

Soldier Communications

Extending communications down to the individual soldier, enables those questions to be answered with a high degree of confidence. Radios, or more properly communications systems tasked with delivering those goals cover a range of capabilities; complex offerings providing simultaneous voice, position alert reporting and data services and other simpler solutions confining themselves to simple voice only communications have both found their adherents on the front-line.

Personal radios

The bedrock of the transformation of soldier communications lies in the advent of the personal radio; a communications device sufficiently light weight and low cost that they could be issued to each soldier without noticeable penalty. Although they have rela-

tively short range, typically limited to several hundred metres this is sufficient to link members of the section and squad, with some systems having the range to also link low level leaders to the company headquarters level. Achieving those links is typically undertaken by point to point links, although the advent of ad hoc communications; routing signals through multiple radios can overcome line of sight and range limitations, is overcoming some challenges, voice latency is an issue.

The voice-only Selex Communications 2.4GHz Personal Role Radio (PRR) and the company's EZPRR, which adds a data capability and AES 128 encryption to the design, have sold over 350,000 to 40 countries, a recent addition being Finland, with the radios also equipping many of the militaries operating in Afghanistan today. With a range of up to 800m in clear and three floors of 300m in urban terrain, every PRR is interoperable and links can also be achieved with EZPPRs in specific modes. By operating at 2.4GHz at 50mW, both radios can be switched on anywhere in the world without the need for regulation or permission.

Additional solutions, based on the PRR have been developed to enhance system capabilities. The Fixed Base Force Protection System extends the range of a PRR and

Under the JTRS programme, General Dynamics and Thales are completing development of the AN/PRC-154 Rifleman Radio which will provide MANET communications for every frontline US combatant © AJB

Thales F@stnet-Twin provides simultaneous VHF and UHF channels with an integrated BMS display © AJB



EZPRR from the command post out to roughly 2.5Km via up to four rebroadcast stations linking the command post with forward operating bases, helipads or nearby patrols outside the wire.

Selex have developed the Soldier System Radio Plus (SSR+), which is in service with Singapore and Peru as well as two NATO members with over 5000 having been sold. It offers longer range out to 2Km in clear terrain and has a dual network capability. A recent feature relevant to a number of Asian countries is a new 'jungle' antenna for the SSR+, which reduces the antenna from 45cm to just 9cm with less than five percent reduction in range.

The launch customers for the 350-450MHz Harris RF-7800S Secure Personal Radio were Norway and Brunei, the former using it as its standard radio for its soldiers in Afghanistan. Other users include Sweden and Malaysia's Special Forces. As part of Norway's NORMANS programme, the radio was used to validate the C4I elements of the country's soldier modernisation solution, being able to operate and communicate in densely wooded terrain akin to jungle, working elements with a Thales C4I solution. A development of the radio, known the Leader Radio has been developed, which hosts computing power and situational awareness software within the radio and when connected to a display device can function as the basis for a soldier modernisation system.

Thales has received a number of orders for its 325-470MHz St@rmille soldier radios including production level quantities for frontline use. A MANET solution with a



*The Harris AN/PRC-152 is a standard
frontline radio for US forces © DoD*

ations

Military transformation means many things to many people. For the dismounted soldier, a big part of their transformation means better answers to the following questions: Where am I? Where are my friends? Where is the enemy?

by Adam Baddeley



The Selex Communications SSR+ is standard issue on Singapore's ACMS programme now being fielded © AJB



ITT's 1.2 - 1.4GHz Spearnet Radio has been selected for Spain's Comfut programme © AJB



A Harris RF Communications RF-7800S equipping Royal Malaysian Air Force PASKAU special forces at LIMA 2009 © AJB

range of 1000m in open terrain, a longer range Platoon version can reach 2km linking platoons together with data rates of 1Mbps.

Raytheon's hand held DH500 and worn Microlight radios are part of the expansive EPLRS family allowing a common waveform to be used from headquarters, up to UAVs and down to individual soldiers. The Microlight is mandated on the US Ground Soldier System programme while the 225-2,000MHz DH500 which uses commercial encryption is designed for export markets and is a bearer on Cobham's Maritime Interdiction Operations System (MIOS), which it has

recently sold to the Royal New Zealand Navy.

Cobham's Eagle Radio, also part of MIOS is a mobile ad hoc networking design used across a number of Asian militaries will add a single rechargeable battery option in the third quarter 2010, replacing six AA batteries.

Elbit's lightweight PNR-500 has had number of customers including Spain, Poland Finland and of course Israel. The next generation of the radio family known as the PNR-1000 and offering MANET connectivity is due to be launched this year.

ITT's 1.2 - 1.4 GHz Speanet Radio has been acquired in number by Spain who has

deployed it to Afghanistan and has been selected as the bearer for its Comfut SMP demonstrator. It communicates over ad-hoc self-forming wireless networks to ranges of up to 6km over five hops and has a sustained data rate of 1.5Mbps.

Kongsberg's SR600 radio, part of its WLAN family were recent used as the basis for interoperability between soldier systems in a NATO test held in Belgium in April. Five nations were involved: Canada, Germany, Netherlands, Slovakia and Spain. Each country brought their own SA system and then linked into the SR600, referred to as the 'loan radio'. Connecting to the SA systems via standard Ethernet ports, seven standard messages were sent using the MIP standard and although interoperable voice was not part of the concept, this feature was proven during the test. The SR600 was Switzerland's selection for its IMESS SMP, lead by EADS and Sagem.

Traditional ways of ensuring that troops remain in contact with vehicle crew; a phone in the back of the vehicle are insufficient.

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Northrop Grumman offers a means of extending data from the vehicle to dismounted soldiers via its SRB at 2.4GHz and 9GHz to a worn radio provided by Rajant, designed to create a low frame link over up to 10km although in testing a tactical application for the Australian Defence Force, ranges of 18-20Km over desert were achieved.

VHF hand helds

While individual radios can effectively connect each soldier, there are security issues with how to link into higher level networks and for the foreseeable future these links will in part or in their entirety be provided by Combat Net Radios (CNR), an area in which

there is considerable work going on to raise performance while reducing size, weight and power to better meet soldier needs.

Two of the newest hand held CNRs on the market are the Thales F@stnet-Twin and Selex's SWave Multiband Multimode radios. Both are SDRs. The French radio is based around the PR4G F@stnet of which over 250,000 have been sold in 35 countries. The Twin is made up of two radios; the PR4G F@stnet VHF and St@rmille UHF soldier radios combined in a single device providing two independent channels, allowing simultaneous integration into UHF and VHF radio nets. The twin also embeds a screen in the upper portion of the radio on which graphical situational awareness information can be presented. The radio has embedded GPS and power output of up top 5W, with standard interfaces to support BMS while weighing less than 1Kg without battery.

In addition to narrowband communications out to 5Km, Selex's SWave adds the Soldier Broadband Waveform a 225-512MHz UHF TDMA MANET waveform supporting



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The Selex PRR and now EZPRR is standard issue for UK forces in Afghanistan and is in service with over 30 countries © Selex Communications

networks of up to 50 users with an over the air data rates of 2MBbps and a range of 2km. Using the Software Communications Architecture, additional legacy waveform have been added. The SWave combines both AES256 encryption and frequency hopping amongst its Transec features.

Harris' RF-7800V-HH, a new hand held VHF SDR launched in February 2009 has been adopted by a number of countries, including in Asia. Harris believe that the performance of the hand held radio which supports up to 10W of operation, embedded GPS, beats the performance of the 20W RF5800V-MP Falcon II manpack, achieving voice ranges of 15km in jungle with body worn antenna but is a fifth of the size and weight of a manpack. In terms of waveforms it hosts legacy solutions from the VHF capable Falcon II, ensuring backwards interoperability.

However additional new waveforms have also been added, including an IP Data waveform capable of supporting up to 192Kbps of over the air, data in a 75Khz channel - stitching together three normal CNR channels to do so. A fixed frequency solution, it allows 20 users to share a contention based network. A further waveform, known as BMS is introduced for high density users sending streaming SA data. This waveform is a TDMA design allowing up to 64 users to send bursts of data every 5-6 seconds in a narrowband frequency hopping ad-hoc network. Voice can be added but that reduces network users to 48. Harris' TacChat application is also

embedded in the radio, allowing tactical internet messaging via the radios front panel in a similar to mobile phones with contact lists, send and receive fields and text to and from other radios and LAN users in an HQ, eliminating cabling and the need for another IT device which saves weight.

Elbit Systems Land and C4I - Tadiran's offering in the hand held world are the PRC-710 VHF and PRC-710MB V/UHF radios, the latter weighing less than 800g.

Thales' AN/PRC-148 JEM and Harris' AN/PRC-152 dominate the hand held CNR market in the US. Both are in service with forces in a number of countries with Australia having operating the MBITR for some time and recently announcing its acquisition of the AN/PRC-152 as part of a package of communications to support dismantled C4I. The DoD is currently limbering up to acquire up to 197,500 of these radios over the next five years in the Consolidated Single-Channel Handheld Radio programme, replacing an earlier, similar contract in which \$2.7billion was spent on the radios. A recent addition to Harris' product line is the RF-310H radio designed to be interoperable with the AN/PRC-152 radio through Type 1 Suite B encryption with the RF-310H having non Crypto Controlled Item components, allowing the radio to be issued to a wider set of countries who don't have access to Type 1 radio while still maintaining compatibility with US forces.

ITT have recently completed work on their proposed upgrade to the PRC-354 for

the Bowman programme which reduces it weight by over 1Kg and other improved features such as a new battery and turns it into a more conventional hand held format.

Headsets

Headsets are the final piece of the puzzle to connect the soldier. For data communications radios are fine. Voice communication requires the voice of the soldier to be 'captured' at one end and transmitted in real time retaining the coherence of the message to the ears of the recipients. At the same time, the headset must provide hearing protection against explosion and sustained gunfire will retaining the ability to hear what's going on around them.

Invisio have supplied their M3 and M3S headsets to the militaries in Australia, Taiwan, Japan and the Republic of Korea. The company's new X50 module optimised for dismounted soldiers is now being trialled in the region work with X5 and X6 headset.

Selex's latest offering is the In The Ear headset which can be directly integrated with the PRR and EZPRR's with negligible power drain. With the addition of specific modules, any radios can use the system. The company's CTX solution is an intelligent radio interface system which senses which radio and headset is attached to it and adapts performance accordingly with up to two radios and an intercom systems able to be connected simultaneously.

Silynx's C4OPS has a strong following amongst the leading special forces in the region and has adopted a modular golf bag approach with the user able to mix and match advanced features according to the mission and features full-spectrum active noise reduction and ear protection, multi-platform integration as well as being immersible to up to 20m.

French firm ELNO's bone mike technology is an integral part of the French Army's FELIN soldier modernisation programme.

Esterline Racal Acoustics latest offering for the dismounted soldier are the new Frontier series, dual sided, lightweight, rugged, in-the-ear headsets with different variants for specific radios such as the Frontier1400 which is linked to the RF-7800S.

Nacre's QuietPro and QuietPro Plus have become a US standard being selected for the US Marine Corps and more recently mandated as the only in-ear solution of the US Army's Ground Soldier Systems programme to replace Land Warrior. [AMR](#)