

VLATACOM - A reliable partner

The OTHR system has been successfully deployed at several locations and tested at different operating frequencies. End-users have been impressed with the high performance and reliability of the system for monitoring their EEZ.

With its continuous coverage the OTHR system creates a unified maritime picture. It automatically correlates its real-time sensor input with its intelligence system to detect and analyze suspicious behavior, providing the operators complete situational awareness. This allows them to be able to act on any threats to their national security, keeping their country safe. VLATACOM's OVER-THE-HORIZON RADAR represents a powerful solution for modern coastal surveillance.

Vlatacom's experience

Since its establishment in 1997, Vlatacom has delivered numerous solutions to a multitude of clients. Vlatacom's policy is to continuously improve the professional skills and knowledge of its employees. This provides Vlatacom with the ability to successfully and professionally integrate complex solutions in the areas of information and communication technologies, biometrics, security, and telecommunications. In 2015, Vlatacom has been officially recognized as research and development institute.

Customised solutions

Vlatacom provides the essential strategies, technology, processes, and personnel to optimise solutions in accordance with your specific requirements and demands. Simple integration of our solutions into existing systems gives you the opportunity to always keep the entire solution under complete control. Provided solutions are customisable to features of local culture (language, alphabet).

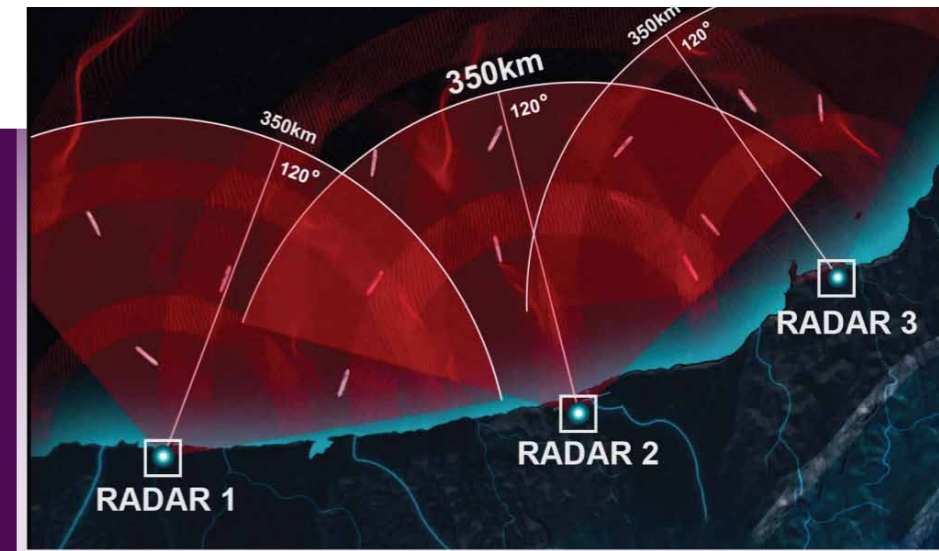


Address:
Vlatacom institute d.o.o.
Milutina Milankovića 5
11070 Belgrade, Serbia

tel: +381 11 377 11 00
fax: +381 11 377 11 99
info@vlatacom.com
www.vlatacom.com



vHF-OTHR



vHF-OTHR

Vlatacom HF Over-The-Horizon Radar

The VLATACOM HF - OTHR system is used for the coverage of the entire Exclusive Economic Zone (EEZ) – up to 200 nautical miles (NM) from the shore. This protection far exceeds the reach of microwave radars and camera systems which require line of sight of the target, enabling efficient and accurate protection of the EEZ (where the country has exclusive rights for fishing, mining, drilling, etc.).

This professional radar system (with separated transmit and receive antenna arrays) utilizes advanced signal processing. The VHF-OTHR system provides some outstanding features like:

- Fast and accurate software beam-forming.
- "Quiet" and low-noise non-interrupted Frequency-Modulated Continuous-Wave (FMCW) operation mode. This mode allows continuous system operation which provides extremely long ranges without blind zones, high reliability and data availability.
- Integrates with AIS, providing ship information.
- Software automatically alerts operators of any pre-defined suspicious activity.

Standard real-time features

The software package includes a ship detection algorithm which is applied in real-time with an integration time of 120 seconds, updated every 30 seconds. The accuracy of the system is +/- 1° by angle, with an 85% probability of detecting a target in the observable range. The data that is collected by the radar system is processed through VLATACOM's specially developed algorithm. The resulting data is then transferred to the central server station for ship tracking and coastal surveillance applications.

Technical Performance

The FMCW operation mode provides data from near shore (0.5NM) to maximal nominal range (up to 200 NM) without blind spots. The range depends on operating frequency, target size and orientation, and environmental conditions (sea state and radio fading and interference).

Nominal detection range vs. operating radar frequency for a 200 m ship:





- 65 NM @ 12 MHz
- 90 NM @ 8 MHz
- 125 NM @ 6 MHz
- 200 NM @ 4 MHz

Day to night range variation (max/min ranges) for a 200 m ship:

- 80 NM / 50 NM @ 12 MHz
- 110 NM / 65 NM @ 8 MHz
- 160 NM / 90 NM @ 6 MHz
- 240 NM / 160 NM @ 4 MHz

Processing Functions and Algorithms

There are advanced image processing algorithms already integrated to improve ultra long range imaging. Furthermore, there are optional functions and algorithms like image fusion from different imaging sources and also video tracking to provide system operators with automatic target tracking. Powerful computing processors perform all necessary preprocessing to eliminate atmospheric interference, noise, and vibration effects and to stabilize and enhance images from each sensor.. Optional mage fusion algorithms can be selected from rich algorithm collection which is open for upgrade to meet new requirements. Image post-processing features can be activated/deactivated/chosen from application environment.

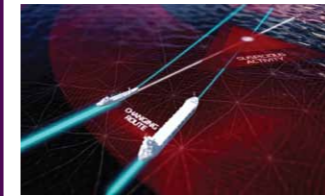
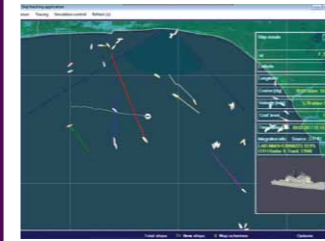
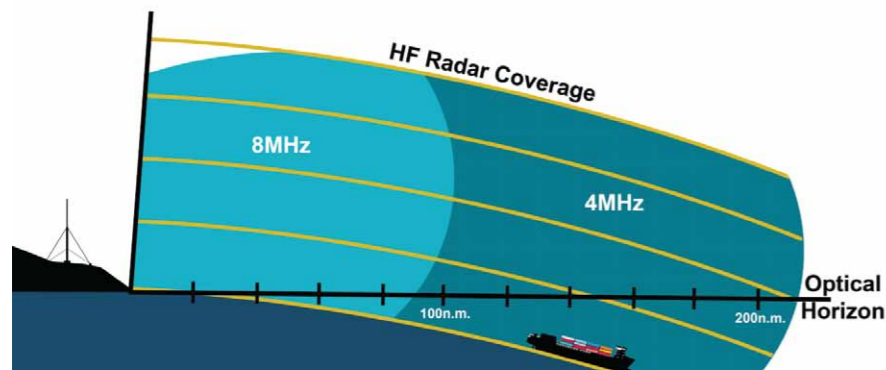
Range vs. ship size and sea state, normalized to the range for a large vessel at Sea State 3 (= 100 %)			
Large vessel >200m	Medium vessel <200m	Small vessel <130m	Very small vessel <80m
			
Sea State 3: 100 %	Sea State 3: 90 %	Sea State 3: 85 %	Sea State 3: 75 %
Sea State 5: 100 %	Sea State 5: 90 %	Sea State 5: 80 %	Sea State 5: 50 %
Sea State 5: 90 %	Sea State 5: 80 %	Sea State 5: 70 %	Sea State 5: 30 %

HF technology and propagation

vHF-OTHR operates in HF spectra: 3-20MHz.

(Exact frequency selection depends on specific requirements: range, targets of interest, frequency licensing – and it is fully customizable)

Specific propagation of waves is the key for over-the-horizon coverage. This is the most important difference between HF radar and standard microwave surveillance radars.



Typical site geometry

The radar is continuously transmitting RF power, no gating or pulsing sequences are used. This provides the best signal to noise performance and requires de-coupling between the transmitter and receiver. It is achieved by using separate locations for transmit (Tx) and receive (Rx) equipment. Site sizes vary based on the OTHR frequency that is used, the typical range is 800m to 1200m long and 50m to 100m wide.

Equipment Housing

Hardware equipment belonging to Tx and Rx parts of vHF-OTHR system is commonly installed in dedicated shelters: Tx and Rx shelters are completely equipped, with appropriate infrastructure provided and professional protection included.

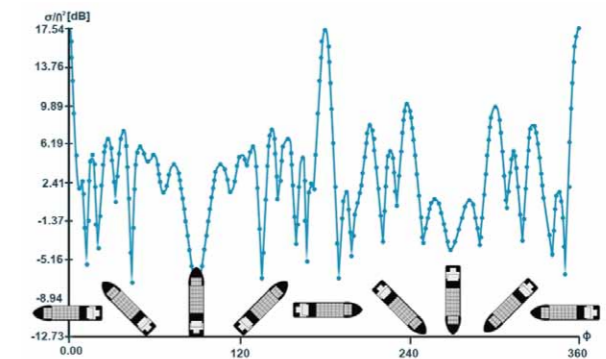
Real-time signal processing

Processing is done continuously: by using advanced spectral analysis algorithms for extraction of information from HF signals, over analysis of range-Doppler maps for target detection, followed by a customized tracking algorithm for continuous tracking and parameter extraction.

Among other parameters of interest, the following data is exported in numerical form to C2 system for further representation:

- Vessel position (coordinates)
- Vessel speed
- Vessel trajectory (history + prediction for future moving)

vHF-OTHR includes its own representation software, in order to provide a situational picture to the local operator. It is supported with realistic map and a descriptive graphical interface.



Automated Alerting

There is a set of possible events that could be pre-defined for automatic alerting for local operator and / or Command center. Possible criteria for automatic alarming includes:

- Situation when vessels enter pre-defined area,
- Situation when vessels leave pre-defined area,
- Vessels moving out of defined corridor,
- Vessels moving too close to each other,
- Unexpected maneuvering,
- Unexpected speed change, and more.

