

Fiber-Optics Used as a Security Mechanism For Perimeter and IT Physical Security

IEEE Subcommittee on Qualification

April 20th, 2005

SecurLAN®

Data Security System



...Protecting Data and Perimeters Around the World

Company Background

- **Fiber-optic sensors**
 - Perimeter Legacy
 - Physical Intrusion Detection
 - Motion Detection and Analysis
- **Response to Government & DOD requirements**

Sensor Applications

- **SecurLAN**
 - **Physical Data Protection**
 - **What about the Physical Layer?**
 - **Protecting vital and sensitive information**
 - **Downtime, taps, accidental intrusion**

- **Fiber Defender**
 - **Perimeter**
 - **Fence and Wall**
 - **Buried Applications**

Military Certifications

- **United States Air Force TEMPEST Certified**
 - Technical Authority Approval
 - FD-208 sensor for PDS applications, 21 March 2003
- **Headquarters Air Force Communications Agency**
 - Approved 21 March 2003
- **Air Force Manual 33-221**
 - *Protected Distribution Systems (PDS)*
- **Department of Air Force Approval**
 - for Priority Level 1 Facilities
 - Approved 3 April 2003
- **SPAWAR Approval**
 - 31 October 2004

Qualification & Compliance

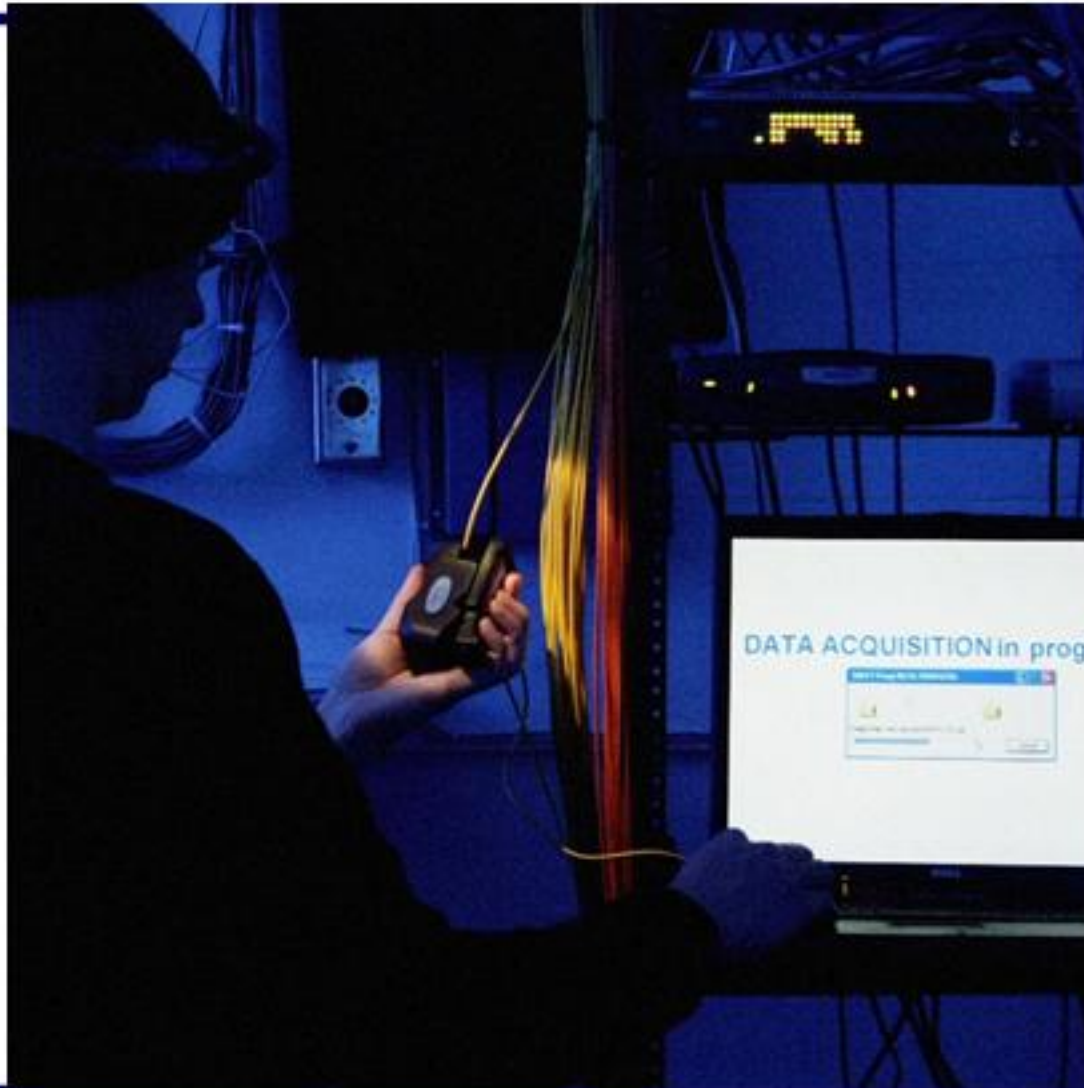
- **Fiber-Optic Cable:**
 - **Meets Flammability Requirements of IEEE-383**
 - **MSHA, TFOCA & TEMPEST Approved**
 - **Same Technology as Military Tactical Field Cables**
 - **Resistance: abrasion/crush, impact, chemical and radiation**
 - **Radiation Hardness and Resistance**
 - **Suitable for Fence, Buried and Physical IT & Telecom**
 - **Mfg. in ISO 9001 System**

NRC Compliance & Qualification

- **NRC Regulatory Guide 5.44 – Materials and Plant Protection (Division 5)**
 - **Perimeter Intrusion Alarm Systems (Revision 2, ML003740097; Revision 3, ML003739217) (Draft SG 479-4, Proposed Revision 2, published 05/1979)(Draft DG-5007, Proposed Revision 3, published 04/1996**
- **No Current Reg. for IT Physical Security Protection**
 - **Collaboration Available**

Applications of SecurLAN

- **Information Technology or Telecom within:**
 - **Nuclear Power Plants**
 - **Military**
 - **Government / DOD**
 - **Financial Industry**
 - **Gaming**
- **Infrastructure Protection**
 - **Water**
 - **Fuel**
 - **Electrical**
- **Reliability & The Threat From Within...**



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SecurLAN Customer Base

- **Integration Partners**

- Northrop Grumman IT
- Open Roads
- Selectron
- Norment

- **Commercial/Corporate**

- Lockheed Martin
- Boeing
- General Dynamics
- Womall Business Solutions

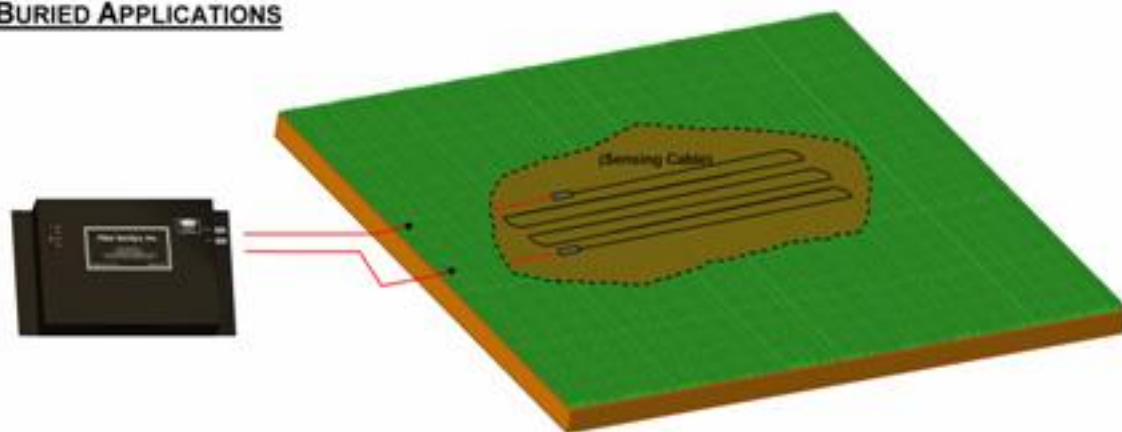
- **Military Projects**

- U.S. Army
- U.S. Navy
- U.S. Air Force

The sensing cable can be deployed along a fence or buried under sod or gravel.

- Intruders compromising these barriers are detected

BURIED APPLICATIONS



FENCE LINE APPLICATIONS



Nuclear Plant Installed Sites

- **Plant Hatch, Baxley, GA**
- **Vermont Yankee**
- **Maine Yankee**
- **River Bend, N. of Baton Rouge, LA**
- **Crystal River, FL**



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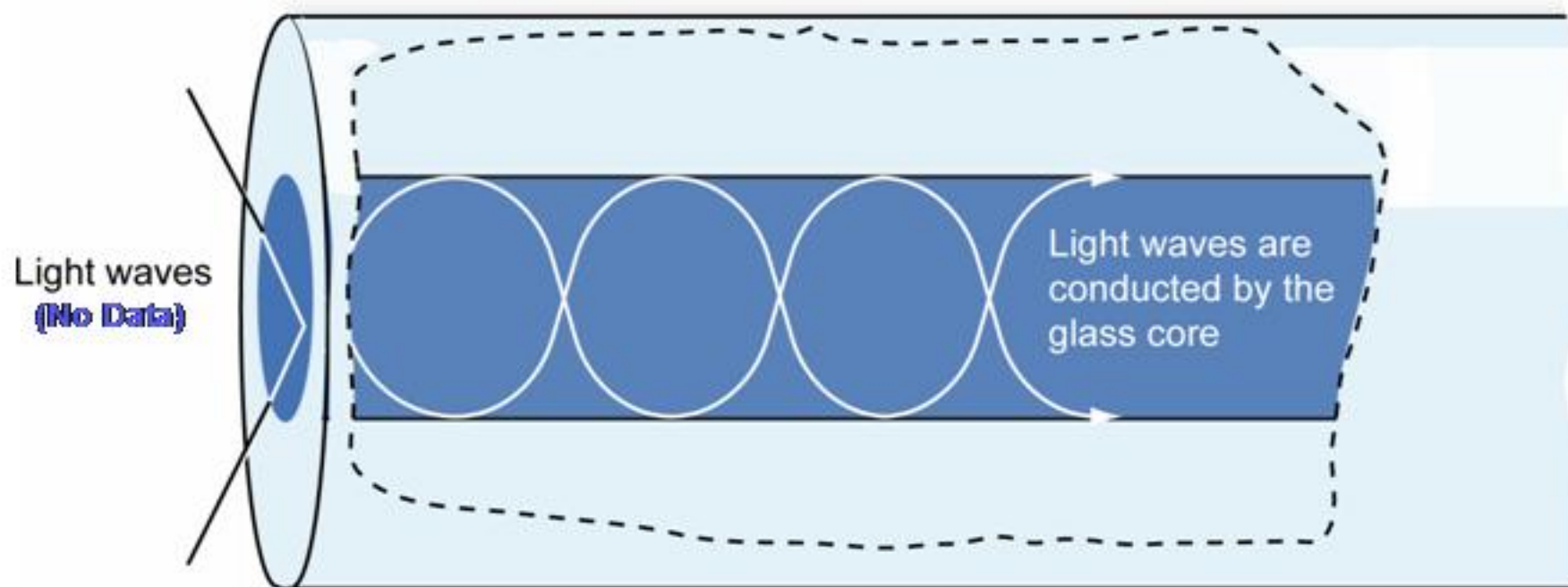


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How the Sensor Works...

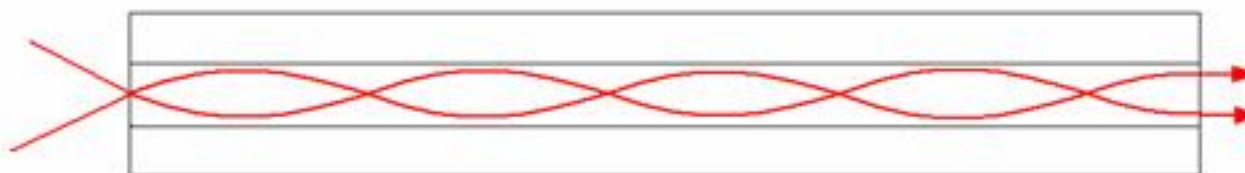
Fiber optic sensing cable is *glass*.

- Inner conductor, called the **core**, guides light

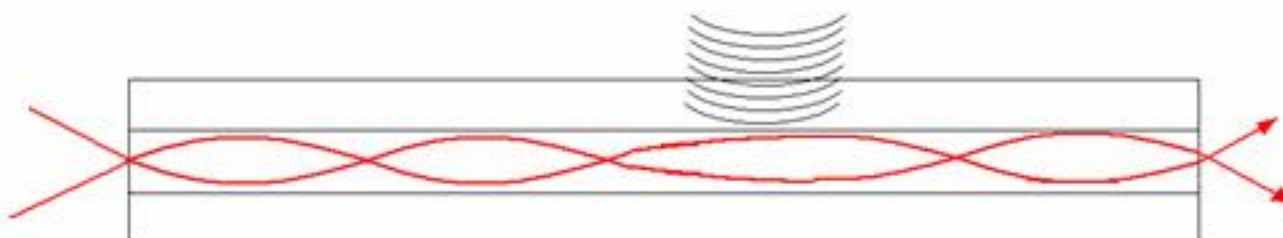


Example of induced change in light propagation

Light passing normally through an undisturbed fiber



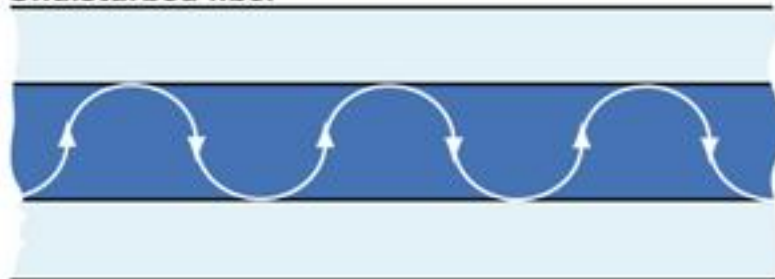
Vibration induces a change in the relative refractive index between the cladding and the core, changing the optical path in the core.



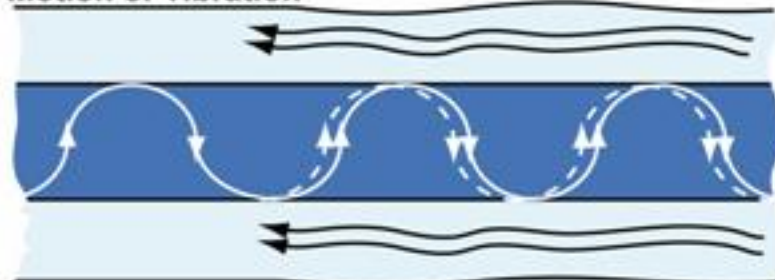
If the fiber optic cable is disturbed, the pattern of conducted light changes.

- Sensitivity to motion, vibration, or pressure

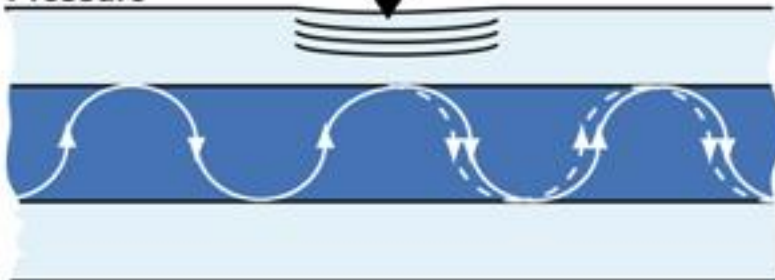
Undisturbed fiber



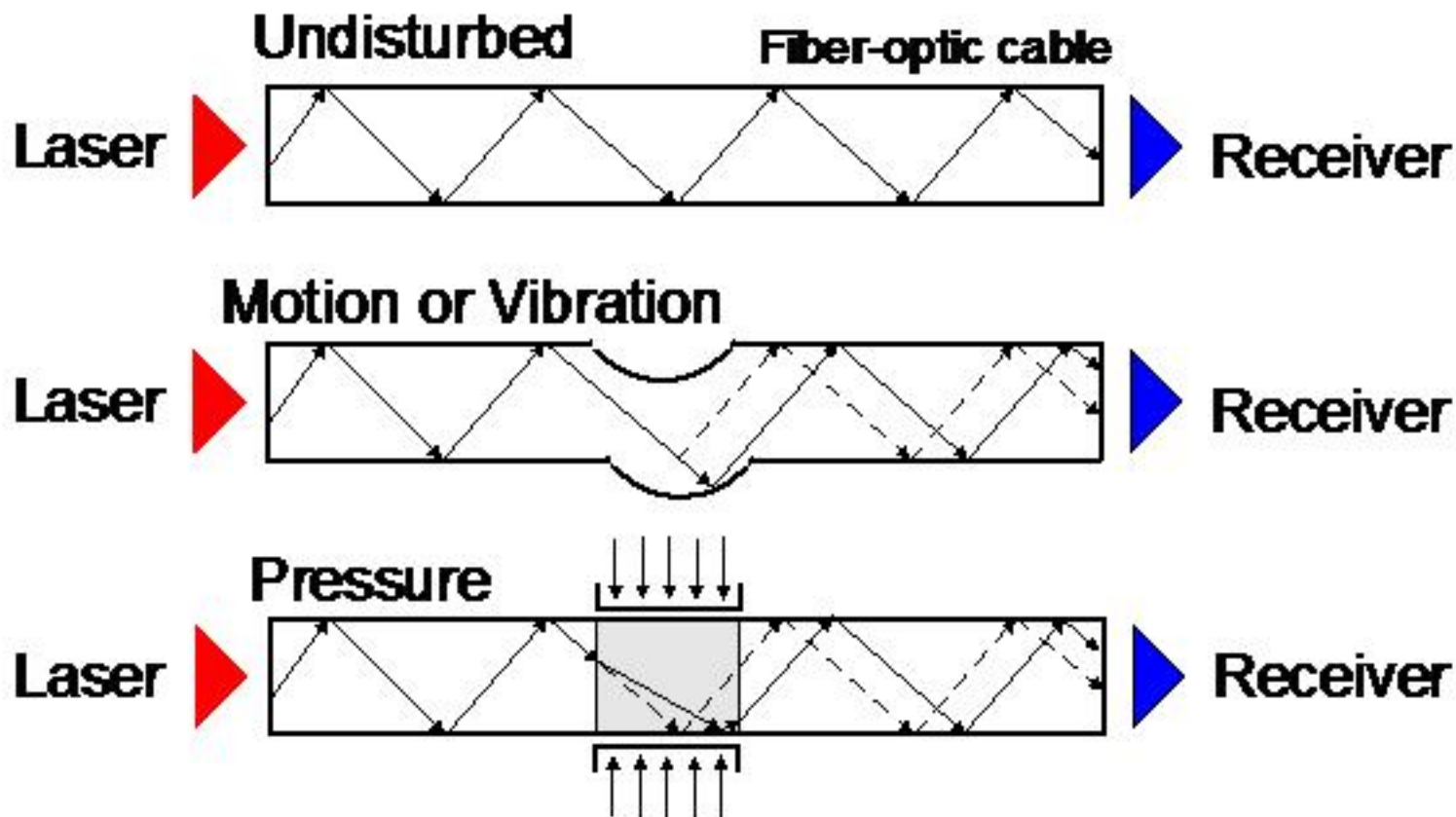
Motion or vibration



Pressure

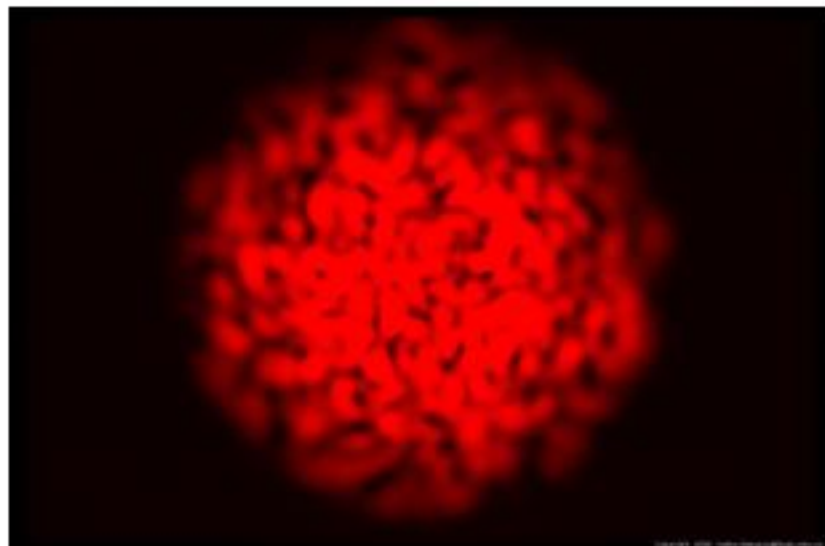


What Will FSI's Fiber-Optic Sensors Sense?



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The alarm processor monitors the light emitting from the fiber.



Very small changes in the multimode speckle pattern are detected and analyzed by the system's digital signal processors.

Protected Distribution Systems (PDS)

- **Wire or Fiber-Optic distribution system used to transmit un-encrypted classified NSI or military information through an area of lesser classification or control.**
- **U.S. Air Force Document**
- **U.S. Navy (via certifying authority)**

AFMAN 33-221

- U.S. Air Force
- Approved Alarm Systems for PDS
- Supplement dated 21 March 03
- Specified FD-208 Sensor
- Conduit must have a visual inspection profile (guards) or be alarmed

System Components

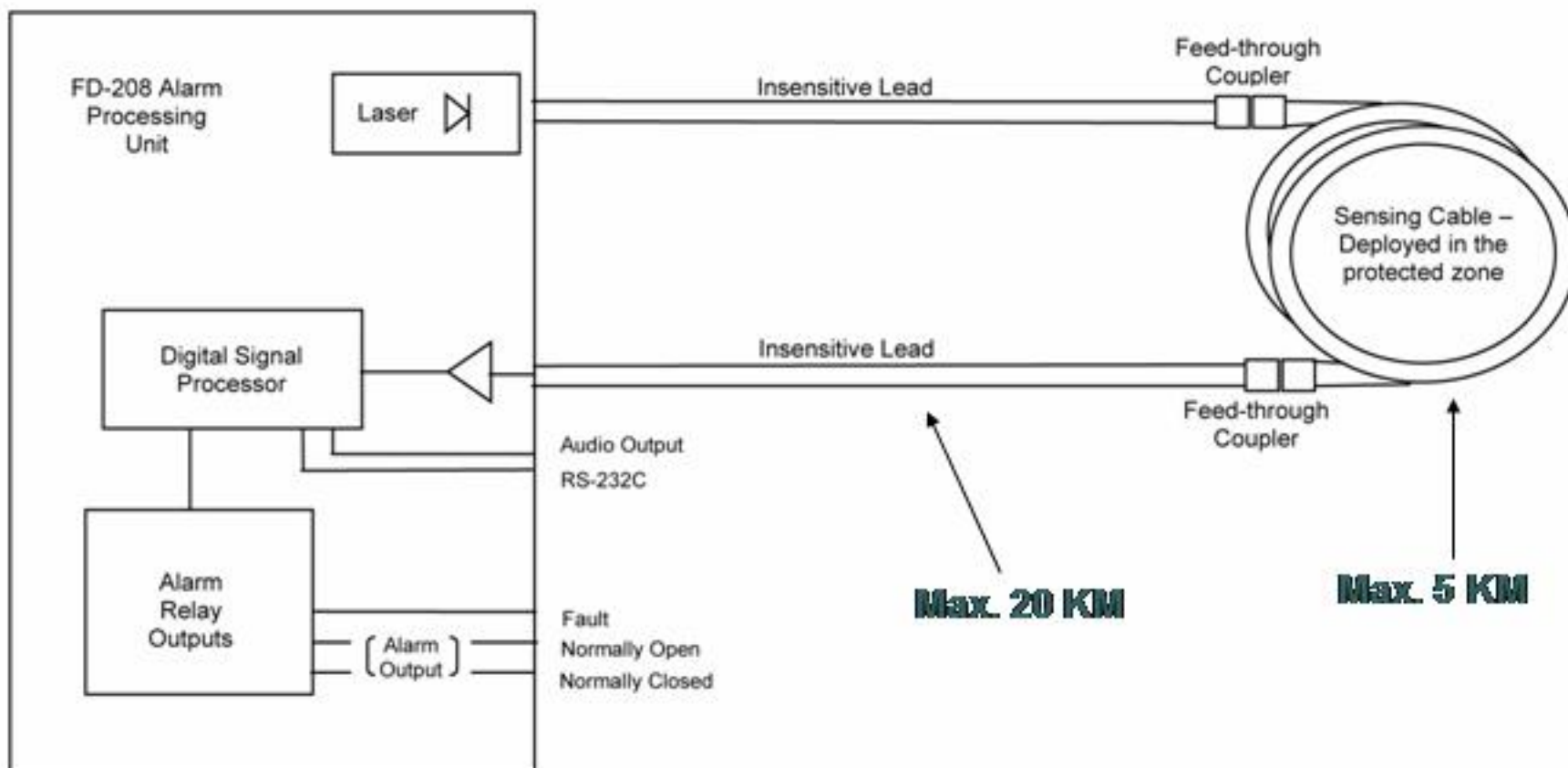
- **Fiber-Optic Cable & Connectors**
- **FD-208 sensor (Alarm Processor Unit)**
- **SMS 2000 Software (optional)**
- **Intelligent Field Panel (502 or 508 controller) (Headend)**
 - **Central connection and control point for all the hardware.**
 - **All system functions are controlled by this unit**

The Alarm Processor Unit

- **Allows remote mounting of the electronics away from the fiber-optic sensing zone.**
- **Models include:**
 - **Stand alone systems**
 - **Rack mount systems**



- **Laser light from the APU transmits through the cable**
- **The system detects shifts in the return light pattern**



Typical IT Security Environment

- **Logical Security (Cyber)**
 - **Addressed through Firewalls, Encryption, Anti-Virus, Passwords, Policies, VPN, IDS, IPS**

- **Internal Factors**
 - **Reliability**
 - **97% of network and system downtime attributed to cabling and hardware related failure and maintenance**
 - *Source: IDC 2004*

- **Tapping**
 - **Copper Tapping – widely known**
 - **Fiber-Optic can also be tapped without protective systems**

Threat

**Trojans, Viruses, Worms,
Spyware, Key Loggers**

Unicode Vulnerabilities

**TCP Session Hijacking, DoS
attacks, "Man in the Middle"**

Port Scanning, NMAP

**Router Password buffer
attack, IP Spoof**

**MAC Spoof, ARP Cache
Poisoning**

**Tapping, Cable Cuts, Cable
Tamper, Backhoe, Accidental
Intrusion**

OSI Model



Security

**Anti-Virus, Spyware detection and
removal**

Patches

**Authentication, SSL, SSH, IPSEC,
Kerberos, strong passwords**

Firewalls, Scan Log d

**Software updates & patches,
restrict console port access**

**Physical Security (SecurLAN
options), Static ARP cache**

**SecurLAN, UPS Power Measures,
Microwave Emission Analyzer**

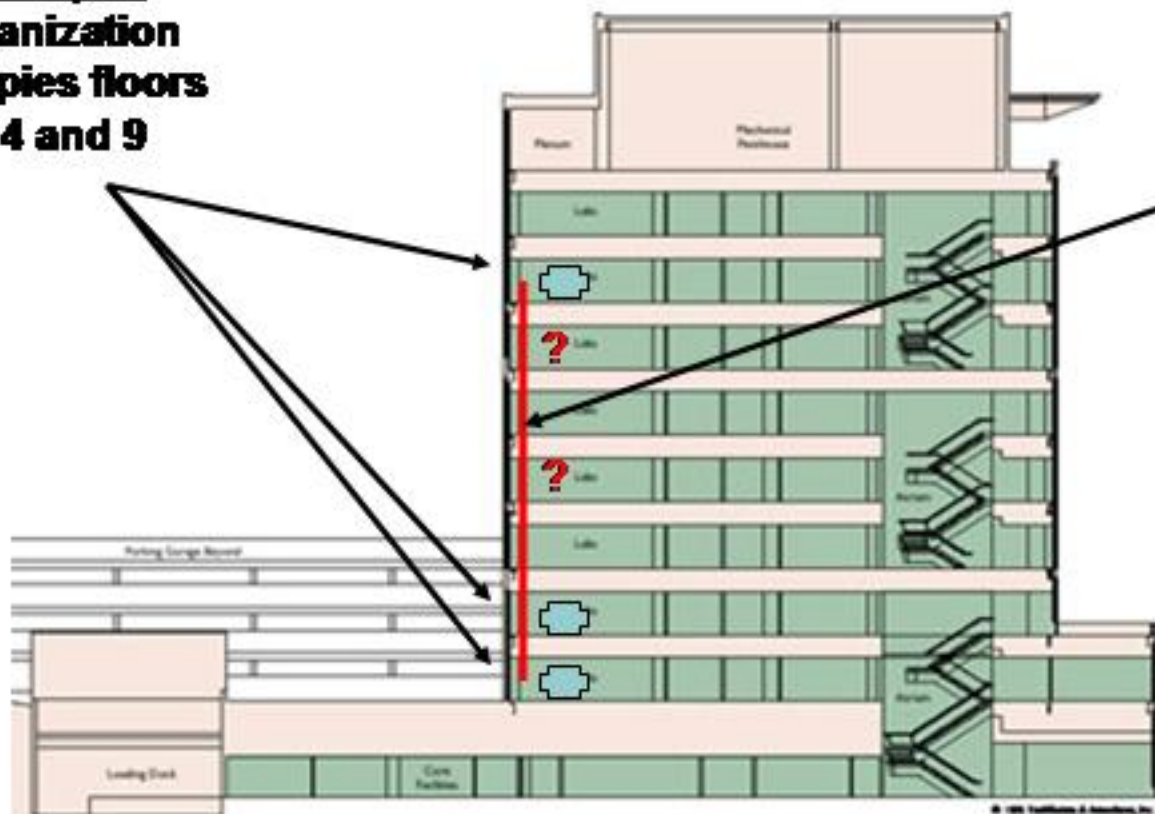
Multiple Floor IT Physical Security



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Multiple Floors

**Example:
Organization
occupies floors
3, 4 and 9**



**SecurLAN
installed in / on
data conduit**

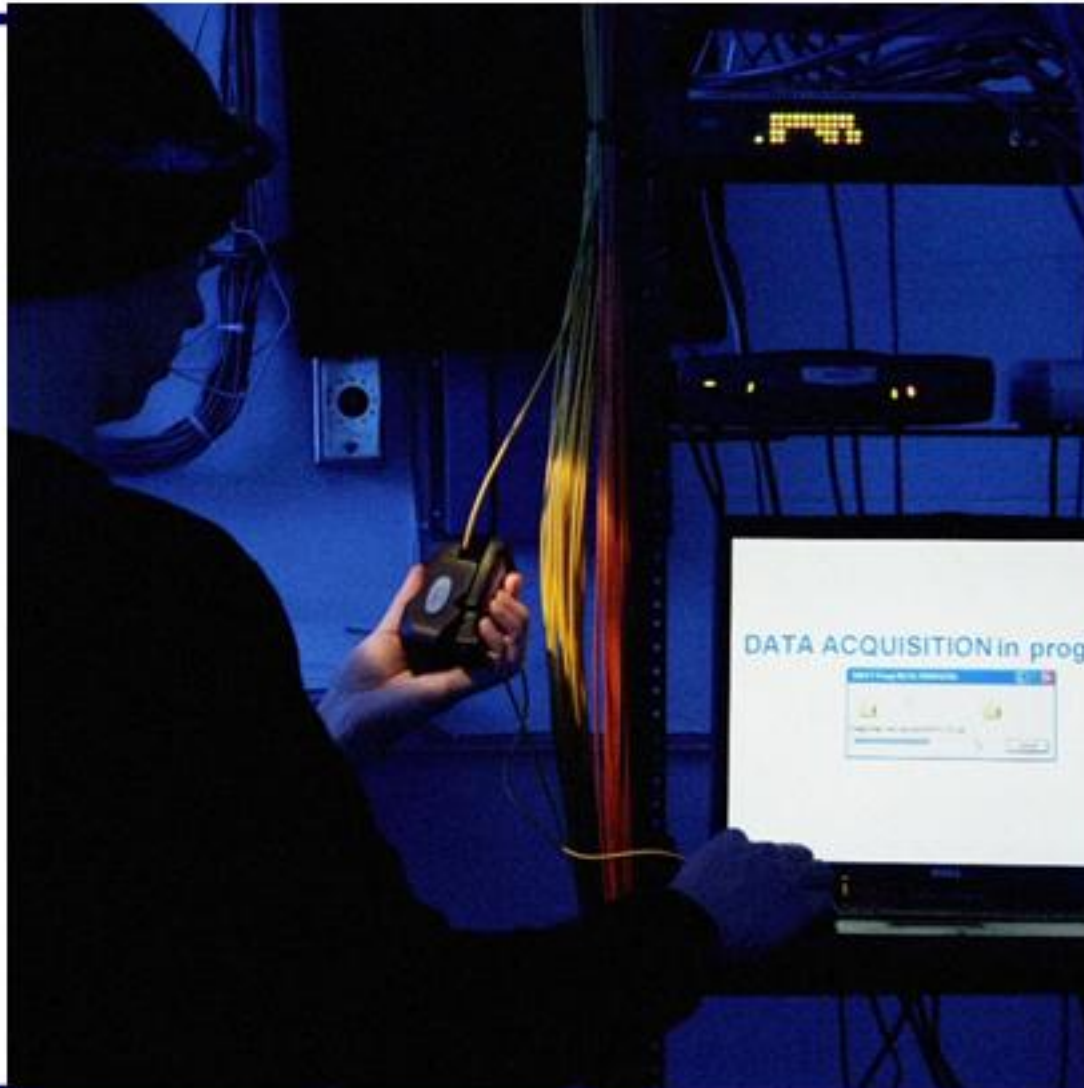
Advantages of Using Fiber-Optic Sensors



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Environmental Calibration

- **with 30 configurable parameters to eliminate nuisance alarms**

Response Options

- **Optical cutoff switch** – Provides shutdown of all connections within the affected zone to deny access to sensitive data.
- **AC cutoff switch** – An alternative method of network shutdown that cuts power to the router, hub, or PC denying access to sensitive data.
- **E-mail alert** – Notify key personnel of intrusion attempts
- **Auto dialer** – contact key personnel through pagers, cell phones, etc.
- **You name it** – integrates with any system that accepts relay inputs (cameras, audible alarms, lights, etc.)

Product Summary

- **Versatile Applications of the Base Technology**
 - *Perimeter, Buried, IT Physical Security, Infrastructure*
- **Physical Layer LAN and WAN Protection**
- **Fiber-Optic Sensitivity**
- **Detects Movement, Sound, Pressure and Vibration**
- **Nuisance Alarm Discrimination**
- **Defined Zone Detection**
- **Complimentary to Existing Security Systems**
- **Customizable Response Options**

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Additional Information:

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