

# Improved Coastal Surveillance for Estonia



## Radar Data Processing for Coastal Surveillance

Developed for EADS European Aeronautic Defence and Space Company



In 2002 the Estonian Government, preparing its entry into the European Union, authorized European Aeronautic Defence and Space Company (EADS) to install an advanced Coastal Surveillance System that would meet all the stringent requirements on the protection of external borders which is an essential prerequisite for joining the European Union. The system, which will start operations by the end of 2004, significantly enhances the performance of the existing coastal surveillance system.

### CSR-E software components from Barco

Barco, since many years renowned as expert for mission-critical display software, was subcontracted by EADS to contribute software components for radar data processing to the Estonian coastal surveillance system. The radar data processing software components developed by Barco allow for the first time the integrated monitoring of surface and air targets in the controlled area.

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# Innovative radar data processing software

Enhanced safety and security for Vessel Traffic Control

The EADS will install in 2004-2005 an advanced coastal surveillance system which enables the Estonian Border Guards to assure the integrity of their territory and territorial waters. Under the project name CSR-E Barco Orthogon AG, a subsidiary of Barco, was subcontracted to supply the radar data processing software for the state-of-the-art surveillance system.

The coastal surveillance system for Estonia includes a total of 20 radars (10 long range radars with sea and air channels, and 10 short range radars with sea channel only) covering the entire coastal region. Four regional operation centers are connected to the national operation center in Tallinn, the capital of Estonia. The system is not only designed for monitoring boarders, but also supports fishery control, environmental protection and search and rescue activities. It can be deployed land and offshore based; it helps to reduce the risks of shipping accidents and to detect and avoid collisions.

EADS, who already subcontracted Barco Orthogon AG for developing a new surveillance radar system for the German Air Force, once again selected the company for this important program.

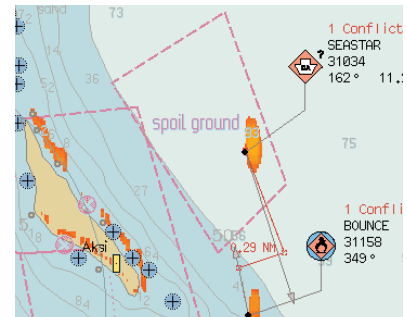


## Enhanced capabilities for coastal surveillance

All subcontracted components used for CSR-E are part of Barco's OPSCENTER™, a component suite designed for efficient implementation and operation of high-performance mission-critical systems. The OPSCENTER™ components combine system flexibility with user-friendly operation, simple maintenance, and cutting edge technology.

The software components integrated into CSR-E such as the Multi Sensor Tracker allow early and reliable detection of traffic, not only of cooperative vessels, but also of hidden intruders. The software features allow to reduce the risk of collisions and shipping accidents; anti-regulation instances or other illegal actions like smugglers or immigrants can also be revealed. Of course targets can be detected accurately even under adverse weather conditions.

Barco provides an open solution that is extensible and supportable over the lifetime of the entire system.



# The first choice for displaying radar video

Enhanced capabilities at lower cost



## Multi Sensor Tracker (MST)

Air and sea targets are tracked by the MST simultaneously, using different radar data sources. The MST fuses all inputs into system tracks, maintaining a track history and a unique track identification. Working with a standard data interface (ASTERIX) and employing extended Kalman filtering algorithms, the MST allows real data fusion instead of simple sensor mosaicking.

Asynchronous data processing allows data fusion of input data with different sampling rates. Flexible sensor specific data assignment prevents undesired target merging. Modular structure and COTS hardware and software are the basis for maximum system stability and maintainability during long term operation.

## Conflict Detection

The Conflict Detection (CDE) monitors the traffic situation and checks for traffic conflicts and potential conflict situa-

tions. The function supports the operator in order to increase the safety, to avoid accidents and to detect intruders.

## Traffic Display System

The Traffic Display System (TDS) displays the current traffic situation including ECDIS map, synthetic chart supplements, radar video (sea channel and air video), synthetic tracks, track labels and different feedback information like conflicts.

## System Coordination & Management

The System Coordination is the core data processing unit. It receives track data from the Multi Sensor Tracker and distributes it to all connected Traffic Display Systems. The system includes a central system coordination process which is responsible for system data persistence, track correlation, conflict management, and callsign association. To guarantee high availability, the entire system is observed by SMCF (System Monitoring, Control, and Failover), a surveillance and administration system for hardware and software.

## Recording and Replay

All traffic-related data are recorded centrally e.g. on a file server, formatted in flat files. System global data like tracks, synthetic chart supplements and conflicts are harmonized and synchronized with the radar video. For testing, demonstrating or debugging recordings can be transported easily. Playback is possible at each TDS, even in parallel to live operations.

## Requirements

The radar data processing software runs on cost-effective standard PCs. No special graphic hardware is necessary. The number of radar sources to be simultaneously displayed is only limited by the performance of the machine. The system can serve many display workstations connected to a local area network (LAN). Network multiplexing for WAN connections is optimized through proxy servers.



# Technical specifications

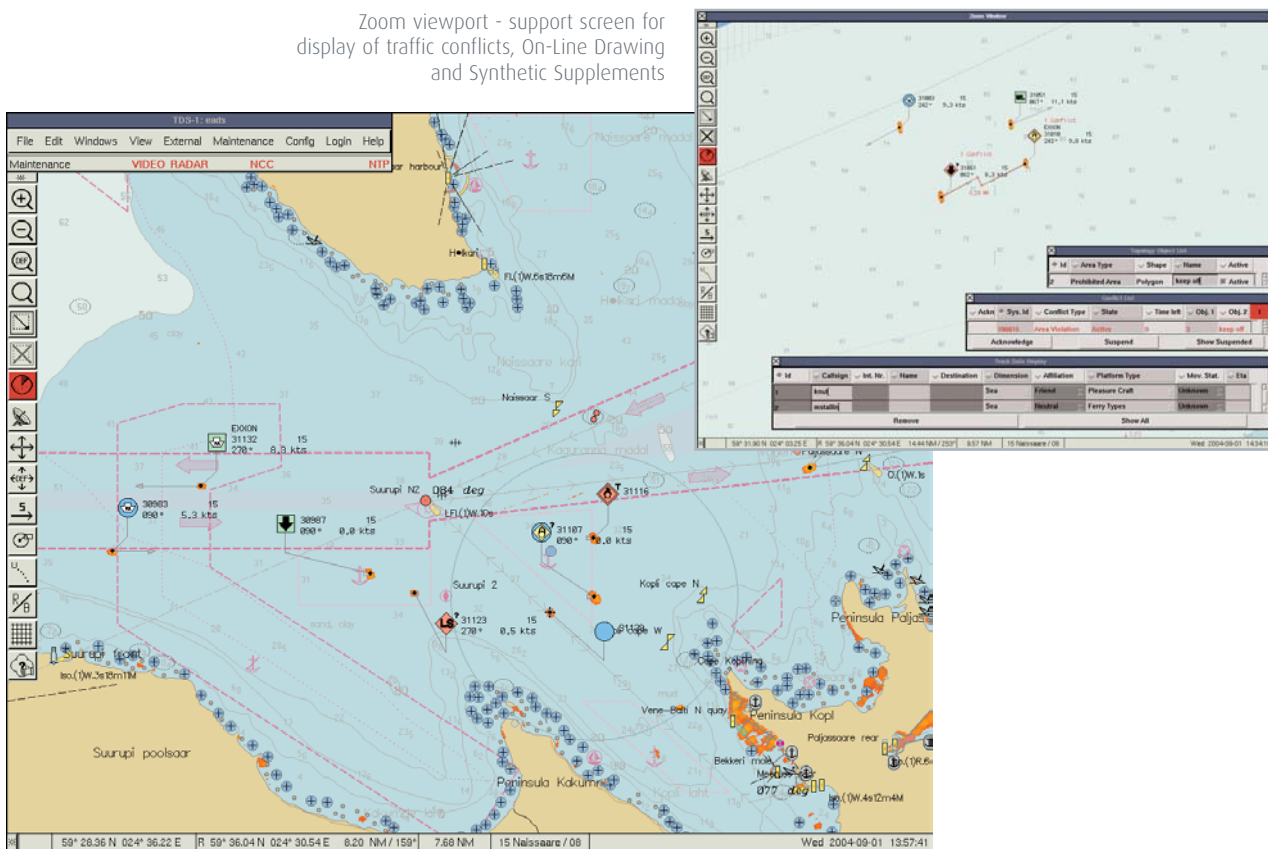
## Technical features of RADAR Server and PCI Radar Interface Card:

- Highly adaptive to signal ranges
- Max 10 Mio range cells/sec
- Max 6000 range cells per beam
- 8 bit A/D video sampling at max. 100 MHz, adaptable at runtime
- Pulse Repetition Frequency (PRF) up to 10 kHz
- Digital input available (Terma Scanner radar)

## Track Presentation:

- MIL-STD-2525B (STANAG 4420)
- Interpolated and measured positions
- Free number of text fields
- History marks support undersampling

Zoom viewport - support screen for display of traffic conflicts, On-Line Drawing and Synthetic Supplements



Traffic viewport - main screen

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