Architectural and Engineering Specification for a

Fiber Optic Fence-Mounted Perimeter Intrusion Detection System

FiberPatrol® FP400

This document is intended to provide performance specifications and operational requirements for the FiberPatrol FP400 fiber optic fence-mounted perimeter intrusion detection system. It is written in a generic format. These specifications may be copied verbatim to form a generic procurement specification.

PART 1 GENERAL **4**
1.1 System Summary 4
1.2 Submittals 4
1.3 Spares 4
1.4 Warranty 4
1.5 References 5

PART 2 PRODUCTS **6**
2.1 Fence-Mounted Perimeter Intrusion Detection System 6
2.2 Manufacturers 6
2.3 Regulatory Requirements 6
2.4 Manufacturing Quality Requirements 6
2.5 Mechanical Requirements 6
2.6 Environmental Requirements 7
2.7 Reliability and Maintenance Requirements 7
2.8 Electrical Requirements 7
2.9 Detection Capabilities 8
2.10 External Input/Output Capabilities 9
2.11 Installation and Configuration Capabilities 10
2.12 Networking Capabilities 10

PART 3 EXECUTION **12**
3.1 Site Assessment 12
3.2 System Installation 12
3.3 System Calibration 12
3.4 Training 12

PART 1 GENERAL

1.1 System Summary

The contractor shall install a fiber optic fence-mounted perimeter intrusion detection system. The system shall detect intruders that attempt to cut, climb, or lift the fence fabric.

The detection sensor shall consist of fiber optic cable. The fiber optic cable shall connect to a processor module that detects attempted perimeter breaches by analyzing the variation in the optical signal that occurs as a result of minute vibrations in the sensor cable.

The sensor cable shall be immune to lightning and EMI and intrinsically safe in explosive atmospheres.

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

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.

C. The supplier shall make available replacement components, parts or assemblies for a minimum of 10 years from the date of purchase.

1.5 References

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

1. EDAPT: Environmentally Derived Adaptive Technology
2. EMI: Electromagnetic Interference
3. PIDS: Perimeter Intrusion Detection System
4. MTBF: Mean Time Between Failures
5. MTTR: Mean Time To Replace
6. PD: Probability of Detection
7. POE: Power Over Ethernet
8. PSIM: Physical Security Information Management
9. SMS: Security Management System
10. VMS: Video Management System

PART 2 PRODUCTS

2.1 Fence-Mounted Perimeter Intrusion Detection System

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

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

2.2 Manufacturers

A. The FiberPatrol FP400 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 61000-6-4:2006/A1:2010, EN 50130-4: 2011, RoHS3
3. Industry Canada ICES-003, Issue 4 requirements for Class A devices
4. REACH (Registration, Evaluation, Authorization and Restriction of Chemicals)

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 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 not need to be installed inside conduit.
2. The sensor cable shall be affixed to the facility's fence through the use of UV-resistant plastic, nylon or metal cable ties.
3. The sensor cable shall have the option to be provided with a corrugated steel tape (CST) armor, for use in areas that have a high potential of physical damage to the cable.

B. Processor unit:

1. It shall be possible to panel-mount the processor unit, install it on a rack-mount tray, or install it in a protective outdoor enclosure.
2. To make installation and maintenance easier, the processor unit shall provide two-piece pluggable terminal blocks.

3. The processor module shall detect and indicate physical tampering conditions including:
    a. Cutting one or more sensor cables
    b. Disconnecting one or more sensor cables

2.6 Environmental Requirements

A. Operating range: The processor 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 95% (non-condensing)
B. Processor enclosure:
    1. The processor shall be housed in a painted aluminum enclosure meeting the requirements of IP32.

2.7 Reliability and Maintenance Requirements

A. Sensor cables: The sensor cables shall provide a minimum service life of 10 years under normal usage conditions.
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 detection processing.
    4. The processor self-test cycle shall be capable of being initiated from its two dry contact inputs or from a command issued over the network.
    5. The processor firmware shall be field-upgradeable, either locally via a USB connection or over a network connection.

2.8 Electrical Requirements

A. Each processor module shall meet the following electrical requirements:
    1. Input power source: 12V to 48V DC source or Power-over-Ethernet (PoE)
    2. Power consumption (standalone unit): Less than 3.0W
    3. Power consumption (with two add-on cards installed): Less than 4.0W
B. Lightning/surge protection: The processor shall include transient voltage protection on its electrical interfaces to protect the system from voltage surges.
C. 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.

2.9 Detection Capabilities

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

B. The system shall process the signal from the sensor cable to detect intruders attempting to breach the perimeter fence by cutting, climbing, or lifting the fence fabric

C. The system shall be able to detect and locate intrusions over a cable distance of up to 300 m (984 feet) per zone.

D. The system shall support up to four zones per processor.

E. Each zone shall have its own set of detection parameters.

F. It shall be possible to calibrate the system so as to optimize performance for different types of fencing

G. 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 Sunrise/sunset

.4 Seismic vibration caused by nearby vehicular or rail traffic

.5 Acoustic or magnetic effects

.6 Standing water

.7 Snow

.8 Fog

b. The system shall utilize advanced algorithms to minimize the probability of nuisance alarms from the following sources:

.1 Wind

.2 Rain and hail

.3 Sandstorms

H. 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 3 m (10 ft) 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. 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.
5. When used for wall break-through detection it shall be possible to install the sensor cable in flexible or rigid conduit.

I. Gate compatibility:

1. The sensor cable shall be capable of being installed on swinging gates.
2. The processor shall be capable of receiving data from auxiliary devices such as microwave perimeter intrusion detection systems.

2.10 External Input/Output Capabilities

A. Processor alarm outputs:

1. The sensor processor shall incorporate a 100BASE-TX Ethernet connection supporting Power-over-Ethernet (PoE)
2. The sensor processor shall have a minimum of six Form-C relay outputs to indicate alarm conditions.
3. 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
    b. Cable cut
    c. Enclosure tamper
    d. Input power fail
    e. Internal hardware fault

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

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.

2.11 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. It shall be possible to install the system such that the lead-in cable connecting the centrally located processor to sensor cable installed on the perimeter fence is non-detecting.
    a. The maximum length of non-detecting lead-in cable shall be 20 km (12.4 mi).
3. It shall be possible to use the same type of fiber optic cable for both the lead-in section(s) and the detecting section(s)
4. The sensor cable must be capable of being attached to the fence with standard UV-resistant cable ties (plastic or metal).
5. All electrical connections to the processor, including the sensor cables, shall be made with screw-terminals on removable connectors.

B. 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 include a real-time plot mode for viewing live fence response data.
4. 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 Integration Capabilities

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

B. 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 relay outputs.

2. The system shall support a networked configuration whereby the processors use a communications network to relay alarm, diagnostic, and supervision status to a central computer running Network Manager software. The Network Manager software shall then communicate the information to management systems.
3. The Network Manager software shall have the ability to communicate alarm, diagnostic, and supervision status to management systems (VMS/SMS/PSIM) through multiple means including:
    a. An IP protocol interface for which an SDK is readily available
    b. Transmission of configurable ASCII messages over either serial or IP
    c. Activation of relays on accessory modules
4. It shall be possible for management systems (VMS/SMS/PSIM) to control the status of the processor unit relays via the Network Manager through one of two means:
    a. An IP protocol interface
    b. By sending configurable ASCII messages over either serial or IP

C. Network communications and integration:
1. The processors shall support the following physical media options for communication with the sensor network:
    a. RS-422 cable supporting daisy-chained asynchronous serial-over-RS-422 communications
    b. Multi-mode fiber optic cable supporting daisy-chained asynchronous serial-over-fiber communications
    c. Single-mode fiber optic cable supporting daisy-chained asynchronous serial-over-fiber communications
    d. Ethernet with POE capability
2. When the processor units are connected together in a daisy-chained loop configuration it shall be possible for them to be polled from both ends of the loop to provide redundant communication paths to each processor.
3. 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.
4. 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.

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

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.