SENSTAR®

Physical Security Technologies for Water Utilities

Intelligent. Innovative. Integrated.

Agenda

About Senstar

Security Challenges

Application Solutions

Senstar Products

System Integration

Q & A

SENSTAR

Overview

With intelligent video management, video analytics, access control, and innovative perimeter intrusion detection systems, Senstar offers a comprehensive suite of proven, integrated technologies.

PIDS Facts	VMS Facts
40 years experience	18 years experience
50,000+ km of installed sensors	25,000 VMS deployments
World-wide service and support	World-wide service and support
World's largest privately owned PIDS test facility (harsh environment)	Leader in intelligent video management solutions

Global Reach, Local Support

Sweden
UK
Germany
Netherlands
France
Spain
Israel
China
USA
Canada
Mexico
UAE
Malaysia
Philippines
Singapore
Kenya
Brazil

Headquarters, manufacturing & sensor development:
Ottawa, Canada

Video and SMS development:
Waterloo, Canada
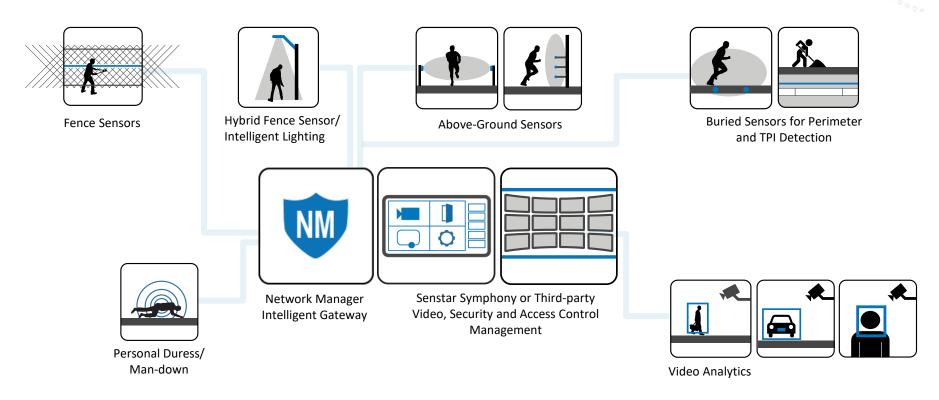
350+ employees worldwide, 150 technical staff

Strong balance sheet, cash on hand, no debt

Proven track record for long-term stability and support

SENSTAR

Product Portfolio

Senstar's range of integrated physical security solutions is unmatched.

Fence Sensors

Hybrid Fence Sensor/
Intelligent Lighting

Above-Ground Sensors

Buried Sensors for Perimeter
and TPI Detection

Personal Duress/
Man-down

Network Manager
Intelligent Gateway

Senstar Symphony or Third-party
Video, Security and Access Control
Management

Video Analytics

SENSTAR.

WATER UTILITIES

Security Challenges

SENSTAR.

The Physical Security Challenge

Protect the integrity of drinking water and waste treatment systems

- Prevent interrupts to service
- Ensure safe storage of hazardous materials
- Proactively address threats: trespassing, vandalism, theft, and terrorism
- Conform to government security policies
- Complement operational workflows
- Be cost-effective for sites with differing security requirements:
    - Different sizes and requirements
    - Limited network connectivity

Why Consider Security Technology?

- Fences and signage only have limited deterrence value

- Remote sites are difficult to monitor 24/7

- Provisioning a guard force is cost-prohibitive

- A sensible combination of physical security technologies is the only cost-effective solution

**The cost of a serious incident
(loss of life, liability and damage)
can dwarf the cost of the on-site security equipment**

Application Solutions

SENSTAR

Facility Security

Requirement	
	• Secure perimeters and egress points
	• Threats include vandalism, trespassing, theft, and terrorism
	• Work across all weather conditions
	• Integrate with video system to support immediate verification
	• Limited network connectivity at remote sites
	• Wide range of perimeter sizes
	• Track authorized activity

FlexZone
Fence-mounted locating sensor:

- Effective and affordable
- Scalable for any size of perimeter

FiberPatrol FP400 or FP1150
Fence-mounted fiber optic sensor:

- Eliminates concerns over EMI-induced voltages on conductors and lightning damage

Senstar LM100

- 2-in-1 intrusion detection and lighting solution
- Deter and detect intruders

Senstar Symphony

- Video management, access control, and analytics in one application
- Server and edge-based storage
- Alert remote staff via email or SMS
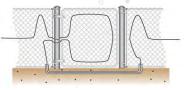
Gate Protection

Requirements	• Protection against theft, vandalism, and liability • Allow unhindered movement of authorized traffic (people and vehicles) • Work across all weather conditions • Integration with video system to support immediate verification

Maintenance yard: Senstar LM100 + Axis IP Speaker
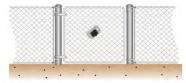
FlexZone or FiberPatrol

- Most effective with swing gates

FlexZone/FiberPatrol cable

Wireless Gate Sensor

- No infrastructure required at gate
- All gate types, including sliding
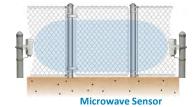- Easy to install, minimal maintenance

Wireless Gate Sensor

UltraWave

Bi-static microwave volumetric sensor

- Works in all weather conditions

Microwave Sensor

Senstar LM100

- Most effective with swing gates
- Illuminate area during gate operation
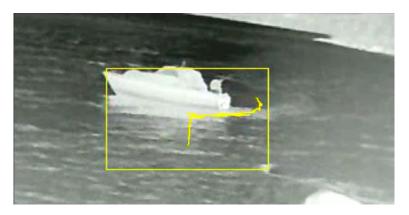
Reservoir Security

Requirement
- Keep people and boats away from dam
- Detect activity near barrier or demarcation point and alert security staff
- Work across all weather conditions
- Minimize light pollution

Outdoor Object and People Tracking

Senstar's outdoor-optimized video analytics have been successfully deployed to track boats and people in shoreline and open water applications

Senstar Symphony

- Support for thermal and long-range cameras
- Scalable video management
- Server and edge-based storage
- Alert remote staff via email or SMS

WATER UTILITIES

Senstar Products

SENSTAR

Senstar LM100

Description

- Hybrid perimeter intrusion detection and intelligent lighting solution
- Accelerometer embedded in luminaire provides detection function – locates alarms to the luminaire
- Optimized optics provide uniform, full spectrum, LED-based lighting
- Lighting is programmable based on sensor alarms and schedule

Key Benefits

- Integrated deterrence capabilities
- Save up to 95% in lighting operational/maintenance costs
- Encrypted wireless mesh network eliminates need for communications wiring

Senstar LM100 Technical Details

Main Features

- Detect intrusions to closest luminaire
- Supports any fence height, spaced 3 to 6 m (10 to 20 ft) apart
- Programmable schedule and light intensity
- Settings may be applied to all, zone-specific, or individual luminaires

LED Specs

- Brightness: 53 lux per luminaire (163 total lumens generated)
- Instant-on illumination and strobing
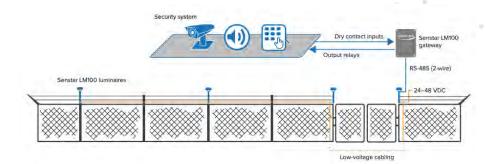
Environment Specs

- **Weather**: –40 to 70 °C (–40 to 158 °F), 100% humidity
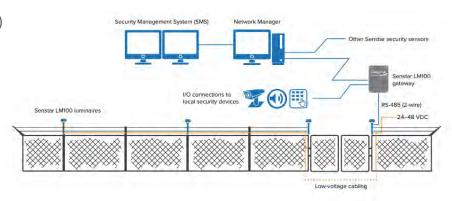- Rugged all-weather hinged aluminum UL enclosure, NEMA Type 4X (IP66)

Electrical Specs

- Consumption: 2.5W per luminaire
- Wiring: 14 or 16 AWG, 2-wire

Networking Specs

- Encrypted wireless mesh eliminates on-fence communications wiring
- Ethernet, RS-422 and fiber communication card options
- Common integration interfaces (API, ASCII, or I/O)

FlexZone

Description

- Sensor cable attaches directly to surface (fence, wall, or building structure)
- Alarms reported by zone and cable distance (±3 m)
- Cost-effective for small sites but scalable for all sites
- Up to 600 m (1968 ft) of coverage per processor
- Up to 60 reporting zones per processor

Key Benefits

- Low cost, easy to install
- Works with virtually all fence types
- Reduced infrastructure (power & comms over sensor)
- Software-defined zones
- Ranging minimizes weather-generated nuisance alarms, assists in locating problematic areas (e.g. loose fence fabric or sign)

FlexZone Technical Details

Main Features

- Detect and locate intrusions (600 m/1968 ft per processor)
- Pinpoint intrusions to within ±3 m (10 ft)
- Sensor cable in standard and armored versions
- Available in two models:
    - FlexZone-4: 4 software-defined zones, zone-reporting
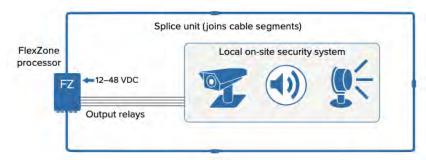   - FlexZone-60: 60 software-defined zones, location-reporting

Environment Specs

- Weather: –40 to 70 °C (–40 to 158 °F), 100% humidity
- Rugged all-weather hinged aluminum UL enclosure, NEMA Type 4X (IP66)
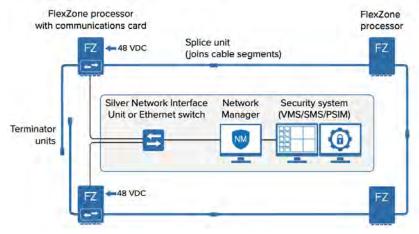
Electrical Specs

- Low power (<2.5W), PoE support via Ethernet card
- Up to 5 processors per power supply (power over sensor cables)

Networking Specs

- Communications over sensor cable reduces network infrastructure
- Ethernet, RS-422 and fiber communication card options
- Common integration interfaces (API, ASCII, or I/O)

Output Relay Integration

Networked Integration

FiberPatrol FP1150

Description

- Fiber optic sensor suitable for fence, wall, and buried applications
- Alarms reported by zone, cable distance or GPS (±4 m)
- Ideal for large sites, borders, and buried pipelines
- Up to 100 km (62.1 mi) of coverage per processor

Key Benefits

- No powered or conductive components in field
- EMI and lightning immune
- Unused fibers can be reused for other applications (e.g. communications), 25+ year cable service life
- Cut-immune configuration

FiberPatrol FP1150 Technical Details

Main Features

- Detect and locate intrusions:
    - Fence, wall, and buried perimeter applications: Up to 80 km (49.7 mi) per processor
    - TPI applications: Up to 100 km (62.1 mi) per processor
- Pinpoint intrusions to within ±4 m (15 ft)
- Up to 1440 software-defined detection zones
- Sensor cable in standard and armored versions
- Cut-immune configuration: locates up to point of cable cut
- 4U height, 19-inch rack-mount Sensor Unit
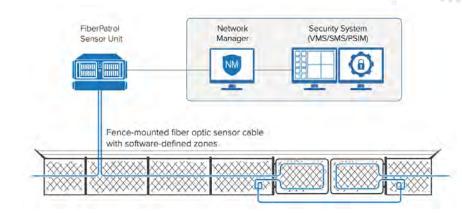
Environment Specs

- All-weather sensor cable: −40 to 70 °C (−40 to 158 °F)
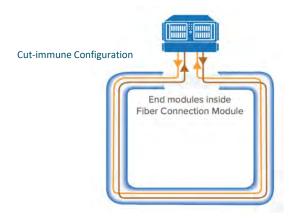- Sensor unit: 0 to 50 °C (32 to 122 °F), humidity 20–80% non-condensing

Electrical Specs

- Dual redundant power supplies
- Consumption: 200W max

Networking Specs

- Dual Gigabit Ethernet
- Common integration interfaces (API, ASCII, or I/O)

FiberPatrol Sensor Unit — Network Manager — Security System (VMS/SMS/PSIM)

Fence-mounted fiber optic sensor cable with software-defined zones

Cut-immune Configuration

End modules inside Fiber Connection Module

FiberPatrol FP400

Description

- Fiber optic sensor attaches directly to fence
- Alarms reported by zone (4 zone per processor)
- Ideal for small sites
- Up to 300 m (984 ft) of coverage per zone

Key Benefits

- No powered or conductive components in field
- EMI and lightning immune
- Up to 20 km (12.4 mi) of lead-in cable
- Unused fibers can be reused for other applications (e.g. communications)

FiberPatrol FP400 Technical Details

Main Features

- 4 detection zones per processor, up to 300 m (984 ft) per zone
- Up to 20 km (12.4 mi) of non-sensing lead-in cable
- Light-weight, easy to install fiber optic sensor cable
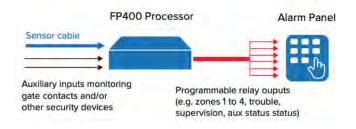- No conductive in-field components

Environment Specs

- Outdoor-rated processor: −40 to 70 °C (−40 to 158 °F)
- Installable indoors or outdoors inside protective enclosure
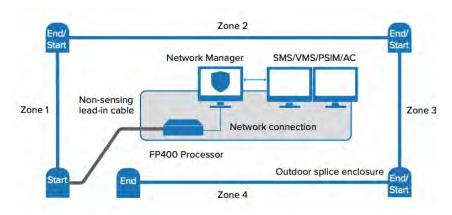
Electrical Specs

- Low power (<2.0W), built-in PoE

Networking Specs

- Ethernet interface (built-in)
- RS-422 and fiber communication card options
- Common integration interfaces (API, ASCII, or I/O)

Output Relay Integration

Networked Integration

Gate and Gap-Fill Solutions

Wireless Gate Sensor

- Detects movement and/or vibration on gates and doors of all times
- Includes auxiliary input to monitor status of gate contact
- Available in solar powered and battery-only versions

UltraWave Microwave Sensor

- A fully digital bi-static microwave sensor that generates a cigar-shaped field between a Tx/Rx pair (up to 200 m or 656 ft)
- Ideal for gates, open areas and security backfill
- Reliable detection in all weather conditions, including rain, fog and snow

Wireless Gate Sensor Technical Details

Main Features

- Accelerometer analyzes vibration, motion, and position data
- Compatible with virtually all gate types (swinging, lifting, sliding (cantilever), garage etc)
- Compatible with FlexZone and Senstar LM100 (up to 4 WGS per processor)
- Solar panel and battery-only versions
- Reports intrusion, supervision, RF link, and auxiliary input alarms

Environment Specs

- Weather: –40 to 70 °C (–40 to 158 °F), 100% humidity
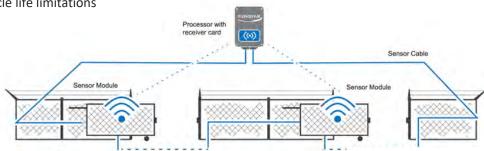- Rugged all-weather acrylic casing, NEMA Type 4X (IP66)

Electrical Specs

- Solar panel version:
  - Eliminates need to replace batteries
  - Super capacitor design eliminates battery memory or cycle life limitations
  - On-board emergency power
- Battery version:
  - 1.5V "D" battery, approximately 1 year of operation

Networking Specs

- Encrypted 128-bit wireless link to receiver card
- Unlicensed operation in regional ISM band

UltraWave Technical Details

Main Features

- Detection range:
    - Walking target: 5 to 200 m (16 to 656 ft)
    - Crawling target: 5 to 150 m (16 to 492 ft)
    - Commando roll: 5 to 100 m (16 to 328 ft)
- Clear zone with total width of 4% of the Tx-Rx separation distance required

Environment Specs

- Weather: –40 to 70 °C (–40 to 158 °F), 100% humidity
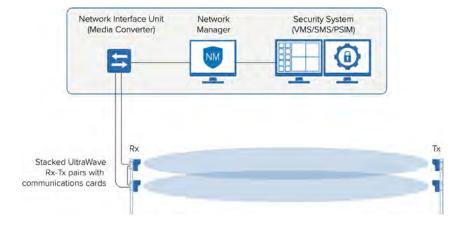- High-impact ABS plastic, marine white enclosures

Electrical Specs

- Low power: Transmitter 1.5W, Receiver 2.6W

Networking Specs

- Wireless link between Transmitter and Receiver reduces cabling
- Ethernet, RS-422 and fiber communication card options
- Common integration interfaces (API, ASCII, or I/O)

Network Interface Unit (Media Converter) — Network Manager — Security System (VMS/SMS/PSIM)

NM

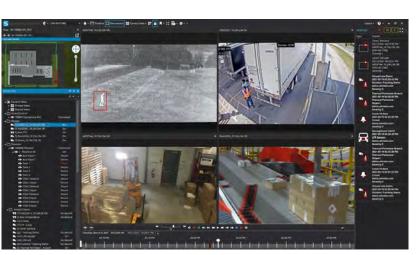Stacked UltraWave Rx-Tx pairs with communications cards

Rx

Tx

Senstar Symphony Common Operating Platform

- Scalable, high-performance open architecture
- Integrated alarm management and on-screen controls for cameras, two-way audio, perimeter intrusion, access control, and I/O devices
- Built-in video analytics
- Intelligent video search via metadata
- Intuitive Windows, web, mobile and thin client interfaces

Graphically display intrusion and camera locations

Manage all alarms from one interface

Manage site operations with bidirectional control of:
- Doors and other access control devices
- Perimeter sensors
- I/O devices
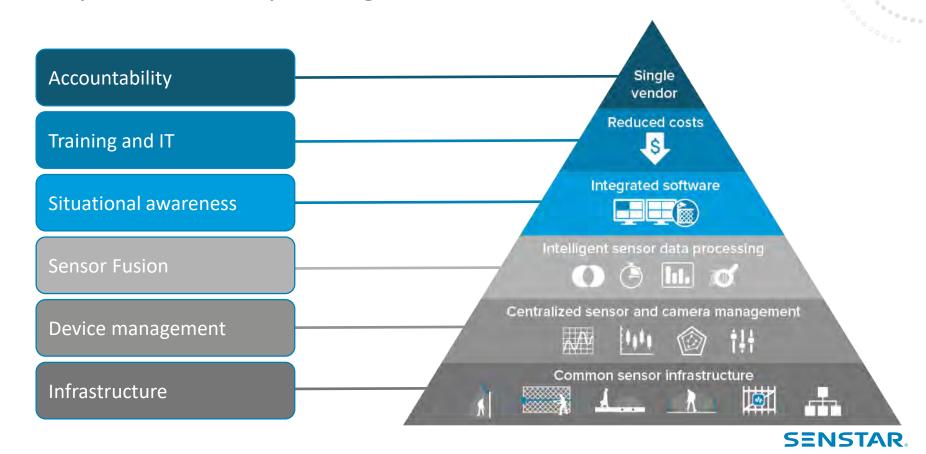
Simplify operator training requirements with a single, intuitive interface

Why a Common Operating Platform?

Accountability

Training and IT

Situational awareness

Sensor Fusion

Device management

Infrastructure

Single vendor

Reduced costs

Integrated software

Intelligent sensor data processing

Centralized sensor and camera management

Common sensor infrastructure

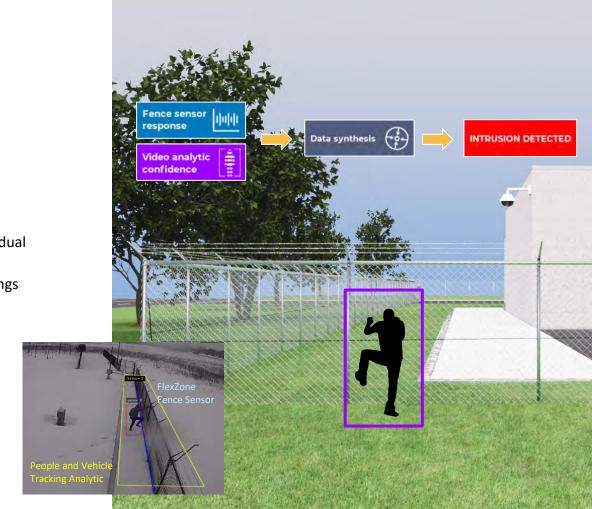SENSTAR

Sensor Fusion

What is Sensor Fusion?

- Synthesize data from separate systems to generate actionable information
- Accesses low level data (more than Boolean logic)

Why?

- Achieve performance levels exceeding individual sensors
- Maximize sensor strengths, avoid shortcomings

Practical Benefits?

- Improved detection capabilities, fewer nuisance alarms
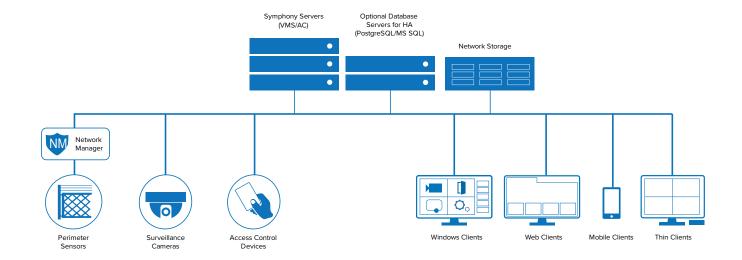- Transparent to end-user (1 alarm)

High-Performance, Solution Architecture
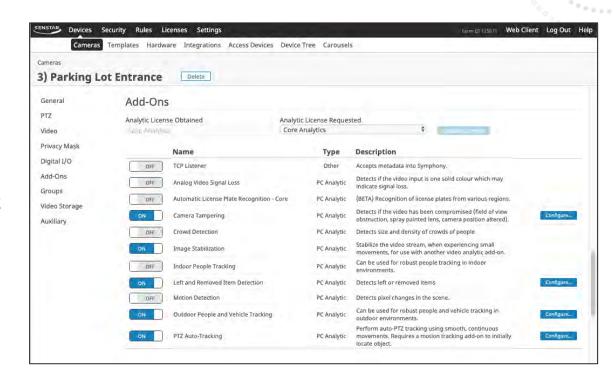
Senstar Symphony is designed with a highly scalable, cost-effective architecture:

- Scales to support thousands of cameras, access control devices, and sensors
- Built-in high availability and failover for servers, database, and storage
- PostgreSQL database eliminates Microsoft Clustering requirements

Symphony Servers (VMS/AC)

Optional Database Servers for HA (PostgreSQL/MS SQL)

Network Storage

NM Network Manager

Perimeter Sensors

Surveillance Cameras

Access Control Devices

Windows Clients

Web Clients

Mobile Clients

Thin Clients

Video Analytics

- Video analytics can be enabled in real-time without additional servers

- Server or edge-based

- Licenses are movable from one camera to another

- Server-based analytics work with virtually all cameras, including low-light and thermal
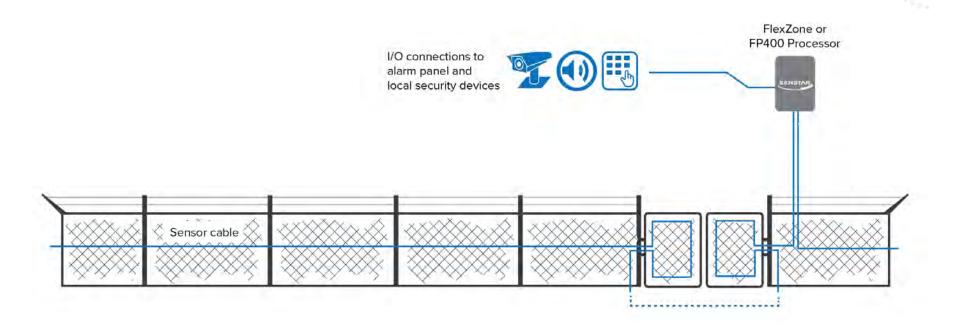
Senstar Analytics (1 of 2)

Analytic	Description	Applications	Example
Camera Tampering	Detects if video has been compromised through view obstruction or position-altering	Detecting camera tampering	
Signal Loss	Detects if analog video input is one solid color, which may indicate signal loss	Detecting video loss with analog cameras/encoders	
Outdoor Tracking	Robust outdoor person and vehicle tracking for dynamic outdoor environments. Unlike simple motion detection, analytic compensates for weather, shadows, and small objects. Can be used a trigger for active deterrent devices, including the Senstar LM100 and 2-way intercoms	Tripwire, alarm zone, loitering, and people counting for outdoor environments	
Auto-PTZ	Performs auto-tracking. Requires event trigger for initial object detection (e.g. via Outdoor Tracking analytic). Enables operators to perform other tasks during security events Maximizes functionality of PTZ cameras	Alarm trigger	

Senstar Analytics (2 of 2)

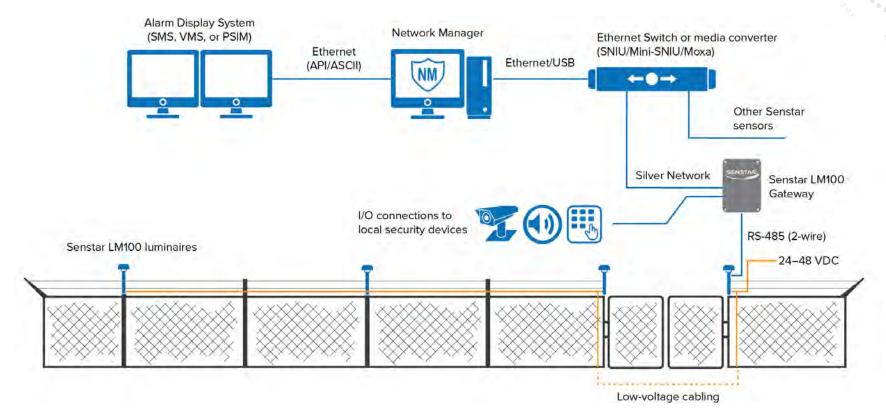| Analytic	Description	Applications	Example
Left and Removed Item Detection	Detects left/removed items based on user-defined min/max object size	Detecting left or removed objects	
ALPR	Detects and captures license plates	License plate detection	
Face Recognition	Detects faces and compares against allow/disallow lists	Two-factor authentication processes for access control	

WATER UTILITIES

System Integration Options

SENSTAR®

PIDS Example: Standalone System

FlexZone or
FP400 Processor

I/O connections to
alarm panel and
local security devices
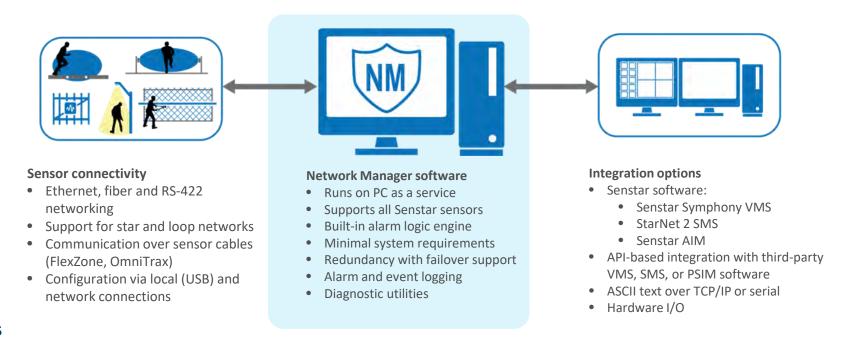
Sensor cable

SENSTAR.
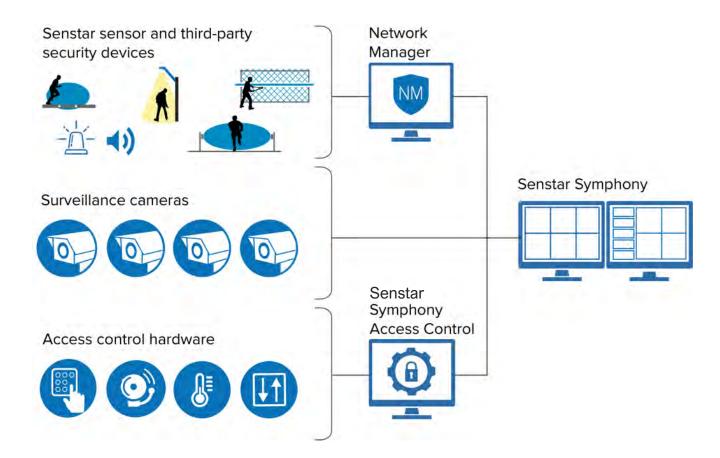
PIDS Example: Networked System

Senstar Network Manager

The Senstar Network Manager software is an intelligent gateway that provides an interface between the perimeter sensors, other connected security devices, and Senstar/third-party security software (VMS, SMS, PSIM etc).

Sensor connectivity
- Ethernet, fiber and RS-422 networking
- Support for star and loop networks
- Communication over sensor cables (FlexZone, OmniTrax)
- Configuration via local (USB) and network connections

Network Manager software
- Runs on PC as a service
- Supports all Senstar sensors
- Built-in alarm logic engine
- Minimal system requirements
- Redundancy with failover support
- Alarm and event logging
- Diagnostic utilities

Integration options
- Senstar software:
  - Senstar Symphony VMS
  - StarNet 2 SMS
  - Senstar AIM
- API-based integration with third-party VMS, SMS, or PSIM software
- ASCII text over TCP/IP or serial
- Hardware I/O

35

PIDS + VMS + Senstar Access Control

Benefits of Integrating PIDS with VMS and Video Analytics

Immediate assessment is critical for a fast, effective response. Integrating perimeter sensors with the VMS and analytics provides several benefits:

- Track persons and vehicles outside and inside the perimeter
- Use "pre-alarm" events to direct PTZ cameras before intrusion occurs
- Automatic camera call-up using zone/location information
- Combine perimeter sensor and video analytic events to reduce nuisance alarm rate
- Use perimeter sensors to improve post-incident analysis (fence data + intelligent video search)

Multiple technologies may be used together as part of a multilayered approach. In this example, a people tracking analytic is applied to a video stream from a thermal camera and works in combination with a fence-mounted sensor.

Outdoor People and Vehicle Tracking analytic

37

Third-Party Integrations

Senstar has extensive experience integrating with a wide range of third parties. For information on a specific integration, including the products supported (e.g. Senstar PIDS, Senstar Symphony VMS, video analytics) and the scope of features, contact Senstar.

WATER UTILITIES

Q&A

SENSTAR.

Key Points

- Senstar security technologies are ideal for protecting water treatment facilities and reservoirs

- Multiple technologies can be used together to improve capabilities

- Integrated solutions improve event assessment and response capabilities

- Senstar's product range and relevant industry experience make us a uniquely capable partner in securing water treatment plants and associated infrastructure