military applications, which has been implemented in the US, where it's been very effective. On the non-military side, Chess's equipment also formed part of the C-UAS solution introduced at Gatwick Airport in December 2018. Chess was able to use this



● ● Chess Dynamics -- MIPS

# GMC Q&A

experience to develop brand new solutions to support civilian airports, which as you can imagine is quite a different environment to those typical in military operations.

**Question: Including Chess, Cohort Group is made up of five business units. Could you give us a quick summary of the other four?**

**Andrew Thomis: MASS** is a company that does a huge amount outside of the public eye, which makes it difficult to discuss specific details of its work, but it does a great deal working with the Ministry of Defence and other UK government institutions to assure security at the highest levels of national defence.

MASS is very active in electronic warfare (EW) operational support - the development of countermeasures used by ships and aircraft to avoid missile threats. The software MASS has developed enables threat identification and analysis as well as the activation of countermeasures such as flares, chaff and jammers to suit the nature of the situation.

MASS also works in the cybersecurity domain alongside governments and in the private sector - offering digital forensics for police forces, and training capabilities as well as supporting exercises for Northwood Joint Forces Command. MASS runs large exercises involving hundreds of people simulating national defence crises and training military and governmental response.

**EID**, the military communications specialists based in Portugal, serve naval and army users. In naval communications, the company's ICCS capability is a naval communications management system, one of the most successful in the world. ICCS has been provided on over 140 platforms from small patrol boats to larger vessels and even submarines.

On the land side, EID has a number of products in field communications, predominantly vehicle intercoms and personal radios. The ICC-401 is a new variant of its highly successful vehicle intercom range, which has capabilities that can compete with anyone at the top of the market. It's ruggedized with a ring topology, which means even serious damage to the vehicle it's installed in won't be enough to take it offline, as well as providing Dynamic Noise Reduction to improve audio intelligibility. It's a very effective lightweight system capable of controlling any radio on the vehicle, even heavy transports with large crews. The

interface is optimised for working with the TWH series soldier radio that EID produce. The latest version, the TWH-110, which was introduced at DSEI 2019 features a 400MHz frequency band and higher radio frequency (RF) power, reliable voice and data communications and automatic network forming, all housed in a single system.

**SEA** is based in the West Country and employs about 300 people, providing engineering and software design services to the UK and international defence, transport and offshore energy markets. The company supplies market-leading mission systems and equipment, communications, weapon launchers and sensor systems to the maritime sector. With 30 years' experience, SEA has provided sonar transducers for large prime contractors, while more recently, it has designed its own specialised sonar system, the Krait Defence System, a complete anti-submarine warfare (ASW) solution for smaller vessels.

As part of this, KraitArray is a very low-profile towed-line acoustic array at 20mm diameter and up to 150m in length. Conventional towed arrays are typically very heavy, which isn't the most practical thing when you're attaching it to a craft where weight is such an essential factor, but KraitArray is a much more lightweight solution. It's also provided at a low cost, and capable of being adapted to a wide range of craft, especially unmanned craft like wave gliders. In a swarm, linked to one another, the KraitArray can provide a very wide aperture offering remarkable submarine detection. The capability is ideally positioned for small navies interested in defence and detection, which there's plenty of demand for. SEA also develops lightweight torpedo systems which are agnostic, meaning they can launch any model of munition, including decoy launchers.

SEA has a very strong capability in military simulation and training as well as in the civilian world, and the development of high-integrity transport software and systems development. If you've been caught by a camera looking at bus lanes or illegal parking, it's entirely possible one of SEA's systems would have been the one to spot you.

Finally, Marlborough Communications Limited (**MCL**) is our smallest business in terms of people, with a current headcount of around 30, based just outside Gatwick. Despite its size, MCL currently generates value in excess of £20 million a year



● ● Photo courtesy of MOD

supplying mostly into the UK, working closely with supply partners in the UK, US, and Europe integrating existing systems together.

MCL collaborates with other groups to adapt systems to meet UK requirements, utilising in-house engineers to support the solutions. MCL tends to work in niche areas across signals intelligence, electronic warfare, surveillance, UAV, military communications, and most recently hearing protection, which is increasingly becoming a priority with the rate of hearing injuries in the armed services.

**Question: Which sector of the industry do you anticipate providing the most growth?**

**Andrew Thomis:** Companies are brought into the Cohort family based on their potential to offer organic growth, so we see all of them as having very good growth opportunities. However, looking at the market today I do see a few exciting avenues in particular.

So much investment worldwide is going into new naval systems, ships and submarines. Anti-submarine systems are a burgeoning market, alongside secure naval communications, and optical and radar tracking systems. All of those I think are likely to expand, due to the investments we've already seen in the South China Sea, Canada, and Europe. We've also seen a rise in surface combatant programs in Belgium, France and the Netherlands.

Counter-UAV, and to that end mobile short-range air defence, is a fantastic growth area. The proliferation of UAVs, and the fact they've been used quite successfully by insurgent forces to deliver lethal arms, has people rightfully concerned. The ability to stand up to drones, both individually and in swarms, has become incredibly important. A UAV is inherently difficult to destroy at any range with a kinetic force because they're so small, fast, and manoeuvrable. Drones can be anywhere, belong to anyone, and can be strapped with anything; that's why Chess' tracking and identification systems are so valuable. We need to know everything we can about a drone in protected airspace as soon as possible.

EW capabilities have become an increasingly prominent part of the military domain. Increasingly, more countermeasure systems have been developed to offer protection, particularly as new purchasers of aircraft realise how vulnerable their craft are when they lose control of their operational systems. Of course, this isn't to undermine the threats in land and maritime

EW. The proliferation of very capable surface to air, and air to air missile systems demonstrated very clearly in recent years, means you need strong EW capability, and MASS will provide the glue that makes that happen.

Those are the main prospects that come to my mind, but of course we see good growth areas across everything we're working with, and a few particularly interesting opportunities with the potential for uniquely rapid growth.

**Question: What are the advantages of small and medium size companies in military markets?**

**Andrew Thomis:** It should be no surprise that smaller companies are more agile than larger groups. They can make decisions and mobilise faster. They aren't spread thin over many separate departments and projects.

We've seen research that suggests smaller companies are more innovative, which comes from their modest allocation of resources, and their potential to completely change direction quickly. Smaller companies are often a better home for ambitious, talented STEM professionals who are interested in experimenting with new concepts with a great degree of autonomy, rather than grappling with old problems, often by applying old methods.

For larger companies, very often technology strategy gravitates towards closed architectures so that only their equipment can be used on a particular platform which they apply incremental improvements to. That sort of strategy is geared to keeping competitors out, rather than solving problems and serving the customer. Smaller companies aren't constrained by that strategy. They're often interested in disruptive innovation that changes everything, because that's how they succeed.

Those are their advantages, of course there are disadvantages to smaller companies too. Cash management for example can be a real issue for businesses working on small projects. Banks are less likely to lend to a smaller company with a higher risk factor. Sometimes venture capital is available, but that always involves a large chunk of your potential success to a passive partner.

What Cohort does to mitigate that is to square the circle by bringing together a group of small companies, configuring them independently to preserve their autonomy, and providing them with a structure that gives them significant support. They have access to capital, expert contacts and greater visibility. **GMC**



● ● Sea Krait Array

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## Mission critical tech in the modern military ● ●

Command, Communications, Control and Computers are the four 'Cs' that sit alongside Intelligence, Surveillance and Reconnaissance (C4ISR) to form the fundamental pillars of every military mission. Adrian Roche, Application Engineer – Aerospace & Defense at HUBER+SUHNER, explores the evolving demands and challenges around C4ISR applications in modern warfare.

**There are several factors at play when considering** the increasing demand for robust C4ISR systems. Political agendas and initiatives, for example, directly impact funding and resource for the sector. Governments around the world are shifting focus, identifying a need to quickly mobilise and increase military operations, while maximising operational safety and security for military personnel and efficiency - reducing the time it takes for mission completion.

The nature of the modern battlefield is also a key driver. There is a growing need for improved battle-space awareness and network-centric warfare. Operations often take place in close quarter, populated, urban combat scenarios. This requires the ability to swiftly and assuredly distinguish between friend and foe and identify any threats lurking within the civilian population.

This, in turn, leads us to the rise in asymmetric warfare and soldier-modernization which is propelling the demand for man-portable C4ISR systems. Wars in Afghanistan and Iraq have

vividly demonstrated the necessity for enhanced C4ISR systems to counter enemy strategies and tactics. Deployed US and allied soldiers operating in urban areas face circumstances where the enemy is hidden, familiar with the territory and has the advantage to be able to choose targets at will.

Considered alongside regular ambush, many countries have been prompted to create a connected battlefield and equip soldiers with advanced C4ISR systems to improve their situational awareness.

### Environmental and situational challenges

There are four segments to the C4ISR market – land-based, airborne, naval and space-based. Each of these presents its own unique challenges and opportunities and includes a broad spectrum of systems and applications. Vital products and services utilised within these C4ISR markets include radio and communications systems, satellites, navigation/mapping, radar, surveillance technology, secure data transmission, intelligence and research, telemetry systems and many more.

These systems and techniques are an integral support for the defense sector in gathering and broadcasting essential information about adversaries, increasingly complex hostile environments and homeland / border control requirements. They are crucial for improving efficiencies – shortening mission time – and allow command to receive and assess progressively larger and more accurate volumes of data and intelligence to make faster, better-informed decisions about mission directives and action.

This in itself can put additional pressure on infrastructure and personnel in the process of transmitting, analysing, storing

and redistributing such vast sums of mission-critical data in a reliable and secure way.

Challenges also lie within the diversity of the environments in which the applications operate. Airborne applications across fighter jets, helicopters, high altitude aircrafts and unmanned aerial vehicles, for example, must be ultra-low-weight, ruggedized solutions that can withstand extreme environmental factors and load factors up to 10g.

Naval applications must be highly waterproof and meet strict flammability and smoke density requirements inherent across submarines and ships. In addition, military requirements for salt fog testing must be met to check corrosion resistance of materials and surface coatings.

Land-based, field-mountable communication equipment, such as navigational aids, jammers and satellite communication hardware incorporated into combat vehicles, operate between 1MHz and 20GHz. This equipment requires a wide frequency range with high shielding effectiveness to avoid interference. Electromagnetic pulse (EMI) protectors also need to be utilised in many mobile platforms to harden equipment against lightning electromagnetic pulse (LEMP) and nuclear electromagnetic pulse (NEMP) and to provide protection from lightning strikes to the equipment.

Mobile shelters and bunker infrastructures operating as command and control centres are required to comply with stringent shielding specifications and each point of entry compromises the screening effectiveness of the complete



● ● Photo courtesy of HUBER+SUHNER



● ● Photo courtesy of HUBER+SUHNER

system. Sensitive equipment must be protected against EMP and electromagnetic interference (EMI) with solutions that ensure long-term screening effectiveness and provide the lowest transfer impedance.

Aside from these unique situational demands and restraints, there are also common challenges to consider across the board. Longevity of the equipment and processes and economic factors need to be addressed. The full potential of these C4ISR systems can only be maximised for as long as the current technology does not become obsolete and, as the technology advances, funding is available for technological upgrades.

#### Mission critical performance

For years, HUBER+SUHNER has demonstrated an innovative and extensive defense-oriented product portfolio with a reputation as a global leader in the manufacture and supply of radio frequency, fibre optic and low frequency cabling, components and bespoke integrated solutions.

We have worked to address the challenges faced by the defense forces with discreet, cost-effective and system-orientated solutions that are optimised for mission-critical operations. Within that, we deliver the high performance, quality, reliability and long service life which is absolutely essential to mission success.

Operating in such an agile and intricate market means that as a manufacturer and supplier we must also adapt and be responsive to market demand. With this in mind, HUBER+SUHNER provides technologically advanced solutions with customisable designs. For example, naval solutions that can be custom-designed with o-rings and glass seals for maximum performance in the most extreme conditions.

With our global production and distribution network and strategic partnerships we have the specialist knowledge that enables us to present engineers with full scale connectivity and communications solutions.

#### The future of mission success

It's not unfair to say that C4ISR is the backbone or nerve centre of defense and security infrastructure and there is no doubt it is a growing market. On the whole, there is a definite trend of Governments around the world increasing the percentage of GDP expenditure dedicated to military and defense in order to safeguard national interests, values and security.

In the future, as new challenges arise and the nature of warfare and technological capabilities evolves over time, so too will demand. Systems and components will need to become more. More discreet, more secure, more portable, more resilient, more lightweight, more responsive, and so on.

Growing investment and a focus on research and development are going to be key to achieving the innovation that will be required in order to keep pace, and to realise the full, ongoing potential of these technologies.

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# Space commands ●●

It might sound like science fiction, but the world's first modern Space Forces, developed to manage off-world threats, are being brought into existence. As space technologies ramp up, and geopolitical tensions rise, everyone wants to make sure they have all their bases covered, and Space Forces or Space Commands are just the latest aspect.

**It's a sign of the times that several nations across** the world are now developing their own Space Forces or Space Commands, military branches to oversee space warfare. Just as the Navy protects the seas and the air force protects the skies, Space Forces are set to protect the space environment. We're a long way off yet from worrying about rival space-based colonies, or off-world threats from new nations in their own rights, but with geopolitical tensions rising and space capabilities more advanced than ever, it's only natural for some nations to see the protection of their nation's privacy and space-based assets as a growing concern.

## Space Command developments

Any discussion around Space Forces naturally has to feature the USA. Back in 2018, the US announced a proposal to create the United States Space Force as a new branch of the United States Armed Forces, with plans to see it in service by 2020. Later in August 2019, President Donald Trump duly launched USSPACECOM, a command dedicated to space warfare.

"This is a landmark day, one that recognises the centrality of space to America's security and defense. SpaceCom will ensure that America's dominance in space is never threatened," said President Donald Trump. "The dangers to our country constantly evolve and so must we. Our adversaries are weaponizing Earth's orbits with new technology targeting... both battlefield operations and our way of life at home."

While the US Air Force already has a dedicated space warfare operation, SpaceCom will heighten its



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importance and foster specialized systems and training for space showdowns. Air Force General John Raymond, USSPACECOM leader, said that rival nations such as China and Russia are already pouring huge resources into space operations. The challenges faced by the US today include adversaries jamming communications and GPS satellites and anti-satellite missiles.

"We are at a strategic inflection point where there is nothing that we do as a joint coalition force that isn't enabled by space," said Raymond. "I'm convinced that space is a war-fighting domain. I'm convinced that our way of life and our way of war depend on space capabilities."

Meanwhile, France's President Emmanuel Macron revealed plans in July for an upgrade of its Joint Space Command, in place since 2010. The new Space Command will see weaponized satellites launched to protect the country, equipped



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with lasers and cameras, by 2030. According to several reports, the weaponized satellites will bolster France's offensive and defensive capacities, so that the government can identify and vanquish enemy satellites committing hostile acts. The plan reportedly involves ground-based lasers, which will be able to blind enemy satellites, as well as lasers installed on the satellites themselves. There's even been rumours of submachine guns breaking solar panels on enemy satellites, although these have since been discredited.

The entire plan is expected to come in at US\$4.8 billion by 2025, according to France's Minister of Defence, Florence Parly. The Space Command will be based out of a new airfield in Toulouse and will see 220 soldiers recruited from France's military space agencies.

### Anti-satellite missiles

Anti-satellite missiles will have a major place in Space Commands across the world, and you can count on seeing more projects around this area coming into fruition in the next few years. Launched from Earth, such anti-satellite missiles have proven capable of taking out satellites in LEO, and maybe even GEO.

The USA launched its first anti-satellite missile in 2008; unlike other nations that have since gained anti-satellite missile capabilities, the USA reportedly needed to destroy the USA-193 reconnaissance satellite, which was decaying in orbit while carrying a large amount of toxic hydrazine fuel. After its successful destruction, experts debated whether the US\$100 million mission was really necessary, as the fuel tank and fuel may well have been destroyed upon re-entry...

China and Russia have also both developed anti-satellite weaponries. China successfully destroyed a defunct Chinese weather satellite back in 2007 with an SC-19 ASAT missile with a kinetic kill warhead launched from a mobile Transporter-Erector-Launcher (TEL), creating a lot of high velocity debris. The country also tested an exoatmospheric ballistic missile in 2018, which can reportedly be used to bring down a satellite. Russia, meanwhile, has made heavy investment into anti-satellite projects in recent years, with successful tests taking place through 2015-2018.

Most recently, back in March, India announced the successful test of its first anti-satellite missile, which was able to destroy a test satellite in low Earth orbit (LEO) from 300km away.

Developed by the Defence Research and Development Organisation (DRDO), part of India's defence services, the missile makes India the fourth nation with anti-satellite capabilities. There was a lot of outcry at the time over the huge amount of additional debris released into LEO, with the US Air Force Space Command detecting 270 new pieces from the test, however, the Indian Ministry of External Affairs said that the low altitude meant the debris would decay and fall back to Earth within weeks.

The anti-satellite missile capabilities of these four countries has become a concern for others, particularly neighbouring nations, who fear that their space assets could become a target. Much like with nuclear capabilities, tensions are rising. However, it's important to remember that though some nations have had anti-satellite missiles for years now, and none have ever been used to take out anything other than their own satellites.

### Space Commands of the future

With more countries racing ahead with their space-based technologies, we're bound to see new Space Forces and Space Commands popping up in the coming years, particularly from nations with strong space programmes. The UK wouldn't forgo a Navy when all other sea-faring nations have one, after all, because that would put its waters and independence at risk. Accordingly, as the small number of existing Space Commands become more well-established, other countries will likely feel the need to form their own such forces to defend themselves and keep up with potential adversaries. Naturally, with an increasing number of Space Commands popping into existence, tensions are bound to rise, particularly while such programmes are in their infancy.

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● ● Ayala Pinhasi, Head of Marketing and Customer Care, Get SAT

## High data-rate communications ● ●

Get SAT is an Israeli satcom developer leading the industry by providing micronized antenna and terminal solutions for high-data-rate communications for land, air, and maritime applications. Laurence Russell from Global Military Communications sat down with Ayala Pinhasi, Head of Marketing and Customer Care, to talk about Get SAT's achievements in 2019, and the company's recent breakthroughs in micronized technology.

### Question: What have been your Get SAT's highlights of 2019?

**Ayala Pinhasi:** Firstly, we've launched our new product, the Nano SAT-H. It's a new satcom terminal that is lightweight and portable, capable of delivering up to 4Mbps. We designed it to be placed on a manpack but that's by no means its only application; it's also appropriate for installation in UAVs. The Nano SAT-H is a very small terminal. It weighs 3.4kg, which includes the app converter, the modem, the gimble, the antenna, HDL, NBD, the entire link. I'm not aware of anything so lightweight in this market, and the fact that it still delivers 4Mbps means this is not simply a skeletal, stripped down system. It delivers just what the market needs, it's just lighter than anything else.

We've also launched an L-band antenna. It's a full phased array, electronically steered in both axes, azimuth and elevation. It is completely electronic in the L-band and can go up to 600Kbps. For L-band that's a lot, which is a real innovation.

We are very close to completing our Active Blade antenna, which is an electronically steered antenna in the elevation axis. It's mechanically steered in the azimuth axis, with a very low profile. It is a high performance antenna system in Ka-band.

We are enjoying a great partnership with Inmarsat. We provide the smallest terminals on the Inmarsat government network, that's our MilliSAT-H and our MilliSAT-Wide. These are our largest antennas whose complete system weight is 10kg. The ruggedized version is 14.5kg, which makes it a very portable model. They're also approved on the GX network.

Another development we're proud of was being approved on the O3b constellation. Medium Earth Orbit (MEO) satellites have a great demand for capacity at the moment, which we're happy to answer. An interesting point about



● ● ManPack-desert-Get SAT

# GMC Q&A



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it is that every other satellite terminal on the O3b network moves so fast it requires two linked terminals, but our systems only need one. Our switching takes less than a second, so the delay in the link is imperceptible with current technology. Once the transition is made, the antenna simply moves. There's no handover between two systems, so the latency is far lower compared to competitors. The system is ultimately cheaper too, since you only need to install one terminal. That, alongside using the smallest technology on O3b, really makes us stand out.

We also have a strong relationship with Ovzon, who plan to use our satellites with the Ku-band systems they're developing.

**Question: You've recently announced a partnership with Global Radiodata Communications which you've said will 'usher in a new era of COTM.' What innovations can we look forward to?**

**Ayala Pinhasi:** With this partnership we hope to sell our ruggedized terminals which are fully MIL-STD 810 461 compatible and highly portable. The heaviest one we produce weighs 14.5kg, which is far easier to transport, both for the supplier and the soldier, than previous or present models. It's appropriate for Razors and other light vehicles, as well as unmanned systems, the kind of machine where you really need to watch the weight of the system, allowing strong communication in the highly remote environments those assets reach.

**Question: With the 'always online' nature of the information era, how important are lightweight, mobile communications to modern defence markets?**

**Ayala Pinhasi:** Of course, most missions soldiers are sent on aren't in developed urban centres. Armed forces often find themselves in the middle of nowhere, far from reliable, secure networks.

Military connectivity is about tactical communication foremost, but there's also a very real demand for keeping the soldier connected in a personal regard. A soldier can be deployed for an exceedingly long time, and in the modern world they've grown up in, they're likely very used to being online.

They have their objectives, but they're also human beings. They deserve the ability to log into Facebook now and again. We believe that's not a particularly complex service to deliver.

Our lightweight applications are small, but they're also reliable. You don't have the performance trade-offs militaries may have been used to in the past. Our terminals integrate the modem, the upconverter, everything you need. Installation is

just a few minutes and you're online, allowing a soldier to stay connected wherever they are.

**Question: Your mobile satcom terminals aren't just suitable for defence, they also offer a lot to government groups and emergency response services. With the threat posed by environmental disasters across the world, do you anticipate remote connectivity seeing increased demand across civil sectors?**

**Ayala Pinhasi:** Yes. Usually in times of serious crisis you can't rely on existing networks or any infrastructure for that matter. Whether you're responding as emergency services, military or otherwise, you have to have some way to connect to your command centre. Our communication terminals can be used from many platforms and are lightweight enough to be moved across challenging terrain. Whether it's an ambulance reporting injuries from a scene, or a drone surveying a disaster area for survivors and gauging the extent of a catastrophe, our terminal is very suitable for connecting them.

**Question: You've overcome a fair few technological challenges when it comes to connecting UAV and helicopter systems. Could you illustrate a few of them for us?**

**Ayala Pinhasi:** The issue of equipping aviation vehicles and UAVs with lightweight communications is something Get SAT has invested a lot of time and effort into solving, and we're happy to say we've accomplished both quite effectively.

UAVs are very sensitive to weight. The payload is highly limited. Every milligram is carefully calculated because it's highly relative to the effective flight of the unit.

Some UAV models are such that they can't accommodate any extra communications technology from existing providers. Even when UAVs can accommodate heavy satcom equipment, it's simply fuel and power inefficient to be carrying unnecessary weight. Our lightweight terminals however are very weight efficient making them extremely well suited for connecting drones.

Regarding helicopter solutions, we are now able to support under-rotor installations with no disconnection whatsoever. To achieve that we employ a specific modem and algorithm incorporated with our antenna control unit. The connection isn't broken, even while the rotors are spinning at high speeds.

Addressing what were once considered technical limitations industry-wide has put us in a very advantageous position on the market, which we're keen to capitalise upon as we forge forward.

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● ● Active blade top with antenna

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● ● Jason Sierra, Sales Director at Seven Technologies Group

## Integrated sensor system ● ●

Seven Technologies Group is an electronic engineering manufacturer specialising in intelligence, surveillance and reconnaissance (ISR) integrated systems for the defence sector. Jason Sierra, Sales Director at Seven Technologies Group, spoke to Global Military Communications' Laurence Russell about their i7ense system, an integrated sensor system that makes the most of cutting-edge automation technology to deliver unprecedented solutions.

**Question: Can you provide an outline on Seven Technologies Group's capabilities and expertise? What are you bringing to the military and defence markets?**

**Jason Sierra:** Seven Technologies Group (7TG) is a UK defence manufacturer, specialising in the provision of intelligence, surveillance and reconnaissance (ISR) systems.

With more than 40 years of industry experience and a combined legacy of 180 years of real-world operational experience, 7TG prides itself in offering its customers the right solution for the right environment.

7TG combines operational experience with world-class engineering to provide its customers with world leading ISR capability. Typically, this can be split into two categories; electronic surveillance to provide advanced ISR capability and robust global tracking solutions.

For military and defence, we are bringing solutions that will absolutely change the way in which business is done. Through AI and deep learning technology, we are delivering real-time intelligence through i7ense, which in turn will free up operational personnel time and speed up the decision-making process when it comes to monitoring and apprehending a person of interest.

**Question: What can i7ense deliver that older systems without automation just aren't capable of?**

**Jason Sierra:** Typically, older systems provide information. That requires someone to continuously monitor and act on that information, spending time and energy simply processing and reacting to sets of data being collected over a longitudinal stretch of time.

Of course, i7ense collects data, but it can also assume the decision-making role, releasing resources and deploying responses. It's a thinking, acting system that doesn't need to sleep. You can put this thing to work and reallocate the manpower you used to spend simply processing sensor data over the course of hours and hours onto more complex tasks.



● ● Photo courtesy of Seven Technologies Group

# GMC Q&A

**Question: In the same vein, why are HD optics necessary in the current market?**

**Jason Sierra:** HD optics complements our hardware well. HD gives you detail, which translates to more information, both in identifying close images and seeing far off objects in clarity. Objects that'd be blurry dots to older cameras. We've certainly been seeing HD becoming more prevalent in both security and defence fields, especially when a customer is interested in detecting persons of interest with facial recognition software.

The most, and perhaps only important priority with facial recognition, is to register an accurate match. In that case, HD optics becomes imperative. It simply doesn't matter how sophisticated your software is if the hardware cannot take in the level of detail to find what it's looking for. You don't want your system matching pedestrians with a passing similarity to your person of interest, and you especially don't want your person of interest waltzing right by a low-quality camera that can't capture a clear enough image to register a match.

That's partly why we felt such a need to develop our own camera technology.

**Question: Let's also discuss your LREOS-HD camera, which capable of delivering a long-distance picture in high quality: Could you tell us a bit more about it?**

**Jason Sierra:** I think everyone wants to be able to detect a threat from as far away as possible. That's why long-range cameras are seeing increased demand across the defence market at the moment.

In the world of cameras, we're very close to the point where technology meets physics, in that the hardware we're developing, which is already capable of delivering an image from 20km away, wouldn't actually be any more accurate or further range in a higher spec. The nature of our planet and atmosphere means that there's a hard limit to how far you can see. In clear weather, top of the line cameras are hitting that limit more and more often.

So, unless physics changes, or some other unpredictable breakthrough occurs, the long-range cameras on the market today are about as sophisticated as they'll ever be.

**Question: Do you have any predictions about what artificial intelligence and machine learning will be capable of delivering for defence in the coming years?**

**Jason Sierra:** Machine learning is going to be a hot potato for most technology organisations. Particularly as industry and government begin to understand what AI is truly capable of.

There's a long road ahead in terms of design, but also in simply clarifying to investors and executives exactly what can be delivered by this technology and how.

It's a complex issue with many moving parts, but regardless



● ● Photo courtesy of Seven Technologies Group

of what shape artificial intelligence and machine learning take as they continue to develop, I can guarantee today that they will reduce costs and required manpower when applied in industry.

**Question: What are Seven Technology Group's current goals moving forward?**

**Jason Sierra:** We're heavily involved in diversifying from our original product portfolio into more autonomous AI applications. We're realising that a lot of our old technology is capable of incorporating machine learning and forward processing in some form.

As the industry continues to seek intelligent systems rather than merely information gathering systems, it's becoming increasingly clear that we have to deliver to those demands at the front end, with accessible, competent systems that can both work well on their own and in tandem with the people they support.

**GMC**



# Royal Thai Navy successfully modernises its fleet with two major projects delivered by Thales ●●

Thales delivered two modernised and upgraded minehunting vessels to the Royal Thai Navy. Built in the 1980s, HTMS Bang Rachan and HTMS Nong Sarai began their transformation in April 2016 when Thales was appointed as prime contractor for the upgrade of the vessels, including providing a full suite of underwater solutions onboard. This contract marked Thales' first success in the underwater systems and sonars market in Thailand.

As prime contractor, Thales was wholly responsible for the revised vessel design, repairs and modernisation, the procurement of equipment and the platform integration. The upgraded ships are now equipped with new solutions including a machinery control system, navigation systems, upgraded communications capabilities, sonar and command and control (C2) system and a multi-influence signature range that allow mine-hunting to be conducted more safely, efficiently and faster to secure the critical sea lanes and sovereign waters of Thailand.

The ambitious turnkey project brought together Thales expertise from the UK, France, Australia, Germany and South Africa, working hand-in-hand with local industry to manage the upgrade. Together with its naval Key Industrial Partner in Thailand, Thales provided training and Integrated Logistics Support (ILS) for the Navy to ensure that the local teams are fully equipped with the skills needed to ensure the smooth operation of the vessels. The modernisation of the Bang Rachan vessels extends the operational life of the ships by over 15 years.

Supporting RTN's maritime security and Exclusive Economic Zones (EEZ) protection missions with Command and Surveillance Solutions

In a second project successfully delivered to the Royal Thai Navy in September 2019, Thales has equipped the RTN's second Krabi-class Offshore Patrol Vessel (OPV) with a Command and Surveillance System that includes the TACTICOS combat management system at its heart.

HTMS Prachuap Khiri Khan was revealed in a launch ceremony in August in the presence of Her Royal Highness Princess Maha Chakri Sirindhorn. Final acceptance of the Thales contract was achieved in late September 2019 and the ship will strengthen the RTN's maritime border control and marine resources protection capabilities. Thales is the lead system integrator and the integrated solution includes the VARIANT surveillance radar, fire control radar and VIGILE Electronic Support Measures. Thales is also supplying the Tactical Data Links and is responsible for all integration of internal and external communication systems onboard the vessel.

The successful and on-time delivery of these two projects this year establishes Thales' position as the leading supplier to the Royal Thai Navy, equipping of 80% of RTN's fleet. In a relationship that dates back five decades, Thales first entered the naval defence market with the WM22 and LW04 radars installed onboard the Tapi class Frigates. Over the years, Thales has built local indigenous capabilities in the country, including local training and service support, as it aligns with Thailand's goal of strengthening high-end local industrial capabilities.

"We are extremely proud to celebrate fifty years of mutual cooperation with the Royal Thai Navy and to have been a continuous partner to their modernisation. The successful delivery of the Bang Rachan minehunters and the HTMS Prachuap Khiri Khan was made possible due to the close working relationships with the Royal Thai Navy and local industry. Thales affirms its commitment to strengthening local industrial capabilities in Thailand through training and technology-transfer. We look forward to a continued partnership with the Navy in the decades to come." Massimo Marinzi, Country Director, Thales in Thailand

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●● Royal Thai Navy successfully modernises its fleet

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