

# INTELLIGENT RADAR MONITORING SYSTEM

Automatic tracking, detection and identification  
Small target, oil spill, wave height



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# Intelligent Radar Monitoring System

The Intelligent Radar Monitoring System is an observation and surveillance system with automatic tracking, detection and identification above sea surface. The system uses radar, CCTV, AIS and GPS as major sensors, which implements excellent tracking ability for small targets ( $RCS \geq 0.1m^2$ , height  $\geq 1m$ ). Advanced signal processing algorithms (non-constant adaptive threshold, TBD, clutter statistic, characteristic matching) are also designed for enhancing the ability of small target detection.

As a part of vessel traffic management information system and surveillance system, The system supports multi-sensors (shipborne, shore based) fusion through TCP/IP network. Implements high-capacity tracking amount, global targets layout in coverage, oil spill detection, wave height calculation and collision avoidance. Helps for law enforcement and oceanic administration.



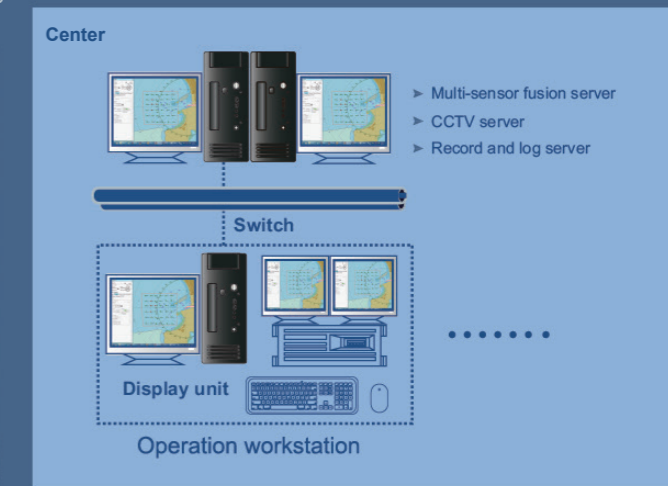
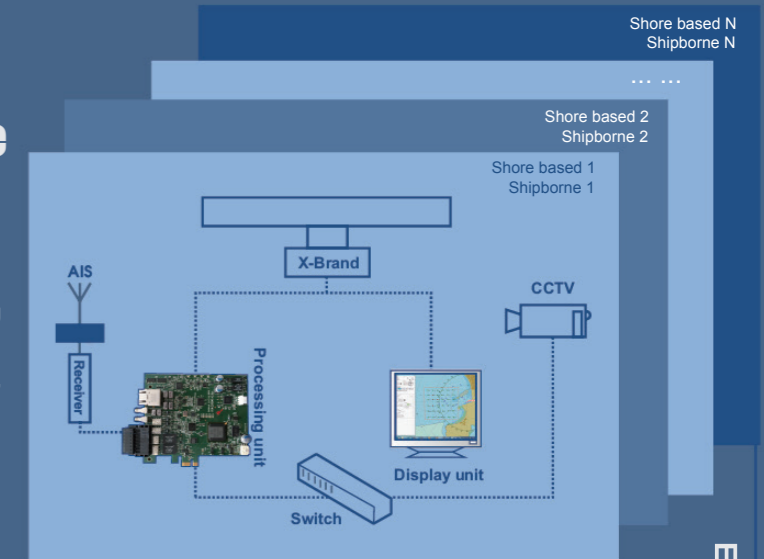
## Application filed: Shipborne

### Law enforcement and rescue ships

- Effectively achieve the goal of "early finding, tracking and handling objects above sea level"
- Improve the maritime right defence and law enforcement, anti-smuggling, and assisted rescue efficiencies.

### Merchant ships and expedition ships

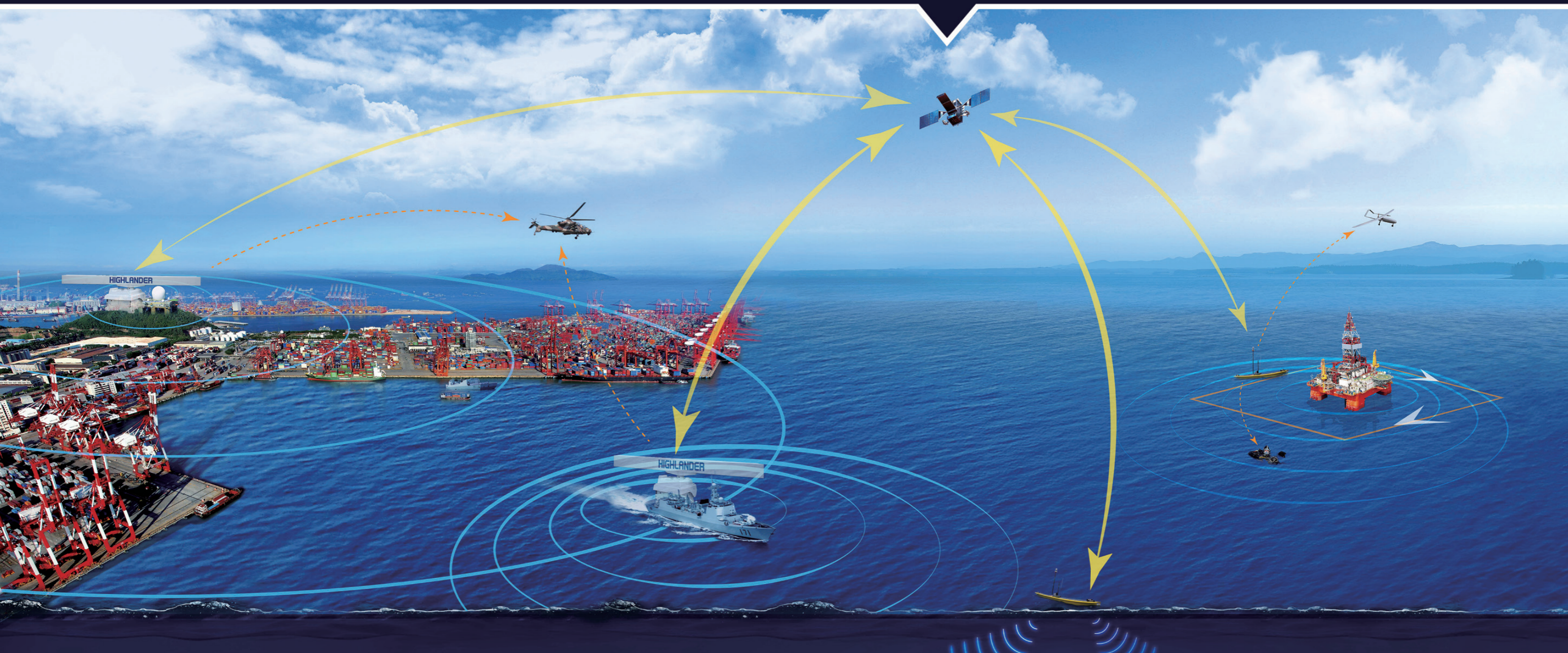
- Shipborne guard protection to prevent pirates and improve the navigation safety level
- Detection of ice and sea surface floating debris to reduce navigation hazards



Ethernet







## Application filed: Shore-based

### Energy platform

- Detect oil spills on the sea rapidly to protect the marine environment and achieve an unattended goal.
- Avoid collision and stay on alert automatically to reduce accidents around the oilfield platform.

### Onshore surveillance

- Enhance the safety level of the sea area
- Protect oceanic resources
- Prevent the marine environment from being polluted
- Guarantee marine information security

### Port management

- Maintain good maritime traffic order, reduce ship traffic accidents and strengthen maritime traffic safety
- Improve port ship dispatching efficiency and prevent the water area from being polluted
- Guarantee port information security

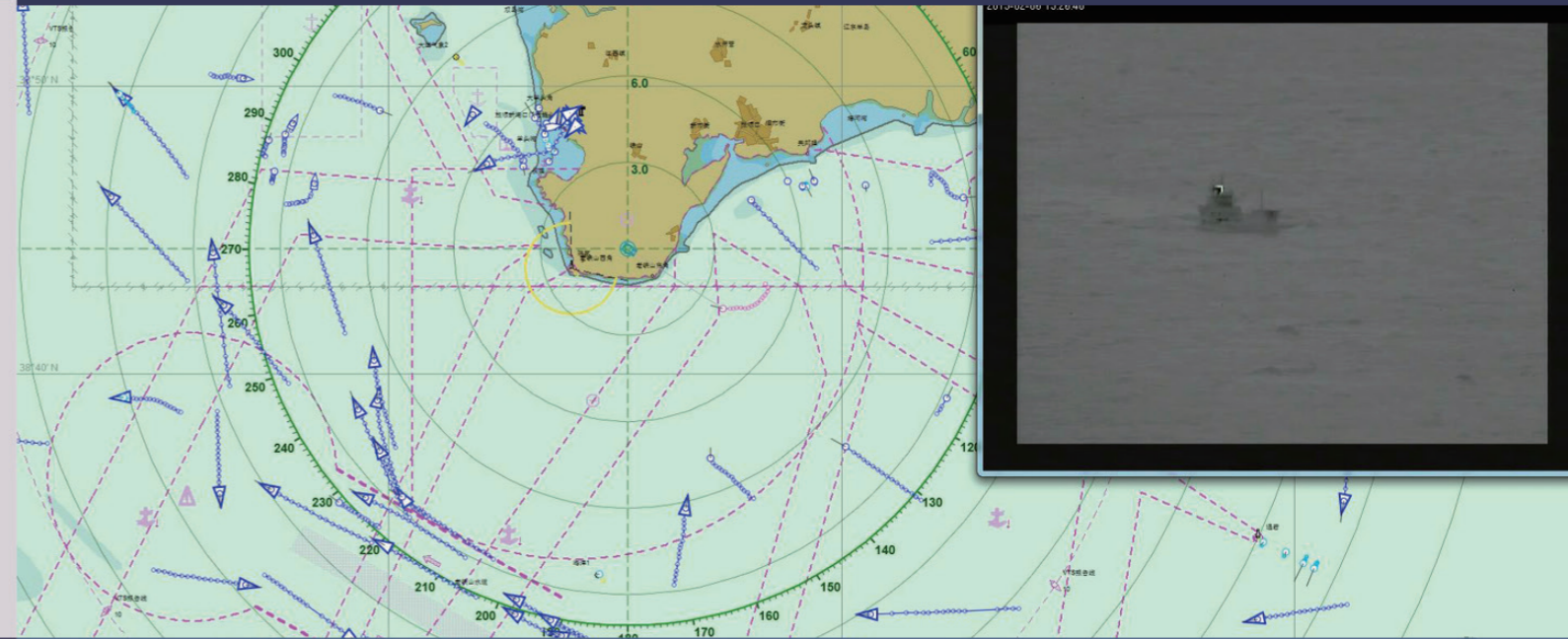
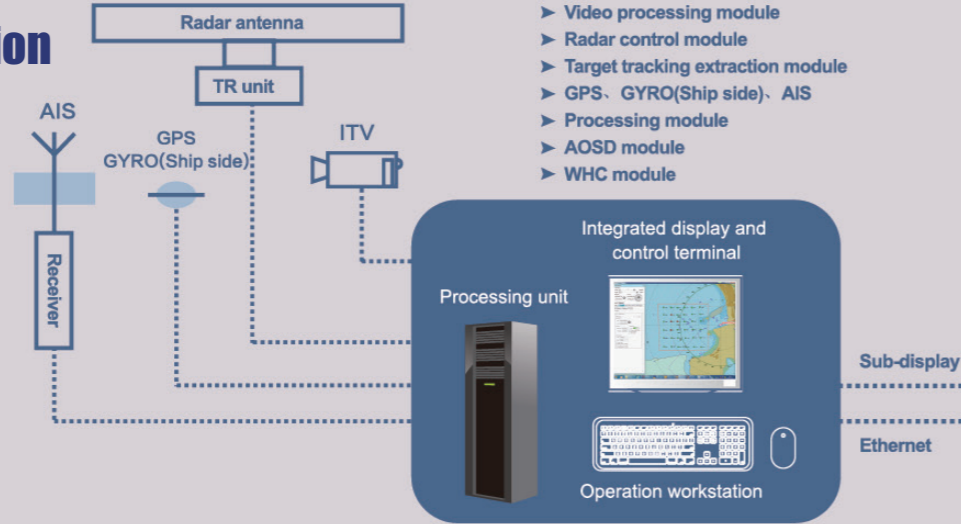




## >>> System composition

### A single system consists of

- Radar TR unit
- Radar antenna
- CCTV
- Processing unit
- Monitor



### ► Specification of HLD-900C-based radar hardware

- Transmission peak-power: 25KW (10KW optional)
- frequency: 9410±20MHz
- Polarization: Horizontal
- Gain: ≥31dB
- Horizontal beam angle: 1°
- Vertical beam angle: 24°



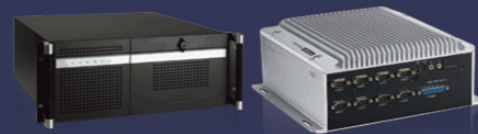
### ► Parameters of radar data acquisition card

- Dual 125Msps/14-digit analogue-digital converter
- Dual 62.5Msps/10-digit additional analogue-digital converter
- Dual isolated RS 422/485 serial port
- Up to ±8V video level range
- Up to ±24V analogue signal inputs



### ► Parameters of processing host

- CPU: i7 Quad-Core
- Hard disk: SSD 64G+256G [can be customized]
- Memory: 8GB



### ► Specification of display and control terminal

- Operating system: Microsoft Windows 7 x64
- Display screen: 23.1-inch [can be customized]
- Resolution: 1600×1200[can be customized]



### ► CCTV

#### Features:

- High performance cooled thermal infrared imager and laser deterrence unit are connected to the radar system for all-weather and all-round sustainable and stable tracking and video evidence collection and can apply non-violent attack against objectives endangering its own security.
- The system adopts a gyro stabilization technology, which can ensure that it can obtain a stable target image and accomplish accurate tracking when the ship is shaking seriously.



#### Day:

- CCD size: 1/2-inch
- CCD pixels: 720 \* 576
- Lens focal length: 15.6mm ~ 500mm continuous zooming
- Angle of view: 23°11 'x 17°30' ~ 0°44 'x 0°33'

#### Infrared:

- Detector type: cooled focal plane array
- Response wave band: 3~5um
- Pixel: 320×256
- Optical system: 30mm/110/500mm F4

#### Servo platform :

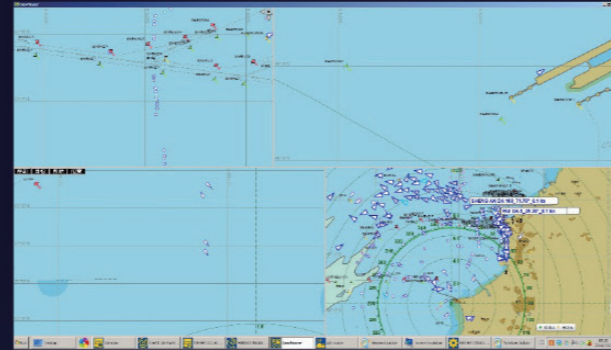
- Horizontal angle: -170° -- + 170°
- Pitch angle greater than: -80° ~ + 80°
- Working temperature: -20 °C ~ +60 </pt298><pt299°C
- Wind-protection level: more than 60m/s
- Protection level: IP67



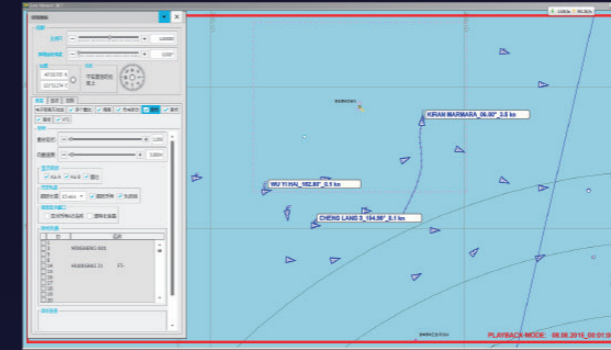


# System characteristics

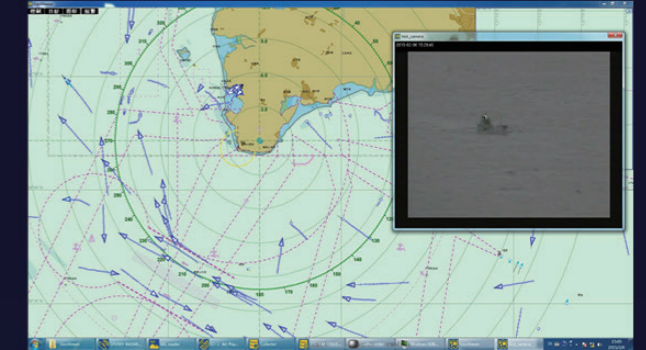
- Independent domestic technologies making data information more secure.
- High-precision sampling (125Mps, 14bits) so that the radar signal and the noise are distinctly distinguished and the target range is defined more accurately.
- The system can be compatible with and control a variety of radar front ends
- Adaptive low usage of network bandwidth, remote controlling and maintenance.



- Excellent target tracking and detection capability (minimum detectable target is RCS = 0.1m<sup>2</sup>, with the target height of 1m), which effectively overcome the defects existing in conventional detection means such as target missing and failure to find small targets accurately, so that the ship sailing is safer and the monitoring is more comprehensive Excellent target tracking and detecting capacity.



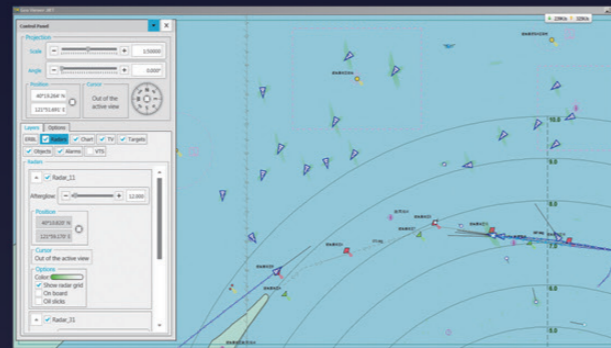
- Implement recording and playback to facilitate verification and improve the work efficiency



- Radar CCTV integration and intelligent guidance to achieve all-weather and around-the-clock tracking, detection and identification of a specific target.



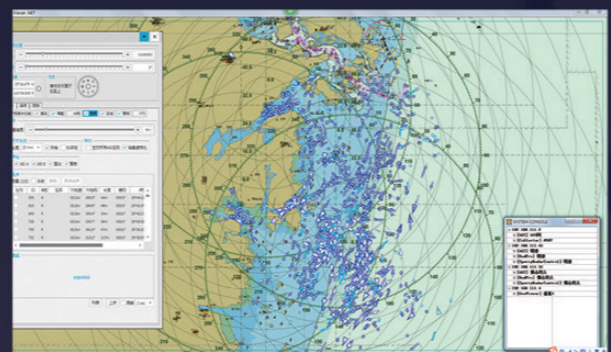
- Non-constant adaptive threshold processing, TBD algorithm, which can track the target according to target position, speed, navigation direction and other parameters.



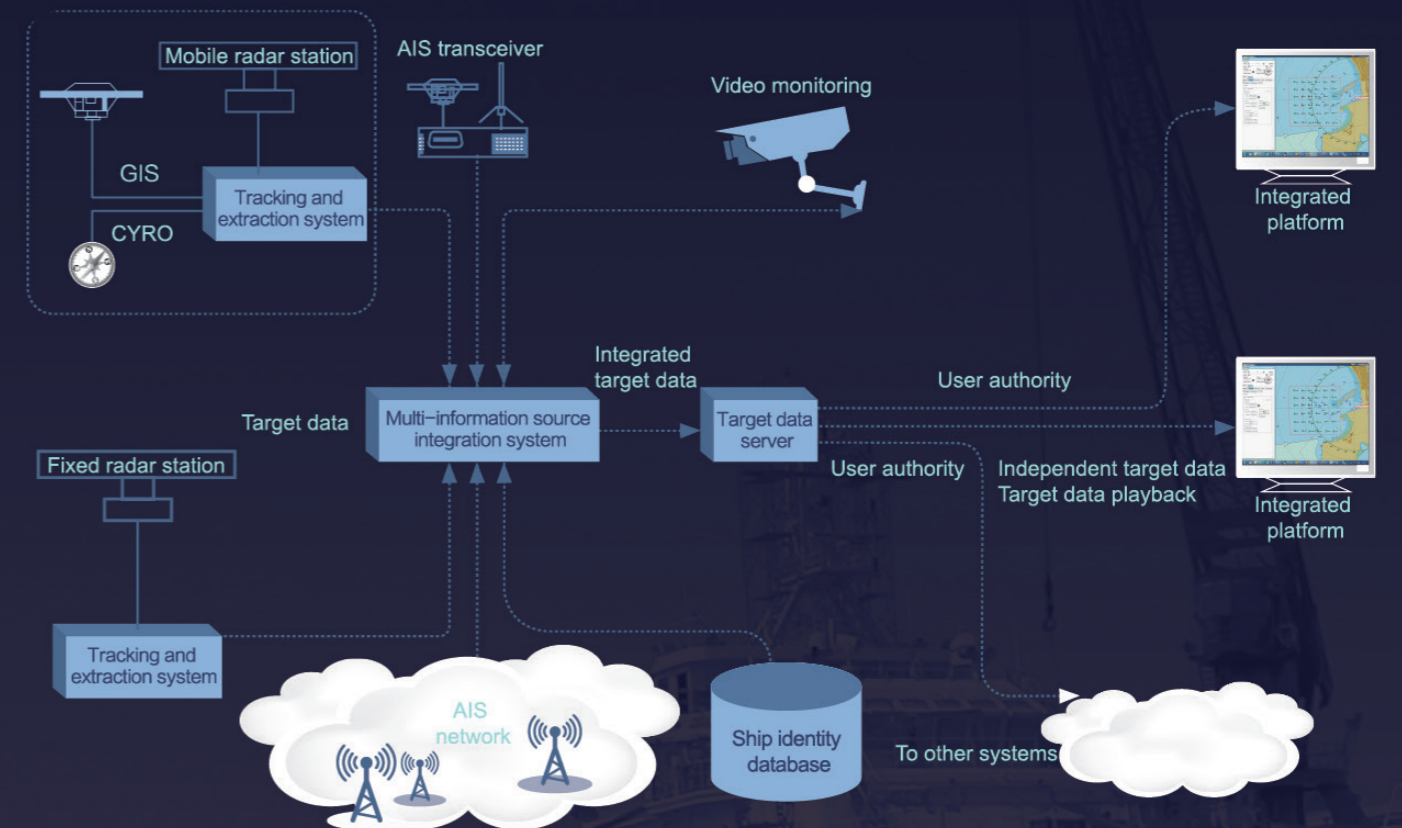
- Simultaneous monitoring of a variety of targets (high speed, low speed, air, sea surface, etc.) and customized alarm.



- Custom warning area and flexible alarm settings meet different management needs so that you can set alarm conditions according to zone control and event control.



- Multi-sensor (radar, AIS, photo-electric, GPS and other active and passive sensor information) fusion, which shows the target detection and identifies source and also analyse the situation under a unified platform.
- Large-capacity data processing, which can reach 2,000 batches and above



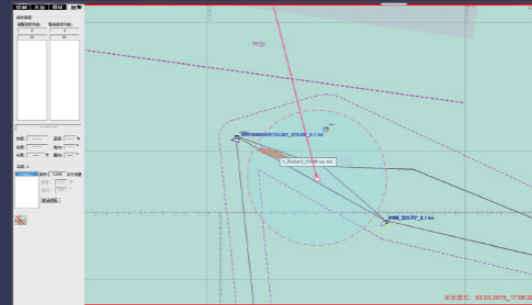
- Multi-radar monitoring stations networking and flexible system structure, which supports a multi-level command centre. The command centre at each level can show the sea situation of all platforms and base stations within its own range



## System expansion

### Oil spill detection

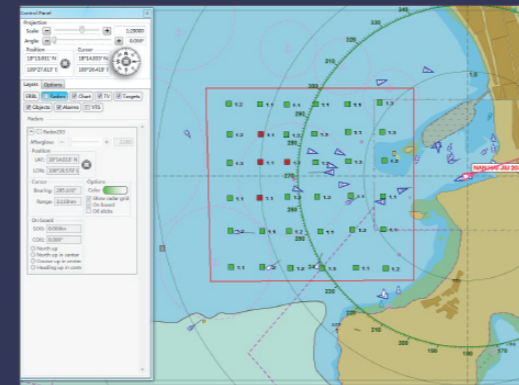
- Fully-automatic oil spill detection, timely warning and rapid response
- Display oil slick outline, area, moving speed and direction in a real-time manner
- Enhance maritime oil spill emergency monitoring and disposal capacities
- Prevent and control oil spill pollution risk and protect the maritime ecological environment.



Actual case: Detect the area of floating oil of 0.04 square nautical miles

### Sea wave detection

- Long-term continuous detection of the sea area covered by the radar so that the data is more comprehensive
- Customized alarm area to effectively detect dangerous sea wave
- Update data in real time to ensure safe operations
- Improve maritime data observation capability to provide the decision-making department with data support
- Support maritime aircraft docking

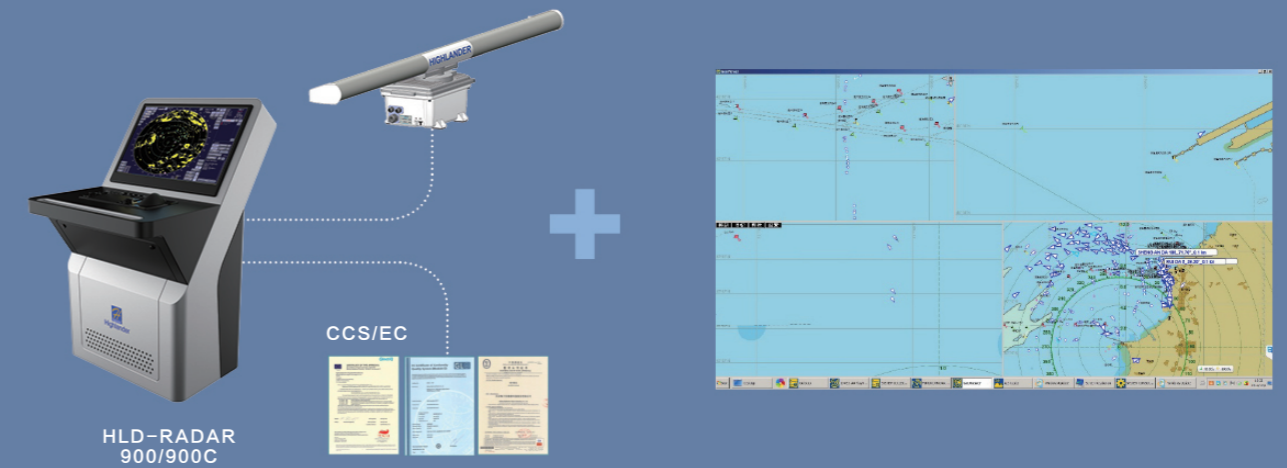


Actual case: sea wave detection

### Composite multi-functional radar

- X-band/S-band navigation radar combines the oil spill monitoring technology and small target detection technology to realize function integration
- Tasks include sea defense, marine environment protection, Navigation collision avoidance
- Less space and more intelligent display

Collision avoidance and monitoring integration



### Build comprehensive monitoring and commanding system

Dedicated to serving the maritime monitoring network construction, Highlander relies on intelligent radar remote measuring and sensing technologies, Unmanned Intelligent Platform system, marine surveying and investigation techniques and UAV to build a comprehensive monitoring and commanding system for shores, islands and major sea areas under the design concepts of "Intelligent technologies" based on the experience learnt in the construction of coastal testing grounds in order to provide services and contribute to the construction of the coastal comprehensive monitoring and defence system.