

ICI and LynxOS Support U.S. Army Communications



Innovative Concepts, Inc. (ICI) provides comprehensive life-cycle system support, including software engineering, hardware design, development, testing, radiation performance and assessment, deployment, evaluation, and fabrication. ICI's products and services support the avionics sector of the aerospace industry, communications sectors of the satellite technology arena, and network-communication-intensive operations of many commercial entities.



ICI's mobile, network, and communications systems are developed for global enterprises seeking sophisticated solutions for complex voice, imagery, video, and data. The company's newly launched product line focuses on tactical and wireless embedded communications systems, reinforcing its dynamic vision to 'engineer tomorrow's communications.'

Making Tactical Connections

ICI's military communications equipment is designed for the United States Army and is used primarily by Army aviation helicopters, such as Apache/Longbow, Kiowa Warrior, cargo helicopters, and others. While the Army and Air Force employ many different protocols to communicate, ICI's IDM (improved data modem), a communications and targeting system, is particularly unique because it can interface between different communications formats.

"The IDM is a complete communications unit and a critical piece of equipment," said Bob Woodward, director, tactical communication systems at ICI. "The IDM essentially provides full networking capability to tactical users and RF-based data communication connectivity to the commercial mobile communication market." It interconnects the U.S. military's major networks for both maneuver and fire support, and also provides critical linkage to the military's legacy systems.

Plans are underway for ICI's IDM to incorporate an embedded subset of the Army's innovative Force XXI Battle Command, Brigade and Below (FBCB2) System software called EBC (embedded battlefield command), which satisfies the Army's growing trend toward smaller, handheld com-



Innovative Concepts' IDM features LynxWorks' LynxOS real-time operating system



puter devices. FBCB2 allows different vehicles on a battlefield to share a joint situational awareness picture in real time.

Hypothetically, a Crusader mobile artillery piece could 'see' on its computer battlefield map the same enemy that a Comanche helicopter flying miles away from it has just spotted. The Crusader could then target its weapons using radar data provided by the Comanche helicopter.

While FBCB2 software will ultimately run in every ground vehicle for the Army, EBC will be integrated into virtually all Army aviation equipment, thereby enabling Army personnel to communicate with one another over the Tactical Internet (which uses the same protocols as the Internet but whose IP addresses are tied to Army vehicles constantly on the go).

A Smarter Way to Communicate

Historically, FBCB2 software ran on the Solaris® operating system, which is a large, process-oriented piece of software. However, the addition of EBC and the requirement for compact computer devices prompted the need for a better, more efficient solution. Redesigning the IDM to accommodate a Solaris card, a disk, and another display for the helicopters proved costly and inefficient. Because VxWorks® was already being used in the IDM, porting FBCB2 to VxWorks seemed a logical approach. However, after three years attempting without success to port to VxWorks, the original project team cut its losses and turned to LynuxWorks' LynxOS® real-time operating system (RTOS).

LynuxWorks' LynxOS blends deterministic performance, reliability, openness, and scalability with patented technology for real-time event handling, and also provides complete UNIX® compatibility. The complete RTOS package proved particularly attractive to ICI. "LynxOS provided us the full UNIX capability we needed in order to meet the Army's requirements," explained Woodward. "VxWorks does not feature all of the UNIX application programming interfaces; it's UNIX-like, but does not provide the true UNIX qualifications necessary to accommodate Army-standard applications. We wanted something that would fit with what we already have yet allow us to proceed to integrate our new technology."

LynxOS meets strict POSIX® conformance tests, plus the UNIX compatibility making its application interfaces compatible with Linux. To be conformant to the POSIX standard, a hardware platform and operating system must be certified as such. Many operating systems like VxWorks, however, only implement portions of POSIX while still claiming POSIX compliance. This represented a significant reason why efforts to port to VxWorks ultimately failed—it is not a true POSIX-conformant operating system.

Innovative Concepts and the Army became convinced that moving forward with LynxOS signified the best solution. "We knew it would not be difficult to port the FBCB2 code to LynxOS, and it wasn't." In fact, in just six short months, the port succeeded. "We received our first ver-



sion of EBC and the initial testing was favorable. "LynuxWorks went beyond the call of duty to ensure that we achieved our goals, and provided professional, top-level expertise all along the way," said Woodward.

A New Standard

As a result of its collaboration with LynuxWorks and the overwhelming success of LynxOS, ICI has shifted its software baseline from VxWorks to LynxOS to support the development and deployment of the Army's standard EBC software for its aviation unit. Moreover, LynxOS has become the de facto standard for virtually all airborne Army communications equipment interfacing with the Tactical Internet.

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