

LIGHTLOC[®]



LightLOC System

LightLOC is a patented, fiber optic based security system providing the optimum in perimeter and access security. The system provides monitoring of remote access points and perimeters using a family of sensors and cables developed and made by LightLOC. The robustness of the system eliminates false alarms commonly seen with other fiber-based security systems. Monitored items can include manholes, gates, doors, culverts, perimeter vehicle detection and vehicle denial cable systems, and custom applications. Monitoring is possible at distances of up to 25km without the need for electrical power at the monitored locations. LightLOC systems are inherently tamper resistant since altering or destroying optical components will trigger alarms automatically.

The heart of the LightLOC system is its state-of-the-art network capable software, system, and server technology. The optical fibers that make up the system are monitored with optical time domain reflectometers (OTDRs) that continuously feed data to the server where it is assessed. Custom software analyzes the data, detects any alarms, and manages the system and OTDRs. It is capable of monitoring any combination of LightLOC sensors under a single system and can pinpoint alarming locations and determine the incursion type. Multiple alarming sensors may also be distinguished. The system is, therefore, intended for large campus-wide installations. It currently supports up to eight monitored lines with up to 25 sensors per line depending on the application.

LightLOC may be easily integrated with existing site-level monitoring systems affording security professionals the ability to operate LightLOC seamlessly with other applications. Outputs from the LightLOC system include remote monitoring stations, relays, e-mail alerts, and custom outputs as required. While LightLOC is designed for network support, it also functions proficiently as a stand-alone system.

System Components and Configuration

A LightLOC System requires a server, LightLOC software, OTDRs, a network connection for the electronic equipment, sensors in the field and fiber to the sensors. The OTDRs used in LightLOC systems are network devices and, therefore, may be located anywhere on a campus where there is a network connection to the

For additional information on the LightLOC[®] system, please contact Doug Piper 864.963.5131 or dpiper@wovenelectronics.com

LightLOC server. This facilitates OTDR placement in the optimal locations for system monitoring. The system uses two OTDRs to monitor each line- one looking from each end of a monitored fiber. This provides redundancy in the event of an OTDR error as well as providing additional bandwidth when multiple sensors are opened. It also allows the entire length to be viewed should a single break occur in a fiber. The system automatically manages the OTDRs and runs then as needed. Typically, only one is run at a time on each line.

The LightLOC software consists of two main programs, the monitoring service and the interface program. The monitoring service runs on the server in the background and performs data analysis, alarm detection, and system management. As it runs in the background, the interface program is needed to provide viewing and control of the service. The service supports multiple interfaces viewing the system with only one having control at a time.

In order for LightLOC to monitor a unique system, the software requires training. The first step in training is learning the secure state of the fiber, or baseline. This is the basis by which the system is evaluated during monitoring and is used for determining alarms. Thus, an accurate system baseline is essential for reliable monitoring. It is acquired and saved during system installation by the LightLOC installers and may be updated by system administrators if needed. Once a baseline is established, the sensors being monitored are learned using the configuration process. Sensor configuration teaches the software the sensors in the field, their locations, and types. The LightLOC system determines events by looking for attenuation resulting from a triggered sensor, such as a Smart Switch in an open manhole, or a break in the fiber, such as a cut grate or detection cable. The system can differentiate between a breach and break, locate the area in which it occurred, and match it to a particular sensor based on the configuration.

Technical Details

Server Size	2U rack mount
OTDR Chassis Size (up to 4 OTDRs)	3U
Input Voltage	120VAC, 60Hz other available
Dynamic Range	10 dB typically usable
Fiber Type	Single mode
Monitored Wavelength	1550nm
Scan Time	5 sec
Breach Alarm Threshold	0.4dB
Break Alarm Threshold	4 dB
Time to Detect Alarm	<15 Seconds
Location Accuracy	5m typically
Operating Environment	Indoors Only

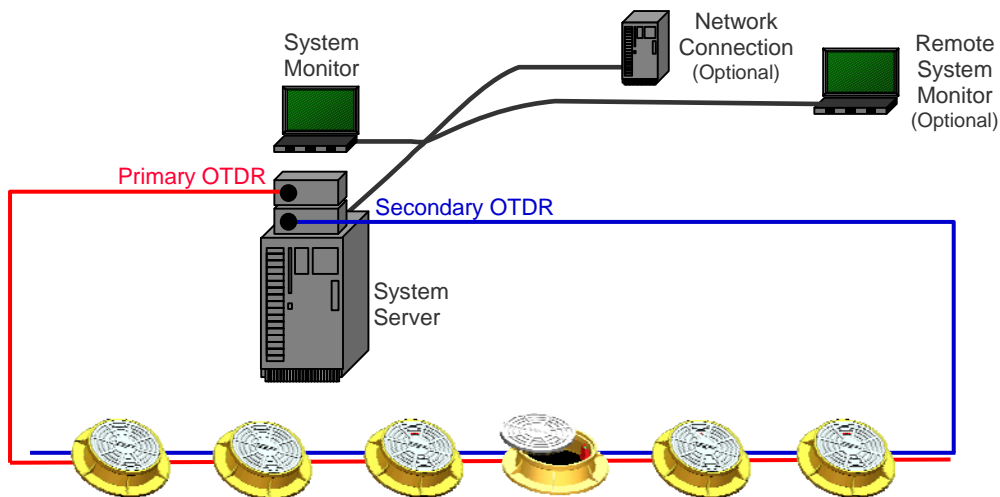
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Typical System Examples

LightLOC is a versatile system that can consist of one or more of the LightLOC sensing devices, all monitored through the same optical fibers by the same monitoring equipment. Some standard systems are discussed below.

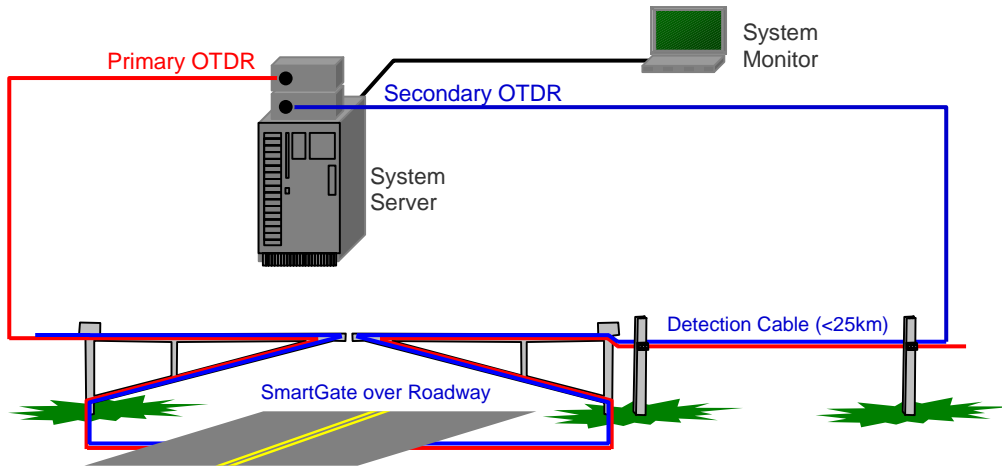
Manhole/Handhole Systems

A common application is manhole/handhole access security. A typical system would include the server, two OTDRs, a Smart Switch sensor for each access point, and the cable to tie it all together. This system is monitored bi-directionally for redundancy in case of a cable or fiber break as is illustrated below. There are several options available, including local and remote system monitoring and a network connection to provide system control, monitoring, and alarm notification via email or pager alerts.



Perimeter Vehicle Detection

Vehicle intrusion into sensitive areas can be detected and located using LightLOC Vehicle Detection Cable. These sensitive areas include government facilities, power stations, railroad property, military bases, etc. Up to 25km of this cable is installed around the perimeter on secure posts using tamper-resistant mounting hardware. In places where access is required, SmartGates are installed and monitored with the same optical fibers as the cable itself. A typical setup is illustrated below.

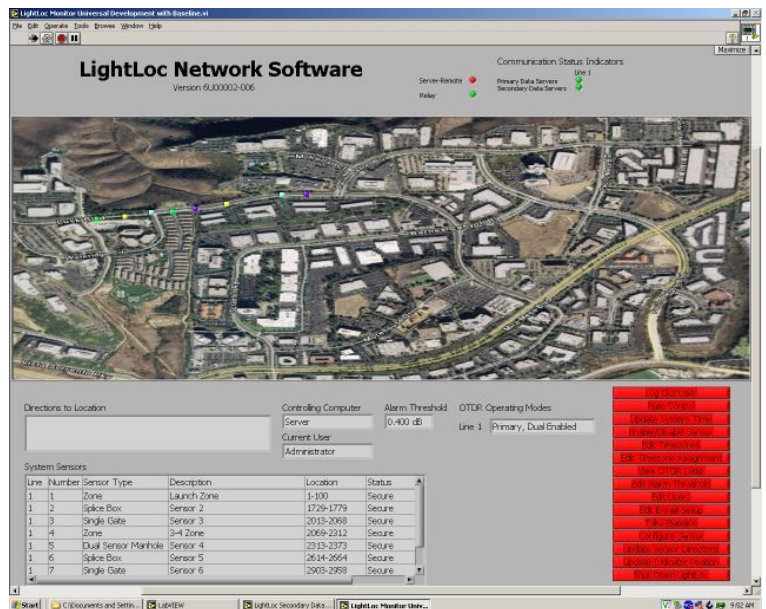


System Outputs

The most basic notification method is through the LightLOC interface program, a graphical user interface (GUI), pictured below. It allows for viewing and controlling the system from any computer with a network connection to the server. It displays information on the sensor statuses in the form of a table and in a map of the site. The map displays an indicator for each sensor to denote its location and type; an indicator blinks to indicate an alarm at a location. Additionally, the OTDR and interface operating statuses are given as well as system control buttons.

Control buttons allow for system configuration, the disabling of sensors, and simulation of alarms among other things. As the software is written in house by the LightLOC team, the software may be customized to meet a specific site's requirements.

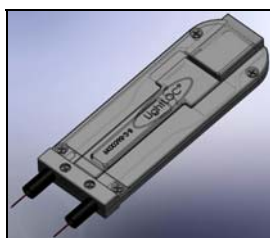
In addition to the interface program, relay outputs are supported. A relay for each sensor along with a couple of system status relays may be provided, or a single relay indicating to check the GUI may be provided as needed. E-mail and pager alerts are also supported provided a network connection is available and are sent to indicate a security



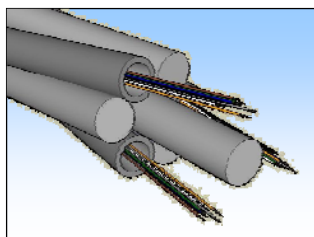
alarm or an unexpected communication problem with an OTDR or interface program. An interface program is also capable of sending an e-mail if the LightLOC server fails to respond to its requests.

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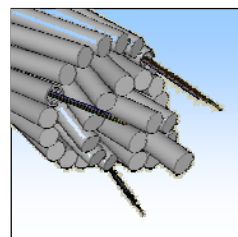
The family of LightLOC sensors is continuously growing! Current sensing products include:



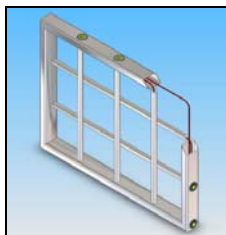
Manhole Lid Sensors



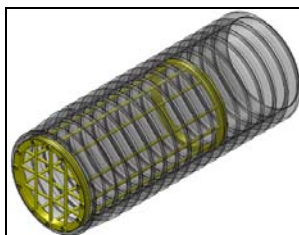
Vehicle Detection Cable (3/8")



Vehicle Denial Cable (1")



Smart Grate



CageGrate



SmartGate