

Gaining an operational edge: why satcom leverage lies in a layered approach ●●

Satellite communications (satcoms) are increasingly critical for global security, prosperity, and competitiveness amongst nations. They've become a priceless tool for defence, security, humanitarian and emergency response, and diplomatic communications. It is of paramount importance for any national defence or multi-national government satcom strategy to take into consideration the innovations happening in space and on the ground to ensure an operational edge.

Koen Willems, Head of Global Government Market Development and Strategy at ST Engineering iDirect

Global defence agencies are well aware of the role satcoms have to play in their strategy, now and into the future. In 2020, the US Army said it was interested in buying satellite-based communications services to improve the performance of its logistics system. It was "conducting market research to better understand how commercially managed satellite communications services might support its logistics network modernization effort."

Likewise, the UK government is spending £5 billion on upgrading the country's Skynet satellite communications capability, which provides strategic communication services to the UK Armed Forces and allies. Additionally, in February 2022, EU commissioner Breton presented a €6 billion plan for secure satellite communications to protect key communications services and surveillance data. The aim is to develop a multi-orbital space-based connectivity system that will extend the availability of these services and to increase the European autonomy so that it need not depend on non-EU based industry.

The ground is ripe for next-gen military networks

For defence agencies, gaining an operational advantage is a critical objective. Satcoms is one of the best and most reliable ways to establish communication links, often in remote and austere locations. For this reason, defence agencies have always relied on satellite technology. This dependence will only continue to grow as military operations become more complex. From strategic communications to intelligence gathering, surveillance and tracking, satellite is essential for connectivity needs across land, air, and sea.

As nations look to build satellite networks or replace decommissioned satellites, new programs provide the opportunity to adopt the latest satellite and ground segment technologies and to find the right mix of capacity types to give them the operational advantage needed for successful missions. Building coverage and network diversity while guaranteeing the latest military-grade security standards offers nations a high level of redundancy, flexibility, and security to meet the needs of a multi-layered, secure, and resilient next-generation defence network.

Advanced security standards, specialized enclosures, national waveforms, and other improvements have been created for defence organizations to better transform their operations. The commercial satellite sector has also undergone an immense transformation, with highly efficient waveforms for greater performance, very high throughput satellites (VHTS), new non-



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geostationary (NGSO) constellations, network integration across access technologies, and other key innovations.

Defence agencies must harness all these innovations to always ensure the operational advantage. They must plan now for their next-generation, multi-layered security and resiliency network that will guarantee success in their most critical operations.

Building a successful, flexible, multi-layered, secure, and resilient network

When looking for the ideal platform, defence and government organizations should consider the following key requirements that are critical to building a secure multi-layered network.

Firstly, when discussing coverage, military network operators must consider whether that network coverage is dynamic enough to meet the diverse needs of their regional and global deployments. For example, a military organization might want to separate secure military capacity for operations with commercial capacity for morale, welfare, and recreation connectivity; and may want to use a mixture of commercial and military satellites to do so. The ideal platform – like a centrally managed VSAT (Very Small Aperture Terminal) platform – would be able to handle a dispersed operation's network complexity and allow military network operators to customize their connectivity networks to meet their varying requirements.

Secondly, providing maximum performance and efficiency for information superiority is key. Information superiority can determine success or failure in military operations. The masses of data sent back and forth across networks mean bandwidth optimization is crucial. Throughput and efficiency must be maximized. Ensuring satellite and ground segment technologies work hand in hand, an innovative VSAT platform can ensure ongoing adaptability to changing environments and help achieve higher spectral efficiency as well as throughput at maximum service availability.

Agility is no doubt a word familiar to officers involved in defence operations. Military leaders want better, quicker, more detailed, and continuous information to make informed decisions, manoeuvre more swiftly, and always gain the tactical upper hand.

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An agile network is formed by combining network performance with flexibility. Software-defined modems, for example, can increase flexibility by supporting over-the-air upgrades, seamless compatibility for new capabilities and easy configuration for operations. Software-defined networks will be key as innovation on the ground enables more capability to leverage network orchestration, virtualization, and slicing functions to offer a truly smooth connectivity service anywhere in the world.

We also need to guarantee security and resiliency. In a military satellite network, link security is no longer the sole point of focus. Security systems will detect, mitigate, prevent, and predict the mix of threats that could hamper operations. As such, a multi-layered security approach using multiple security technology layers should be adopted to achieve the highest information assurance.

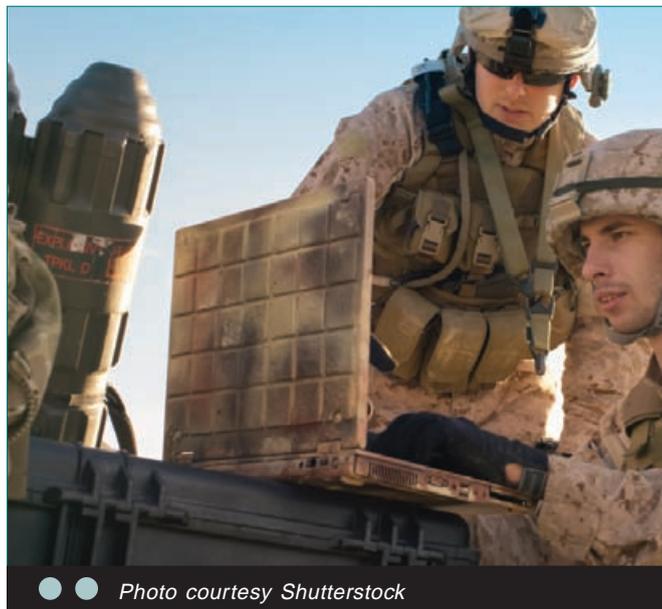
Ease of use must also be considered – expertise for satellite communications is becoming less common among military agencies in several nations, and not every operation can afford to send a satellite communications engineer on every deployment. Yet, with each layer of complexity, the VSAT networks that many military organizations are building can be susceptible to increased risks of security breaches or mistakes. A quick to deploy, simple to use VSAT terminal can allow for military personnel to focus on their core operational tasks more quickly.

Finally, as intelligence and information sharing across government organizations is often essential, interoperability is a key enabler for the conduct of effective, collaborative, multiservice military operations across a wide range of scenarios. One such example is using the same military waveform, such as the European Protected Waveform (EPW). The EPW initiative is the ST Engineering iDirect Europe-led consortium for EDF2021 (European Defence Fund) where 19 companies from 11 EU countries have engaged in developing a secure, agile, and efficient waveform for military applications.

Breaking new ground

It's clear that a successful satcom strategy is not only dependent on technological capabilities in the sky, but also the innovation on the ground. That's why New Ground, an industry movement spearheaded by ST Engineering iDirect, aims to highlight the critical and unifying role of the ground segment in NewSpace and satellite's future in a much broader connectivity landscape.

Agencies face a growing complexity as government satellite networks are required to support increasingly dispersed and complex operations, across geographies and various terrains, be it on land, air, or sea. With the upcoming wave of technology innovations and the convergence of the terrestrial and satellite



● ● Photo courtesy Shutterstock

ecosystems, nations can build next-generation networks. Standardization, virtualization, and orchestration are critical IT advances that will improve the speed, scale, cost, and flexibility of service delivery. We are seeing a convergence of space, cloud, service, and user layers with the ground segment serving as the enabler and the unifier.

All this innovation and New Ground technology converges into the upcoming Pooling and Sharing initiatives, which will be based on new architectures to allow for easy interfacing between the different network elements as well as interoperability and the flexibility to groom and distribute value added services over multi-orbit satellite constellations.

These types of centrally managed software defined networks cater to quick deployment and scaling and have an inherent cyber element to secure the network. Additional security layers come from network diversity, secure waveforms such as the EPW (European Protected Waveform), and increased resiliency capabilities. As traditional service delivery moves more towards cloud-based, automated service delivery, we must ensure that security is not impacted.

The integration of satellite into core cloud ecosystems - both private and public - brings built-in benefits such as high security and access to new services via a harmonized method for orchestrating assets' functions and onboarding new missions more easily. This also reinforces the multi-layered security approach to detect, mitigate, prevent, and predict interferences and threats.

A unified approach

To effectively deal with both established and emerging threats, the satcom industry must leverage commercial partnerships to ensure the successful and timely delivery of satcom-based systems. Emphasis must also be placed on the enablement of allied space activities to create a strong and unified approach.

The requirements for building a multi-layered, secure, and resilient network, coupled with the innovations that are happening on the ground and in NewSpace enable a fortified satcoms approach for the armed forces, defence, and government agencies. However, military network operators must look for an ideal platform that adopts these technologies and combines flexibility, performance, efficiency, security, agility, and ease of use in order to give them the operational advantage needed for successful missions.

Read our whitepaper, *Gaining Operational Advantage Through Innovation MilSatCom Networks*, to learn more about how military organizations can build a multi-layered, secure and resilient network: https://www.idirect.net/wp-content/uploads/2021/03/Whitepaper_Gaining-Operational-Advantage.pdf **GMC**



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