

# GE Uses RFID to Secure Cargo

General Electric's Security division is developing a new RFID-based system that can be built into a new generation of shipping containers.

By Jonathan Collins

Jan. 12, 2005—Looking to push a new technology into the nascent market for electronically securing shipping containers used around the world, U.S. conglomerate General Electric's Security division is developing a new security system that uses radio frequency identification (RFID) and can be built into a new generation of containers. It is also set to finance the installation of its own RFID readers and software at ports around the globe throughout 2005.

GE has partnered with China International Marine Containers (CIMC), the world's largest container manufacturer, to incorporate its GE Security Tamper Evident Secure Container (TESC) system into CIMC's next-generation containers. Scheduled to be available for sale in the third quarter this year, along with the built-in TESC device, the new containers feature door hinges on the inside of the container.

TESC uses wireless technology to ensure that, after the containers are sealed by a trusted manufacturer of the contents being shipped or by a border official, they have not been tampered with. It promises to add security to global shipping lanes as well as speed the time it takes shipments to clear customs.

There are currently more than 16 million shipping containers in use around the world, and seals are used not necessarily to prevent access, but just record if tampering took place. While mechanical seals have predominated, a new generation of electronic seals, or e-seals, from companies such as Savi Technology, are increasingly being used. These e-seals use battery power and transponder seals that are not electrified while monitoring but are briefly powered up by (or for) the seal reader to check if tampering has occurred. The e-seals can be in the form of a sensor bolt or smart seal with an embedded RFID tag that is used to lock the container doors but also monitor any tampering with the container door lock.

The Smart and Secure Tradelanes, an initiative involving commercial and government participants, has used active RFID sensor bolts to provide security and real-time visibility across international shipping lanes. The SST system has been installed at more than 15 ports in Asia, Europe, Latin America and the United States, and so far, more than 2,000 containers sealed with active RFID sensor bolts have been shipped in SST-related programs. (See African Beef Gets Tracked and Safeguarding Shipping Profitably.)

Most smart container seals work with existing containers, but because the seals are fitted to the outside of the container and because these containers have external hinges, says GE Security, these existing containers are still vulnerable to tampering.

"A lot of e-seal offerings don't ensure that containers have not been opened because the external locks and hinges can be removed without being detected by the e-seal. By placing the TESC device inside the container and making the hinges internal, this system prevents any tampering going unnoticed," says James Petrizzi, vice president of engineering for GE Security.

The new containers from CIMC have their hinges on the inside of the container as well as a new GE TESC device embedded in the seal of the door's frame. Just the device antenna is visible from outside the container. The TESC device can record if a door was opened as well as if any tampering took place.

Using TESC, which operates in 2.4 GHz, shippers can secure the sealed containers with a handheld RFID reader that sets the device and records information from the TESC device, including the unique ID numbers of the device and of the container it is attached to.

GE's system also includes fixed readers and software that can pass data collected by the readers and transmitted over GSM cellular networks to a GE-hosted shipping management application, which stores the details of each container being tracked as the TESC device is read, as well as whether it has been tampered with. The system can also pass on this information to port security and customs officials, as required.

GE recently concluded a real-world test of TESC. Between October and December 2004, the trial tracked shipments using the new CIMC container from a GE factory in China to another GE facility in California. The trial was set up and monitored by systems integrators Unisys, which is already involved in a number of container security projects, including Operation Safe Commerce (see Unisys Starts Up RFID Unit) projects with the Port Authority of New York and New Jersey. During the GE trial, the TESC device managed to detect a range attempts to defeat the security system.

"We set up a team to devise ways to break into the containers without being detected, but each attempt failed," says Peter Regen, vice president of Unisys Global Visible Commerce.

Eighteen containers carrying GE products from China to the U.S. were tracked using a mix of handheld and fixed readers. Handheld readers were used where the containers were first loaded and sealed. Fixed readers at the ports at Hong Kong and Long Beach, Calif., recorded the containers as they were loaded and unloaded from the container ship, and handheld readers were used again when the containers reached their final destination at a GE facility in California.

"Of the 18 containers, 12 were left untouched and reported no false alarms, five had scripted break-ins that were detected, and the remaining container was opened at customers and that was recorded by the system," says Petrizzi.

The technology uses container tags and readers designed by All Set Marine Security AB, which is based in Stockholm, Sweden, and built under license by GE Security. The handheld readers have an operating range of 10 meters from the container; the fixed readers can operate at a distance of 30 meters.

Operating at 2.4 GHz was essential, says GE, as it will enable the technology to be deployed in available spectrum immediately around the world.

In a bid to jump-start the market for its technology, GE Security says, it will invest in deploying its RFID readers at all ports taking part in the U.S. Customs Container Security Initiative (CSI), which was launched in 2002 to use information technology to identify and target high-risk shipments for inspection. So far 32 ports are participating in the program, but the total is expected to reach 40 ports by the end of this year. GE Security also says it will work to see its technology adopted as an industry standard, and that after running further tests on its TESC system, the company will eventually move toward opening the patented technology to other vendors to license.