Architectural and Engineering Specification for a

Perimeter Intrusion Detection
and Deterrence System

Senstar LM100

This document is intended to provide performance specifications and operational requirements for the Senstar LM100 Perimeter Intrusion Detection and Deterrence System. It is written in a generic format. These specifications may be copied verbatim to form a generic procurement specification.

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PART 1   GENERAL

1.1   System Summary

The contractor shall install a perimeter intrusion detection and deterrence system. The system shall be to illuminate the perimeter along the fence as well as detect and locate intruders that attempt to cut, climb or lift the fence fabric.

The system shall consist of durable lightweight Luminaires and a Gateway device, both of which shall be easy to install and configure.

The system shall be capable of being integrated into the facility's Security Management System (SMS).

1.2   Submittals

A. Contractor submittals to the facility owner shall include the following, as a minimum:

1. Site conditions report as per part 3.1

2. Configuration and test results for the system after installation and calibration are complete as per part 3.3

3. All manufacturer-supplied software required for the maintenance and operation of the system.

1.3   Spares

A. The contractor shall deliver to the facility owner spare system components.

B. For each system component, spares consisting of at least one unit or 3% of the number that comprise the system, whichever is greater, shall be provided.

1.4   Warranty

A. The product shall be under warranty for a minimum of three years from the date of purchase.

1.5   References

A. Abbreviations and acronyms: The following acronyms and abbreviations are used in this document:

CSA: Canadian Standards Association

DC: Direct Current

IDA: International Dark-Sky Association

MEMS: Micro-Electro-Mechanical System

MTBF: Mean Time Between Failures

MTTR: Mean Time To Replace

NPT: National Pipe Thread

RF: Radio Frequency

SMS: Security Management System

UL: Underwriters Laboratories

PART 2   PRODUCTS

2.1   Perimeter Intrusion Detection and Deterrence System

A.   The contractor shall supply a perimeter intrusion detection and deterrence system.

B.   The system shall consist of:

1.   Low voltage, lightweight, durable Luminaires with integrated intrusion detection capabilities and wireless mesh networking.

2.   A Gateway device that provides connectivity to the site's alarm system.

3.   Low voltage wiring to provide power to the Luminaires.

4.   Indoor or outdoor 48V DC power supply(ies) with sufficient current capabilities to power the hardware connected to it.

2.2   Manufacturers

A.   The Senstar LM100 Perimeter Intrusion Detection and Deterrence System from Senstar Corporation (www.senstar.com) meets the requirements stated in this document.

2.3   Regulatory Requirements

A.   The system shall be registered with a nationally registered testing laboratory such as CE, IC and FCC and safety tested as per EN62368-1.

B.   All equipment shall carry the appropriate registration label(s).

C.   The system equipment shall carry the appropriate RF registrations for use in the country where it will be installed.

D.   The Luminaires shall be UL certified.

E.   The Luminaires shall be available in a version that is International Dark-Sky (IDA) certified in order to minimize light pollution.

2.4   Manufacturing Quality Requirements

A.   The manufacturer's quality management system shall be certified as conforming to ISO 9001:2008 or newer standard.

B.   Outdoor system components:

1.   All electronic modules and assemblies intended for use in outdoor applications shall use conformal coatings.

2.   The modules and assemblies shall be tested during manufacture over their entire operational temperature range on a sample basis.

2.5   Mechanical Requirements

A.   Luminaire:

1.   The dimensions shall be equal to or less than 98.4 x 14.3 x 5.1 cm (38-3/4 x 5-5/8 x 2 inches).

2.   The weight shall be equal to or less than 740 g (26 ounces).

3.   The base of the luminaire shall include a ½-inch National Pipe Thread (NPT) to support the optional use of conduit to protect the low-voltage wiring.

B.   Gateway:

1.   The dimensions shall be equal to or less than 31.7 x 16.0 x 8.8 cm (12-1/2 x 6-5/16 x 3-1/2 inches).

2.   The Gateway enclosure cover shall be hinged as to enable access to the internal components without requiring removal.

3.   The Gateway enclosure shall be capable of being secured with a padlock.

4.   The Gateway enclosure shall include pre-installed cable glands so that install technicians do not need to drill their own cable entry points.

5.   To improve accessibility during installation and maintenance, two-piece pluggable terminal blocks shall be used.

6.   The Gateway shall detect and indicate physical tampering conditions, including:

a.   Opening of the Gateway enclosure cover, resulting in tamper switch activation

b.   Short-circuiting the low voltage cable

c.   Disconnecting the low voltage cable

2.6   Electrical Requirements

A.   Each Luminaire shall meet the following electrical requirements:

1.   Input power source: 12V to 48V DC

2.   Power consumption: 2.5W

3.   Wireless range: 30 m (100 ft)

B.   Each Gateway shall meet the following electrical requirements:

1.   Input power source: 12V to 48V DC

2.   Power consumption: less than 1.0W

C.   Lightning/surge protection: The Luminaire shall include transient voltage protection to protect the system from lighting strikes or electrical tampering.

D.   Lightning/surge protection: The Gateway shall include transient voltage protection to protect the system from lighting strikes or electrical tampering.

E.   Gateway auxiliary input and output electrical configuration:

1.   Output relays: Each relay shall be rated for at least 1A at 30V.

    2. Auxiliary inputs: The values of the supervision resistor(s) for each dry contact input shall be set from the configuration software.

F. Any optional communication card connected to the Gateway will be capable of using the existing Gateway's power source and not require any additional power connections.

2.7 Environmental Requirements

A. Operating range: The Luminaire shall operate within specifications under the following environmental conditions:

    1. Temperature: –40°C to 70°C (–40°F to 158°F)

    2. Relative humidity: 0% to 100% (condensing)

B. Luminaire:

    1. The Luminaire neck and mounting plate shall be constructed with aluminum which is coated with all-weather polyester powder black finish.

    2. The Luminaire head will be made of an all-weather ruggedized U/V rated ASA housing (NEMA Type 3S).

    3. Cable ingress/egress port shall be sealed with a bushing.

C. Operating range: The Gateway in its standard enclosure shall operate within specifications under the following environmental conditions:

    1. Temperature: –40°C to 70°C (–40°F to 158°F)

    2. Relative humidity: 0% to 100% (condensing)

D. Gateway enclosure:

    1. The Gateway circuit card shall be housed in a painted aluminum enclosure meeting the requirements of UL Type 4X/IP66.

    2. Cable ingress/egress ports shall include cable glands that require no additional sealing compounds to provide an environmental seal for sheathed cables.

2.8 Reliability and Maintenance Requirements

A. Luminaires:

    1. The Luminaires shall provide a minimum service life of 50,000 hours, excluding damage caused by non-environmental forces.

    2. The Luminaires shall have a mean time to replace (MTTR) of less than 10 minutes.

    3. The Luminaires shall be capable of performing internal self-diagnostic tests of the internal circuitry and detection processing.

    4. The Luminaires firmware shall be field-upgradeable via a connection over the secure wireless network.

B. Gateway:

1. The Gateway shall have a predicted mean time between failures (MTBF) of greater than 100,000 hours when calculated per Telcordia Reliability Prediction Procedure, Parts Count Method, at 70°C.

2. The Gateway shall have a mean time to replace (MTTR) of less than 10 minutes.

3. The Gateway shall be capable of performing internal self-diagnostic tests of the internal circuitry and detection processing.

4. The Gateway firmware shall be field-upgradeable, either locally via a USB connection or over the network.

2.9 Detection Capabilities – Fences

A. The Luminaire's sensor shall consist of a MEMS electronic device integrated into each of the Luminaires which are attached to the fence along the full length to be protected.

B. The system shall have the following detection capabilities:

1. Process on board sensor data to detect intruders attempting to breach the perimeter fence by cutting, climbing, or lifting the fence fabric.

2. Pinpoint the position of a detected intrusion to the Luminaire with the greatest measured response.

3. Detect multiple simultaneous intrusions.

4. Support flexible, software-defined detection zones. Each Gateway shall support up to 50 distinct, individually sized zones.

5. Be capable of being calibrated to function on different types of fencing (see section 2.9E, Fence Compatibility).

6. Utilize environmental discrimination algorithms in the detection process to optimally distinguish between the spatially localized disturbances of real intrusions and spatially distributed disturbances like wind and rain.

C. The Luminaires shall use RF technology to communicate with one another with a maximum range of 30 m. This wireless communication system shall support a self-healing mesh network to ensure continued intrusion detection on the perimeter in the event of a Luminaire failure. Each Gateway can support a maximum of 100 Luminaires on its secure mesh network.

D. Intrusion detection performance:

1. The probability of detection (Pd) of an intruder cutting the fence, lifting the fence fabric, or climbing unaided over the fence shall be 95% with a 95% confidence factor, when the system is installed in accordance with the manufacturer's directions on a high-quality fence.

2. Nuisance (environmental) alarms:

   a. The system when calibrated according to manufacturer's guidelines shall not suffer nuisance alarms from any of the following sources:

      1. Temperature changes

      2.   Motion of nearby objects or vegetation that are not striking the fence

      3.   Motion of surface or ground water

      4.   Sunrise/sunset

      5.   Seismic vibration caused by nearby vehicular or rail traffic

      6.   Acoustic or magnetic effects

      7.   Snow

      8.   Fog

   b.   The system shall utilize Environmentally Derived Adaptive Processing Technology (EDAPT) to account for the background environmental noise level in the vicinity of a disturbance before declaring an alarm to minimize the probability of nuisance alarms from the following sources:

      1.   Wind

      2.   Rain and hail

      3.   Sandstorms

E.   Fence compatibility:

   1.   The system shall support installation on the following types of metal fencing:

      a.   Chain-link

      b.   Expanded metal mesh

      c.   Standard welded mesh

      d.   Vinyl-coated chain-link

      e.   Palisade

      f.   Any of the above fences with Concertina and/or razor wire

2.10   Detection Capabilities – Gates

A.   To protect swinging and sliding gates, the system shall support the use of a wireless gate sensor, an accelerometer-based device that detects intrusions and other gate activity.

B.   The Gateway shall communicate with the wireless gate sensor via an RF card installed in its enclosure.

C.   The Gateway shall be capable of providing data connectivity so that auxiliary devices like Senstar's UltraWave or Wireless Gate Sensor can be integrated into the sensor network at gate locations.

2.11   Illumination Capabilities

A.   The Luminaires shall direct illumination along the fence line on the side of installation, within 3 m (10 ft) from the fence.

B. The luminaires shall support a minimum of three lighting level modes, each of which can be set from 0 to 100% intensity.

C. The lighting level modes shall be controllable via a programmed schedule or via commands issued by the video or security management system (VMS/SMS).

D. The system shall support configurable alarm modes in which the detecting Luminaire or a defined zone can go into alarm.

E. During an alarm, the lighting system shall be configurable as follows:

1. Switch the zone or detecting Luminaire to the alarm lighting level.

2. Switch the zone or detecting Luminaire to strobe at the alarm lighting level.

3. Switch the zone to the alarm lighting level and the detecting Luminaire to strobe at the alarm lighting level

4. Extinguish the lighting.

F. The alarm lighting duration can be configured from 1 to 15 minutes.

G. The system shall provide a scheduling feature that enables the Luminaires to be automatically illuminated based on a pre-set customer schedule.

H. The Luminaires shall emit a minimum of 163 total lumens.

I. The manufacturer shall provide an IES photometric file that can be used with lighting simulation software.

2.12   **Gateway External Input/Output Capabilities**

A. The Gateway shall consist of a total 10 I/O ports which will be configurable as either inputs or outputs.

B. Additional I/Os can be added with the addition of relay output and dry-contact input cards.

C. Gateway alarm outputs:

1. The Gateway shall have up to ten outputs to indicate alarm conditions. Each output is individually configurable as a dry contact Form A or Form B relay or voltage sourcing output capable of driving up to 100mA inductive load.

2. For each relay it shall be possible to assign one or more conditions from the following list under which the relay will activate:

a. Zone alarm (configurable zone start and end)

b. Enclosure tamper

c. Input power fail

d. Internal hardware fault

e. Fail safe (assert on total loss of power)

f. Wireless Gate Sensor intrusion, supervision, and diagnostic alarms

D. Contact inputs:

1. The Gateway shall have up to ten configurable contact inputs to accept the indication of alarm conditions detected or generated by third-party devices.

2. The Gateway shall be capable of switching luminaires on or off from one of the contact inputs.

3. The Gateway shall be capable of wirelessly monitoring the status of gate contacts via the Senstar Wireless Gate Sensor.

2.13 Installation and Configuration Capabilities

A. The system shall be simple to install and shall have the following characteristics, as a minimum:

1. The Luminaires must be capable of being mounted to the fence posts or structure with the use of stainless-steel clamps or proper anchor bolts.

2. The low voltage cable must be capable of being attached directly to the fence without needing to be put in a conduit.

3. The low voltage cable must be capable of being attached to the fence with standard UV-resistant cable ties (plastic or metal).

4. For installations where conduit is required, the base of the luminaires shall include a ½-inch NPT opening.

5. It shall be possible to mount the Gateway enclosure directly on a fence post that forms part of the fence to be protected.

6. All electrical connections to the Luminaires, the low voltage cable, shall be made with quick install crimp terminals.

7. All electrical connections to the Gateway, including the low voltage cable, shall be made with screw-terminals on removable connectors.

B. The system shall support the following configuration and calibration features:

1. The Gateway shall provide a standard USB connector for attachment to a PC running Microsoft Windows.

2. Configuration and calibration shall be performed via a Windows-based software tool with a graphical user interface.

3. The calibration software shall support precise sensitivity leveling on a per node basis.

4. The calibration software shall enable the creation of de-sensitized zones that ignore vibration events (for example, by gates or areas where intrusion detection is not required).

5. The calibration software shall include a real-time plot mode for viewing live fence response data.

6. The calibration software shall include settings to optimize sensitivity levels for flexible and rigid fence constructions.

7. Gateway configuration and calibration settings shall be capable of being stored in a computer file for record keeping purposes and available for reuse when configuring additional or replacement Gateway.

2.14 Networking Capabilities

A. The system shall be capable of operating in a stand-alone or networked configuration:

1. The system shall support a stand-alone configuration (i.e. not connected to a Silver Network). In this configuration, alarms and supervision information from the Luminaire wireless mesh network shall be communicated via the Gateway's output relays.

2. The system shall support a networked configuration. The Gateway shall use the Silver Network protocol to relay alarm, status, and supervision information from the Luminaire wireless mesh network to the Network Manager. The Network Manager shall then communicate the information to an SMS.

3. The system shall support the reporting of individual zone alarms as well as status and supervision information to Silver Network-compatible relay I/O modules.

B. Network manager tools: The system network management software shall provide the following tools to facilitate system monitoring, commissioning, and troubleshooting:

1. System status tool that provides a visual display of the status of all Gateways in the system

2. System event log tool that provides a searchable log of system events

C. Network communications:

1. The Gateway shall be capable of communicating alarm, status, and configuration information to and from a central location over the Silver Network.

2. The lighting level of the Luminaires shall be controllable from the facility's video or security management system (VMS/SMS).

3. Alarm, status, and configuration information shall be able to be communicated over the Silver Network, thus enabling a multi-Gateway system to require only one connection to the facility's network and/or SMS.

4. The Gateway shall support the following physical media options for communication with the integrated sensor network:

   a. EIA-422 cable

   b. Multi-mode fiber optic cable

   c. Single-mode fiber optic cable

   d. Ethernet with POE capability

5. The Gateway shall maintain an internal alarm queue in the event of a network interruption. The alarms shall automatically be resent when network connectivity is re-established.

6. Networking of auxiliary input and output relays:

   a. The status of the Gateway's auxiliary dry contact inputs shall be communicated over the integrated sensor network.

   b. The Gateway's output relays shall be controllable over the integrated sensor network.

D. Network management:

1. The system shall include network management software to manage the communications over the sensor network. The network management software shall be capable of running on a standard Windows PC.

2. The system's network management software shall provide the following interfaces:

   a. TCP/IP-based interface for communicating alarm, status, and configuration data to and from an SMS. The system supplier shall furnish complete documentation of this interface to facilitate integration with an SMS.

   b. Serial and TCP/IP-based interfaces for communicating alarm, status, and configuration data to and from an SMS using configurable, ASCII-based text strings.

   c. TCP/IP-based interface to be used by the system's PC-based software calibration and configuration tool to allow calibration and configuration of all Gateway settings to be done from a central location.

PART 3   EXECUTION

3.1   Site Assessment

Before installation begins, the installation contractor shall provide a report to the facility's owner documenting any site conditions that may prevent the system from operating satisfactorily. Examples of such conditions include loose fence fabric, loose gates, or objects such as signs or tree branches hitting the fence.

3.2   System Installation

The system shall be installed in accordance with the manufacturer's recommended procedures as defined in the manufacturer's documentation.

3.3   System Calibration

A. The installation contractor shall calibrate the system in accordance with the manufacturer's recommended procedures as defined in the manufacturer's Product Guide.

B. The installation contractor shall submit to the Owner the calibration and configuration settings for each Gateway in the system.

C. The installation contractor shall submit to the Owner a response plot for each zone in the system.

3.4   Training

The installation contractor or vendor shall train the Owner's maintenance personnel in the calibration and system maintenance procedures as given in the manufacturer's product documentation.