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Military Now Often Enlists Commercial Technology

By SIMON ROMERO

If the United States invades Iraq, many of the information technologies used by the armed forces would have their origins in commercial rather than military initiatives — a shift from the way the American military traditionally developed the communications used to wage war.

Technology like fiber optic-laced clothing, head-mounted computer displays, global satellite phones, impromptu wireless networks and rugged laptop computers that the military may use in Iraq or future conflicts have largely descended from ideas originally conceived in Silicon Valley and other commercial enclaves.

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"The military quit trying to develop anything significant in communications 20 years ago because it took too long and wasn't cheap," said Alan D. Campen, a retired Air Force colonel who has written widely on the use of information technologies in armed conflicts.

But marketplace efficiency may or may not translate into a military advantage, Colonel Campen said.

"The greater implications of adapting commercial technologies for the military are still unknown," he said, "because we haven't had much practice putting a lot of information in the hands of low-level troops and then letting higher levels figure out what it means."

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A soldier in the 82nd Airborne division uses an earlier generation single channel ground-to-air radio system. The radio is carried into battle and provides secured channels.

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Many of the new technologies already in use or under consideration by the military have been tailored to make information gathering and analysis easier for troops in combat. That includes the rugged portable computers made by Itronix, a company in Spokane, Wash., that recently won a Defense Department contract to develop mobile computing services. The computers would be adapted from Itronix devices already in commercial use.

One laptop Itronix has adapted to military specifications can withstand deluges of four inches of rain an hour and temperatures ranging from 10 below zero to 140 degrees Fahrenheit, and has features like a glow-in-the-dark keyboard and a screen easy to read in the sun's

full glare. The laptop, which sells for about \$4,500 to commercial and military customers also functions with three different types of radios, including the cellphone technology commonly used by large commercial wireless carriers.

Even now, the military lags behind large companies as users of Itronix's laptops. The company's largest customers include companies like [Sears, Roebuck](#), which bought Itronix equipment for 10,000 of its traveling product repair employees. [BellSouth](#), the large telephone company based in Atlanta, also uses Itronix laptops for its field technicians.

"Defense is not a big part of our business yet, but we're hoping it will be," said Tom Turner, Itronix's chief executive.

Two decades ago and earlier, military communications technology was more likely to sow, rather than reap, civilian applications.

Contemporary wireless services provided by large American carriers like [Verizon Wireless](#) and [Sprint PCS](#), for example, are descendants of the "spread spectrum" military radio technology that first came into use during World War II. For the military, spread-spectrum technology allowed signals to be scattered over a range of frequencies and then collected back onto their original frequency by the receiver, making communications hard to jam or intercept.

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The Itronix GoBook MAX is a wireless "ultra-rugged" laptop computer. It can withstand heavy rains and extreme temperatures.

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Photo: Alexander Graham Bell opens New York-Chicago phone line, 1892



In the early 1980's, the commercial possibilities of spread-spectrum communications prompted Dr. Irwin Mark Jacobs, a former Massachusetts Institute of Technology engineering professor, to found [Qualcomm](#). The company has built a formidable business by developing a large portfolio of patents for ways to improve spread-spectrum technology for civilian purposes. The benefits for commercial carriers like Verizon are signal clarity and the relatively efficient use of bandwidth, because scattered signals are less likely to interfere with other transmissions — even ones on the same frequencies.

Even now there are other efforts to adapt some military communications technologies to civilian needs. For instance, MeshNetworks, a start-up based in Maitland, Fla., is seeking to commercialize a wireless system that [ITT Industries](#) developed in the 1990's for the military.

MeshNetworks' technology allows users to communicate with each other without having to install cellular transmission stations or bulky switching equipment. Instead, the network, originally designed as a system for troops in battlefield conditions, essentially makes each user's equipment an ad-hoc transmitter of voice or video images.

Rick Rotondo, director of technical marketing for MeshNetworks, said that the company has had interest in its technology from municipal emergency response officials around the country.

The popular Global Positioning System similarly grew out of a project originally conceived in the 1970's by the Department of Defense that enabled receivers anywhere in the world to pick up location signals from an orbiting network of 24 satellites. And yet it has been civilian uses of G.P.S. — whether for boaters and hikers, dashboard direction systems in automobiles, or location-sensitive cellphones — that have brought innovation and refinements to the technology.



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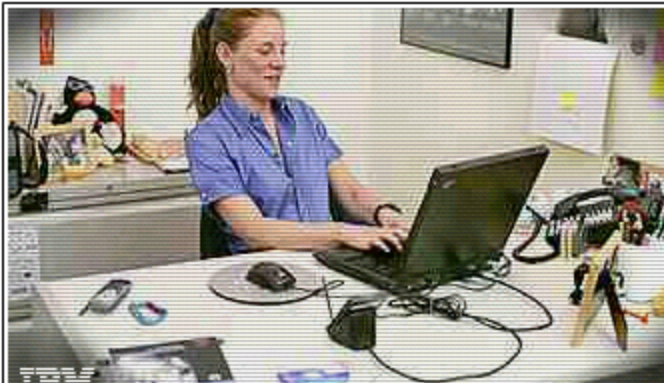
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Even in cases where the military has an active role in developing new technologies, it is sometimes taking a new-style approach in which it serves as an incubator for start-ups. For example, at the Applied Communications and Information Networking project in Camden, N.J., the Army provides office space to small firms that develop services like encryption methods for wireless phones.

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And at the Army Soldier Systems Center in Natick, Mass., a location responsible for developing technologies for soldiers in the field, start-ups are involved in numerous projects, like the development of wearable computers,

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an area where small computers or fiber optics are woven into or attached to clothing. Eventually, the developers of wearable computers hope the devices could aid in translating other languages or tracking targets.

[Xybernaut](#), of Fairfax, Va., is one of several makers of wearable computers that sell their products to the Defense Department. The company's small computers, which are also sold to civilians, can be attached to a person's wrist or belt or placed in a backpack, and are used by the Marine Corps, Air Force and Navy for maintenance and repairs of field equipment.

Perhaps the most striking example of the military's adaptation of a civilian communications technology is the Iridium global phone network, a satellite-based wireless communications system. [Motorola](#) and other investors spent more than \$5 billion during the 1990's to build Iridium into a commercial global satellite telephone system, only to have the company file for bankruptcy protection in 1999 after it failed to sign up many customers.

The Defense Department salvaged Iridium in 2000 by negotiating a two-year, \$72 million agreement with the company's new owners, Iridium Satellite of Leesburg, Va., to have unlimited access to its network, which allows users to place calls or send and receive text messages almost anywhere in the world. The Pentagon hired General Dynamics to develop special encryption services and built a \$200 million ground station in Hawaii to use as a gateway for connecting Iridium calls.

The Defense Department renewed its \$36 million annual airtime contract with Iridium last December, allowing about 20,000 government workers to continue using the system. Warren Brown, an Iridium spokesman, said the Defense Department remained the company's largest customer, but large contracts with civilian customers were an increasingly important part of Iridium's revamped business.

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