

**Architectural and Engineering Specification for a
Real-Time Locating System
Flare[®]**

This document is intended to provide performance specifications and operational requirements for the Flare Real-Time Locating System. It is written in a generic format. These specifications may be copied verbatim to form a generic procurement specification.

Senstar, the Senstar logo and Flare are trademarks or registered trademarks of Senstar Corporation. The information in this document is subject to change without notice. Senstar reserves the right to make changes to product design or manufacturing methods, as engineering progresses, or as other circumstances warrant.

Copyright © 2017. Senstar Corporation. All rights reserved.

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 Real-Time Locating System	6
2.2 Manufacturers	6
2.3 Regulatory Requirements.....	6
2.4 Manufacturing Quality Requirements	6
2.5 Mechanical Requirements.....	7
2.6 Electrical Requirements.....	7
2.7 Environmental Requirements.....	8
2.8 RF Requirements	8
2.9 Performance Requirements	9
2.10 Wearable Duress Transmitter Functionality.....	9
2.11 Fixed Position Duress Transmitter Functionality	10
2.12 Alarm Generation and Announcements	10
2.13 Reliability and Maintenance Requirements	11
2.14 Alarm Recording and Storage	12
2.15 Installation and Configuration Capabilities.....	12
2.16 System Security	13
2.17 Networking Capabilities.....	13
2.18 System Battery Backup	13
PART 3 EXECUTION	14
3.1 Site Assessment	14
3.2 System Installation	14
3.3 System Calibration.....	14
3.4 Training.....	14

PART 1 GENERAL

1.1 System Summary

The contractor shall install a Real-Time Locating System (RTLS). The system shall be used to identify and locate personnel under duress in potentially high-risk situations (e.g. those in correctional, medical, or industrial environments).

The system shall consist of a lightweight, wearable duress transmitter and a fixed position duress transmitter that communicate over radio frequency (RF) with receivers distributed throughout the building or complex.

A duress alarm shall be initiated by pressing a button on the duress transmitter. Optionally, the wearable duress transmitter shall initiate a duress alarm when a pin attached to a lanyard is pulled out or when the duress transmitter is tilted beyond a specified angle for a specified period of time (man-down feature).

The system shall provide a software interface in which duress alarms can be communicated to operations staff and displayed on user-configurable maps.

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 two years from the date of purchase.
- B. 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:

AC: Alternating Current

CAD: Computer-Aided Design

DC: Direct Current

PoE: Power-over-Ethernet

RTLS: Real-Time Locating System

RF: Radio Frequency

UPS: Uninterruptable Power Supply

PART 2 PRODUCTS

2.1 Real-Time Locating System

- A. The contractor shall supply a Real-Time Locating System (RTLS).
- B. The system shall consist of:
 - 1. Lightweight, low power, wearable duress transmitter, one per staff member, that communicate over radio frequency (RF) with receivers distributed throughout the building or complex.
 - 2. Low power fixed position duress transmitter which can be mounted on a wall or post, which communicates over radio frequency (RF) with receivers distributed throughout the building or complex.
 - 3. RF receivers distributed throughout the building that communicate by radio frequency (RF) with the wearable and fixed position duress transmitter.
 - 4. A software application that alerts operators of received alarms and can display alarms and alarm location on user-configurable maps.
 - 5. A network of Ethernet switches with PoE support that provides communication and power to the sensor units.

2.2 Manufacturers

- A. The Flare RTLS from Senstar Corporation (www.senstar.com) meets the requirements stated in this document.

2.3 Regulatory Requirements

- A. The LSECS shall be registered with a nationally registered testing laboratory such as CSA or UL.
- B. All equipment shall carry the appropriate registration label(s).
- C. The LSECS shall operate within a licensed frequency band (450 to 470 Mhz) that will not be shared by other RF equipment at the same location.
- D. The LSECS shall not operate within the unlicensed bands in the United States, or in similarly unregulated bands within other countries.
- E. The LSECS equipment shall carry the appropriate RF registrations for use in the country where it will be installed.

2.4 Manufacturing Quality Requirements

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

2.5 Mechanical Requirements

- A. Wearable duress transmitter:
 - 1. The dimensions shall be equal to or less than 12 x 5.01 x 2.5 cm (4.7 x 2 x 1 inches).
 - 2. The weight shall be equal to or less than 200 g (7 ounces) (including battery).
 - 3. Durability: Other than for cosmetic damage, the wearable duress transmitter shall not be damaged or malfunction after six drops onto a tiled floor from a height of 1.5 m (5 feet) with one drop on each of the six sides on three orthogonal axes.
 - 4. The wearable duress transmitter enclosure shall have a tamper-resistant construction.
 - 5. The wearable duress transmitter shall include a ruggedized belt-holster.
 - 6. The wearable duress transmitter shall include an option for a lanyard with pull-pin.
- B. Fixed position duress transmitter:
 - 1. The dimensions shall be equal to or less than 13.0x 9.4 x 8.9cm (5.1 x 3.7 x 3.5 inches).
 - 2. The fixed position duress transmitter's enclosure shall have a tamper-resistant construction.
- C. RF receivers:
 - 1. The dimensions shall be equal to or less than 25.4 x 15.2 x 7.6 cm (10.0 x 6.0 x 3.0 in.)
 - 2. The RF receiver enclosure shall include mounting flanges to facilitate its installation on a wide variety of surfaces.
 - 3. The RF receiver shall have the option of using external antennas for increased range.

2.6 Electrical Requirements

- A. Wearable and fixed position duress transmitters:
 - 1. The wearable and fixed position duress transmitter device shall use commercially available 9VDC non-rechargeable batteries.
 - 2. Battery shall be replaceable by the user or system administrator.
 - 3. The wearable and fixed position duress transmitter device shall automatically report a low battery condition to the operator's alarm notification system.
 - 4. Under normal operating conditions (3 test transmissions per day) the wearable and fixed position duress transmitter device battery shall provide a minimum life time of one year before a low battery condition is reported.

5. The wearable and fixed position duress transmitter device shall be capable of operating normally for at least 15 days following the initial reporting of a low battery condition.
- B. RF receivers:
1. The RF receiver shall use antenna diversity to maximize system accuracy by utilizing the RF information from two internal antennas on different planes.
 2. The input power for the RF receiver shall be supplied by the Ethernet switch through its Power-over-Ethernet (PoE) interface as per IEEE 802.3af specification.
 3. The RF receiver shall consume 1.2 watts of power or less.
 4. The RF receivers shall be powered via minimum Class 1 Power-over-Ethernet (PoE) as per IEEE802.3af.
 5. The RF receivers shall be connected to a dedicated IP network in order to mitigate network congestion in this life safety application.

2.7 Environmental Requirements

- A. The wearable and fixed position duress transmitter shall operate within specifications under the following environmental conditions:
1. Operating temperature: -20°C to 60°C (-4°F to 140°F)
 2. Water resistance: The wearable duress transmitter shall not malfunction after being exposed to 30 seconds of heavy rain.
- B. The RF receivers and other installed devices shall operate within specifications under the following environmental conditions:
1. Operating temperature: -20°C to 60°C (-4°F to 140°F)

2.8 RF Requirements

- A. The LSECS shall operate in licensed bands as to avoid potential interference from a third-party.
- B. The LSECS shall support the International Public Safety band, 450 to 470 MHz
- C. It shall be possible to configure the LSECS to operate at any of a number of frequencies within the approved band in order to avoid RF interference from pre-existing RF sources on or near a particular site.
- D. The option shall exist for an external antenna to be used in order to increase the indoor coverage area.
- E. The option shall exist for external antennas to be mounted outdoors and connected with an RF cable to the RF receiver which will be located indoors. This shall increase the outdoor area coverage area.
- F. The RF signal shall not be blocked by common building materials, smoke, the human body, or heavy clothing.

2.9 Performance Requirements

- A. The LSECS shall support transmissions up to 1 km (0.6 miles) when the wearable duress transmitter has a line-of-sight with an RF receiver equipped with an external antenna.
- B. The LSECS shall support at least 10 alarms within a 10 second time period.
- C. The LSECS shall meet the following system capacity requirements:
 - 1. Minimum of 4,000 unique duress transmitter identification codes.
 - 2. Minimum of 24,000 unique locations, or zones, per facility. Any or all zones may be either indoor or outdoor locations.

2.10 Wearable Duress Transmitter Functionality

- A. The wearable duress transmitter shall include a button that, when pressed, activates an alarm transmission
- B. The wearable duress transmitter shall be capable of generating an alarm if the transmitter is taken from the user. This tamper function shall require the use of an optional device, such as lanyard with a pull-pin, which causes an alarm to be generated when it is removed from the transmitter.
 - 1. The wearable duress transmitter shall transmit repeatedly after a duress call is initiated by pull-pin activation. In this way, the transmitter can be tracked and located if the person carrying it does not remain in one location.
- C. Man-down feature:
 - 1. The wearable duress transmitter shall have an optional man-down capability, whereby the transmitter automatically transmits a duress alarm when it tilts beyond a user-specified angle for a user-selectable period.
 - 2. The wearable duress transmitter shall automatically reset when brought back to its upright position.
 - 3. The wearable duress transmitter shall use an internal accelerometer to correctly detect tilt conditions which can be programmed with a sensitivity range.
 - 4. The man-down function shall include the following user-programmable features:
 - a. Sensitivity level
 - b. Time delay before warning of pending alarm
 - c. Audible warning of pending alarm
 - d. Warning duration
- D. Each wearable duress transmitter shall be configurable by the system administrator to report a specific identification code, without a return to the factory. This will enable any transmitter to be used as a replacement for another transmitter that is damaged or otherwise needs to be replaced.

- E. The wearable duress transmitter user shall be able to self-test the unit at any time by adjusting its orientation and holding the button while in a pre-defined self-test zone.
- F. The wearable duress transmitter shall be programmable by the system administrator to match the same protected frequency used by the RF receivers (450–470 MHz).
- G. The wearable duress transmitter’s battery shall be replaceable with a standard quality 9V non-rechargeable battery.
- H. The wearable duress transmitter shall be belt worn to the hip in a ruggedized holster.

2.11 Fixed Position Duress Transmitter Functionality

- A. The fixed position duress transmitter shall include a button that, when pressed, activates an alarm transmission.
- B. Each fixed position duress transmitter shall be configurable by the system administrator to report a specific identification code, without a return to the factory. This will enable any fixed position transmitter to be used as a replacement for another transmitter that is damaged or otherwise needs to be replaced.
- C. The fixed position duress transmitter shall be programmable by the system administrator to match the same protected frequency used by the RF receivers (450-470 MHz).
- D. The fixed position duress transmitter’s battery shall be replaceable with a standard quality 9V non-rechargeable battery.

2.12 Alarm Generation and Announcements

- A. Each person requiring the ability to generate a duress alarm shall wear a wearable duress transmitter.
- B. Each wearable duress transmitter user shall be capable of transmitting a duress alarm, which will be reported at the control computer, using one or more of the following activation methods:
 - 1. Pressing the button on the wearable duress transmitter.
 - 2. Removing a pin attached to a lanyard from the wearable duress transmitter (optional)
 - 3. Activation of the man-down function (optional)
- C. Any area that has a potential for requiring a duress alarm without the presence of a person carrying a wearable duress transmitter shall be equipped with a fixed position duress transmitter mounted on any suitably mountable surface which will be easily accessible by someone under duress.
- D. A duress alarm shall always be reported as originating from one location. A duress alarm shall not be reported as originating from more than a single location, or from several possible locations.

- E. A single protection zone may include more than one room, allowing a duress alarm to be reported in multi-room zones.
- F. A single alarm zone may, optionally, include several calibration zones that further subdivide the alarm zone.
- G. The location of a duress alarm transmission shall be visually presented on a computer generated graphic floor plan of all, or part, of the facility. The boundary of the zone in alarm shall be highlighted. Optionally, the alarm point within the zone shall be displayed.
- H. The acknowledgement and clearing of duress alarms, and all other alarm handling functions, shall be performed using a computer mouse or touch screen interface. A computer keyboard shall not be required for the alarm processing operation of the LSECS.
- I. The LSECS shall be able to display alarms from multiple duress transmitters, up to the number of duress transmitters used in the system.
- J. The LSECS shall report duress alarms with a distinct audible and visual indication that is easily distinguished from equipment, maintenance, and diagnostic alarms.
- K. Optionally, the LSECS shall be capable of generating an EIA-232 data string or Ethernet packet for each reported alarm. These interfaces can be used to communicate duress alarms to other systems in the control room, or in remote locations.

2.13

Reliability and Maintenance Requirements

- A. The LSECS shall continuously monitor the state of all system hardware. The system shall be capable of immediately reporting a maintenance or diagnostic alarm, upon the detection of a system problem or the failure of a hardware component.
- B. Configuration and upgrades:
 - 1. The RF receivers, transmitters and other hardware items shall be microprocessor based, and shall be designed such that software reconfigurations and software upgrades can be accomplished without removing the units from the site.
 - 2. The unique ID code and frequency of operation for each duress transmitter shall be configurable.
 - 3. Installed equipment shall be capable of receiving software patches or software upgrades from the control computer at the site, without the need to physically access each piece of equipment.

- C. Diagnostics and accuracy checks:
 - 1. The system shall run regular diagnostic checks on all installed equipment,
 - 2. The system shall report any exceptions or failures as alarms on the control computer.
 - 3. The system shall perform a locating accuracy check along with RF receiver functionality verification, a minimum of once per day, to ensure that all receiver equipment is functioning correctly.
- D. The LSECS shall create and maintain a record of all system equipment failure notifications.
- E. The LSECS software shall not be installed on a Virtual Machine (VM) in order to maintain prompt system response in this life safety application that can be made problematic when run on a VM due to its handling of timed events.

2.14 Alarm Recording and Storage

- A. The LSECS shall log all duress and warning alarms to the control computer's hard disk.
- B. Duress alarms shall be displayed as a distinct log, separate from equipment failure and other alarms.
- C. The data logged for each alarm shall include the identification and location of the alarm, the time of the alarm, the time that the alarm condition was acknowledged and the time that the alarm was cleared from the system.
- D. All logged data shall be saved in a current Windows-compatible, commonly accessible data format, from which data can be exported or retrieved by the system administrator, or others, for analysis or to archive.
- E. The LSECS administrator shall be provided with the capability of selecting and printing any, or all, alarms from the alarm logs on demand.

2.15 Installation and Configuration Capabilities

- A. The LSECS shall be capable of locating duress transmitters within 20 feet of accuracy in all prescribed parts of a facility without requiring the installation of locating hardware in every room, closet, and other discrete location throughout the facility.
- B. In a correctional services environment, the LSECS shall be capable of locating wearable duress transmitters within 20 feet of accuracy, in all prescribed parts of a facility, without requiring the installation of any equipment in the inmate's cells.
- C. In a correctional services environment, the LSECS shall be capable of locating fixed position duress transmitters to their exact location, in all prescribed parts of a facility where the fixed position transmitter is mounted in a permanent location, without requiring the installation of any equipment in the inmate's cells.
- D. The distributed RF receivers shall function correctly when mounted in cable chases, above false ceilings, and in other areas, which are not accessible or visible to inmates. Installation of the RF receivers should be avoided in areas that are

shadowed by large metal structures or metal reinforced materials as this will reduce the RF capabilities of the receivers.

- E. The wearable and fixed position duress transmitter shall be configurable from a software application running on a Windows-based PC.
- F. It shall be possible to convert and edit Computer-Aided Design (CAD) files of the facility for use as floor plans in the control computer.

2.16 System Security

- A. The LSECS shall provide a minimum of three levels of password protection. Each level of password protection shall allow successively greater levels of access to operating, maintenance, and administrative functions.

2.17 Networking Capabilities

- A. The LSECS shall support the following RF receiver interconnect options:
 1. Standard off-the-shelf 10/100BaseT Ethernet (RJ-45 connectors)
 2. Fiber backbone between buildings

2.18 System Battery Backup

- A. The RF receivers shall be powered by Power-over-Ethernet (PoE) through the Ethernet switches. The Ethernet switches shall use a backup power source way of a centralized UPS system. This shall guarantee the systems functionality during a power outage until such a system is depleted.

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.

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 documentation.
- B. The installation contractor shall submit to the facility's owner, the configuration settings and performance test report for the system.

3.4 Training

The installation contractor or vendor shall train designated staff members on the system operation and maintenance procedures as described in the manufacturer's product documentation. A record of the training will be documented and submitted to the facility's owner.