





Multi**Sense**

Effective Intrusion Detection Meets Smart Perimeter

Introduction

MultiSense from Detection Technologies represents the latest development in the field of perimeter intrusion detection and smart perimeter. The system is designed to secure perimeter boundaries (e.g. fences, walls) and buildings. It offers a whole multitude of different sensors all integrated and distributed on a deployment of a protected site. It utilises the best intruder detection technology available including Vibra**Tek Plus** microphonic sensor cable and VibraFon seismic sensors. With the addition of Vibra**Tilt**, a 3axis acceleration and tilt sensor, and the extensibility to integrate any thirdparty sensor, MultiSense is a onestop-shop solution for perimeter protection.

The detection system consists of MultiSense Nodes that allow for different sensor types to be pluggedin where required. Mixing and matching sensors eliminates "blind spots" that would be difficult to detect without such flexibility. Each sensor can be supplied with custom configuration settings so that variations in the protected perimeter can be accounted for. The data collected by the sensors is centrally analysed by the MultiSense Hub.



What We Secure

The Multi**Sense** intruder detection system shines when it comes to extensibility and flexibility. Due to its ability to apply the right sensor at the right place, all aspects of a modern perimeter can be secured within a single system.

MultiSense detects any breakthrough or climb-over attempts on fences, walls, gates or even building shells.



Typical Applications

High Security

- Military installations
- Prisons
- Mental health facilities
- Reception centres' for immigrants
- Note issuing banks
- Mines

Public Institutions

- Airports
- Railway stations
- Car parks
- Amusement parks
- Swimming pools
- Border agencies

Utilities

- Nuclear power stations
- Waterworks
- Gas plants
- Power stations
 - Pipelines

Private Estates

- **VIP** residences
- Secured real estate areas
- Private residences with high security needs



The resulting information allows effective decision making to reliably differentiate between environmental influences such as wind, rain or hail and intrusion related activity.

MultiSense has been sensibly designed with a major focus on security. Various encryption techniques have been implemented to prohibit unauthorised access, data manipulation and/or inclusion of malicious hardware. All user interactions with the system are centrally logged and therefore traceable. Besides that, all system components are being tamper protected. The system ports are continuously monitored so that plugging in any unregistered device or unplugging any trusted device will be detected and annunciated.

A modern front-end control system with integrated processing offers smart perimeter visualisation/control and annunciation of intrusion events. The system can integrate into any Security Management System (SMS). It allows for multiple client access across various platforms (e.g. Windows, Linux, macOS) or devices (e.g. computers, tablets).

Industrial Applications

- Logistics
- Food industry
- Chemical sector
- Automotive industry
- Agricultural machinery dealers
- Car dealerships
- Caravan dealers
- Farms
- Vinevards
- Data centres
- Solar farms
- Scrapyards

System Architecture

The MultiSense system consists of a network of Nodes that are either installed on the perimeter boundary (e.g. fences, walls or gates) or on the shells of buildings (e.g. walls, roofs and windows). Each Node can house multiple sensor types to accommodate the custom detection requirements. All sensing devices communicate to the centralised MultiSense Hub. The Hub is normally installed inside a secured control room. It connects to all the deployed Nodes using a communications and power Bus as a single cable. The Bus can be a linear spur or a redundant loop for resilience against first-line attack.

The MultiSense Hub processes all the sensor intrusion disturbances to evaluate an alarm condition. This has the advantage that the best decision making can occur when determining an alarm based on assessing neighbouring sensors or zones together (or deployment-wide) unlike when this task is undertaken individually on separate electronics. The net effect is unbelievably low false alarms.

system to control the perimeter centrally from any PC or tablet. Fence is typically protected with Vibra**Tek Plu**s sensor cable. The sensor is connected between two Nodes. The distance between two ٩, 20ne Nodes defines the zone size (typically between 50m-100m max.) igodol \square III Hub … \bigcirc 700m Lonel LoneA \bigcirc AM O Walls are typically protected with Vibra**Fon** seismic sensors. Depending on the structure of the wall the distance between the sensors is 3-5 meters. Swing gates are typically protected One or multiple sensors can be The connection between the control The Multi**Sense** Bus is a single via VibraTilt sensor. The sensor room and fence line may be combi-cable containing power and combined into alarm zones. These maybe installed on the gate post or realised via MultiSense Bus ethernet cores. It can be installed in zones are then visualised on a on the gate wing. (<=100m) or fibre optics a redundant loop or as one or map/picture of the perimeter in the (>100m). multiple lines (star configuration). View software. 0 0 Multi**Sense** Bus ----Vibra**Tek Plus** Sensor Vibra**Tilt** Sensor Multi**Sense** Node Ο Vibra**Fon** Sensor

Sensor Suite

MultiSense allows mixing and matching a collection of perimeter detection sensors to suit the security needs of the site to be protected. Crucially, new sensor technology that becomes viable and available can be added after an installation. This can be adopted without any interruption of system operation. The sensors are designed as plug-in interface cards based on the same fundamental communication Node.



Perimeter accesses an be easily

integrated into the MultiSense

Vibra**Tek Plus**

We recently introduced the 4th generation of our tried-and-trusted linear acoustic microphonic sensor cable. More than 500km of this sensor have been installed to protect hundreds of security sensitive sites worldwide. Vibra**Tek Plus** offers continuous detection leaving no room for blind spots. The sensor generates a signal that is typically 1,250 times greater than the background noise. This exceptional signal-to-noise ratio is the reason for an effective intrusion detection.

Vibra**Tilt**

This 3-axis acceleration and tilt MEMS sensor adds a new dimension to the Multi**Sense** system. Its ability to detect tilted or lifted fences, gates, windows is highly effective in perimeter intrusion detection. The MEMS technology allows for tilt detection to +- 1 degree on 2-axis.

Vibra**Fon**

By its nature, seismic sensors are incredibly sensitive. As such they have ideal characteristics to detect breakthrough and climb-over attacks of perimeter walls. VibraFon will detect

drilling small holes int through and climb-over attacks of perimeter walls. Vibra**Fon** will detect drilling small holes into the perimeter as well as using a ladder to overcome the perimeter wall.

I/O modules

Input/output modules provide an easy solution to flexible integrate external security equipment or perimeter access equipment. All relay and contact wiring are sabotage monitored for shorting and resistance spoofing.







I/O Module

The sensors interface with the Nodes by using plug-and-play adaptors allowing a communications module to house several different types of sensors. This enables project integrators to plug-in any sensor wherever they require. Besides that, during commissioning the interfaces can be changed and moved dynamically without interrupting the system operation.

Multi**Sense** is designed to be scalable to suit all perimeter sizes. Ranging from private estates to large international airports. There is no practical limitation when it comes to size of the perimeter to be protected. With no settings to initialise, no MAC addresses or IP addresses required before commissioning, the Multi**Sense** perimeter security leads the way on true Plug-And-Play methodology considering the advanced distributed deployment it spans.

Audio Alarm Verification

Audio signatures resulting from hostile events are monitored and stored in digital format so they may be subsequently recalled and replayed. Each sensor maintains an audio buffer offering pre-and-post alarm audio (20 seconds pre-alarm to 5 second post-alarm) to assist security personnel to verify alarm activity.

Redundancy

The entire solution follows a fail-safe design principle. Multi**Sense** avoids any "single point-of-failure". Physical sensor loss can be limited to only a small area of monitoring worst case without affecting neighbouring sensors or zones.

The inter-Node Bus connectivity as a loop allows for the power and communications to be re-routed upon attack / sabotage to minimise the damage. The system self-heals within 500 micro-seconds and maintains operation upon restoration.

Power is injected anywhere on the distributed installation. However, multiple injection points are acceptable to allow for resilience against attacks or to enlarge the distance of the deployment as a single system.

A system can operate with a single MultiSense Hub. However, when failure redundancy is required, the solution seamlessly operates with multiple distributed Hubs. This conforms to the no "single point-offailure" concept that allows multiple sensor lines, right through to multiple control rooms with multiple clients.



Self-Monitoring

Multi**Sense** ensures that all aspects of operation are continuously monitored and reported alongside legitimate alarms. The system informs the monitoring staff in early stages of potentially occurring faults before they are happening. A 24/7 health check ensures that all Nodes remain within the specified temperature, moisture and voltage range. Moreover, water ingress or other fluid ingress into any Node will be immediately reported.

All system components have tamper events associated. Any plugging/unplugging of cables/peripherals immediately cause a tamper alarm. Anything other than a system operating within normal bounds will alert the staff monitoring which gives the protected establishment full confidence in their intrusion defence system.

Multi**Sense** offers a complete solution for intrusion detection on perimeters and/or protected environments. On top of that, it provides the ability to make a perimeter smarter. We consider a perimeter as smart if it is well visualised so it can be centrally monitored and controlled. MultiSense allows to intuitively manage physical entry/exit access such as gates, barriers, doors, turnstiles and bollards.

Cyber Security

Numerous cyber security measures prohibit unauthorised system access, data manipulation and inclusion of malicious hardware.

The MultiSense network incorporates as standard full AES 128-bit CBC with key-exchange authentication. The key acts as a certification of any given Node device which ensures that malicious un-authorised hardware is introduced to the system is alerted unless accepted by the operator.

Using encrypted packets to carry the data around the Multi**Sense** Bus prevents unauthorised data access (network snooping). The hashingalgorithms in place prohibit altering important information (network spoofing). Affected packets will be dropped and ignored. Sustained interference would yield a device missing and under sabotage which would cause a front-end alert to the staff.



The digital control panel is browser based which means it runs crossplatforms (e.g. Windows, Linux) and cross-devices (e.g. PC, tablet) without any internet connectivity.

In contrast to an analogue control panel, the digital variant can include interactive animations, graphs and widgets. It can easily incorporate any structural perimeter changes without additional hardware investment. In terms of security the digital panel



All system configuration files are being fully AES 128-bit encrypted on disk. JWT encrypted tokens and SSL 1024-bit user interface encryption ensures that no unauthorised users get access to the system.

Triple Wire Mesh

MultiSense can be retrofitted to any existing fence construction. However, in cases where no fence construction is present, the triple wire mesh is a very attractive option. It combines the advantages of the proven and widely used wire mesh fences with Detection Technologies' intrusion detection technology.

Highlights

- The well thought out arrangement of the triple wires enables a tamper-proof and elegant integration of the MultiSense system into the fence. Visually, there are hardly any differences to a conventional
- wire mesh.
- Installed inside the cable routing, the VibraTek Plus sensor cable is in continuous contact to the triple wire panel. The resulting signal transmission is optimal which leads to an outstanding
- hostile activity detection.
- Significant assembly time savings due to cable fixation with cable clips and no tedious cable/sensor looping around the fence posts.
- Any conventional cables up to a diameter of 8mm can be integrated effortlessly and visually appealing into the fence construction. The triple wire panel is available in various heights and cable routing





Interior view: The cable clips are simply clipped over the two internal horizontal wires to fix the sensor cable.

Secure And Elegant Cable Routing

Depending on its height, the triple wire mesh can be equipped with one or more cable routings. Each cable routing consists of two parallel horizontal wires, which can accommodate cables of any type up to 8 mm in diameter. Installation is quick and easy using cable clips.

For effective protection against vandalism and sabotage, the cable ducts are integrated on the nonattack side of the triple wire mesh. As an additional safety measure, a third, slightly offset horizontal wire is located on the attack side of the triple wire mesh. This makes the cable almost invisible to the observer and complicates manipulations.



hardly visible.





Exterior view: The MultiSense Bus or the VibraTek Plus sensor is protected against sabotage and manipulation by the offset third horizontal wire and is

Operational & Environmental Specifications

Input Voltage Range:	14 - 48V d.c.	
Typical Worst-Case Current Consumption:	31mA peak (22mA average)	
Sensors:	Vibra Tek Plus, microphonic sensor cable	
	Vibra Fon , seismic sensor	
	Vibra Tilt , acceleration and tilt sensor	
	Third party sensors	
Contact Inputs:	5V applied or voltage-free	
Output Relays:	Dry Voltage Free - 230V a.c RMS @ 350mA	
Operating Temperature:	-40 to +85 degrees Celsius	
Relative Humidity:	95%	
Enclosure Material:	Aluminium die-cast	
Enclosure Sealing:	IP66	
Enclosure Dimensions:	125.4 x 80.4 x 40.8	
Centralised Server Audio Output:	600 ohms isolated audio output @ 0dBm level	
EMC/EMI Certification:	Class-A Industrial	
Emissions:	EN61326-1: 2013	
Immunity:	EN61326-1: 2013	

Notes



Integrates doors and gates in the monitoring section



Fence line consisting of triple wire panels with two cable routings

Fence line consisting of triple wire panels with a single cable routing





MultiSense Highlights

Best In-Class Intruder Detection

Centralised data analysis enables cross correlation between sensors so that intrusions are reliably differentiated from environmental influences.

No Single Point Of Failure

A fail-safe design ensures continuous functionality in case of single-point attacks or sabotage.

Tamper-Proof

All system connections are continuously monitored so opening enclosures or plugging/ unplugging of any cables/peripherals will be detected.

Scalable

Whether small residence or a large international airport, the system is scalable to any size of perimeter.

Smart

Monitor and control all your perimeter accesses (e.g. gates, barriers or bollards) digitally.

No Blind Spots

Mix-and-match sensors to suit the perimeter boundary (e.g. fences, walls or gates) or building (e.g. walls, roofs and windows) to be protected.

Cyber Secure

Various encryption technologies prohibit unauthorised access, data manipulation or inclusion of malicious hardware.

Traceable

All user interactions with the system are consistently logged so that any system changes can be traced back to the individual user.

Extensible

Third party sensors or security devices can be easily integrated into the system.

Intuitive

A modern software designed from scratch ensures a feature-rich and pleasant user experience.



PROTECTING PERIMETERS WORLDWIL

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