SATELLITE
Markets & Research

MARKET Briefs

Executive Summaries of Market Trends and Opportunities in Key Market Segments and Regions Worldwide

The Military Satellite Market

The Military Satellite Market

by Elisabeth Tweedie

Governments and militaries around the world rely on satellite communications, for defense: Intelligence, Surveillance and Reconnaissance (ISR) and for Morale, Welfare and Recreation (MWR). The US Department of Defense (DoD) alone, is the largest user of satellite capacity in the world. Usage is split between MILSATCOM (military) and COMSATCOM (commercial) satellites. In recent years usage of commercial capacity has been growing, and NSR is predicting a CAGR of almost 32% over a ten-year period to 2028, rising from consumption of 30 Gbps in 2018 to 480 Gbps in 2028. Bulk leasing will account for almost 40% of that capacity by 2028.

Key Market Drivers

One of the things causing this rise in use of COMSATCOM is the falling bandwidth prices, caused by a vast increase in supply, as a result of the advent of high throughput and very high throughput satellites (HTS and VHTS). In 2018, just two years ago, the average price per Mbps per month ranged from ~US$650 to US$850, now it's just over US$300 to US$500 and NSR is projecting a further fall to US$300-425 next year. Government and military users respond to the same commercial drivers as the commercial market does. The difference however, is that numerous other criteria, unique to these markets have to be satisfied as well.

Overall, resilience, security and agility are the key drivers; for the ground infrastructure the ability to provide multi-band, multi-orbit and multi-network capabilities are key requirements. In the words of General Colin Powell: "The ultimate goal is simple: give the battlefield commander access to all the information needed to win the war. And give it to him when he wants it and how he wants it." That statement was made in 1992. A lot has changed since then, making satisfying that goal a much more complex proposition. HTS were only a concept at that point in time, now they are commonplace and the second and third generations VHTS are being launched. Non-geostationary satellites (NGSOs) were on the drawing board for communications in the early 90s, but with the exception of Iridium, none saw commercial light of day. Now, we have a first-generation Medium Earth Orbit (MEO) constellation, O3b, with mPOWER, the second more powerful and flexible generation scheduled for launch next year. Several low earth orbit (LEO) constellations are being developed including those from One-Web, Starlink, Telesat, among others. The latter two have multiple satellites in orbit, although both of them are some time away from a commercial service launch.
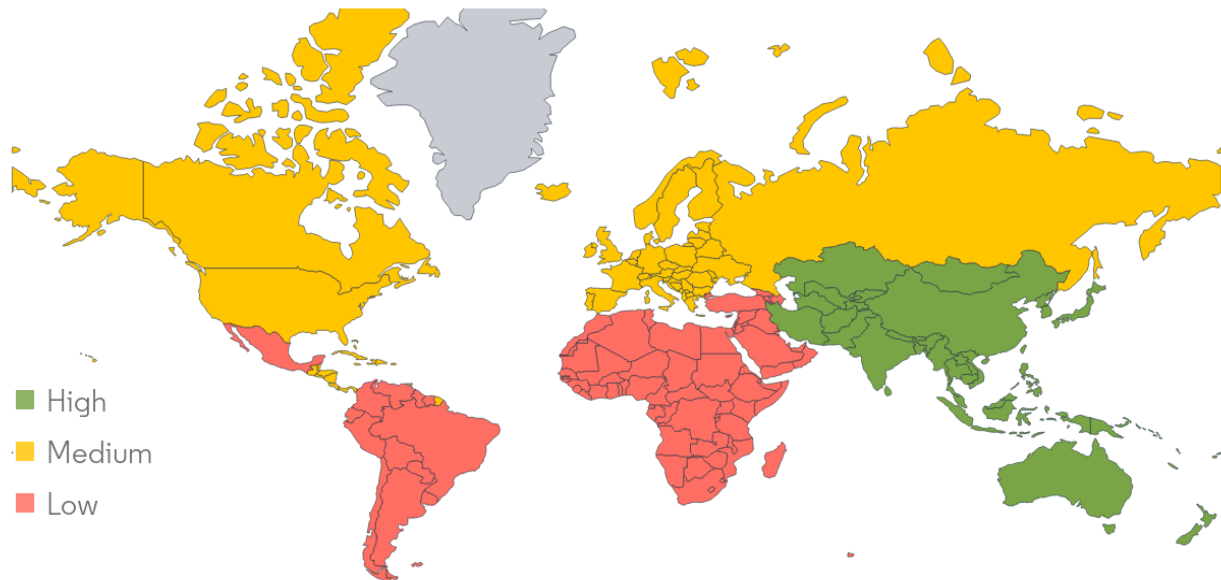
The military is also dealing with the same explosion in data as the commercial world. The proliferation of smart devices is driving the importance of mobility. The modern soldier is rapidly becoming a walking communications center, being equipped with a variety of portable and wearable devices which may include: body cameras, headsets, goggles, smart phones and watches, and sensors all of which relay critical encrypted messages and data back to base and equally as important receive information. As if that wasn't enough, military animals may also be equipped with a variety of sensors.

Videoconferencing on the move is becoming the norm and drones may be controlled from the smart phones. Couple all this with a base, that no longer changes every few days to avoid detection, but now moves every few hours, and the need for agile, resilient, secure, easy to use, always-on communications-on-the-move (COTM) and communications-on-the-pause (COTP) becomes apparent.

Information is power. Military operations are becoming more complex. A vast amount of data is generated by modern warfare equipment. Continuous data streams needed for situational awareness, for planning and executing maneuvers will come from other units, from Unmanned Aerial Vehicles (UAVs), from field communications nodes, and headquarters. This could be ISR ultra-high definition video (UHD), sensor data, and/or strategic information. This data load will only increase as information from 5G technology, machine to machine (M2M) and Internet of military things (IoMT) sensors and devices, becomes more

Military Satellite Market - Growth Rate by Region (2020 - 2025)

Legend:
- High
- Medium
- Low

Source : Mordor Intelligence

The military satellite market is projected to grow at an annual compounded rate of 6 percent through 2025 according to a report from Research and Markets. The highest growth will be from Asia-Pacific market followed by North America and Europe (*image source: Mordor Intelligence*)**.**

commonplace. Systems that offer maximum throughput and efficiency are therefore vital to enable units in the field to make informed decisions on the fly.

Changes are on-going in the air as well. UAVs continue to proliferate, and as the number of onboard cameras steadily increase so too does the quality of the video that they transmit back to base; moving from standard definition (SD) through high definition (HD) and now ultra-high definition (UHD). A briefing from Avascent showed that the total number of UAVs and the total data from those UAVs will both double in the ten-year period to 2025.

Security is important for any communications system, however, for government and military use it is paramount and additional layer or layers of security have to be built into the communications protocols, which is why take-up of new

devices and methodologies, usually lags commercial usage. Nevertheless, governments and militaries around the world, want and need access to the latest technology. As Doug Schroeder, oversight executive of the US DOD's Joint Capability Technology Demonstration, commented during a panel at Satellite 2020 in Washington DC, earlier this year: "Any user, using any terminal, anywhere to seamlessly connect to any other user, using any other terminal, anywhere." This comment was made in the context of explaining that the US DoD wants satellite operators and other companies to offer "visions of a new seamless communication system for the US military."

Governments and militaries rarely act in total isolation these days, whether cooperation comes through NATO, the Five Eyes or other alliances, these independent coalition forces need to be able to easily communicate, so that need

to "seamlessly connect to any other user" extends far beyond national boundaries. For this reason, in recent years, industry attention has been focused on multi-faceted solutions that can effortlessly switch not only between different satellites and frequency bands, but also between different orbits, whilst at the same time providing the required level of security. Being able to offer this flexibility between satellites and orbits provides several advantages:

- Using the same ground infrastructure and terminals, systems can be spread over several satellites, so preventing a total loss in the event of an accidental or deliberate service interruption.

- Similarly, this allows for the separation of MWR service from critical ISR operations.

- In the event of accidental or

deliberate loss of service, it can be quickly restored by switching to another satellite or frequency band.

One of the key requirements for any satcom system is resilience, but for government and military systems it is paramount as those systems frequently have to deal with numerous additional threats including cyberattacks, jamming and even counter-space weapons. Service restoration needs to be rapid.

The WGS certified MDM9000 Satellite Modem is a high performance, versatile modem optimized for a wide range of fixed and mobile government and defense applications over satellite.

Ease of use is also important as staff in the operational units in the field may not have telecommunications and satellite expertise therefore systems need to be foolproof and simple to use.

As always, the satellite industry loves a challenge and the key players, particularly those working in the ground segment, are rising to the occasion. Many of them, to a greater or lesser extent, offer products that support the military. Two that spring to mind are Gilat and Hughes. Gilat provides Block Upconverters (BUCs) to the US DoD. Its military portfolio also includes complete VSAT solutions that fit into a backpack. Hughes, offers Class 3 and 4 UAVs a beyond line of sight (BLoS) communications system, it also provides a way for rotary wing aircraft to transmit video and data direct to a HTS through rotating blades with no packet loss. However, one company stands out, and that is ST Engineering iDirect.

ST Engineering iDirect

The company prides itself on working closely with military end users and agencies, not only to understand their basic needs, but also how they are going to use the equipment. ST Engineering iDirect focuses on the international defense and government market serving 21 EU nations and 19 NATO member states, through its Belgium based Eu proxy. In addition, the wholly-owned subsidiary, iDirect Government, which operates independently under a proxy agreement, is the market leading provider for the US DoD.

A key element of the products available from the company is the fact that they support both sovereign or shared MILSATCOM as well as COMSATCOM, and will work with both in tandem. So a nation is free to employ a mix of capabilities, as well as managed services if this is its preference. ST Engineering iDirect's VSAT platforms are built to support satellite programs now and in the future.

It is therefore important that any ground equipment is certified to operate on key military satellites. ST Engineering iDirect has a complete portfolio of Wideband Global SATCOM (WGS) certified products, including specific versions of Evolution Defense software and hardware, which is at the heart of the solutions ST Engineering iDirect offer to governments and militaries around the world. The tactical hub and 9-Series family of modems are also certified. The MDM9000 modem, now one of the most powerful DVB-S2X modems operating on the WGS constellation is the latest ST Engineering iDirect product to receive certification. "Our latest WGS certification marks another significant milestone in our efforts

The WGS certified MDM9000 Satellite Modem is a high performance, versatile modem optimized for a wide range of fixed and mobile government and defense applications over satellite.
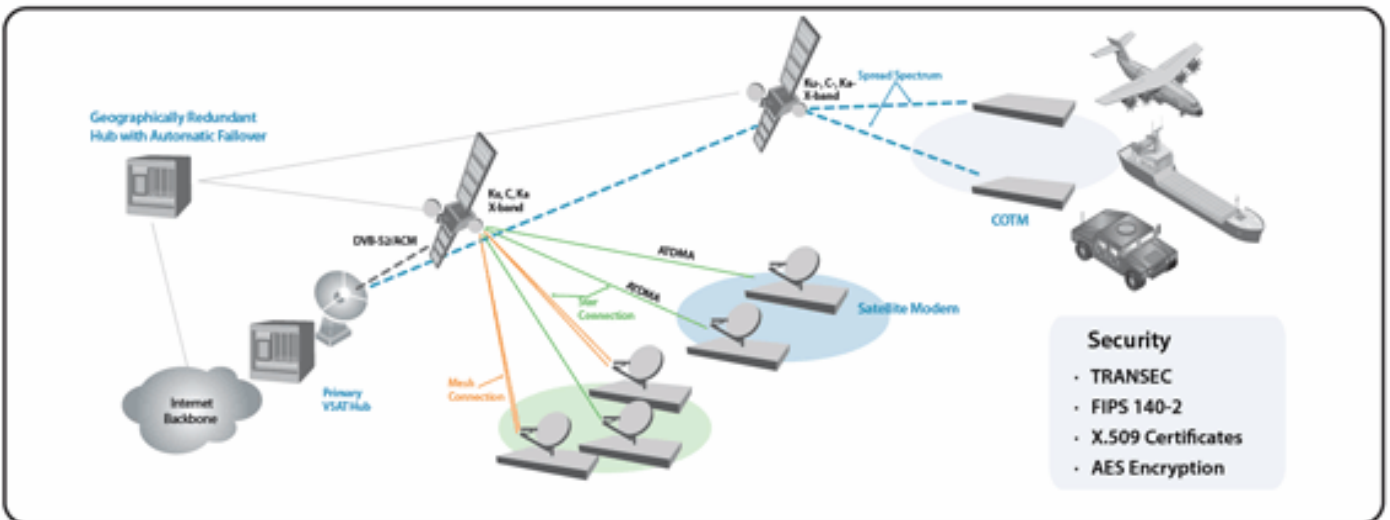
ST Engineering iDirect Evolution® Defense

ST Engineering iDirect's broadband capabilities provide secure connectivity for all voice, video and data communications and specialized applications for assured access in even the most challenging environments.

Today's military and defense organizations face the challenge of extending high-speed broadband access from strategic command centers to the front line, while maintaining the highest possible level of security to protect communications and deployed units. The more data a military can share real time between headquarters, mobile units and individual soldiers, the better equipped it is to make more accurate, informed decisions when lives are on the line.

Maintaining connectivity in a military enviroment

able, efficient and highly secure solution for any application, in any environment, fixed and mobile, across land, sea and air. The ST Engineering iDirect platform is a single, unified, IP-based satellite communications architecture that enables seamless integration with existing infrastructure and allows for interoperability and communication with all IP-based devices and friendly forces' networks.

The Evolution® Defense product line consists of a flexible, universal hub and line card system that can support Ku-, C-, Ka- and X-bands, as well as multiple topologies and applications, and can connect to up to five satellites. Our satellite modems are engineered with versatile functionality and varying form factors to meet unique military application needs and industry-specif-

A single hub can support a diverse range of secure defense applications, spanning multiple satellites, topologies and geographies.

requires a network that can be rapidly set up and scaled without distance or terrain restrictions, and managed from a centralized location. From a state-of-the-art mobile operations center, commanders can utilize advanced IP Satellite networks to monitor troop locations, gather intelligence, communicate tactical plans and advantageously allocate resources in the field.

The ST Engineering iDirect Satellite Solution

ST Engineering iDirect's defense product line and ready-to-access functionality delivers a reli-

ic industrialized and security requirements. And fully integrated operating and management software allows military and defense organizations to centrally monitor, configure and control the entire satellite network.

Mission Critical Reliability and Efficiency

ST Engineering iDirect's Evolution Defense platform is designed for large outbound channels and produces major gains in data throughput. It's combined with Adaptive Coding and Modulation (ACM), which enables each satellite remote to

maximize efficiency and availability by continually evaluating signal strength based on local weather and spectrum conditions to preserve throughput.

Network Architecture

In addition, ST Engineering iDirect's modular hub architecture offers multi-channel demodulation line cards, which can be software activated to support up to sixteen return channels. This reduces hardware costs and maximizes chassis space, both of which are important to militaries with tight operating budgets and the need for flexible communications solutions.

As militaries share mission critical information, it's imperative that any site on a network has sufficient bandwidth at every moment. Our platform is a shared, two-way Time Division Multiple Access (TDMA) system built to dynamically allocate bandwidth from a shared pool based on real-time usage requirements.

To guarantee military organizations assured access to critical information, our Group Quality of Service (GQoS) technology prioritizes bandwidth efficiently across different needs, ranging from welfare services to intelligence data to real-time tactical updates in the field, all over one network.

Military-Grade Security

Network security is always a top priority for military operations, requiring the content, location, type and amount of information sent to be highly protected.

The Evolution Defense platform is compliant with the highest security standards such as TRANSEC and FIPS and can operate at multiple security levels from welfare to intelligence information exchange.

Using FIPS 140-2 Level 3 certified encryption, 256-bit keyed AES encryption and built in security features, ST Engineering iDirect ensures that the content and size of all user and network link layer traffic is completely undetectable to adversaries.

ST Engineering iDirect ensures that the content and size of all user and network link layer traffic is completely undetectable to adversaries.

Mobility Applications

Militaries operate in multiple and diverse locations for indefinite periods of time. As units move between deployments, their communications networks must follow them. Vehicles must be fully broadband-enabled in order to provide effective communications between central command and deployed units. On an individual level, soldiers who stay connected while on the move behind enemy lines have access to updated threat analysis, receive critical command data and troop updates, and benefit from telemedicine applications that can help save lives.

ST Engineering iDirect's defense product line can extend a broadband platform to vehicles, aircraft or maritime vessels. Their platform utilizes a spread spectrum waveform technology that enables the use of small antennas necessary for COTM applications, and reduces the risk of interference to adjacent satellites by spreading out bandwidth and power.

Network Management

To ensure that militaries can easily configure and manage all of their fixed and mobile network deployments, ST Engineering iDirect's iVantage (NMS) allows centralized control from a single location and makes it easy for non-technical personnel to quickly deploy new sites in the field.

As mobile remotes move between networks on various transponders and satellites, ST Engineering iDirect's Global NMS enables military organizations to monitor the health and location of all their deployed remotes, identify and fix performance degradation, and troubleshoot any situation that may arise.

ST Engineering iDirect's product portfolio combines innovative technology and solutions to support all your networking requirements for bandwidth, location, satellite frequency, topology or application, in any environment, fixed and mobile.

Koen Willems, Head of International Government and Defense Strategy-ST Engineering iDirect

The Defense market has always been a big user of satellite and their networks are becoming increasingly complex. At the same time, the satellite world is also undergoing change. How will these innovations enable Defense organizations to be more effective in their communications?

The question here indeed is whether the digital revolution and the space 2.0 technology initiatives for both the commercial satcom world and the defense market requirements are aligned. The commercial satellite sector is a critical source of bandwidth, technology, products and services for defense organizations that are looking for high performance, efficiency and access to ground infrastructure that supports multiple waveforms and software-defined networks for dynamic capacity allocation. However, as the commercial satellite industry undergoes immense transformation—becoming more complex with new innovations such as very high throughput satellites (VHTS), LEO/MEO/GEO/HEO and new constellations—defense and government organizations will need to plan for their next-generation, future-proof, multi-service, multi-layered network to ensure an operational advantage in the coming years.

Defense networks are also becoming more complex due to dispersed operations. This results in different requirements where everything needs to be connected including smaller troops or assets that are on-the-move. All requirements, such as throughput and security, need to be supported by one single platform with a flexible hub that has access to multiple satellites and mediums of transmission. For example, Morale Welfare and Recreation (MWR) may prioritize higher data speeds and bandwidth efficiency and may not need military-grade security that other applications require.

The defense sector is looking carefully at all the evolutions that are happening in terms of multi-orbit constellations and 5G and how they can best employ them whilst meeting their security and resiliency needs. Today, hybrid networks already provide extra reliability by combining satellite and 4G/LTE networks and intelligent routing. A signal will simply travel over a satellite or a terrestrial link. It doesn't matter which one because it will use the method that is the most appropriate and reliable at the time.

There are conversations happening on 5G and edge computing. Edge computing offers a lot of benefits for defense users, for example, as traffic does not need to be transported back to HQ so there is no longer the risk that the traffic may be intercepted and compromised. There's also a benefit in terms of latency as the signal doesn't have as far to travel as everything is done locally.

Koen Willems

Defense agencies have the opportunity to harness all of these innovations to ensure operational advantage at all times These innovations must all be in tune with the stringent requirements for military networks that want their information faster, better and more secured.

What are the most notable trends that you see in terms of satellite communications in the defense sector?

The first trend would have to be sensor technology, such as the Connected Soldier. Today, warfighters are wearing smart vests, bodycams and smart devices to run diagnostics on their health or physical status in training or during operations and providing real-time situational awareness and sharing information with headquarters or other assets in theatre. Technologies such as IoT, M2M, 5G, IA, Big Data and bandwidth hungry ISR sensors are finding in-routes towards multiple military applications and

are resulting in a surge in capacity demand as all information gleaned by these technologies must be fed back to HQ and to other assets in theater to give the bigger picture. These live feeds significantly aid situational awareness. Use of IoT on connected vehicles, for example, can signal a breakdown of components which will enable the vehicle to be repaired quickly and operational again.

Changing security threats are also resulting in more resilient and secure networks. Operations are happening on a global basis today with multiple nations on joint operations. The networks that serve them must be highly secure and resilient due to cyber threats and the desire of adversaries to disrupt the supply chain.

There is an increased amount of On-The-Move (OTM) and On-The-Pause (OTP) applications that trigger demand for Size, Weight and Power (SWaP), Flat Panel Antennas (FPAs) and technology that provides seamless, high throughput communications to these satellite terminals on land, sea or in the air. This need for advanced mobility also brings with it its own challenges in terms of the speed at which vehicles or vessels or aircraft move and the blockage of signals. Linked with this is the increased usage of unmanned and autonomous systems for many types of applications from mine hunting to ISR.

The military market is also increasingly investigating how the new satellite constellations in different orbits and HTS will improve their operations. There's also discussion on 5G and how that will be used. It will be very useful for IoT and M2M, but what challenges does it pose in terms of security and resilience? Lots of technology is being evaluated and will eventually find its way to the field of operation.

Can you tell us more about how ST Engineering iDirect approaches the issue of security and resiliency within the defense sector?

Our platform is built around a multi-layered security and resiliency approach which encompasses a lot of aspects. The end user requires seamless operations, maximum Quality of Experience (QoE) and information assurance. There are a lot of threat factors that must be addressed such as jamming,

"...defense and government organizations will need to plan for their next-generation, future-proof, multi-service, multi-layered network to ensure an operational advantage in the coming years..."

interference, cyberattack, both physical and cyber gateway attacks. Our multi-layered approach, which combines a variety of technologies, standards and procedures allows the military service provider to detect, mitigate, protect and prevent, achieving seamless always-on networks protected against an increasing amount of threat vectors.

For interference detection, a network management system, spectrum monitoring and geolocation services can identify and mitigate potential threats. Our Glowlink signal management and monitoring product line enables them to detect, locate, and remove satellite interference to improve the quality and integrity of satellite communications. A spectrum monitoring solution can further detect any anomalies by pooling together bandwidth and comparing current conditions against a defined carrier plan. Geolocation can determine the latitude and longitude of an interfering signal and provide actionable intelligence by isolating and characterizing the source of interference.

When a security threat occurs, a proper mitigation response is needed. Signal excision technology and network diversity can help users swiftly leverage another network capacity to ensure persistent communications. Our CISR™ technology cuts away interference to provide a clear signal. We also provide network diversity by re-routing traffic to another satellite if one becomes jammed.

For prevention of future security breaches, transmission security (TRANSEC) and information assurance capabilities can ensure that systems remain resilient. TRANSEC technology keeps communications, and ultimately military operations, safe and secure as they transmit sensitive data over the airwaves.

Finally, prediction of future interferences and threats can be done by evaluating and understanding network activities, looking at historical data and

ensuring rapid response to adjust for any inconsistencies.

This is an integrated approach which is multi-layered and where all technologies and procedures work together to create the highest level of security and resilience.

What impact has the COVID-19 pandemic had on government and defense sector and on the demand for your technology in this market?

On the one hand, the defense sector has long-term and resilient budgets for long-term plans. There were some immediate needs from the market as military forces were widely deployed to build hospitals, distribute goods and generally support civil resilience efforts to combat COVID-19. So, we have seen demand for programs for COVID-19 mitigation and for welfare and first responders and an increase in network requirements next to long-term programs. As yet, we have seen few impacts on defense budgets.

On the other hand, we expect that future impact on defense budgets might come from the debts incurred in supporting healthcare systems and damaged industries. Budgets are unlikely to be immune from cuts in the coming years as they will be reallocated to fund recovery initiatives. Defense industries have been confronted with the impact of the lockdowns and other measures that have presented challenges such as supply chain disruptions and infections of critical staff.

At ST Engineering iDirect we have seen an uptake in demand for emergency services and first responder networks to counter the first waves of the pandemic. Countries are building crisis networks to manage the different healthcare, education and first responder demands for bandwidth. Next to that, welfare programs have upgraded their networks to accommodate defense personnel that also need to work from home or are stuck abroad due to travel bans or are in quarantine or that cannot return home because missions are prolonged. Due to the scalability and flexibility of our platforms, service providers have been able to respond rapidly to changing demands and to re-purpose networks to fulfil demand for distance education networks for example. Our multi-service platform allows our service providers to respond quickly to these types of events.

Next to the growth of emergency networks, there has also been a demand for resiliency and security technology as cybersecurity and cyber protection have become indispensable to protect medical records, secure corporate and government networks with people working from home or seeking emergency information.

What are the next innovations for OTM and OTP applications that will immediately impact the efficiency of defense operations?

OTM and OTP terminals have their own distinct challenges as they are mounted on vessels, vehicles or aircrafts or need to be carried around in harsh conditions. The defense sector is increasingly using smaller terminals, whether they are flat panel or parabolic. The question is how small the terminal manufacturers can go to make them easier to transport.

With the decrease of the terminal size also comes the requirement to host higher throughput services and provide seamless communications to the deployed military end-users. The efficiency of both antennas and modems have evolved over time and technologies are now in place to provide double the throughput compared to legacy technology.

We are well used to enabling small terminals. Our modems and platforms already offer the efficiency and throughput required to support these small terminals. Our multi-service platform allows our service provider customers to offer global connectivity with a seamless user experience as our modems can automatically switch from one beam to the next.

We are investing in the design of compact OEM boards that can be installed in small or flat panel terminals taking the SWaP requirements into consideration in order to provide easier transport, better form fit and longer autonomy to improve the efficiency of the operation.

to deliver military-grade communications solutions which can provide the bandwidth, flexibility and security required by global militaries to carry out missions successfully and reliably," said Koen Willems, Head of International Government and Defense Strategy at ST Engineering iDirect. "We are proud that the modem has passed the stringent evaluation and testing of the certification process and

abling seamless integration with existing infrastructure and interoperability with all IP-based devices and friendly forces' networks.

The Evolution® Defense product line features flexible hubs and line cards, versatile satellite modems, and advanced communications technologies. The Universal Hub can support multiple networks on

to provide mobility: being able to follow a foot soldier, a moving vehicle or an airborne asset is of upmost importance. Vehicles need to be equipped with broadband, and the connected soldier on the move, needs to have continuous access to updated threat analysis and troop movements, and also, if necessary, be able to utilize telemedicine applications. Equally important is

can join our vast portfolio of accredited government and defense solutions."

As already mentioned the key requirements for government and military communications systems are: agility, security and resilience. At the same time, these systems need to be easy to use, as most remote units don't include trained satellite engineers. These criteria represent the keystone of all ST Engineering iDirect's products for military and government users.

Agility

ST Engineering iDirect's solutions for the government and military markets are based around a single unified IP-based satellite communications architecture, en-

up to 20 line cards, while the compact Tactical Hub is ideal in mobile environments. When paired with the receive Defense Line Card (DLC-R), the 9-Series modems can reach up to 29 Msps on a single carrier for tremendous Adaptive TDMA performance. This allows support for bandwidth-intensive applications such as ISR.

For effective bandwidth management, the Group Quality of Service (GQoS) provides a comprehensive set of powerful, state-of-the-art features that bring dimensions and options for traffic configuration and prioritization in a shared network. This can span multiple applications, remotes and even sub-networks.

Military systems must be able

the information that is being transmitted back to base from troops on the move.

Similarly, airborne assets need to be constantly connected as they move across and between satellite footprints. All this has to happen automatically without any human intervention, and the built-in Automatic Beam Switching (ABS) integral to ST Engineering iDirect's equipment, enables this by determining the precise moment to redirect antennas and allow connectivity to be assigned to the most appropriate satellite beam.

If it is necessary the whole system can be made into a compact, portable communications system that can be carried into the field by an individual, or installed onto

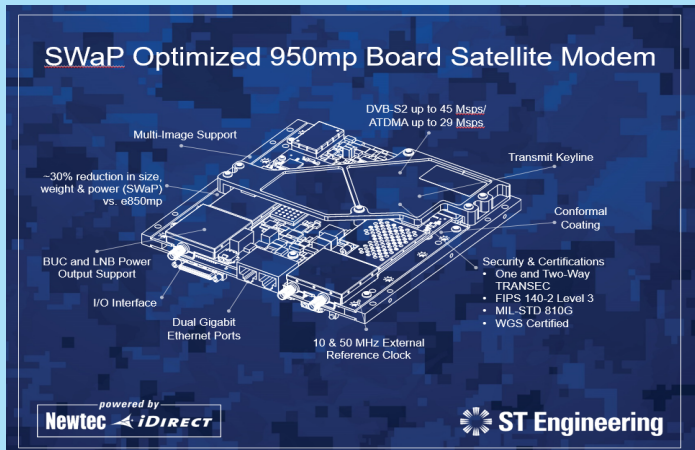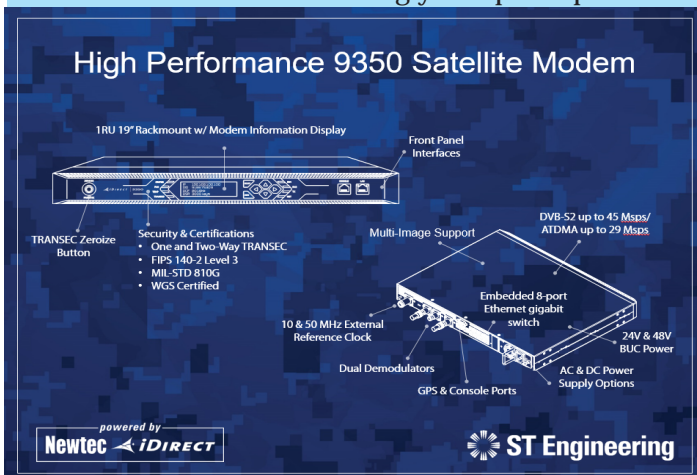# Building a Defense VSAT Network for the Egyptian MOD

The Challenge

The Egyptian Ministry of Defense (MoD), which manages the Egyptian Armed Forces, sought to build a new defense VSAT network that was reliable, secure, and could support a broad range of both fixed and mobile applications.

Just like the majority of the defense agencies, they needed a communications solutions that can handle increasingly complex operations. More and more defense agencies require support for more bandwidth-intensive applications such as Intelligence, Surveillance, Reconnaissance (ISR) as well as new emerging use cases such as the connected solider and the Internet of Military Things (IoMT). As global operations also grow more dispersed, defense users need persistent connectivity no matter where they are—whether that's a remote outpost, an aircraft, a maritime vessel, an on-the-move vehicle, or all of the above.

Defense users expect their mission-critical communications to work—quickly, securely and easily. They need a network that lets them share sensitive and classified data—whether that's sensor data, video feeds, voice or more—to better coordinate resources and to build a common operating picture. Resilient networks that are available no matter what are key—whether on the move, on the pause, at sea, in the air, under cyber-attack or more.

On the battlefield, communications platforms must adhere to size, weight and power (SWaP) requirements, as satellite terminals need to be transported and sometimes carried into conflict areas. As such, terminals must also be quick and easy to deploy. A platform that can handle these increasingly complex operations

SWaP Optimized 950mp Board Satellite Modem

High Performance 9350 Satellite Modem

is ST Engineering iDirect's Evolution Defense platform.

The Solution

The Egyptian MoD primarily selected the Evolution Defense platform for its scalable and flexible hub solution to respond to multiple requirements. Additionally they needed a platform that had high security standards. ST Engineering iDirect was already the incumbent within the top government agencies and was the market leader among VSAT service providers in Egypt, which facilitated interoperability across agencies.

A key feature is ST Engineering iDirect's TRANSEC capability, which is built into its defense-grade product line and exceeds the requirements set by the Egyptian MoD. Other competitors require a third-party box. ST Engineering iDirect's TRANSEC encrypts everything from layer 2, data-link layer, and above and adds an extra layer of encryption on top of that. Both one-way and two-way TRANSEC is included.

On the remote side, the 9-Series modems were also a key consideration. The Egyptian MoD equipped their naval ships with 9350 modems, which is designed for high-bandwidth, mobility applications. The SWaP-optimized 950mp is used for troops on the move for its compact size, ease of portability, and low-power requirements.

The Egyptian MoD continues to expand their ST Engineering iDirect network to provide reliable and secure satellite connectivity to their armed forces for mission-critical communications.

aeronautical vehicles. Hubs, line cards and remotes are hardened for transport and use in harsh environments. The system uses power-saving features to ensure long battery life by only turning on the amplifier when transmitting. At the same time size, weight and power (SWaP) considerations are taken into account so as to be able to provide easier transportation and better form fit.

Spread spectrum technology allows the use of the small antennas needed for COTM and reduces the chance of interference to adjacent satellites by spreading out bandwidth and power.

Security

Obviously, end-to-end security is paramount for military operations, everything including the location, type and amount of information and of course content needs to be highly protected. ST Engineering iDirect is proud their wholly owned subsidiary iDirect Governemnt was awarded the Top Cybersecurity Solution Award from the Mobile Satellite Users Association for its transmission security, TRANSEC, which is one of the most user-friendly security systems currently available. TRANSEC is part of the Defense-in-Depth solution offered by ST Engineering iDirect. Defense-in-Depth brings together many strategies to mitigate threats by presenting multiple obstacles to potential hackers.

Other parts of ST Engineering iDirect's Defense-in-Depth solution include compliance with the Federal Information Processing Standard (FIPS) 140-2 Level 3 certified encryption, and 256-bit Advanced Encryption Standard (AES). Different levels are required depending on what is being

Vehicles need to be equipped with broadband to have continuous access to updated threat analysis and troop movements. Pictured here is an armored vehicle equipped with the latest connectivity equipment.

transmitted, and the Evolution® platform can simultaneously operate at multiple security levels as needed. At the highest level the size and content of all user and network link layer traffic is completely undetectable to adversaries.

Evolution® remote software includes SHIELD remote protection. SHIELD is a service where information assurance (IA) scans are conducted to evaluate a device for vulnerabilities that hackers could use to access a system or network. The user is then provided a Remote Security Bulletin (RSB) to implement in order to mitigate these risks. This feature is available on all 9-Series satellite modems including airborne variants.

Resilience

Redundant hub and line card configurations and geo-redundant operations options, enable the sys-

tem to perform critical failover in the event of an incident occurring at the teleport or hub, thereby ensuring maximum redundancy and increased reliability.

Interference is a known and increasing problem in satcom, whether intentional or accidental the damage can be profound. With the increasing numbers of NGOs it is inevitable that not only the number of interference and jamming events will increase, but so will the complexity of tracking them down and taking appropriate mitigating steps. ST Engineering iDirect's Glowlink Product Line provides a number of technologies to deal with this issue. Firstly, it has an industry-leading geolocation solution, allowing the location of inappropriate signals wherever they originate, secondly, it has a signal monitoring system enabling teleport operators to keep track of multiple signals simultaneous-

ly. And most importantly it has a signal excision technology known as Communication Signal Interference Removal (CSIR™). CSIR can identify and remove the source of interference without the need for additional bandwidth. Traditional anti-jamming products rely on spread spectrum and therefore require a significant amount of additional bandwidth to remove even the smallest jamming signal. Frequently in military environments that additional bandwidth simply isn't available. ST Engineering iDirect has both a stand-alone CSIR product that can work with any modem, and a built-in version incorporated into its 9-series modems. CSIR can mitigate interference from a variety of sources, with no added complexity for system operators.

CSIR is designed to effectively mitigate a wide range of interferers from continuous wave (CW) to multiple strong interferers, without requiring any prior information on those interferers. The product can mitigate unknown interference in a variety of scenarios with zero added complexity for anyone on staff or, as mentioned, additional bandwidth requirements.

Ease of Use

In order to keep the system easy to use, ST Engineering iDirect's iVantage Network Management System (NMS) allows centralized control from a single location and makes it easy for non-technical users to quickly deploy new sites in the field. As remotes move between satellites and transponders, the Global NMS enables military organizations to monitor the location and performance of all remotes and when necessary correct performance degradation and

troubleshoot and if appropriate perform a seamless switchover to a backup network in a matter of minutes.

Impact of Covid-19

The Government and Military satellite communications market, unlike many other sectors, is in the fortunate position of being relatively unscathed by Covid-19. If anything, short-term demand has increased, as governments around the world scramble to provide additional capacity to support the requirements arising from the provision of new telemedicine services and temporary medical facilities being built to deal with Covid-19 infections. According to a recent survey conducted by NSR, Government and Military was one of the market segments least likely to suffer as a result of Covid-19 and may in fact even see a positive impact. In many cases, Non-governmental organizations (NGOs) and governments alike have had an immediate, but short-term need for communications, which the satellite industry has been quick to respond to. For example, in order to help in the Piedmont region in Italy, which was one of the worst hit regions in the first wave

of Covid-19 in Europe, SES, Gov-Sat and the Luxembourg Department of Defense, came together to provide an end-to-end network for real time transmission of data from Covid-19 tests. Being able to transmit the tests and receive the results so quickly, enabled medical workers who tested negative to be able to carry on working.

Similarly, SES working with the Mexican government was able to deploy a telemedicine network to connect 35 public hospitals in less than three weeks.

Another example of the satellite industry helping government and military alike, is the way Telenor has responded. As part of its normal operations, Telenor works with the Norwegian Armed Forces Cyber Defense Division, sharing expertise and resources to safeguard national security and emergency preparedness. In addition to this, in response to the crisis, Telenor stepped up to invest 15% of its revenue into infrastructure and network stability.

Whether for military, government or emergency needs, the world can count on the satellite industry to be there.

"...Whether for military, government or emergency needs, the world can count on the satellite industry to be there. ..."

Elisabeth Tweedie is Associate Editor of the Satellite Executive Briefing has over 20 years experience at the cutting edge of new commmunications entertainment technologies. She is the founder and President of Definitive Direction (www.definitivedirection. com), a consultancy that focuses on researching and evaluating the long-term potential for new ventures, initiating their development, and identifying and developing appropriate alliances. She can be reached at: etweedie@definitivedirection.com