



# ACMS Begins Large Scale Fielding

The Advanced Combat Man System programme is a major step in the transformation journey for the Third Generation Singapore Armed Forces who are fielding the system throughout its active force from 2010 onwards

***“Mission demands for the soldier are increasingly complex and expanding rapidly,” explained Lieutenant Colonel Jimmy Toh Yong Leng, Programme Manager for Advanced Combat Man System (ACMS), outlining the underlying rationale for the programme. “In the past we had to mainly focus on winning a conventional war but now, the spectrum of operations demands security operations in peace, counter-terrorism, humanitarian disaster relief, Peace Keeping Operations and many more, commonly known as the Three Block War. In the past, we only needed to be concerned with the Blue and Red forces but now, enemies come in all shapes and sizes. There is an increasing need to modernise and maintain complete situational awareness of the battlefield.”***

A key concept within ACMS is that every warfighter becomes a sensor. Lt. Col Toh said, “Opaque urban terrain and a diverse and mobile enemy erodes precision warfare, demanding investment in a networked force. Every sensor is networked to bigger systems to coordinate precision manoeuvre and collaboratively deliver concentration of fire.”

ACMS has had a long developmental path, starting back in 1998 with the first ACMS Technology Exploration and Development suite, followed in 2002 by seven sets for the Technology Consolidation and Development phase. In 2006, lessons learned were incorporated with the latest technology available at that time and sixty ACMS sets were integrated during the Component Development and Demonstration phase, designed to demonstrate and to understand how the systems could support up to company level operations. In 2009, after all the operational trials and evaluations were successfully

completed, a decision was taken to equip at Battalion level and to extend to more units.

Lt. Col. Toh summarised the lessons learned from that period, “The trials showed that ACMS improved the (1) Situational Awareness (SA) (2) Survivability (3) Mobility of the combat soldiers significantly. Information dissemination is up to twice as fast with ACMS and improved the accuracy of enemy reporting rose from 30 percent to 80 percent. It improved the ability to navigate to the objective, demonstrated enhanced survivability especially during the movement phase because soldiers have a faster reaction to time enemy contact due to more reliable communications and greater skill. Improved positional data also facilitated medical personnel in faster casualty evacuation.”

New Tactics, Techniques and Procedures are being used to exploit the new capabilities associated with ACMS such as distributed movement rather than by single file movement because ACMS enables greater situational awareness and superior topographical intelligence.

Underlying ACMS is the concept of the four S's for the Third Generation of soldiers: 'Shield Tough', 'Shoot Sharp', 'Sustain Well' and 'Shield Tough' each with its own load budget, which adds up to 22Kg which represents one third of the typical Singaporean soldier's weight. Addressing the soldier payload, Lt. Col. Toh explained, “We have conflicting power and weight requirements. There is an ever increasing demand for added features so we need to optimise the load a soldier can carry. The solution is not to add more weight. We have three different ACMS configurations for different echelons; the (1) Basic Fighting System (BFS), (2) Commander Enhancement System (CEA) and (3) Information Management System (IMS). The BFS is used by team

leaders while the CEA System is for Section, Platoon and Company commanders. The IMS is useful for Platoon HQs, Company HQs and even Battalion HQs for planning and monitoring the operation.

The first ACMS battalion completed equipping by Jan 2010. A second battalion will be delivered in March 2010. More ACMS will be equipped thereafter to most of the active units in the Singapore Army.

The ACMS is designed to provide the soldier with better situational awareness. With the introduction of this capability, the ACMS soldier will be networked into the larger force structure to draw upon systems capabilities to enhance mission effectiveness and survivability.

The system provides a comprehensive network capability according to Lt. Col. Toh, “The system's Blue Force Tracking capability enables the ACMS soldier to pinpoint the exact position of his peers and supporting elements, reducing fratricide and enhancing command and control in the battlefield. The navigation module also enables the soldier to manoeuvre accurately inside and outside of buildings. The Red Force marking capability allows the ACMS to mark enemy targets and share information to enhance the SA of fellow soldiers. This information can also be disseminated to the fire support elements, for the delivery of calibrated firepower to eliminate the enemy. ACMS's concept of the “mothership”, sees the network system being added to armoured platforms, so that it can function with its “mothership”, enabling ground units to deliver higher HQ requirements when required.”

ACMS' “I See You Shoot” approach is a call for fire function as a node to a larger network. The ACMS soldier can leverage this network to delivery firepower beyond his own capability, creating a ‘1-800-dial-a-bomb’ capability. ▶

- ▶ The ACMS soldier can also capture a picture of the enemy and send it back to higher HQ for receipt of fires."

The ACMS system consists of five subsystems: (1) Head mounted display, (2) Communication and Navigation subsystem, (3) Weapon subsystem, (4) Soldier Computer and (5) Power subsystem.

The ACMS Weapon System is a variant of the SAR-21 assault rifle which incorporates a modular mounting system and a shorter barrel to enable manoeuvrability in tight spaces and also allows mission specific accessories to be mounted, where necessary the components can be connected to the soldier wearable computer via a single cable.

The Soldier Computer processes data and presents relevant real time information to the soldier. Lt. Col. Toh said, "This significantly improves soldier operational effectiveness by allowing him to instantaneously see crucial battlefield information. The Navigation subsystem provides autonomous navigation capabilities by matching their GPS with a DRM for situation where there is no GPS reception."

The Communication subsystem comprises the Selex Soldier Personal Radio (SPR) providing voice and data communication capabilities. Together with active noise reduction system, it improves SA in noisy environments as well as protecting the soldier's hearing.

Lt. Col. Toh said, "Collectively the subsystems allow for meshing sensors. Through the integration of voice, data and video communication capabilities, the ACMS soldier can deliver each position to the network defined as a system of systems."

The Power subsystem consists of an integrated comprehensive power management module for intelligent and efficient power management.

The ACMS comes with an integrated Load Bearing Vest (ILBV), that has a hydration bladder and able to house armour plates where necessary. The system also allows each soldier to reconfigure various pouches to suit individual preferences.

The Singapore Armed Forces continues to maintain technological watch on the development of the new generation of soldier networked systems. Lt. Col. Toh said, "Moving forward, we are embarking on two main tracks for the ACMS' development; the equipping track and the

experimental track. The focus for the new systems is on light weight, long operation, high reliability and enhanced performance. We also want to improve current systems, some of the specific areas that we will be looking at including wireless technology and the integration of ACMS with unmanned sensors for live video images."

"Soldiers continue to provide valuable feedback on areas for improvement, some of the challenges include indoor navigation accuracy, Red Force updates and accuracy interfaced with legacy subsystems for incorporating new technologies. We also have some bandwidth issues especially with frequency management and frequency agility. We also want to increase connectivity range to support up to 200 nodes."

Other areas include the fuel cell technology and providing a wireless link between different subsystems such as helmet and weapons and a voice command smart vest.

The Navigation Module's Dead Reckoning Module solution allows a five percent deviation in accuracy, a higher error rate than the requirement but which has been accepted for the time being.

Continuing the situational awareness theme, Lt. Col. Toh commented, "There will be continuing challenges as we embarked on this new development, issues such as Red Force updates, when he spots an enemy, every soldier mark its down on the computer and send it back, soldier creating several reports for each enemy." Successfully fusing this picture, perhaps with a combination of automation and human intervention in the process has to be studied further." ■



*Singapore is well on the way to competing fielding of ACMS across its active force © DoD*