Fibre Optic
Sensing Solution

Protecting **Perimeter Infrastructure** and **High-value Assets** is the need of the hour
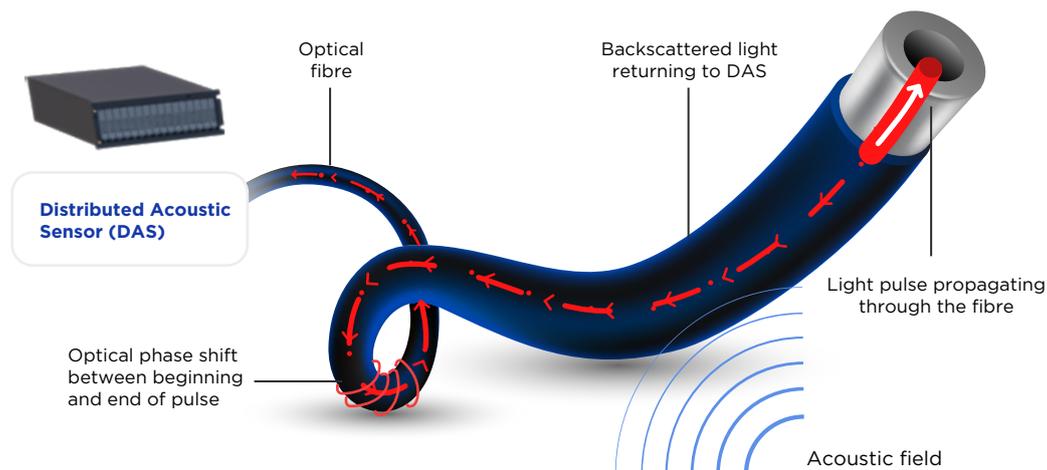
A growing number of high-value assets deployed for multiple industries are often not adequately protected against crime or infiltration. Detecting and deterring criminal activities such as theft, and trespassing requires continuous monitoring and surveillance. Any failure in providing protection and security over stretches of thousands of kilometers is not physically possible 24X7. One single breach could lead to a major repercussion. Technological innovation has led to the development of solutions for intrusion detection and securing high-value assets and critical infrastructure.

Optical fibre has sparked widespread interest due to its unique ability to function as a sensor. It has the capability to provide high-precision fault detection, high performance, and protection of data networks. It enables improved system uptime and availability by monitoring and anticipating accidental damage due to digging or other intrusive human activity. Fibre Optic Sensing Solution helps in Asset, Perimeter, and Network monitoring which are critical functions for securing infrastructure. It offers a wide range of benefits for companies of all sizes.

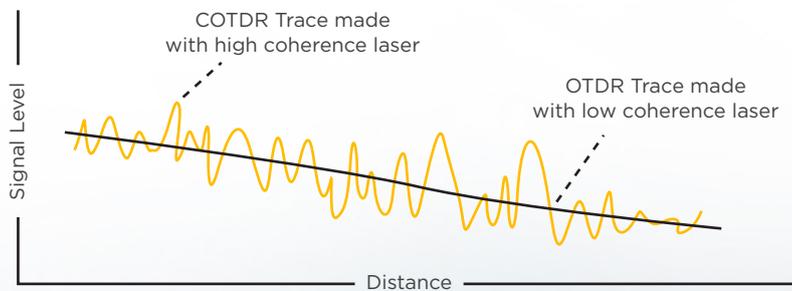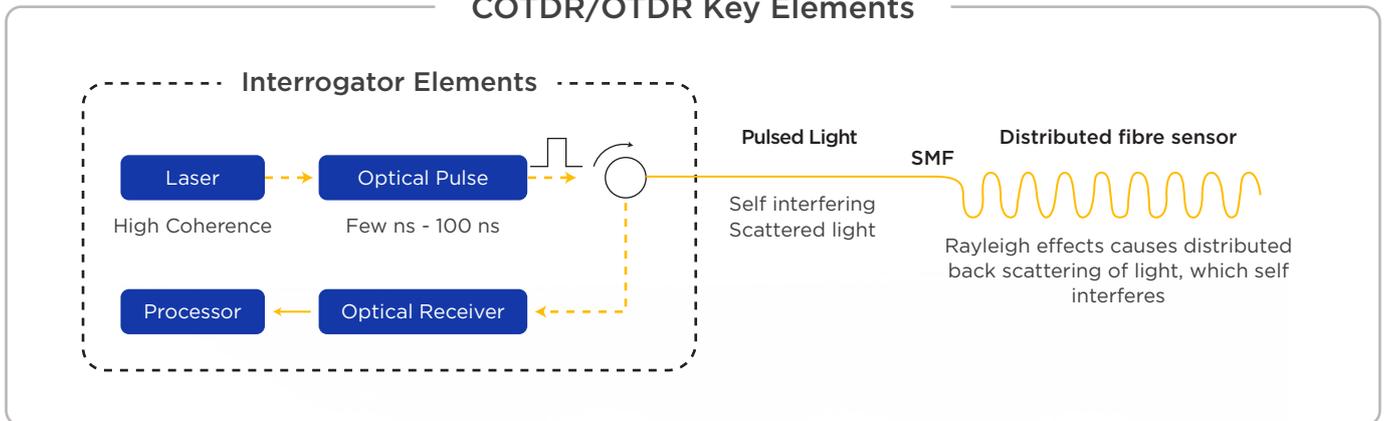# STL's **Fibre Optic Sensing (FOS)** Solution

STL delivers a fully integrated and networked sensing solution based on Distributed Acoustic Sensor (DAS) coupled with an AI-enabled smart alarm system that helps to detect, inform, and defend with actionable insights. A DAS interrogator converts standard communications single mode fibre into thousands of extremely sensitive acoustic and vibration sensors. It senses the vibrations from various events around it, which could be several meters away.

As the data is processed in real-time, advanced signal processing and AI algorithms in our sensing solution recognize the unique pattern of each type of event. The events are detected, classified, and reported to the users through a GUI with actionable insights. The system can then show the users the precise locations and durations of the events and enable the user to make a timely and appropriate response.

Optical fibre

Backscattered light returning to DAS

Distributed Acoustic Sensor (DAS)

Light pulse propagating through the fibre

Optical phase shift between beginning and end of pulse

Acoustic field

FOS Working Principle

COTDR/OTDR Key Elements

Interrogator Elements

Laser	**Optical Pulse**	
High Coherence	Few ns - 100 ns	
Processor	**Optical Receiver**	

Pulsed Light

Self interfering
Scattered light

SMF

Distributed fibre sensor

Rayleigh effects causes distributed
back scattering of light, which self
interferes

Signal Level

COTDR Trace made
with high coherence laser

OTDR Trace made
with low coherence laser

Distance

With the DAS technique, also referred
to as Coherent Optical Time Domain
Reflectometry (COTDR), a perturbation
along the fibre is detected by measuring
the changes in the backscatter intensity
from pulse to pulse.

Building Blocks of STL's FOS Solution

DAS Interrogator | Sends thousands of short pulses of light along the fibre every second and observes the backscattered light disturbed by the vibrations surrounding the optical fibre

Software module that controls various parameters in the DAS interrogator | **Sensor Control Module**

Pre-Processing Module | Converts huge data received from the DAS interrogator into meaningful data for easy visualization and processing

Deep Learning algorithm that detect and classify events based on the unique signature | **Event Detection and Classification**

Graphical User Interface | Web-based user interface to monitor events – type, location and time, configure zones, control user access, configure various parameters & settings, etc

Stores event-related information | **Data Storage**

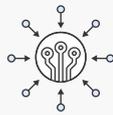**API** | Enables integrations with other applications

Features of **FOS** Solution

Advanced AI/ML-algorithm -based solution

Detects and locates multiple intrusions simultaneously

Both single (range*- 40+ km) and dual (range*- 80+ km) channel deployment

False/nuisance alarm rate: < 1%

Event location accuracy: ± 5-10 metre

Monitoring experience: 1.2 mn km.hrs

Probability of detection: > 95%

Capable of detecting and locating cable cuts

Identify and mark various events with superior confidence levels

Buried and fence deployment

System uptime: > 99 %

Response time : 2-7 Sec

Detection range (Depends on soil conditions & event types)

a. Human movement: up to 1-7 metre
b. Vehicle movement: up to 4-20 metre
c. Digging: up to 5-20 metre

*based on the link attenuation

Software **Features**

Graphical user interface

User access control system

System configurations and **calibrations**

Monitoring and control of the sensing solution from a **central location**

Simple and intuitive button-driven **alarm response** functions

Logging of all event information to the database for a **historical view**

Software-based zone configurations over the length of the entire sensor cable
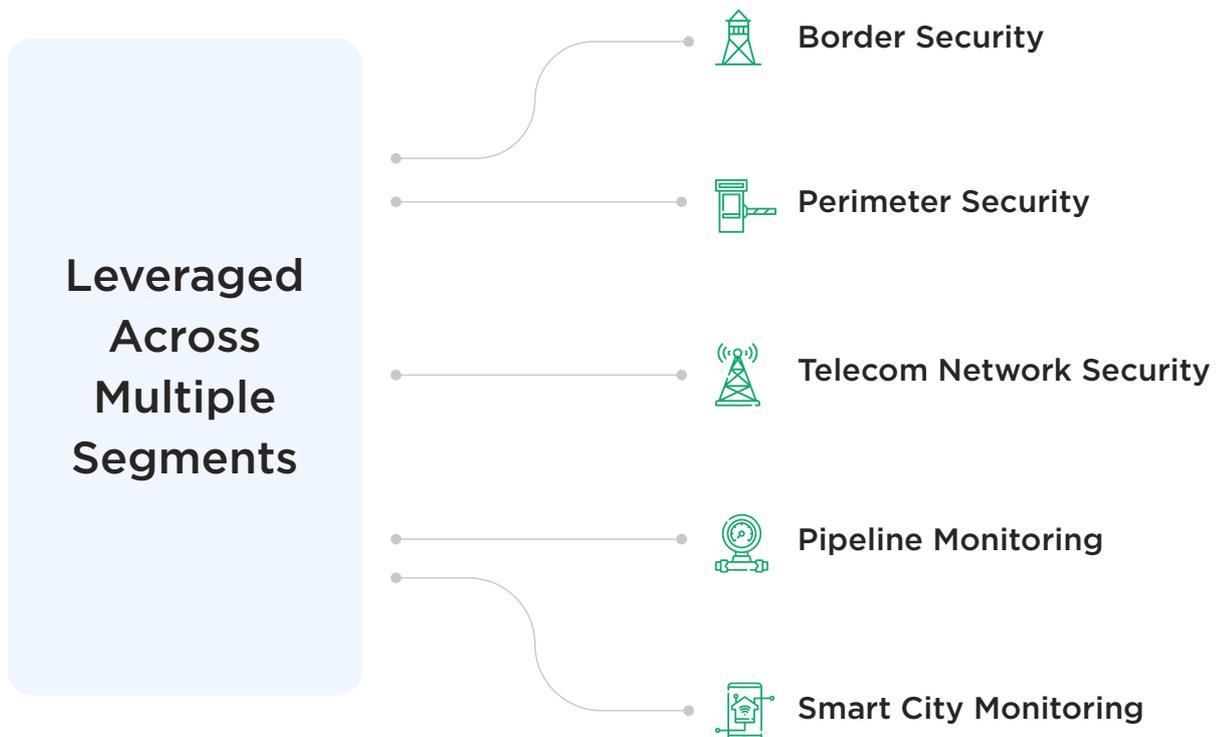
Display of **event information** - zone number, cable distance, time and GPS coordinates on the map with perimeter overlay

Our FOS Solution is **trained to Detect** and **Classify** Multiple Event Types

Our Smart Fibre Optic Sensing Solution prevents **intrusion activities and network unavailability** due to intentional or accidental fibre cuts. The system is tunable and machine learning algorithms are trained to detect different use cases. The solution is trained to detect and classify multiple events such as:

Human Movement	**Vehicle Movement**	**Digging Activity**
Tunneling Activity	**Network Intrusion Monitoring**	**Flap Monitoring**

Creating **custom build** solutions

Leveraged Across Multiple Segments

- Border Security
- Perimeter Security
- Telecom Network Security
- Pipeline Monitoring
- Smart City Monitoring

STL **FOS Advantage**

Prevents
fibre cuts

Early diagnosis, better prediction
and faster resolution

Make-in-India
Solution

Integration with
3rd Party Applications

Works with SM live fibre
or dark fibre

No change to
Network Design

Served multiple
Use Cases

No Special
Infrastructure Required

In-House
Support Team

Customization Applications
and AI-Models

End-to-End Solution Capabilities-
DAS, Fibre, and Software

Better management
of OpEx/CapEx

About STL

USD 656 ^{Million}
Revenue

50 MFKM
annual glass capacity

35 MFKM
annual cable capacity

750
Patent count

Optical Networking
Optical Networking solutions including fibre, cables and OI.
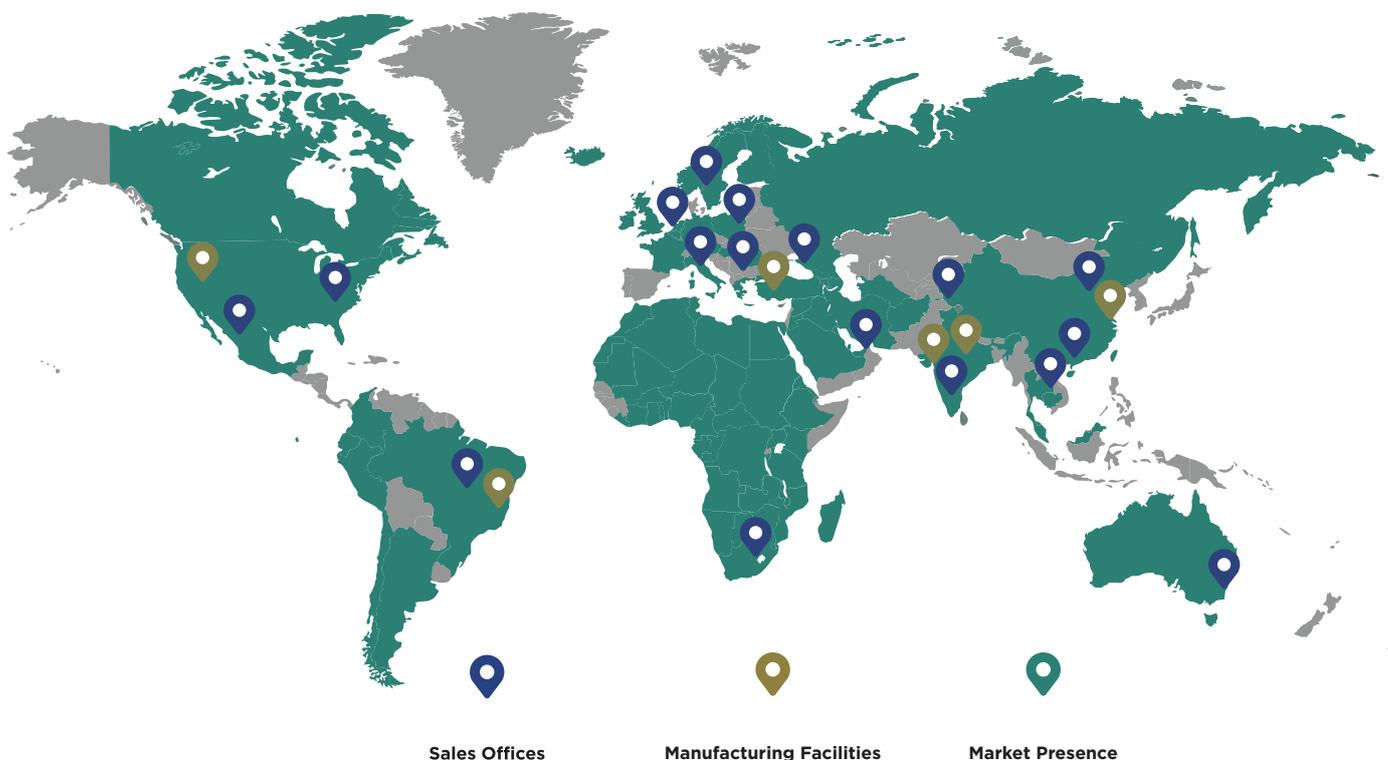
Global Services
Unique digital integration expertise across the full stack.

STL Digital
Digital solutions and services across business verticals

Our presence

Sales Offices

Manufacturing Facilities

Market Presence

10
Production Facilities

*Data as of FY23

Glass Facilities	
India	China

Glass Facilities	
India	China

Cable Facilities	
India	Brazil
USA	Italy

OI Facilities	
India	Italy

"Distrust and Caution
are the Parents of Security"

- Benjamin Franklin

STL | beyond tomorrow

About STL - Sterlite Technologies Ltd

STL is a leading global optical and digital solutions company providing advanced offerings to build 5G, Rural, FTTx, Enterprise, and Data Centre networks. The company, driven by its purpose of 'Transforming Billions of Lives by Connecting the World', designs and manufactures in 4 continents with customers in more than 100 countries. Telecom operators, cloud companies, citizen networks, and large enterprises recognise and rely on STL for advanced capabilities in Optical Connectivity, Global Services, and Digital and Technology solutions to build ubiquitous and future-ready digital networks. STL's business goals are driven by customer-centricity, R&D and sustainability. Championing sustainable manufacturing, the company has committed to achieve Net Zero emissions by 2030.

Contact us at:

Phone: +91 9560552222

For queries or demo email us: kuhu.rastogi@stl.tech