SENSTAR

Physical Security Technologies for Logistics

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
35+ 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

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

Map labels: Sweden, UK, Germany, Netherlands, France, Spain, USA, Canada, Mexico, Israel, China, UAE, Malaysia, Philippines, Singapore, Brazil

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Industry Experience

Senstar has international experience securing warehouses and distribution facilities, as well as harnessing the power of video analytics and access control to address operational use cases for logistics.

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Security Challenges

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Warehousing Unique Physical Security Needs

Perimeter Security

- Remote warehouse locations

- High crime rate neighborhoods

- Length of fence lines

- Authorized access to facilities

Internal Security

- Interior of large facilities difficult to monitor

- Massive inventories, constant activity

- High value items

- Building walls and ceilings vulnerable to intrusion

Warehousing Unique Operational Needs

Access Control

- Restrict access to high value items
- Highly changeable work force status day-to-day
- Flexible, centralized administration

Process Monitoring, Tracking, Investigation & Improvement

- Monitor and track goods throughout the facility
  - Data correlation and video verification
- Increasing automation
  - Process video verification and defect detection
  - Actionable data for process efficiency improvement

LOGISTICS

Application Solutions

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Perimeter Physical Security

Requirement	• Flexible coverage • Scale to meet different site sizes • Accurate zone detection • Single pane of glass • Integration with internal intrusion detection solution • Support video event verification
Site characteristics	• 24x7 operation • Long fence lines • High crime neighborhoods • Poor lighting • Limited guard resources

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
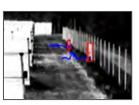
Analytics Solutions

- Outdoor people and vehicle tracking
- PTZ auto-tracking
- LPR

Internal Physical Security

| Requirement	• Flexible coverage (walls, ceiling, floor) • Scale to meet different site sizes • Accurate zone detection • Single pane of glass • Integration with external intrusion detection solution • Support video event verification
Site characteristics	• 24x7 operation • Large wall and ceiling area • Impossible to monitor visually • Vulnerable building materials • High crime neighborhoods • Poor lighting • Limited guard resources
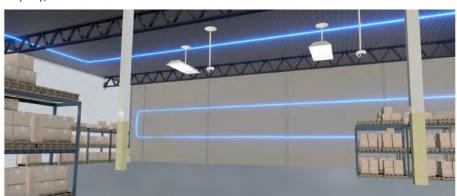
Example of a successful break-in at an electronics warehouse via an exterior wall

FlexZone (internal applications)

- Can be installed on a variety of surfaces including:
  - Security mesh partitions and cages
  - Concrete
  - Sheet metal
- Provides precision sensitivity leveling (per meter)
- High probability of detection (Pd), low nuisance alarm rate

Analytics

- Indoor tracking
- Face recognition
- LPR

Rendering of FlexZone installed on walls and ceiling to protect against drilling and cutting attacks

Access Control

Requirement	• Dozens of geographically distributed warehouses and distribution centers
	• Very dynamic work force
	  • Constant resignations & new hires
	  • Unpredictable daily work attendance
	• Need to ensure proper building access for authorized personnel
	  • Restrict access to high-value goods
	  • Restrict access by location, zone and schedule
	• Ensure unauthorized are locked out

Site characteristics	• 24x7 operations • Large, multi-zone warehouses • High daily shipment volumes

Symphony AC

- Centralized administration for large distributed work force (accommodates more than 50K employees)
- Single pane of glass for all sites
- Granular access, templates, zones, access levels and schedules
- Open platform supporting legacy and IP-based controller hardware
- Optional time and attendance module

Symphony Analytics

- License Plate Recognition
- Face Recognition

Process Monitoring: Loading Dock

Requirement	• Track and video verify shipments
	    • Inbound: Verify contents is complete & as ordered
	    • Outbound: Proof of order state at time of shipment
	• Limitation of liability and dispute resolution

Site characteristics	• 24x7 operations • Large, multi-lane loading docks • High daily inbound and outbound volumes

Symphony VMS and Analytics

- Cameras placed in each loading dock
- Trailer arrival / departure verified by video
- Trailer unique identification number recognized and stored as XML by Symphony video analytic
- Every trailer detected in the dock is date/time stamped
- Video evidence and analytics data supports manual cargo manifest verification process

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Process Monitoring: Air Freight ULD Container Tracking

Requirement	• Track and video verify air cargo ULD (Unit Load Device) containers
	• Track within Distribution center
	• Provide video evidence to help Identify:
	    • Improperly routed containers
	    • Container damage and how it occurred
	    • Last known location of lost containers
	• Drastically reduce investigation times

Site characteristics	• 24x7 operations • Large air cargo distribution facility • High daily inbound and outbound volumes

Symphony VMS & Analytics

- Cameras placed strategically throughout the distribution center
- ULD container unique identification numbers are recognized and stored as XML by Symphony video analytic
- ULD identification captured at camera checkpoints
- Possible to track and video verify the path of a ULD device within the facility using checkpoints

Process Monitoring: Resource Restocking

Requirement	• Track critical production resources and alarm on preconfigured thresholds:
	    • Shipping boxes
	    • Shipping pallets
	• Proactive warning when resource levels reach (e.g. 20%)
	• Alarm and communication triggers restocking process
	• Production is not interrupted

Site characteristics	• 24x7 operations • Large warehouse or distribution facility • High daily inbound and outbound volumes

Symphony VMS & Analytics

• Cameras placed to monitor key production resources

• Symphony analytics can be configured to automatically estimate resource requirements

• Will alarm on preconfigured thresholds

• Integrate with warehouse restocking processes

• Video verification & historical event reporting
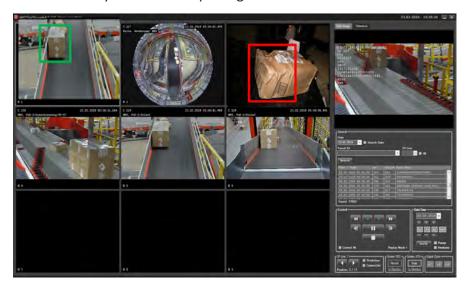
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Package Tracking

Requirement	• View and correlate events from multiple cameras and link to physical location within facility • Find and investigate missing or damaged packages • Reduce trace and provide video proof • Avoid customer disappointment
Site characteristics	• Large warehouse or distribution facility • 24x7 operation

Symphony VMS & Analytics

• Cameras placed at key package route locations

• Package ID data linked with video metadata

• Link still images and live video

• Search for scanned data and display occurrences of results

• Future analytics to detect package abnormalities

Search ID and track through facility

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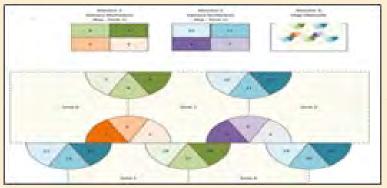
Facility-Level Track and Trace

| Requirement	• View and correlate events from multiple cameras and link to physical location within facility • Find missing or damaged containers or pallets • Reduce mean-time to complete investigate and provide video evidence • Intuitive interface for viewing multiple locations quickly
Site characteristics	• Large warehouse or distribution facility • 24x7 operation
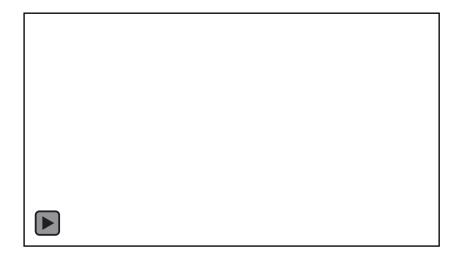
Symphony VMS & Analytics

- Cameras placed at key locations
- Tracking links between cameras enable operators to "follow" packages throughout facility

Cameras views with visual links to cameras and views

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Detect Warning Light Operation

Requirement	• Detect abnormal operation that triggers warning lights • Cabling to central monitoring facility may be too expensive or impractical • Monitor/record events related operational and workplace safety
Site characteristics	• Large warehouse or distribution facility • High daily inbound and outbound volumes

Symphony VMS & Analytics

• Camera placed to monitor equipment operation

• Video analytics detect warning light and generate alarm

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Senstar Products

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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)
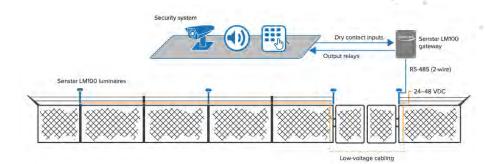- Instant-on illumination and strobing

Environment Specs

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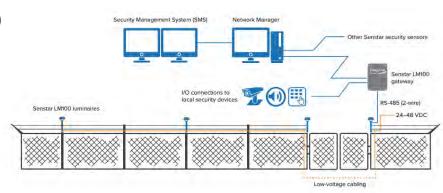
Electrical Specs

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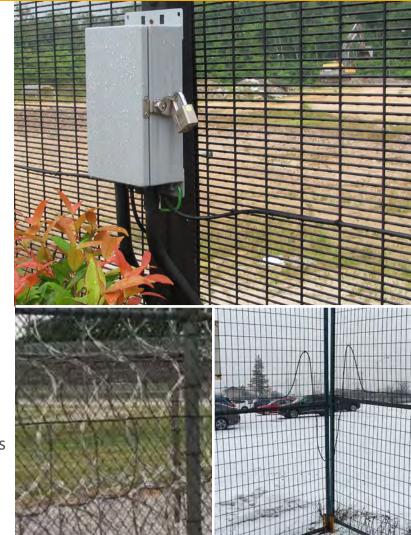- Common integration interfaces (API, ASCII, or I/O)

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
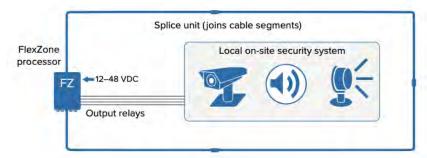 - FlexZone-60: 60 software-defined zones, location-reporting

Environment Specs

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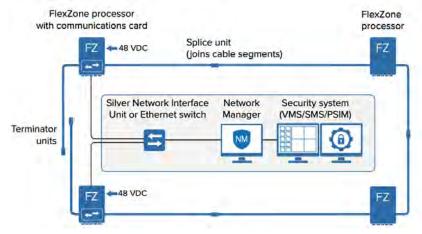
Electrical Specs

- 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
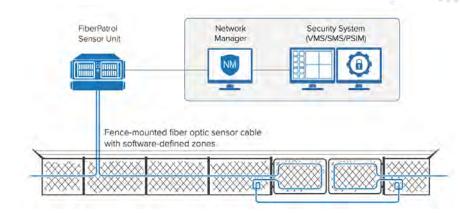
Environment Specs

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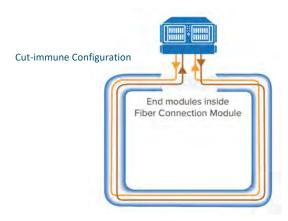- Sensor unit: 0 to 50 °C (32 to 122 °F), humidity 20–80% non-condensing

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)

NM

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
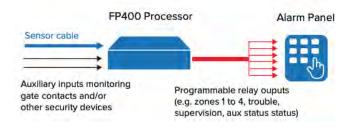- No conductive in-field components

Environment Specs

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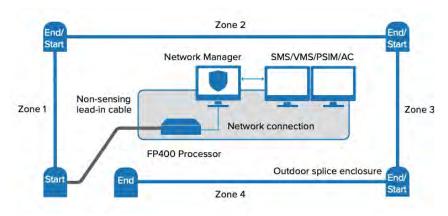
Electrical Specs

- 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)
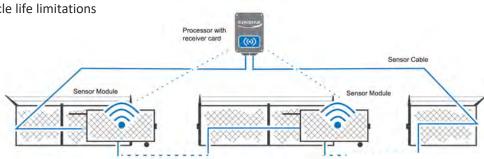
Electrical Specs

- 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
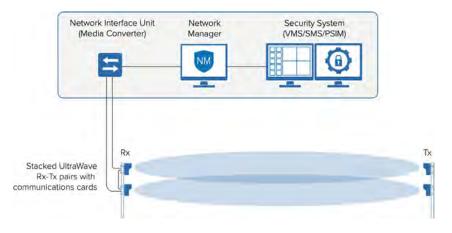- High-impact ABS plastic, marine white enclosures

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

Rx

Tx

Stacked UltraWave Rx-Tx pairs with communications cards
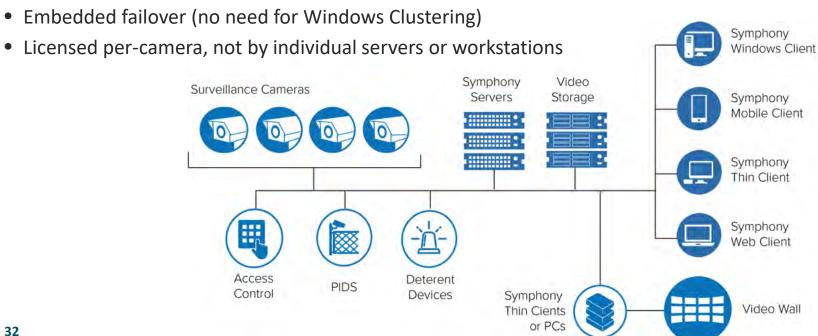
Symphony Common Operating Platform

- 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

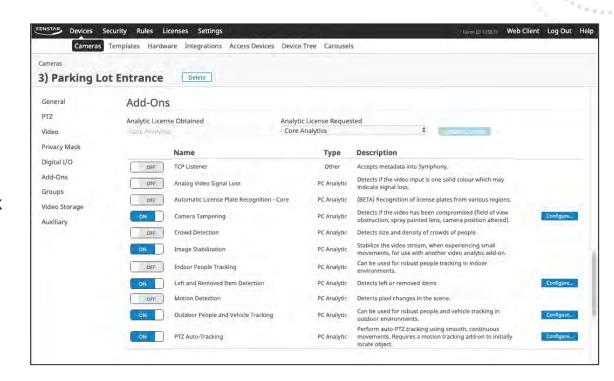# Symphony Architecture: Scalable and Open

Symphony installs on off-the-shelf hardware, supports thousands of network devices as well as industry standards (ONVIF profiles S and G), and is designed to have a low server footprint.

- Multi-server architecture (no separate management or analytic servers, one installation package)
- Embedded failover (no need for Windows Clustering)
- Licensed per-camera, not by individual servers or workstations

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	

NVR Hardware

E-Series Description

- Compact, fanless server appliance
- Ideal for retail stores, gas stations, and restaurants

R-Series Description

- Dell enterprise-grade hardware
- Mini-tower, 1U and 2U form factor options
- Scalable solutions with high availability, hot-swappable components and server redundancy

Key Benefits

- Validated hardware for optimal performance with comprehensive 3-year warranty
- Simplifies ordering and support
- Different hardware options based on requirements
- Dell on-site support for R-series hardware

E-Series Physical Security Appliance

R-Series NVRs

Thin Client

Description

- Network video display appliance
- Decodes and displays up 16 live video streams
- Compatible with ONVIF Profile S and RTSP camera streams
- When paired with Symphony, provides playback, export, and video wall functions

Key Benefits

- Easy to install and use
- Compact, durable, fanless design
- Powered via PoE
- Manage locally or remotely
- Touchscreen, mouse and mobile app support (no keyboard required)
- Supports Symphony privacy controls

Thin Client Technical Details

Main Features

- Video output: HDMI 1080p (cable included)
- Supported layouts: 1: 1920 x 1080 @ 25 fps, 2: 960 x 1080 @ 25 fps, 4: 960 x 540 @ 25 fps, 6: 640 x 540 @ 20 fps, 9: 640x 360 @ 20 fps, 12: 480 x 360 @ 10 fps, 16: 480 x 270 @ 10 fps
- ONVIF Profile S and RTSP support
- One-way audio (from audio-capable cameras)
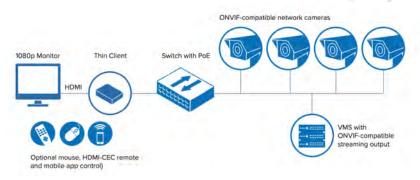- Video playback, export, and video wall functions (via Symphony)

Interfaces

- 100 Mbps Ethernet (RJ-45) (additional interface via USB-Ethernet adapter)
- 2 USB ports (USB 2.0)
- Audio output (3.5 mm)
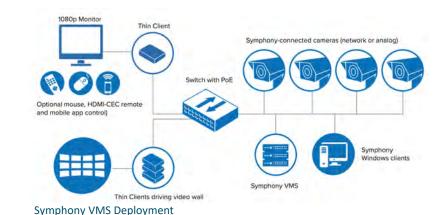
Control Options

- Mouse (USB), touch screen, TV remote control via HDMI-CEC, PTZ joystick
- Web interface
- Mobile app (iOS, Android)

Privacy Controls (via Symphony)

- Dynamic and static masks
- Password protection and restricted operator mode

Stand-alone Deployment (Direct Connect)

Symphony VMS Deployment

Senstar Enterprise Manager

Reduces operating costs and IT burden associated with maintaining secure, reliable video surveillance systems in multi-site deployments

Policy Template
Define configuration once, apply to many

Health Alert
Unified visibility of entire deployment via web-based dashboard

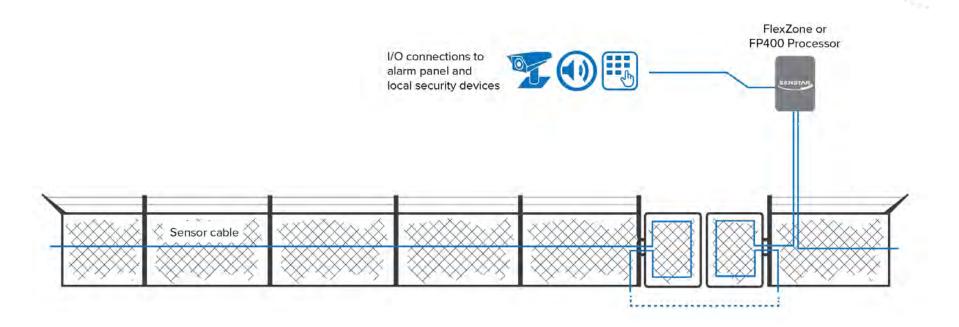### Cloud Backup
Backup server configured centrally

Auto-Update
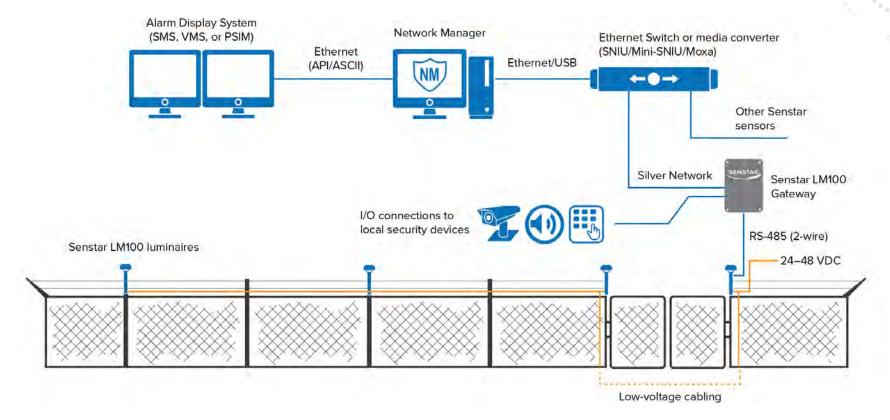Manage software updates remotely

LOGISTICS

System Integration Options

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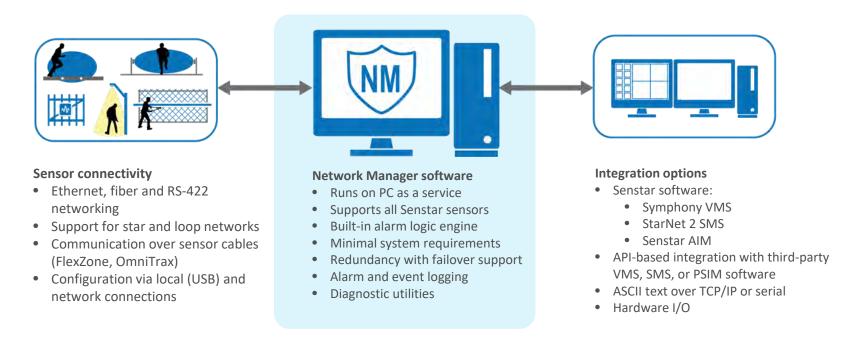# PIDS Example: Standalone System

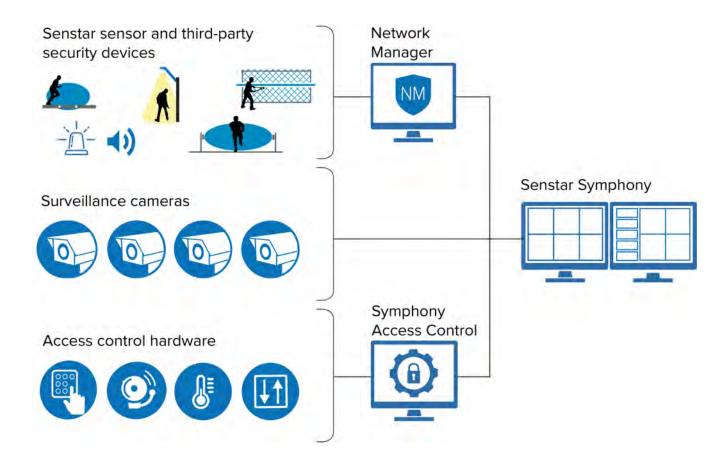# PIDS Example: Networked System

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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).
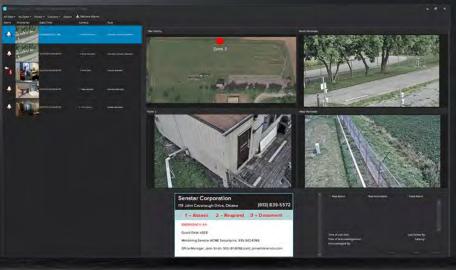

Sensor connectivity

- 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:
  - 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

PIDS + VMS + Senstar Access Control

Senstar sensor and third-party security devices

Network Manager
NM

Surveillance cameras

Senstar Symphony

Access control hardware

Symphony Access Control

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Symphony Integration – Alarm Console

- Sensor alarms in Symphony are displayed alongside video analytic and access control events.

- Each event may be linked to multiple cameras and graphically displayed on a site map, maximizing operator assessment capabilities.

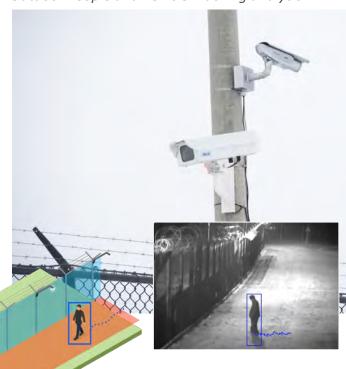- Bidirectional communications enable automated and manual control over sensor and camera I/O interfaces.

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

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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, Symphony VMS, video analytics) and the scope of features, contact Senstar.
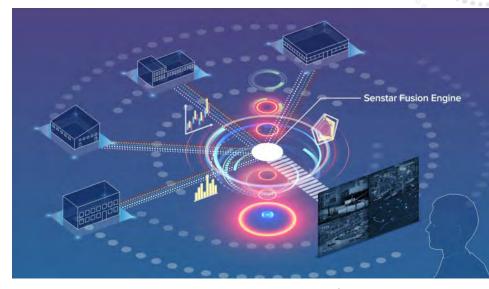
Looking to the Future – A Deeper Integration

- "Sensor fusion" – integrating sensor technologies to receive the advantages of both while avoiding their disadvantages

- Goal: achieve a high probability of detection while maintaining a low nuisance alarm rate or low vulnerability to defeat

- Existing systems use Boolean or time-based logic, next-generation systems to process data via fusion engine:
  - Pattern recognition
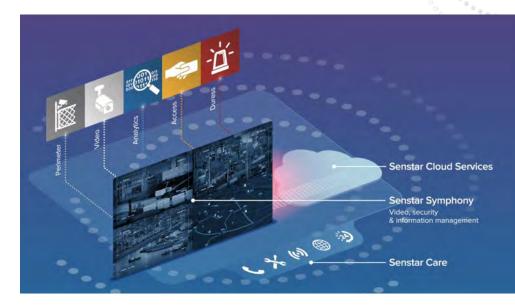 - Artificial intelligence
  - Multi-sensory approach

Senstar has the unique capability to fuse sensor and video analytic data over a common platform.

Senstar Common Operating Platform

Senstar is uniquely situated in the industry to provide a fully integrated common operating platform.

- Single vendor accountability
- Reduced training and IT costs
- Integration = situational awareness
- Fusion = intelligent data processing
- Centralized device management
- Common security infrastructure

Senstar customers benefit from world-class hardware and software, including open interfaces and platforms, while avoiding risks and complexity

SENSTAR®

LOGISTICS
Q&A

SENSTAR

Key Points

- Senstar has extensive experience in protecting warehouses and distribution facilities
- Senstar's portfolio is unmatched in the industry
- Integrated solutions can improve security while taking into account the unique characteristics of the industry
- Leverage physical security technology to improve business processes