



WELL CONNECTED

Tristan Wood explores the power of hybrid networking and how it can underpin robust wide area networks across all arms and services — from land, sea and air

Defence technology is often a trailblazer for civil systems and applications, and innovation in voice and data communications is no exception. As early as the mid-Eighties, the electronic distribution, sharing and storage of encrypted battlefield data between brigades, divisions and corps headquarters in the British Army of the Rhine (BAOR) was in many ways a rudimentary form of the internet. If an infantry or armoured brigade's tactical headquarters were to be destroyed, the data was resident and shared elsewhere on the 'network'. As national armies innovate with technology to seize and hold the military advantage, the boundaries of possibility are constantly being pushed.

One thing which hasn't changed is the importance of communicating on the move (COTM). Whether on land, sea or in the air, COTM relies on the most robust

connectivity solutions to enable rapid information exchange, situational awareness and ISR (intelligence, surveillance and reconnaissance) to allow for seamless command and control, and to ensure human safety.

This has ushered in a new era of satellite communication on the move (SOTM), enabling secure messaging, voice and information exchange, including the emergence of the military internet of things, Mlot.

Today's battlefield is not just about decisional information, it has extended to machines and sensors which talk to each other within a wide range of communication networks, from cellular to secure point-to-point systems.

Within less than a decade, Mlot technology will enable soldiers carrying a pocket-sized device to locate and identify everyone in their vicinity, even in pitch darkness, so important is situational awareness in the chaos of battle. Nor is this limited to the army; air and naval systems will depend on robust connectivity across

an exponentially growing number of devices and nodes. Predictive maintenance systems deployed on assault and utility helicopters, naval destroyers and combat aircraft will rely on communication with their digital twins, as will connectivity underpin the rapid growth in autonomous systems at sea and in the air.

Resilient connectivity will support 24/7 automated protective oversight of sensitive locations, being borders, clearance stations for fuel and explosives and forward logistics bases. Meanwhile, connected battlefield health telemedicine systems will enable soldier-worn body sensors to send vital data to field hospitals and medical facilities receiving real-time updates on those in the field or in triage, matched with a soldier's stored medical records.

None of these applications will endure in the face of adversaries' attempts to weaken a force without the guarantee of a wide area network capable of withstanding the disruption of lost connections and damage to nodes.

The solution lies in hybrid connectivity, deploying the resources of the full spectrum of communications infrastructure to avoid reliance on single points of failure and maximise available resources to ensure always-on, intelligent connectivity wherever and whenever it is needed. Hybrid can also sit at the heart of interoperability, between legacy and new technologies, as too with seamless communication between allied forces with different tactical military communication systems and infrastructure.

The concept of agnostically making use of any network, based on location, quality and even cost of service, should dramatically reduce the impact of the problem, and yet awareness and application of 'bonding' technology, or 'true' hybrid connectivity, is nowhere near where it needs to be as machines, people and battlespace demand ever faster 'always-on' connectivity.

The capacity for selective use of satellite networks, alongside the ability to combine this with the power of all other available networks lies at the heart of hybrid connectivity, and the many advantages it can offer.

A key benefit which hybrid connectivity brings to battlespace is its ability to bolster resilience to physical and cyber attack. By combining the resources across the full spectrum of available channels on a wide area network, (WAN) including satellite, hybrid connectivity mitigates against single-point failures and ensures continuity of operations even in the face of persistent interference and disruptions caused by adversaries.

At the core of hybrid is SD-WAN - a technology that uses software-defined networking concepts to distribute network traffic across the WAN. This architecture creates a virtual overlay that bonds underlying private or public WAN connections, such as Multiprotocol Label Switching (MPLS), internet broadband, fibre, LTE, 5G cellular or wireless. As a result, hybrid SD-WAN networking can agnostically combine and transition between these networks. Instead of relying on failover using classic routing techniques — which replaces one bearer with another — hybrid SD-WAN bonds all available connections into a single, seamless and heterogenous 'pipe'. Applying this technique to connectivity on the move, where the availability and characteristics of networks change

rapidly, a hybrid solution overcomes the challenges of intermittent connectivity, poor performance and resultant difficulty in scaling.

With hybrid, multiple network technologies are engineered to work seamlessly together and share the load and resources, performing according to any range of preconditions programmed into the underlying architecture. In this way, it can deliver a faster and, crucially, more reliable service, as outlined in Livewire Digital's White Paper, The Future is Hybrid Connectivity.

In civilian settings, bonding and optimisation of communication paths within a hybrid network are enabling drones to deliver live low-latency video

ROBUST CONNECTIVITY WILL BE REQUIRED FOR A GROWING NUMBER OF DEVICES AND NODES

and advanced 3D world sensing & mapping data. This is already being deployed with great success in the policing and first responder markets, from the management of serious incidents involving multiple agencies to the provision of emergency telehealth, deploying remote diagnostics and supervisory support from hospital-based doctors and other specialists right down to the roadside.

A technology that can seamlessly combine multiple networks, such as 4G, 5G, Wi-Fi, GEO and LEO satellite connections, into one fast, secure and highly resilient service is a 'true hybrid' solution. Because it is programmable and not hardware-centric, the variables are potentially limitless for adapting the performance and prioritisation of the network. Classic routing technology may be fine for fixed network applications in peacetime and the office, but not in battlespace where the characteristics and even availability of WANs is constantly changing. This more elastic SD-WAN environment also allows for much greater interoperability of hardware, facilitating a unifying architecture which supports greater collaboration between the three-armed services, as well as between armies and logistic infrastructure.

By harnessing the power of a software-defined approach, all applications and solutions come with improved operational efficiency and economy of resources, as well as cost. It is also scalable, allowing legacy systems to continue operating alongside more advanced network technologies, weapon platforms and equipment. As international geopolitics become more and more turbulent and complex, this degree of interoperability will assume ever greater importance to Defence and Security Alliances to operate with a unified defence system without holding back the evolution of different defence platforms and technologies.

In summary, battlespace and its ether will become increasingly contested. As myriad military hardware and the armed forces that depend on them — on land, sea and air — rely increasingly on a connection, it is vital that the wide area networks which support them benefit from the most robust connections and hybrid is increasingly proving to be its holy grail ●

Mlot technology will enable soldiers carrying a pocket-sized device to locate and identify everyone in their vicinity, even in pitch darkness.

Tristan Wood is founder of Livewire Digital.