BOXING CLEVER

Hutchison is a key player in a global initiative that will significantly increase safety and security within the world's maritime container trade.

By Matthew Flynn

J ust as a secure house helps people sleep peacefully at night, the introduction of Smart and Secure Tradelanes (SST) is allowing the shipping industry to rest easy in the knowledge that containers carrying their valuable merchandise will arrive safely every time.

Until now, shippers had no real control over their goods after they'd been packed into containers. Any tampering with the contents in transit, or even the loss of the entire container, was almost impossible to detect until it was too late.

But all this is rapidly changing with the introduction of SST. The system effectively provides each container with the equivalent of its own electronic dead bolt and burglar alarm, along with supporting technology that enables owners to track the container and monitor the integrity of their goods from point of origin to final destination.

The initiative comes at a time of growing concerns worldwide over security issues. In the wake of the events of 9/11, the movement of containers has been identified in some quarters as a vulnerable link in the global security chain. In the worst-case scenario, some argue, a container could be used to deliver a bomb.

At the forefront of technology solutions for container security, and one backed by Hutchison Port Holdings (HPH), are anti-intrusion sensor systems that are both tamper proof and monitored by a radio-wave network. The sensor systems transmit coded radio alerts in the event of unauthorised tampering and also carry an encrypted computerised log of the container's handling history.

This SST initiative is a global effort to use proven technologies and best business practices to plug security gaps throughout the supply chain. Similar technology is widely used in anti-shoplifting devices. With an average container cargo worth US$50,000 to US$100,000, it is not surprising that the technology is now being applied to protect commercial cargo in transit.

"HPH is joining with other industry leaders to build a network to read messages from individual containers as to their location and sensor activity," explains HPH Group Managing Director John Meredith.

"When the messages are received from their origin loading and destination unloading facilities, shippers will be able to closely monitor the containers in their supply chain."

Meredith is a founding member of the Strategic Council on Security Technology (SCST), which is the driving force behind the SST initiative. The SCST was brought into existence in response to the events of 9/11 to focus on security with the aim of being an international resource. It is comprised of an international assembly of top executives from the world's largest port operators, logistics technology providers, military logistics leaders, former public officials and prominent transportation consultancies. The participation of leading global ports players means that SCST represents 75% to 80% of the container traffic crossing US borders.

TECHNOLOGICAL BLUEPRINT

With growing demand for the establishment of more dependable security, the commercial container industry has known for some time that it faces a dramatic change in the way of doing business.

The basic requirement is that each container carry with it reliable information on where it has been and who has had access to it. In short, each container must be secure and tracked.

By volume, more than 95% of the US non-North American foreign trade arrives by ship. Yet the US Customs Service is only able to inspect 2% to 3% of the seven million containers that arrive each year, carrying everything from rugs and razorblades to frozen fish and sports cars. A major security breach conceivably could cripple global trade.

As the collection and discharge point for sea containers, ports are the strategic control points in the supply chain. But

Via the web-based software of Safe and Secure Tradelanes (SST), detailed cargo information is submitted to relevant security authorities by the various links in the global supply chain – including factories, government representatives, logistics service providers, terminals and shipping lines. The data is simultaneously captured and retained in the SST security software platform.

there have been obvious and potentially dangerous security gaps – until now.

The SCST has recently signed a partnership agreement with the International Standards Organisation (ISO) to accelerate the standards-development process and ensure that the industry-government coalition implements a defined, cohesive and practical set of criteria.

The participation of the ISO is important because it responds to earlier calls by the World Shipping Council to ensure a workable radio wave network as well as communications security.

While the ISO is responsible for defining the standards of the technology, the foundations of the Smart and Secure Tradelanes have already been established, tested and proven by the US Department of Defense.

The application of sensors and automated tracking systems to containerised cargo came about after the US military's supply chain became hopelessly tangled during the first Gulf War. Soldiers were eating breakfast three

times a day after the containers of lunch and dinner meals went missing. This was a minor inconvenience, but planners realised the potential danger if ammunition were to get lost in a mountain of metal containers.

The system provides each container with the equivalent of its own electronic dead bolt and burglar alarm

Today, the US military uses sensor systems and radio tracking on all crucial shipments. During the second Gulf War, containers were tracked and kept secure while the data remained confidential.

The availability of an already developed secure method to tighten control over supply chains serves as a useful model for the shipping industry.

PIVOTAL ROLE FOR PORTS

HPH has installed the Radio Frequency Identification (RFID) reader equipment in several facilities – Hongkong International Terminals (HIT), Port of Felixstowe (PFL) and Europe Container Terminals (ECT) – and can bring new ports on line in a matter of weeks. In due course, all HPH container ports will deploy the SST technology.

When the container enters the HPH facility by truck or barge, a handheld RFID reader is used to scan the sensor systems. Several dozen readers throughout the marshalling yard watch over stored containers while fixed readers attached to quay cranes capture movement on and off container vessels.

The first wave of "smart and secure" ocean containers was shipped in December 2002.

Among these shipments were ten container loads of store merchandise loaded by HIT for a major US-based retailer. (HPH handles about 50% of the 17,000 containers that enter US seaports each day.)
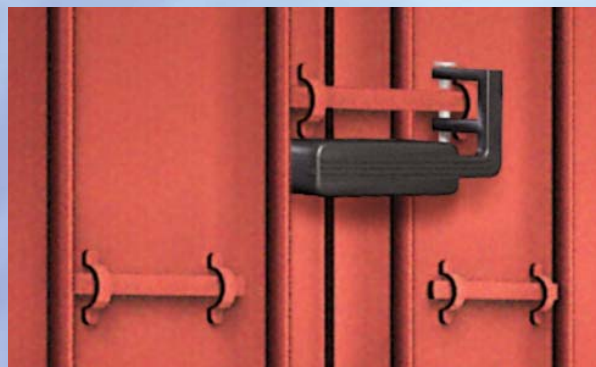
2 After the container has been packed and before it enters the container terminal, authorised personnel affix a sensor system, making the container "smart and secure". The Radio Frequency Identification (RFID) tag contains automatic identification technologies and sensor-related intrusion-detection systems that dramatically improve the ability to track, locate and detect the integrity of shipments in real-time.

Following the typical 10-day journey across the Pacific Ocean, the vessel berthed at the Port of Seattle, where strategically placed RFID readers recorded their location and security status.

After Customs clearance to exit the Port of Seattle, the smart containers were loaded onto the chassis of a regional trucker and transported to a distribution facility where key events continued to be captured and transmitted. Authorised personnel then unlocked the sensor system using an encrypted code. The event was recorded and transmitted to the Transportation Security System software, enabling complete information verification and the instant creation of a documented audit trail. From there, the merchandise was shipped to retail stores throughout the American Northwest – efficiently, safely and securely.

SAFETY FIRST

Meredith points out that, as a major container terminal operator, it is natural for HPH to be well advanced in security applications. "We are in 32 locations and smuggling may occur in some of these," he says.

Everyone will benefit and the shippers themselves will be the main winners

"HPH and the other participants of SST are committed to enlisting a strategic group of multinational shippers who can implement end-to-end and port-to-destination container security."

Shippers' requirements go back further than the ports, linking back to point of origin at the loading docks and factories. The unbroken origin-to-destination process will naturally require collaboration with the shipper's other physical network partners, which include carriers and forwarders in addition to port operators.

"Shippers should use whatever process and technology that will allow them to monitor the location and sensor activity of the containers carrying their goods as they move through their supply chain," Meredith asserts. "We believe Safe and Secure Tradelanes provides them with this service and we think that the effort we have already put into it will be seen in a good light by all players internationally."

To date, SST is probably the most far-reaching container security initiative globally.

COMMERCIAL BENEFITS

While the new technology brings additional expenses, Meredith believes it will also result in savings. "Everyone participating will benefit from increased container security and the shippers themselves will be the main winners," he says.

Commercial benefits will include better supply chain visibility, bringing "substitution cost savings" such as a

3 Information contained in the RFID tag is captured on the Internet-based security software platform which facilitates the necessary information exchanges and makes data readily available to authorised parties. Phase 2 adds more security layers, including a grid of sensor technologies for detecting environmental changes inside containers, surveillance cameras, biometric identification, and satellite tracking for in-transit visibility.

4 At the terminal in-gate, a hand-held device reads the container's security status then sends the information to the security software platform. The device enables authorised personnel to capture and verify key information, which is available for customs authorities to determine pre-loading inspections.

5 Once security is verified, the container enters the terminal to be loaded. Tracking occurs when the sensor systems affixed on the container pass through the fixed readers installed in the node. At the point of loading, the sealed containers are scanned again through readers mounted on quay cranes, providing a final security confirmation.

reduction in Bill of Lading surcharges and expedited freight.

Greater certainty of a container's location in the supply chain will also allow shippers to reduce their inventory of "safety stock."

The US military, for example, has used the sensor systems to move from just-in-case logistics, where planners always shipped extra in case something was lost or delayed, and instead adopt a much more efficient just-in-time logistics.

Meredith also anticipates that shippers will enjoy across-the-board direct and indirect cost savings as fewer shipments get tangled in trade compliance procedures and there is less risk of loss. "Major retail shippers are already relying on imbedded computer chips to protect products from theft," he says. "Many of these corporations are now ready to adopt this type of technology to track their containerised shipments."

IT PEDIGREE
HPH has strong credentials in the IT

field, having won awards for the development of a computer programme for yard management and workflow systems that arrange containers efficiently.

SST operates on an "open architecture" software principle to read various

This is going to be the next revolution in technology

manufacturers' RFID tags. The monitoring information is then transmitted to software that alerts shippers on the status of their cargo.

Naturally, shippers and other service providers will be sensitive to who will have access to the commercially sensitive information.

Meredith explains that shipping information is the property of the shipper. "The information provided to the

shipper for the monitoring of location and sensor activity is one more input to their data from service providers," he says.

Each terminal facility has its own site manager who collects the data from the readers. This information is then sent to the various shippers' systems, or they can access it from the Internet using their passwords. "The protocols are in place for security," Meredith confirms, pointing out that there have been no security breaches in the US Department of Defense's use of the system.

"The key to monitoring the location and sensor activity of a 'smart container' is the network of readers and the ability to forward data to the shipper for alerts," notes Meredith. The terminal operators' network will be a large sector of this but additional reading stations at intermodal yards/facilities will further enhance the network to provide closer scrutiny of the shippers' supply chain.

To date, the main company producing the smart locks is Savi Technology, which clearly has a head start thanks to

6 Secure containers leave their port of origin on board a vessel. Each container can now be tracked to its final destination along Smart and Secure Tradelanes. (Currently, six lanes are available: HK to Seattle; HK to Tacoma; ECT to NY; Felixstowe to NY; Singapore to LA/LB; Antwerp to NY.)

7 The container arrives at its destination port where its integrity is again checked using a hand-held device. Information on key supply chain and security events is immediately available. Business processes have been recorded, and container tamperings, mis-routes and delays have been monitored and reported accurately throughout the global tracking network in real-time.

its track record with the US military.

But RFID hardware is not limited to one company. "This is a quickly developing sector that is going to be the next revolution in technology," Meredith predicts.

A major container maker in China, for example, has just signed on with a proposal for installed imbedded readers in their newly built containers, while retailers and product manufacturers are now making orders for RFID to track at the product level.

"HPH welcomes more advanced systems that may come into play," says Meredith. "Security is the incentive and security protects our people and our company's assets," he adds. "Our prime motivation is to take concrete action and do our part to provide a service to shippers that enables them to better secure their supply chains."

Rollout Under Way

SST has undergone a rigorous testing process. Phase 1 was launched in December 2002 and focused on the installation of the readers and location monitoring. It has seen more than 900 containers secured from point-of-origin to point-of-destination. In this phase, more than 4,000 container location

This is a collaborative effort and not a competition

monitoring and sealing events were recorded, spanning the globe and including ports in Rotterdam, Shanghai, Bangkok, Semarang, Jakarta, Singapore, southern China, and Hong Kong.

Phase 2 is now under way and the focus is on sensor status monitoring, while also expanding the volume of tracked containers.

"A great deal of impetus will come when, in return for shippers showing a secure supply chain, governments give them speedy access to land their goods," says Meredith. "Shippers who can provide accurate and comprehensive location and sensor status of their containers will be at the top of that fast lane list. This is a collaborative effort and not a competition of terminal operators to build security into the global supply chain. The participants in SST recognise the importance of a secure trade lane to the world economy and believe that at present their initiative is the only one upon which shippers can rely."

As for the future, it's quite feasible to predict that someday soon all containers will be "smart and secure". And there's almost no limit to the potential of the technology to keep shippers informed. Besides tracking their goods via global positioning, for example, they could soon be keeping tabs on the temperature within their container or even be able to "see" their goods via remote cameras.

Now, if only our homes and offices could be so secure.

8 The "seal" of the RFID sensor system is finally broken. The movement of cargo within the marine container has been accomplished with a high level of security.