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ViaSat: providing for the military

Government satellite communications form a core part of ViaSat's capabilities and the company is playing a key role in transforming the way in which the military communicates. Helen Jameson spoke to Peter Weissmann, Business Development Manager at ViaSat Australia and a former soldier himself, about the evolution of communications in the military and where ViaSat fits in.

Question: Communications-on-the-Move is fast becoming the most important application in terms of satellite applications for the military. Why is this the case?
Peter Weissmann: Over the last few years the tempo of modern military operations has been increasing dramatically to the point where forces are now required to conduct independent operations in widely dispersed "points of battle", often simultaneously, across a theatre of operations which might encompass one or more countries. Satellite communications have proven the ideal medium for beyond line-of-sight, networked communications in this scenario, providing the backbone for broadband video, voice and data capabilities, particularly at the edge of the battle space where there is typically no infrastructure.

High speed mobility has also become a major requirement for forces moving across these large areas with commanders needing high speed communications between mobile Command and Control (C2) platforms and higher command elements to keep everyone synchronised to the current operational picture. Constant battlefield situational awareness is critical to avoid friendly fire incidents, especially where air and ground elements are co-operatively engaged with an enemy.

Previously, military commanders and their staff would be in a virtual communications blackout whenever they were moving by road or air and having to "re-synchronise" with the current battle scenario whenever the convoy stopped or plane landed. Broadband COTM allows the commander to be in continuous communications whenever and

wherever he goes in the Area of Operations (AO), completely removing the requirement to re-synchronise.

Military platforms employing ViaSat broadband communications-on-the move systems include Blackhawk helicopters and C-130 aircraft as well as HMMWV, Bradley C2 Infantry Fighting Vehicles, and other vehicle mounted C2 platforms.

Question: The migration towards IP by the military is inevitable but at what stage is this migration? How long do you believe it will take for the move to be completed?

Peter Weissmann: In Australia as early as 2001, the Defence Science and Technology Organisation (DSTO) published a series of papers with the overall title "IP Convergence in Global Telecommunications". At the time, the Australian military had a large investment in ATM and ISDN infrastructure which has ultimately delayed the introduction of converged IP networks. Finally now, as the equipment ages and needs replacement, they are finally starting to implement new IP networks.

During the exercise Talisman Sabre in July/August 2007, ViaSat and Cisco were able to demonstrate a deployable converged IP network over satcom. A combined US/Australian exercise conducted in the Shoawater Bay training area off the Queensland coast, was able to demonstrate voice, video and data communications over three separate security domains overlaid on a single IP backbone provided by LinkWay Multi-Frequency TDMA satellite modems and IP network encryptors from ViaSat together with Cisco routers and VoIP telephones.

The US Army has coined the term "Everything Over IP" (EOIP) to push ahead with the adoption of converged IP networks. For example, the deployment of the Joint Network Node (JNN) 2.4M trailer mounted satellite terminals to the Middle East brought IP connectivity of the Secret and Normal IP Routed Networks (SIPRNET/NIPRNET) down to battalion level in that theatre of operations. In the future, the Warfighter Information Network – Tactical (WIN-T) network, with first increment deliveries beginning now from General Dynamics and Lockheed Martin, will provide a high speed, high capacity IP backbone network for all deployed US forces.

Question: What are the other communication trends that you see emerging on the battlefield at present and what impact are they having on the chain of command?

Peter Weissmann: Radio over IP is an extension of VoIP where a port on a network router is connected directly to a radio via its handset connector giving users located anywhere in the network the ability to "talk" over a remotely deployed radio circuit using a VoIP phone. The advantage of this is that staff in Operational Headquarters can listen in or take part in a deployed tactical radio network even when, in some cases, it's located half way around the world.

The Wave software developed by Twisted Pair also allows multiple radios to be connected via a virtual control panel so that each radio network and users on the IP network can be "joined" into a single interconnected voice network. This is particularly useful for natural disaster relief and emergency situations where disparate radio networks as used by the Military, Police and other Emergence Service organisations can be joined together to provide a single interoperable voice network.

Question: ViaSat is involved with several different communication programmes for the military. Can you tell us a little about these programmes and ViaSat's involvement?

Peter Weissmann: In cooperation with Harris Corp. and under contract to Northrop Grumman Corp., we are developing the satellite ground equipment for the follow-on Force XXI Battle Command Brigade and Blue Force Tracking (FBCB2-BFT) satellite network upgrade. As confirmed in recent prototype testing, this new development will provide a high-speed, next-generation BFT 2 system that has the capability to move information up to 45 times faster than the current BFT rate, refresh information at 30 times the

current rate and perform functions previously not possible with the current BFT, such as sending email attachments, pictures and even Word documents across a satellite network in seconds.

As stated in a recent press release, ViaSat has been awarded contracts totalling $25 million for LinkWay®S2 satellite modems to support the US Army, USMC, and other DoD customers. The LinkWayS2 modem is designated as a "Current Force Modem" by the US Department of Defense, which means it is a key component in the DoD push to accelerate the adoption of new technology to enable more modular, mobile forces. The LinkWayS2 system provides single-hop, full mesh, high speed bandwidth-on-demand, and a second demodulator to receive simultaneous DVB-S2 broadcast or multicast traffic from Global Broadcast System (GBS) transmitters. We're also being funded to add new system features that will provide continuing improvements in throughput and efficiency.

We're also growing our data links business. We're one of two qualified vendors of Link 16 Multifunctional Information Distribution System (MIDS) terminals where we have grabbed a big market share lead this year. MIDS is a joint force system that presents a common situational awareness picture to users in a battle space. And through an acquisition we gained entry into digital video data links for unmanned systems. The EnerLinks system is a big advance over legacy analogue links in terms of extended range, better video quality and greater efficiency of the link.

ViaSat has developed the new MD-1366 Enhanced Bandwidth Efficient Modem (EBEM) which defines a new military standard for high-speed satellite communications. Using military and commercial satellites at X-, C-, Ku-, and Ka-band frequencies, the MD-1366 delivers much-needed capacity for the military's high-speed broadband and multimedia transmissions.

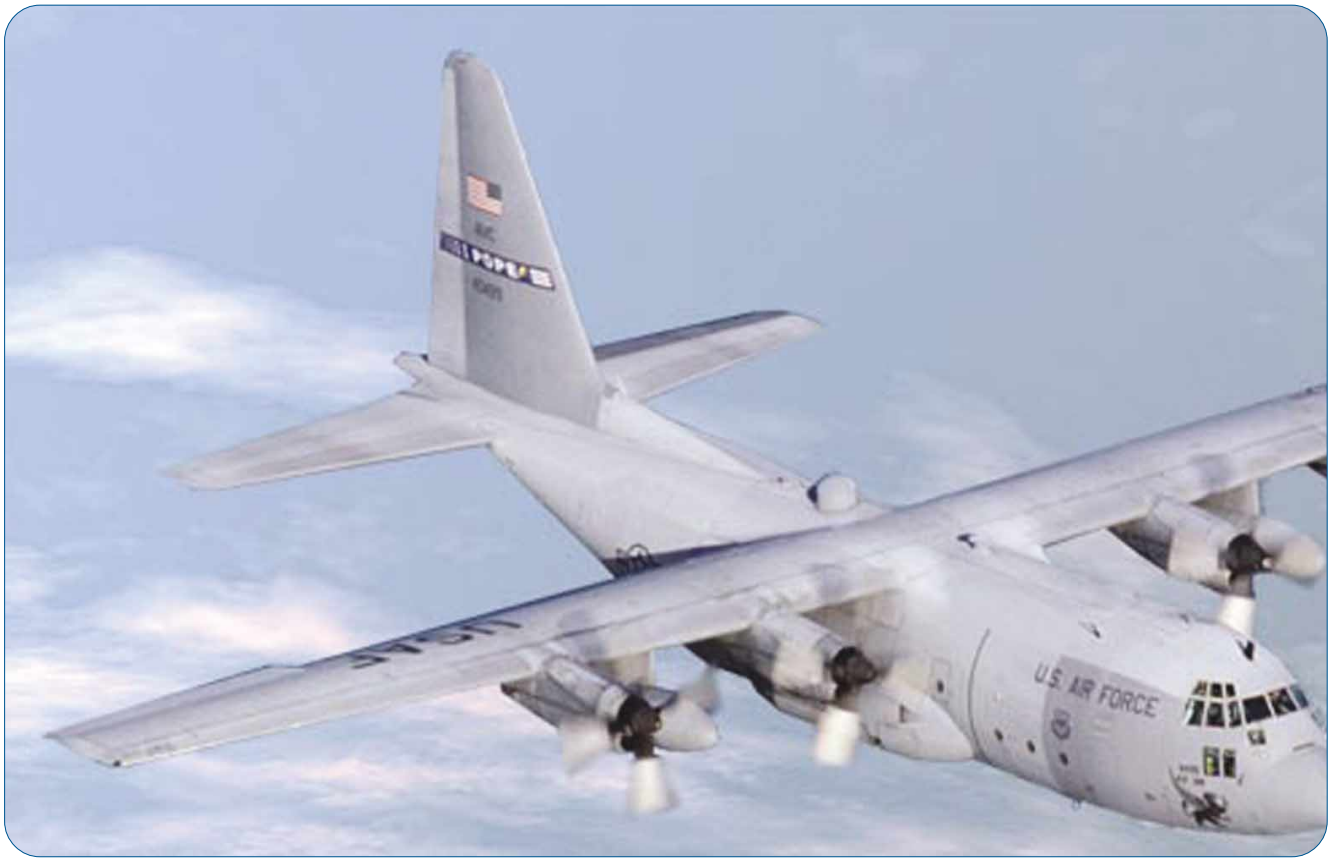
ViaSat was also selected to develop the new Joint IP Modem (JIPM), which will combine flexible satellite networking with information assurance capabilities to deliver secure, high speed IP. JIPM is built on open standard DVB architecture, so many vendors will be able to supply compatible modems once the reference design is complete.

ViaSat is also upgrading the Net Control Stations of the UHF Milsatcom network to enable installation of the new Integrated Waveform capability which will increase the number of voice channels when using DAMA mode. We have roles in several other new programmes too, such as TSAT, FAB-T, and MUOS.

Question: How is the secure transmission of data ensured on the battlefield? Will the move towards IP make security easier to guarantee?

Peter Weissmann: To ensure the security of information passing through all the various voice and data communications links across the battlefield, the military has always employed various kinds of encryption schemes, protocols and/or devices to provide the appropriate level of information assurance for the data being passed. Each link normally required a unique type of cryptographic device depending on the medium, so that a VHF voice radio network would use a totally different device from a HF data radio network. This means that a headquarters would normally have many different types of cryptographic devices and networks to support current operations.

For IP networks there are many different types of encryption software and hardware devices that can provide appropriate levels of information assurance or encryption from personal privacy information to highly classified Government and Military information. The important difference here is that IP encryptors only have to work with a single protocol so the major differentiator between IP encryption software or hardware is matching the appropriate device for the required security level. There are two IP encryption software and hardware standards that are currently being adopted by Western and Western Coalition Partner Militaries worldwide. The Advanced Encryption Standard (AES) is being used mainly for transmission security and coverage of lower classification



level data while devices meeting the High Assurance IP Encryptor – Interoperability Specification (HAIPE-IS) such as ViaSat KG-250 and KG-255 In-line Network Encryptors (INEs) are used to cover high and very high level (Secret and above) classified IP data domains.

These standards ensure a very high level of information assurance and interoperability while allowing converged voice, video and data transmissions to pass through the IP network at their respective classification levels, without the need for individual data or voice encryption devices. Further to that, security domains of different classification levels such as Secret and/or Restricted can be separately and securely layered over the same IP network by using a separate encryption key for the encryption devices in each domain.

While moving to IP will reduce the number of disparate cryptographic devices used, the security guarantee or information assurance for any encrypted data system still remains dependant on the uniqueness of the encryption keys used and the physical robustness of the management and handling methods used to distribute and control those keys.

Questions: The network-centric battlefield is gradually becoming a reality but what challenges does the military face in order to achieve it?

Peter Weissmann: Speaking as an ex soldier myself, I think one of the hardest challenges will be to change the perceptions of those that are used to the old stove piped communications systems and methods and don't want to change or learn a new "system". Changing over from a paper map with plastic overlays to a computer screen environment is quite a large step particularly when human nature tends to mistrust anything new until it's well bedded in.

Moving to a converged IP architecture can be expensive in initial hardware and training costs although for some, the new IP architecture is just like the internet in the office or at home so the transition should be relatively simple and straight forward.

Information overload is another challenge to overcome. As units become "connected" into the network, more and more information becomes simultaneously available not only to the commander and staff but all connected units both up and down the chain of command.

While this means that the soldiers and planners have access to large amounts of data, for example from live sensor feeds to detailed administrative planning documents that they've never had before, it also means that this data has to be analysed or interpreted, sorted and stored, all of which takes time and may not even relate to the task at hand. The challenge is to filter the data so that units don't become overwhelmed with data unrelated or inappropriate for their task or mission at hand.

Question: Do you expect to see an increase in the use of commercial capacity as opposed to capacity specifically for military use? Which frequency bands will be most in use for military applications?

Peter Weissmann: There is a move by militaries worldwide to reduce the amount of commercial satellite bandwidth to save on operational costs that have been steadily increasing as demand for bandwidth increases. The US has several programmes under contract, including the Wideband Global Satcom (WGS) and the Transformational Communications Satellite (TSAT) programme to name two, which will provide very high speed IP data communications capability for US Government and military users only.

This will cause a major move by military users from Ku- and C-bands on the commercial satellites to the X- and military Ka-bands on the government owned satellites. Aside from the US, several countries such as Australia, South Korea, Japan already have there own sovereign satellites with X- and military Ka-band transponders and other countries such as India are planning to build and launch their own satellites to move away from commercial capacity and have their own sovereign capability.

However, we know that bandwidth demand is always growing, so the requirement for commercial bandwidth by military users will continue, and perhaps continue to grow. Especially because of the slow pace of military satellite deployment.

Question: What are the principal areas that ViaSat will be working on in the next 6 months?

Peter Weissmann: As you can see by our recent press releases, ViaSat is moving ahead to fulfil the first orders for ground terminals and infrastructure for the Eutelsat KA-SAT satellite in Europe and with the construction and launch of our own ViaSat-1 satellite for North America in 2011. This new development is exciting because it is truly a game-changer in bringing a 10x improvement in bandwidth capacity and affordability to satellite communications. Bandwidth volume is what we really need from our broadband connections now, and our new technology will be the first satellites that can support the exploding demand for rich multimedia and video to the consumer.

Mobility is another big focus of ours. We just announced, with our partner KVH Industries, a major expansion of our mobile broadband network for aircraft, vessels, trains, and vehicles. Over 100 business aircraft are on that network already, KVH is rapidly growing the maritime applications for it, and we expect to have near global coverage by the end of next year. The network is made possible by our advanced ArcLight® mobile broadband system, the same technology used in our military COTM applications.

On the military side, as I've stated previously, we have major new orders for our LinkWayS2, EBEM and JIPM high-speed satcom modems. In addition, we are developing, testing, manufacturing and delivering several other types of satellite systems for the US DoD, further consolidating the move to "Everything over IP" and broadband connectivity anywhere for deployed forces. ■