A Senstar Corporation White Paper

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Comprehensive Solutions Designed for Border Security

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Contents

Abstract

Border security is an increasingly important and critical area of focus for a range of reasons least of which relate to issues of terrorism and illegal immigration. There is no "Silver Bullet" security solution or product that is able to address the many complexities that relate to climate, topography, geographic location, and even the associated politics. Real solutions require a variety of innovative products that must work together through seamless integration to provide effective protection, confidence in the system and ultimately, the required capabilities for effective border protection.

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Insights

The 21st Century is proving to be an era of intense and constant threats. From the potential and actually committed acts of terror to increased crime rates and anti-government protests and acts of violence, protecting citizenry is of paramount importance within the international community. As vast as the world is, it continues to get smaller and smaller every day. A dominant concern of most countries is the integrity of their national borders against illegal immigration, smuggling, hostile invasion, terrorism and the impacts to their economies by other illegal activities that come as a result of ineffective border security.

There are several factors and parameters that should be taken into consideration when designing an effective border security system:

- **Threat analysis** - such as armed forces, terrorism, smuggling, illegal immigration or other threats
- **Geography/Topography** – is it an open and easily accessible area, populated area, rural area, etc.
- **Environmental conditions** - Temperature, humidity, high/low regions of rainfall and more
- **Human and "soft" factors** – Culture, legal aspects, first responders availability and CONOPS (Concept Of Operation), who will operate and maintain the system, etc.
- **Budget priorities and constraints**

A comprehensive border security solution is often a balance between all these considerations and priorities.

Common requirements

In deference to the many variations mentioned above, identifying key fundamental and common requirements is needed in developing effective border intrusion detection and protection solutions:

- **Very low False / Nuisance Alarm Rate (FAR / NAR)** is mandatory; response forces are typically spread very thinly along borders; optimizing their effectiveness and capabilities is vitally important. .
- **Very high Probability of Detection (PD)** – Adversary detection is the critical feature for intrusion detection systems and developing a solution that matches the threat is ultimately the best measure for the investment.
- **Inherent robustness** to counter the system limitations of environmental conditions – rain, hail, snow, ice, lightning, fog or mist, dust, temperature range, humidity, wind, water, salty environment along seashores, noisy EMI / RFI (Electro-Magnetic / Radio Frequency Interference) environment, etc.
- **Low dependency** on infrastructure and limited accessibility: power may not be available or expensive; communication lines, if available, may have restricted bandwidth; access to the fence / detectors may be blocked due to vegetation and lack of paved roads.
- **Integration** through advanced Command and Control or Physical Security Information Management (PSIM) systems is needed to streamline the decision process and fast response to alarms during both routine operations and crisis situations.

All of the above features of intrusion detection systems must be considered as end-users and system integrators determine overall requirements with reliability, maintainability and robustness being paramount.

Tailored solutions to different customers

The Secure Border Initiative (SBInet) project in the United States has proven to be excessively costly and limited on promised capabilities. This project's "one-size-fits-all" approach hardly fits a "tailored" security design application and definitely is not achieving the desired goal of securing this strategic (terrorism, immigration and economic) border.

Senstar has developed a family of environmentally friendly sensors that address the various borders' security needs. Below is a description of a few examples of tailored solutions.

West European typical solutions

Western Europe is characterized by perceived limited national defense threats but with the focus on illegal immigration, drugs smuggling with emphasis and awareness to aesthetics. Therefore physical barriers are the least preferred solution. **Virtual fences / volumetric sensors** are the best fit; for example:

- **OmniTrax Buried Cable** - A virtual fence implemented by a smart cable, buried less than one foot underground. The cable creates an invisible electromagnetic field, capable of detecting any intruder entering the narrow virtual corridor. The buried cable is concealed and therefore unnoticed and practically impossible to defeat by intruders. OmniTrax locates the intruder with to the closest one meter and therefore verification with another sensor such as a PTZ camera is straight forward.

- **Radar** - is an ideal sensor for open and clear areas (i.e. no traffic),

where early warning can significantly reduce the first responders' reaction time.

- **CCTV and thermal day / night** / short or long range cameras should augment the solution by verification layer
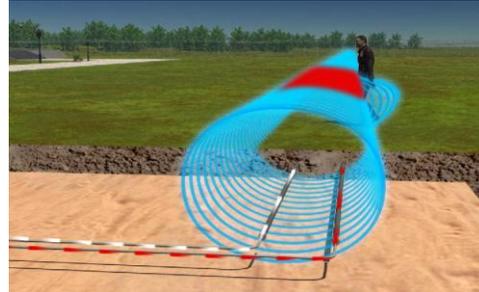
OmniTrax animated representation.

OmniTrax buried cable will be concealed and unnoticeable once the foliage grows to cover the earth moved for installation.

The United States of America, Asia and the Middle East typical solutions

The USA, Asia and the Middle East related borders are mainly affected by fundamental homeland security concerns such as illegal immigration, drugs, goods, biological and chemical materials smuggling and any other illegal activities. This is the classic region for physical barriers such as:

- **Taut wire** – A hybrid system of sensors weaved into a barbed wire fence. This solution offers guaranteed performance in all-weather conditions. It has demonstrated a high probability of detection (PD) and an almost zero false alarm rate (FAR). It is therefore ideal for high security where deterrence and delay must be achieved on top of uncompromised intrusion detection or high security dual technology fences.

- **Radars** - Ground protection radars are ideal for open and clear areas, where early warning can significantly improve the response time.

- **CCTV and thermal day / night /** short or long range cameras should augment the solution by verification layer.

Senstar's taut wire fence provides both intrusion detection and physical barriers for border protection.

Harsh Climate Conditions

Senstar operates the most comprehensive private test facility of its kind in the world.

Senstar's Test S.I.T.E. (Sensor Integrated Test Environment)

The Test S.I.T.E. was created to ensure our products perform in the most extreme of environments. Our 3.3 ha (8.2 acre) outdoor test site puts our products through the ultimate in environmental testing. Inside, our environmental chambers test every product before it is shipped.

Senstar's taut wire fence maintains optimal performance, even in the harshest of climates.

Populated areas

In these areas sometimes the border is right on the edge of a city on one or both sides, with no "clear zones". In such places there may be a need to deploy a physical high wall or fence. Achieving early warning is generally not practical, since any sensor will be saturated by the level of non hostile "noise" and traffic.

If the barrier already exists, adding Fence Mounted Sensors would turn it into a smart barrier, yielding Instantaneous reliable automatic alert in real time and in any weather and lighting conditions. Naturally verification sensors must be deployed when immediate response is not practical.

Fence-mounted sensors are ideal add-ons to existing fences as an affordable solution.

Senstar's FlexPS fence-mounted sensor is ideal, with all-digital processing and advanced algorithms, to provide assured detection of attempts to cut, climb or lift a fence fabric. High-speed sampling ensures high-fidelity capture of the fence signals, providing optimum discrimination between real intrusions and nuisance alarms. Factory defaults allow for a quick installation and when needed, an extensive set of configurable detection parameters are provided. Each

processor provides detection processing for two zones, up to 300 meters long each. The integral sensor network provides alarm reporting, sensor configuration and control of auxiliary security devices with minimal field wiring. This network is compatible with other Senstar sensors, and is designed as cost-effective and an easily installed sensor solution.

Border crossings

Protecting a border crossing may include an array of mobile and thermal cameras as well as people tracking & inspection devises based on RFID technology. Using microwave technology such as the previously described ultraWave in concert with access & gate control, all managed by Senstar's Command and Control systems provide for effective border controls.

- **Microwave volumetric sensor** - Senstar's microwave intrusion detection system, ultraWave™, uses digital signal processing and signature analysis algorithms to provide a high probability of detection against even the most stealthy of intruders while keeping nuisance alarms to a minimum. ultraWave also includes numerous features to speed installation including wide-ranging automatic gain control circuitry that simplifies the alignment process, 10 high-isolation operating frequencies that allow for total flexibility in site layout, and a Tx-Rx wireless datalink that makes complete transmitter operating status available with no data wiring to the transmitter unit. ultraWave's integral sensor network is compatible with other leading Senstar sensors such as OmniTrax®, FlexPS™ and XField® and enables alarm reporting, sensor configuration and control of auxiliary security devices with minimal field wiring. Like all Senstar products ultraWave is designed for harsh outdoor environments.

Summary – Borders Security: one size does not fit all

When it comes to border security, one size never fits all; every border has uniquely different challenges when it comes to security – terrain, environment and how to respond to detected intrusions in remote border locations.

Security decision, after evaluating their entire range of requirements should choose the best possible and most cost effective solution. These decision makers must determine what they want to achieve; i.e. deter, delay and/or detect intruders and develop a tailored solution that best achieves these objectives?

With the largest suite of products in the industry, Senstar is uniquely able to offer a comprehensive choice of multi-layer intrusion detection systems **that can be tailored to the various types of borders.**