A Senstar Corporation White Paper

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Integration of a Perimeter Security System

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Title

April 20, 2012

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Brief History

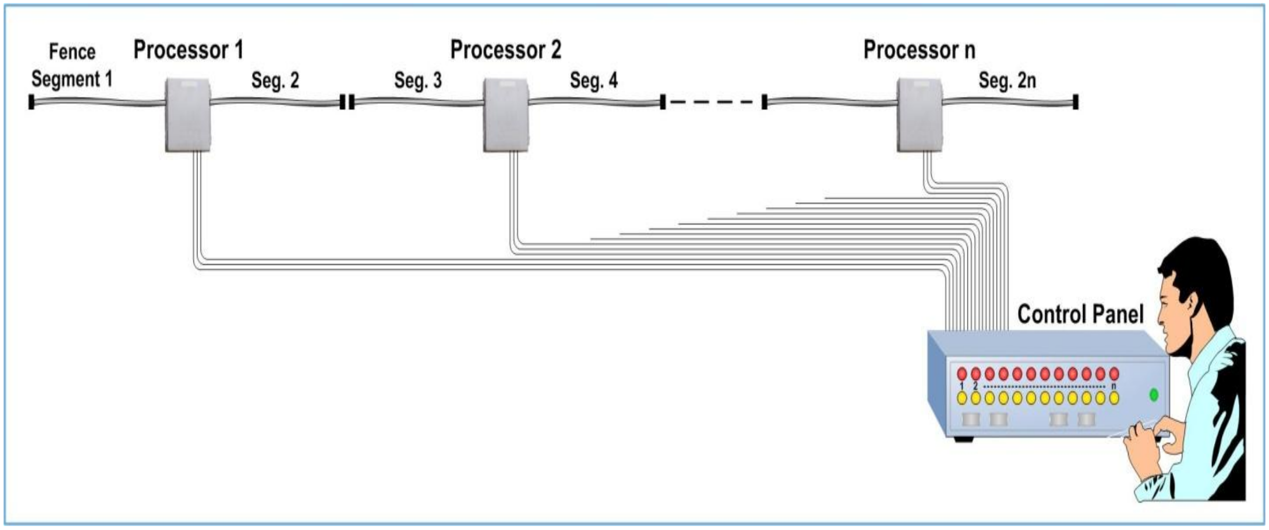
Perimeter Intrusion Detection Systems (PIDS) began to develop about 40 years ago with the maturing of electronic sensing and processing.

From day one, the industry needed to bring comprehensive solutions to enable gathering and displaying information to the decision maker - the one that ultimately determines if and where to send the first response force.

The Basic Solution – Dry Contacts

The trivial solution was the use of electric contacts (dry contacts) that close or open upon alerts. As such, paired wires from processor outputs are woven into a braid that "travels" directly to a control room. A box, a panel with lamps, was placed in the control room, each lamp connected to an alarming segment, usually 50-200 meters/150-600 feet in length. The disadvantage of this solution was felt particularly in large sites and the most extreme case is of a border fence; in sites of this type it was necessary to install thick braids that collect information from many long segments, while in the control room, lamps were housed in crowded panels.

In addition, this method required physical access to each processor routine technical tasks such as calibration and fault monitoring.



Transition to Network

For the reasons mentioned above, almost all manufacturers developed dedicated networks, collecting the information from the various sensors, transmitting and multiplexing the information via a network that made the thick braids, described earlier, obsolete.

Beyond the savings on wiring, networks provided a number of other significant benefits:

- Two-way communication capability between processors and control room
- Ability to perform remote technical monitoring
- Ability to perform remote set-up and remote calibration (e.g. thresholds changes)

However even today, when networking is mature, still most processors preserve the dry contact/s as a redundant option.

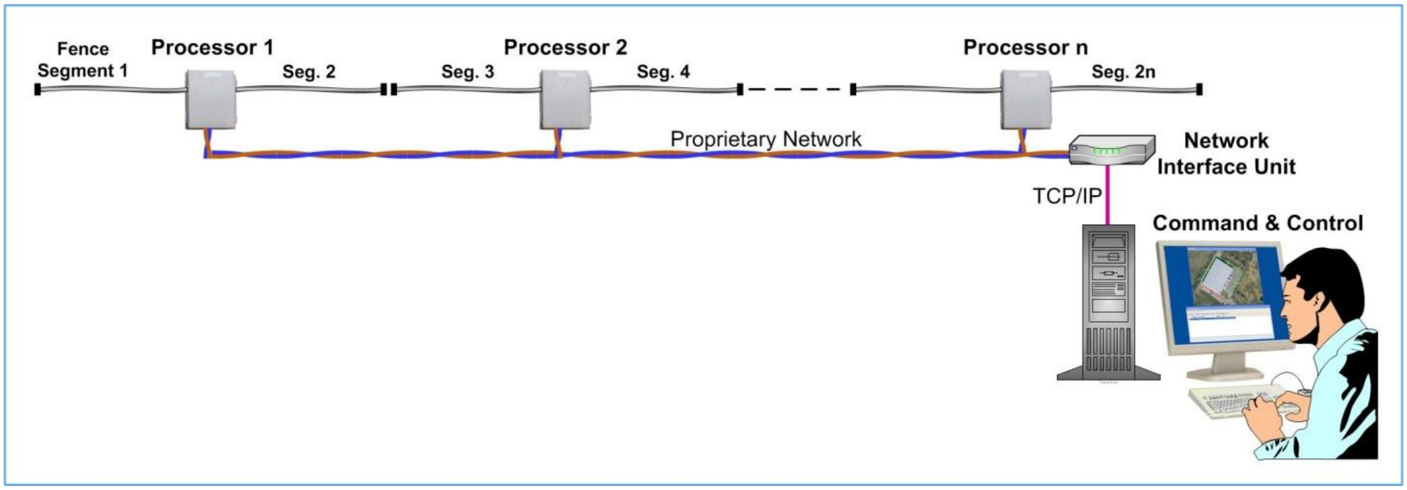
PIDS Network Special Requirements

Perimeter networks were optimally developed for the specific PIDS applications; PIDS systems are characterized by lengthy deployment (kilometers and even tens of kilometers), often in unmanned areas, with low- availability of power resources and difficult access for maintenance.

In addition, the network's response time is critical and must have a reporting reliability of 100%. On the other hand, the required bandwidth for the transmitted data is usually small. This is because most of the processing is done locally, and only the final results are transmitted to the control center.

Therefore, the networks of market leaders are based on serial protocols (like RS485), that are optimal in energy-efficiency and real-time messaging, with high reliability levels that are necessary for regions with maintenance access difficulties.

In the last few years we see a trend to install TCP/IP plus PoE (Power over Ethernet) everywhere and force PIDS applications to use these resources. While this can be done this approach may suffer from a few disadvantages, since TCP/IP is not optimized for real time applications and it is certainly not efficient, mainly energy wise.



Senstar's Silver Network

Senstar's latest-generation sensors, including OmniTrax, XField, FlexPS, and ultraWave use the latest network version - Senstar's Silver Network. Silver Network uses a loop topology with separate Transmit (Tx) and Receive (Rx) point-to-point links between each sensor or other connected Silver Network-compatible equipment.

Silver Network is designed to be polled from both ends of the communications loop, thus providing redundant data paths to the field equipment. Point-to-point links can be EIA-422, single-mode or multi-mode fiber, or in the case of OmniTrax over the sensor cables themselves. The data signal is regenerated at each node in the loop to ensure signal integrity and reliable data transmission around long perimeters. Silver Network includes error detection with automatic retries to provide a reliable and high-integrity communications path.

Silver Network allows a wealth of information to be communicated including:

- *Sensor operational status including intrusion alarm status, alarm location, device tamper status and diagnostic alarms (internal trouble conditions)*
- *Alarm and supervision status of auxiliary dry-contact inputs and control messages for auxiliary relay outputs*
- *Sensor configuration data such as thresholds, gain settings, zone lengths, etc.*
- *Sensor response data to support calibration and troubleshooting activities*
- *Sensor firmware updates (FlexPS and ultraWave)*
- *Sensor event log – access to processors' internal event log*
- *Other sensor diagnostic information such as operating temperature, input voltage, battery voltage and power consumption*
- *Commands to initiate sensor self-test (device dependent*)

The Integration Challenge

Almost all companies have developed special proprietary display panels that continuously communicate with in-house manufactured perimeter sensors.

However the challenge is to connect the sensor systems of manufacturer A with the Command and Control System (C&C) of a third party manufacturer. This may be required due to reasons of history (Legacy system) or the need for total integration of a perimeter protection system that combines more systems, such as access control, fire alarm, CCTV and so on.

Customers want the freedom to choose a control system from Company A and PID sensors from company B, a sensor market-leader, that will give them a reliable technological advantage, and more importantly – give support over many years.

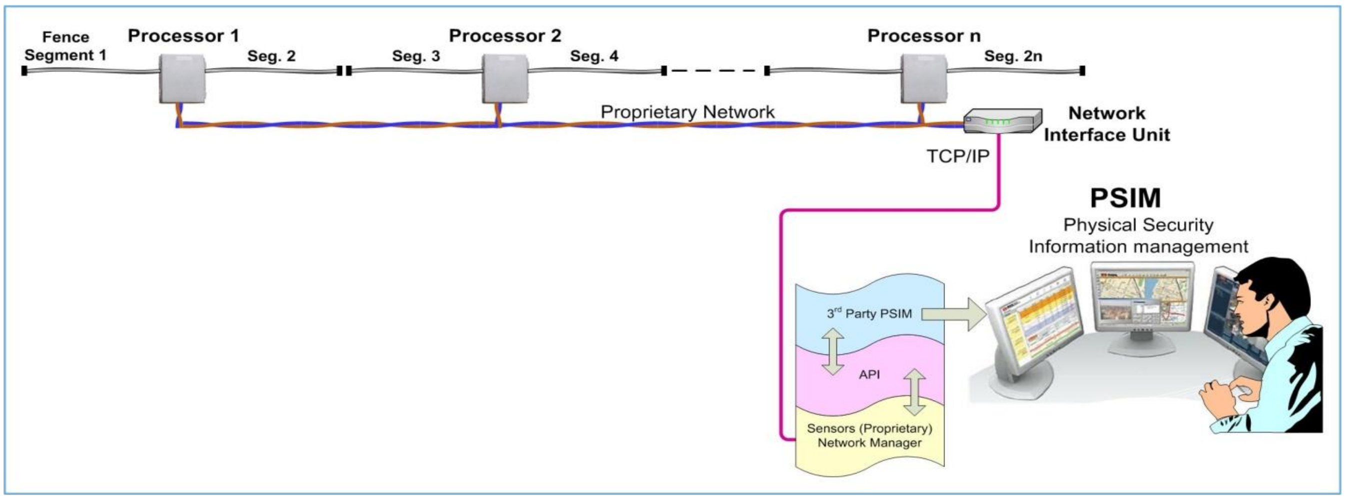
So the industry developed various levels of integration: at one extreme was the brute force approach through Dry Contacts, and at the other end, total integration performed by use of software packages that connected the sensor network to 3rd party applications.

Conventional Integration Methods

Here are the main two approaches for PIDS integration into a head-end / control system:

The traditional method – This old method is based on dry contacts and does not use a network. Braided wires from the processors reach the control room directly. The control system itself (third-party) directly translates the signals to the operator display.

Full integration method – In this method an integration software layer translates the networked sensors into the control display. Leading manufacturers of PID sensors usually provide integration modules (SDK or API) that allow a relatively easy way for control systems to read data and give commands to the sensing systems, thus achieving full and clean integration without having the need for dedicated hardware to mediate between control and the sensing systems.



Senstar’s µltraLink Solution

Senstar’s µltraLink is a comprehensive software and hardware solution for the configuration and management of PIDS sensors and for integration with the other SMS (Security Management System or PSIM (Physical Security Information Management) applications. µltraLink consists of the following components:

1. *Network Manager Service (NMS) – a software package that has the following main functions:*
   a. *It manages the Senstar's Silver Network (initialization and controls)*
   b. *It provides the software interface for sensor alarm reporting and system management*
   c. *It provides an IP-based interface layer to other applications through Applications Programming Interface (API)*

2. *Sensor Management Toolkit (SMT) – utility applications used to configure, calibrate, monitor and maintain, Senstar's sensors:*
   a. *Plot Tool – displays up to 8 channels of recorded or live data of the selected sensor type (OmniTrax, FlexPS, etc.)*
   b. *Status Tool – shows complete current status of all sensors on the network*
   c. *Event Log Tool – provides remote access to the Network Manager Service log files*

3. *Alarm Integration Module (AIM) – provides two important capabilities:*
   a. *An easily-configured means to convert alarm data collected by Network Managers into relay outputs for interfacing to a 3rd-party and / or*
   b. *A basic (single-map) alarm display system for customers with simple security environments or who want a secondary or maintain “fall-back” display dedicated to the PIDS*

4. *µltraLink I/O modules - are DIN rail-mountable relays, controlled by a computer. They provide the hardware means necessary for hybrid network-dry contacts integration philosophy (see below) and can be mixed and matched to provide almost any combination of relay and open-collector outputs and dry-contract inputs.*

5. *µltraLink Software Development Kit (SDK) – provides everything required for 3rd party SMS providers to integrate the Network Manager into their SMS. It includes of full documentation on the Network Manager API, sample code and a Network Manager simulator that simulates the behavior of a Network Manager connected to any array of sensors*

Combined Methods

There are also nuances, combinations of methods or partial implementations; we will mention here two examples:

Hybrid of network and dry contacts – In this method the information collection from the processors is done by communication network, with all the benefits mentioned above (remote access, saving on wiring cables, etc.); however, translating the signals from the network is not performed directly into display computers; this is because such coordination requires writing software that bridges between different languages / different manufacturers (API / SDK mentioned above).

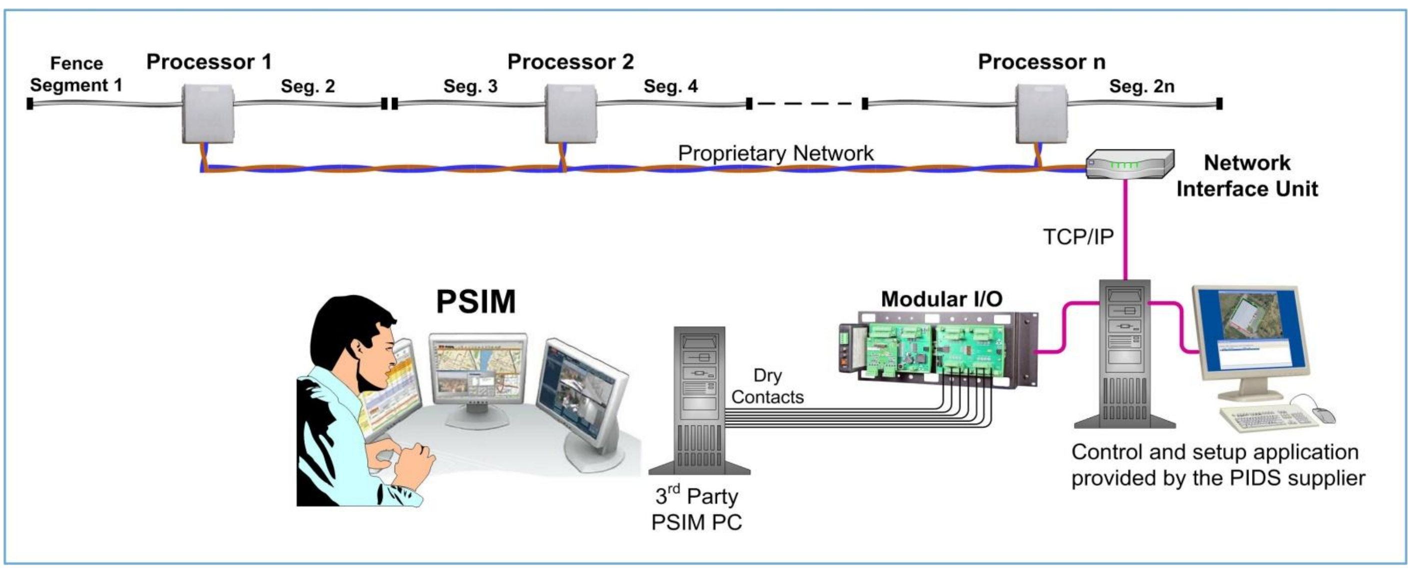
Therefore, the network signals are translated in to simple dry contacts via a software controlled hardware panel. The Panel effectively takes network signals and converts them to 0 or 1 outputs. These 0/1 signals are inputted in to the control system just like the traditional method mentioned above (use of Dry Contacts).

Even though this method seems awkward, it is very popular in the market, as its implementation can be done relatively quickly by technicians without having to write software.

The drawback to the method is the need to add dedicated hardware mediating between network sensors and the control system, as well as certain degradation in detection system features done in order to simplify the integration.

In this method, the technical control and maintenance of the PIDS is done through the application of the PIDS manufacturer, while the operational real time display is done via the third party C&C application.

Partial integration through software – In this method the C&C system implements only some of the functionality; for instance full interface to real-time alarms is developed but all the technical functionality is not 'translated' and therefore these abilities are conducted via the application of the PIDS manufacturer.



Senstar's µltraLink I/O Modules

Senstar's µltraLink Input/Output modules can be used to transfer network-collected alarm information to the SMS via relays or open-collector outputs and to gather alarm status from auxiliary sensors. The µltraLink I/O module family consists of 4 DIN rail-mountable members, which can be cascaded in any combination:

- *Processor Module - provides the interface to Senstar's Silver Network, 8 relay outputs, 8 dry-contact inputs, and a USB port for configuration; it is the minimal configuration (must have module) as a base for any other add-ons*
- *Relay Output Module - provides additional 32 relays configurable for activation type and timing*
- *The Open Collector Output Module - provides additional 32 open collector outputs*
- *Dry-Contact Input Module - provides additional 32 supervised dry-contact inputs configurable for input activation (N/O or N/C), supervision type, supervision resistance values, activation time, noise allowance, and line-drop allowance*

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