Architectural and Engineering Specification for a

Fence-Mounted Perimeter Intrusion Detection System

FlexZone®

This document is intended to provide performance specifications and operational requirements for the FlexZone perimeter intrusion detection 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 ranging, fence-mounted perimeter intrusion detection system. The system shall detect and locate intruders that attempt to cut, climb, or lift the fence fabric.

The detection sensors shall consist of easy-to-install cables. The cables shall connect to signal processing modules that detect and locate attempted perimeter breaches by analyzing the electrical signals that occur as a result of minute vibrations in the sensor cables.

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

The system shall support the use of wireless sensors to augment perimeter protection in areas where physical cables pose installation and/or maintenance challenges, such as with sliding or swinging gates.

1.2   Submittals

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

1.   Site conditions report as per article 3.1

2.   Configuration, calibration settings, and sensitivity plots for each processor in the system after installation and calibration are complete as per article 3.2A

3.   All manufacturer-supplied software required for the calibration 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 least one unit or 10% 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.

B.   The end-user shall have the option of extending the warranty to five years without additional fees.

1.5 **References**

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

1. PIDS: Perimeter Intrusion Detection System

2. MTBF: Mean Time Between Failures

3. MTTR: Mean Time To Replace

4. Pd: Probability of Detection

B. Reference Standards: The following regulatory and industry standards are referenced in this document:

1. Federal Communications Commission: FCC 47 CFR Part 15, Subpart B requirements for Class B devices.

2. Industry Canada ICES-003, Issue 4 requirements for Class A devices.

3. CE standards: EN 61000-6-3:2007/A1: 2011 (Part 6-3: Generic standards - Emission standard for residential, commercial, and light industrial environments), EN 50130-4: 2011 (Alarm systems - Part 4: Electromagnetic compatibility - Product family standard: Immunity requirements for components of fire, intruder, hold up, CCTV, access control and social alarm systems), Restriction of Hazardous Substances Directive 2011/65/EU (RoHS2)

4. Underwriters Laboratory (UL) 50 (Environmental Ratings)International Organization for Standardization: ISO 9001:2008

5. International Electrotechnical Commission (IEC), Ingress Protection (IP) 66

6. European Union Regulation 1907/2006: Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

PART 2   PRODUCTS

2.1   Fence-Mounted Perimeter Intrusion Detection System

A.   The contractor shall supply a ranging, fence-mounted perimeter intrusion detection system (PIDS).

B.   The fence-mounted PIDS shall detect and locate intruders attempting to breach the perimeter fence by cutting, climbing, or lifting the fence fabric.

2.2   Manufacturers

A.   The FlexZone™ system from Senstar Corporation (www.senstar.com) meets the requirements stated in this document.

2.3   Regulatory Requirements

A.   The system shall comply with the following regulations:

1.   FCC 47 CFR Part 15, Subpart B requirements for Class B devices

2.   CE: EN 61000-6-3:2007/A1:2011, EN 50130-4: 2011, RoHS2

3.   Industry Canada ICES-003, Issue 4 requirements for Class A devices

4.   REACH

5.   UL 60950-1, 2nd Ed

6.   CSA 60950-1-07, 2nd Ed

2.4   Manufacturing Quality Requirements

A.   The manufacturer's quality management system shall be certified as conforming to ISO 9001:2015.

B.   Outdoor system components:

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

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.   Sensor cable:

1.   The sensor cable shall have the option to be encased in an armor jacket, for use in areas that have a high potential of physical damage to the cable.

2.   The sensor cable shall have a minimum bend radius no greater than 10.0 cm (4.0 inches).

3.   The sensor cable shall be affixed to the facility's fence through the use of UV-resistant plastic or metal cable ties.

4. The sensor cable shall not require a cable conduit to be installed along the fence perimeter.

B. Processor modules:

1. The manufacturer shall provide the facility owner with the option of installing each processor assembly in its own enclosure or use an existing enclosure.

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

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

4. The enclosure for the processor module 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 processor module shall detect and indicate physical tampering conditions, including:

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

   b. Cutting the sensor cable

   c. Short-circuiting the sensor cable

   d. Disconnecting the sensor cable

2.6 Environmental Requirements

A. Operating range: The processor 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)

B. Processor enclosure:

1. The processor 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.

2.7 Reliability and Maintenance Requirements

A. Sensor cables: The sensor cables shall provide a minimum service life of 10 years, excluding damage caused by non-environmental forces.

B. Processor:

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

3. The processor shall be capable of performing internal self-diagnostic tests of the internal circuitry, cable continuity and termination, and detection processing.

4. The processor self-test cycle shall be capable of initiating from its two dry contact inputs or from a command issued over the network, if configured.

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

2.8 Electrical Requirements

A. Each processor module shall meet the following electrical requirements:

1. Input power source: 10V to 60V DC

2. Power consumption (standalone unit): less than 2.0W

3. Power consumption (networked unit): less than 2.5W

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

C. The system shall support the provision of power over the sensor cables, so that individual processor modules, when connected together, can share a common power source.

D. The system shall be capable of having up to 5 processors share power from a single 48V (nominal) power source.

E. 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 processor assembly will be capable of using existing processor's power source and not require any additional power connections.

G. The system shall be capable of being powered via Power-over-Ethernet (PoE) when an Ethernet communications card is installed.

2.9 Detection Capabilities

A. The PIDS sensor shall consist of a cable that is attached to the fence along the full length to be protected.

B. The system shall be able to detect and locate intrusions over a cable distance of up to 600 m (1,968 feet) per processor.

C. The PIDS processor shall have the following detection capabilities:

1. Process the signal from the sensor cable to detect intruders attempting to breach the perimeter fence by cutting, climbing, or lifting the fence fabric.

2. Each processor shall support two sensor cables, with each one being up to 300 m (984 feet) in length.

3. Pinpoint the position of a detected intrusion to within 3.0 m (9.8 feet) or less at least 95% of the time.

4. Detect multiple simultaneous intrusions, when each intrusion attempt is separated by a sensor cable distance greater than 50 m (164 feet).

5. Support flexible, software-defined detection zones. Each processor shall support up to 4 or 60 distinct, individually sized zones, depending on the model.

6. Be capable of being calibrated to function on different types of metal fencing.

7. 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.

D. The system shall support communication path redundancy to ensure continued intrusion detection on the perimeter in the event of a cable cut.

E. 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. False alarm rate: The maximum rate for alarms generated by the internal electronic processes of the processors (cables excluded) shall be less than one per zone per year, averaged over the total number of zones in the system.

3. 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

F. 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. Concertina and/or razor wire

    e. Vinyl-coated chain-link

    f. Palisade

2. The system shall perform as specified in single-pass installations on high-quality chain-link fences of up to 4.3 m (14 feet) in height.

3. It shall be possible to use multiple passes of sensor cable to obtain the specified detection performance for fences of any height.

4. The manufacturer shall provide installation guidelines regarding the type and height of fences that can be protected with one, two, and multiple passes of sensor cable.

5. It shall be possible to use the system for wall break-through detection whereby the system shall detect any attempt by intruders to cut, saw, chisel, drill, or smash their way through building walls, ceilings, roofs, floors, or stock cages.

6. When used for wall break-through detection it shall be possible to install the sensor cable in flexible or rigid metal conduit.

G. Gate compatibility:

1. The sensor cable shall be capable of being installed on swinging gates.

2. The sensor cable shall be capable of being bypassed on sliding gates.

3. The processor shall be capable of providing power (2.0W) so that auxiliary devices like passive infrared (PIR) sensors can be powered at gate locations.

4. The processor shall be capable of communicating with a Senstar FlexZone Wireless Gate Sensor in order to protect gates without having to route power or sensor cables onto the moving gate sections.

5. The processor shall be capable of powering a Senstar UltraWave microwave intrusion detection system.

6. The processor shall be capable of providing data connectivity so that auxiliary devices like Senstar's UltraWave can be integrated into the sensor network at gate locations.

7. The system shall have the option of using "quick disconnect" connectors at infrequently used gates (swinging or sliding), so that the sensor cable can be installed as normal over the gate and temporarily disconnected as required.

H. On-board storage: The processor shall be capable of using an off-the-shelf Secure Digital (SD) memory card to record a local copy of the sensor response data.

I. The system shall support sensor fusion, in which time, magnitude and location data from the sensor cables is synthesized with AI-based video analytic data to intelligently characterisize risk in order to avoid nuisance alarms and improve the probability of detection (Pd).

2.10 External Input/Output Capabilities

A. Processor alarm outputs:

1. The sensor processor shall have a minimum of four Form C relay outputs to indicate alarm conditions.

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. Side A supervision alarm

   c. Side B supervision alarm

   d. Enclosure tamper

   e. Input power fail

   f. Internal hardware fault

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

   h. FlexZone Wireless Gate Sensor intrusion, supervision, and diagnostic alarms

3. The sensor processor shall support four additional relay outputs via the use of an add-on card.

B. Dry contact inputs:

1. The processor shall have a minimum of two configurable dry contact inputs to accept the indication of alarm conditions detected or generated by third-party devices.

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

3. The sensor processor shall support four additional dry-contact inputs via the use of an add-on card.

2.11 Installation and Configuration Capabilities

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

1. The sensor cable must be capable of being attached directly to the fence without needing to be put in a conduit.

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

3. It shall be possible to mount the processor directly on a fence post that forms part of the fence to be protected

4. It shall be possible to connect the sensor cable directly to the processor without the need for any intermediary cable

5. All electrical connections to the processor, including the sensor cables, shall be made with screw-terminals on removable connectors.

B. The system shall be available in different configurations for sites with different zoning requirements:

1. The processor shall be available in a configuration that supports up to 4 zones on a single processor.

2. The processor shall be available in a configuration that supports up to 60 zones on a single processor.

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

1. The processor 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 meter (3 foot) basis.

4. The calibration software shall enable the creation of de-sensitized zones that ignore vibration events (for example, by gates or areas where instruction 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. Processor 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 processors.

2.12 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 shall be communicated via the processor's output relays.

2. The system shall support a networked configuration. The processors shall use the Silver Network protocol to relay alarm, status, and supervision information over the sensor cables to the Network Manager. The Network Manager shall then communicate the information to a security management system.

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. When a network-capable system is required the requirements of this section (2.12) shall apply.

C. Network manager tools: The system's network management software shall provide the following tools to facilitate system monitoring, commissioning, and trouble-shooting:

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

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

   3. System plot tool that can store and recall the response data for all networked sensors and display a plot of the response from a minimum of 8 sensor zones simultaneously

   4. Audio tool that generates an audio signal representing a sensor's response data for each zone.

D. Networked processor self-test: It shall be possible to initiate a self-test over the network.

E. Network communications and integration:

   1. The processors shall be capable of communicating alarm, status, and configuration information to and from a central location over an integrated sensor network.

   2. Alarm, status, and configuration information shall be able to be communicated over the sensor cables, thus enabling a multi-processor system to require only one connection to the facility's network and/or security management systems.

   3. The processors 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

   4. The sensor network shall be capable of being connected in a loop configuration and of being polled from both ends of the loop to provide redundant communication paths to each processor.

   5. The processors 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 processor's auxiliary dry contact inputs shall be communicated over the integrated sensor network.

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

F. 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 security management systems. The system supplier shall furnish complete documentation of this interface to facilitate integration with security management systems.

   b. Serial and TCP/IP-based interfaces for communicating alarm, status, and configuration data to and from security management systems 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 processor settings to be done from a central location.

PART 3   EXECUTION

3.1   Site Assessment

A. 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

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

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 processor in the system.

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

3.4   Training

A. 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.