

Mark Bown explains why Radar is becoming as important for port security as it is for navigation

THE INCREASING OF RADAR



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The need for greater, and more effective, security at ports and harbours across the world is increasing all the time. From smuggling to trafficking to a potential terrorist attack, the fundamental problem is how to detect an illegal intrusion or potential security or safety risk – whether from over the water or dockside – in time to coordinate and execute an appropriate response. In this article, we will be looking at some of the ways in which radar-based systems can be deployed not only to establish a virtual security perimeter, but also an enhanced situational awareness picture.

The main shipping lanes within a port are typically monitored by a Vessel Traffic Service (VTS) system.

However, VTS systems are intentionally focused on managing legitimate activities and do not typically provide radar coverage of dockside and some inlet areas – precisely the vulnerabilities that smugglers, traffickers and terrorists will seek to exploit. To ensure the security of the port, there is a need for greater surveillance, a capacity for monitoring the movements of all people, vehicles and small boats.

The SBS (Shore Based Sensors) range from Kelvin Hughes has been specifically developed to meet not just the stringent operational requirements of port, harbour and river traffic operators, but also their security requirements. Including either non-coherent

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The main shipping lanes in a port are typically monitored by a VTS system (above right)

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or fully coherent solid-state radar sensors, SBS systems are available in multiple configurations to suit any specific application whether a single radar site or a multiple radar sensor network. Designed in accordance with standard industry protocols, the SBS range can be incorporated by any system integrator easily and at minimum cost – an important consideration in any port security enhancement project.

The SBS-800 family all feature Kelvin Hughes' SharpEye transceivers. The critical features of SharpEye, particularly when it comes to safeguarding ports and harbours, are that its solid-state pulse Doppler technology not only offers extremely high reliability, but also makes it possible to detect a wider range of targets at a greater distance even in adverse weather conditions.

Available in both S and X-Band frequency versions, the SBS-800 transmits a low-power patented pulse sequence, which enables short, medium and long-range radar returns to be detected simultaneously – allowing the radar operator to maintain situational awareness regardless of the range scale setting of the radar display software.

Doppler processing of the radar returns provides coherent information concerning target velocity (radial) and enables the detection not only of larger vessels, but also very small and slow-moving objects and targets with a low Radar Cross Section (RCS) such as RHIBs, small wooden boats, USVs and jet skis.

SharpEye X-Band transmitters are also the first in their class to employ Gallium Nitride (GaN) power transistor technology. The significant performance benefits of GaN transistors have been harnessed to directly improve the performance of the radar.

Deployable as a single upmast transceiver with the SharpEye sensor integrated in the antenna turning

unit, the SBS-800 both reduces the downmast housing requirements and improves the system performance. The configuration and quality of the sub-systems ensure an availability of 99.6 percent – meeting the 'Basic' and 'Standard' capability types of IALA V-128. Standardisation, removal of any need for a magnetron and high reliability of the system also provides the operator with a simplified Integrated Logistics Support (ILS) requirement.

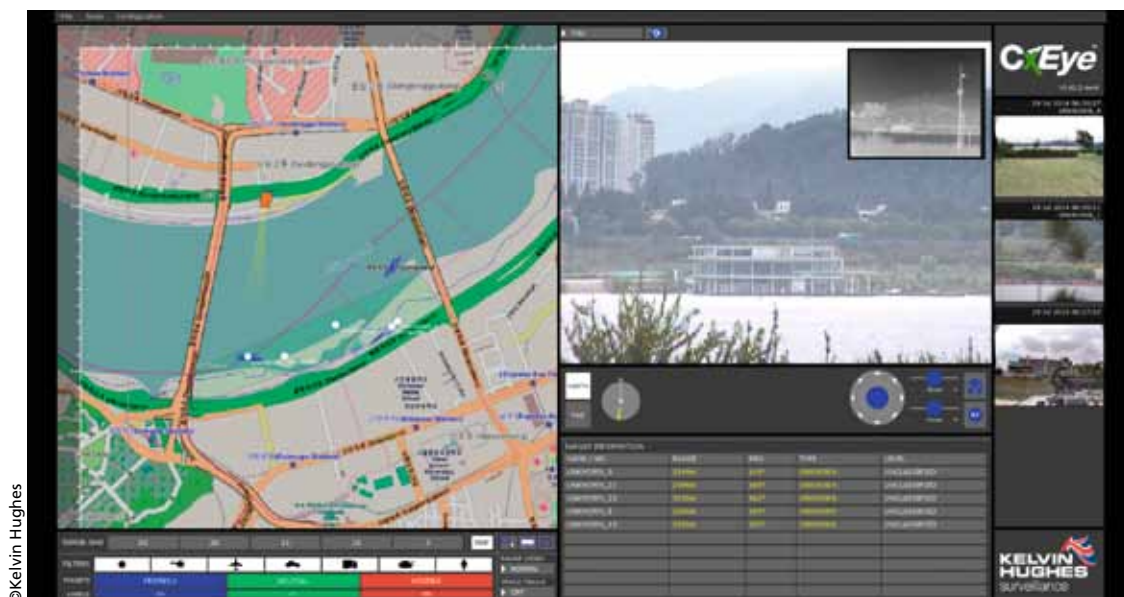
An SBS-800 system can be remotely controlled over a Wide Area Network (WAN), although local control can be achieved through an RDU control panel or optional service display, enabling the maintainer to fully control and display the radar locally for commissioning and maintenance purposes.

Another significant differentiator of SharpEye is its interoperability. SharpEye radar systems from Kelvin Hughes do not interfere with other systems and are not susceptible to interference from other radar transmissions. This can be a significant factor for port operators and government agencies responsible for coastal surveillance. Existing systems will often be made up of overlapping areas of coverage provided by a mixed supplier system developed over a number of years. Any radar sensor from the SBS range will fit seamlessly into the radar environment without contributing to the saturation of the transmission spectrum in the area.

Of course, as indicated above, security threats to ports and harbours can come not just from the water but also from the land. So, how does one counter potential dockside intrusion?

Kelvin Hughes has again addressed the perimeter security problem with SharpEye technology in a unique way. The SxV is a radome-enclosed lightweight

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CxEye control and display software integrates data from multiple sensors into a single display package

solution measuring approximately 580mm in diameter and weighing circa 20kg. The SxV can be deployed at the heart of a system designed to provide security and surveillance in those areas not covered by VTS or any other system.

Port perimeters are typically bounded by physical barriers and may include CCTV and intrusion detection sensors. However, cameras alone can only see what the operator spots and each camera can only see one thing of interest at a time. A radar maintains the situational awareness picture allowing the user to interrogate each detected radar target with a combined range of cameras and possibly mobile security personnel. Intrusion detection sensors will trigger once the intrusion has been made, but may not provide any indication as to where the intruder has then moved to. Physical barriers can be breached. Providing early detection of threats affords the opportunity to react and intercept before that breach of the perimeter occurs.

Designed to provide early radar detection of the presence of potential threats by extending the perimeter out, the SxV ensures not only ground-based target detection – from vehicles to people on foot – but also an alert to any low-level aerial threat such as that from commercially available drones.

Lightweight and mobile, the SxV can be deployed on a single mast, tower, building or vehicle. Installation is simple and reliable. The radome-enclosed unit consists of an antenna providing 360° coverage and is environmentally sealed to IP67 standards to ensure it will work in extreme cold, hot and wet conditions.

When deployed on the Kelvin Hughes Single Mast Solution (SMS), the radar can be co-located with electro-optic slew-to-cue cameras as well as thermal imaging devices. With one cable connection, the SMS can ensure complete radar and camera surveillance with no blind arcs. The telescopic mast can be supported on its own tripod or incorporated into a vehicle to provide uninterrupted surveillance of critical port or harbour perimeters, inlets, keys and docking areas.

Having been acquired, of course, the information

needs to be interpreted. CxEye – Kelvin Hughes' control and display software – integrates data from multiple sensors into a single, easy-to-use display package. The software is based on a simple command and control system, which incorporates track fusion of the various sensors, mapping functionality and a target priority tote, all presented on touchscreen-capable software. Designed to be highly intuitive, little training is required to use CxEye effectively.

Providing radar tracks, geo-referenced on a selection of mapping tools, the system can also fuse tracks from multiple radar heads into one user-friendly display. Surveillance of a port or harbour can be achieved instantaneously, with reporting of threats achieved automatically or through user-determined parameters. Radar tracks in different domains, displayed in an easy-to-understand format, enable the user to evaluate and coordinate a response through a Detect, Recognise, Identify and Classify methodology.

The key point behind all of the above is that the effective protection of ports and harbours depends on the earliest possible detection of any threat – real or potential, waterside or dockside. And radar-based systems have to be a key part of any solution to what most experts would agree is an ever-growing problem.

The world changed after the 9/11 attacks on the US and certainly those events had an accelerating effect on the negotiations that led to the signing of the International Ship and Port Facility Security (ISPS) Code, an amendment to the Safety of Life at Sea (SOLAS) Convention, in 2004. But, while the code still provides an essential framework for port and harbour operators of all kinds, events have moved on and potential new threats are emerging all the time. How can we be prepared for what may yet come?

Technological developments continue in the area of radar detection and radar-based security systems that offer further capability to those charged with safety and security – from enhanced processing algorithms that are able to focus on specific threats to phased array technology that provides opportunities to implement surveillance and security in more areas of a port.

Mark Bown is Group Marketing Manager at Kelvin Hughes and has been with the Company for six years working across the group but with a key focus on developing the Surveillance and Security market channels. Mark has 20 years' experience working in the defence, oil and gas and maritime industries.