WOLF COMPLEX

Warning Optic-fiber Line Facility

The Ultimate Security Fiber Optic Sensing

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Thieves steal $250m of Nigerian oil from one pipeline

28 November 2015 Africa

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Pipeline theft is the latest major threat to Mexico's battered oil industry

CHRISTOPHER WOODY MARKETS FEB. 6, 2016, 10:51 PM

Mexican oil prices fell after a brief rally earlier this week, slipping to $24.47 a barrel on Tuesday and prolonging the slide of one of the country's most lucrative exports.

In addition to the continuing downstream pain — or the brutally low prices oil is being sold for on the market — Mexico's oil industry is dealing with a severe theft problem preventing an increasing amount of its production from ever getting to market.

Henry Romero/Reuters

Pipeline theft in Mexico rose 52% in 2015 according to an Associated Press report, a spike that comes after a 43.7% annual increase recorded in 2014.

The number of illegal taps has risen from 132 in 2001 to 3,348 in 2014.

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Cases of cables below ground being cut on the rise

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MRT train vandalised at Bishan depot

Photo: ST

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AsiaOne
Wednesday, Aug 17, 2011

Another MRT train has been vandalised in an apparent security breach at a depot, the second case in

The Mercury News

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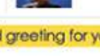

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San Jose: Latest airport fence breach renews focus on persistent problem

By Eric Kurhi and Mark Gomez | Staff writers

SAN JOSE -- Nearly a year after a high-profile security breach at Mineta San Jose International Airport, little seems to have been done to bolster what has proven to be a repeatedly exposed vulnerability: 6 miles of perimeter fence that doesn't do its job of keeping people out.

Click photo to enlarge

mid-day

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News National News

Mumbai: Frequent intrusions worry airport security officials

By Neha LM Tripathi | Posted 12-Jun-2015

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Five cases of security breaches have been reported at the city airport in the past 6 months, where people have been able to sneak into the premises either by submitting a forged ticket or by scaling the outer perimeter walls

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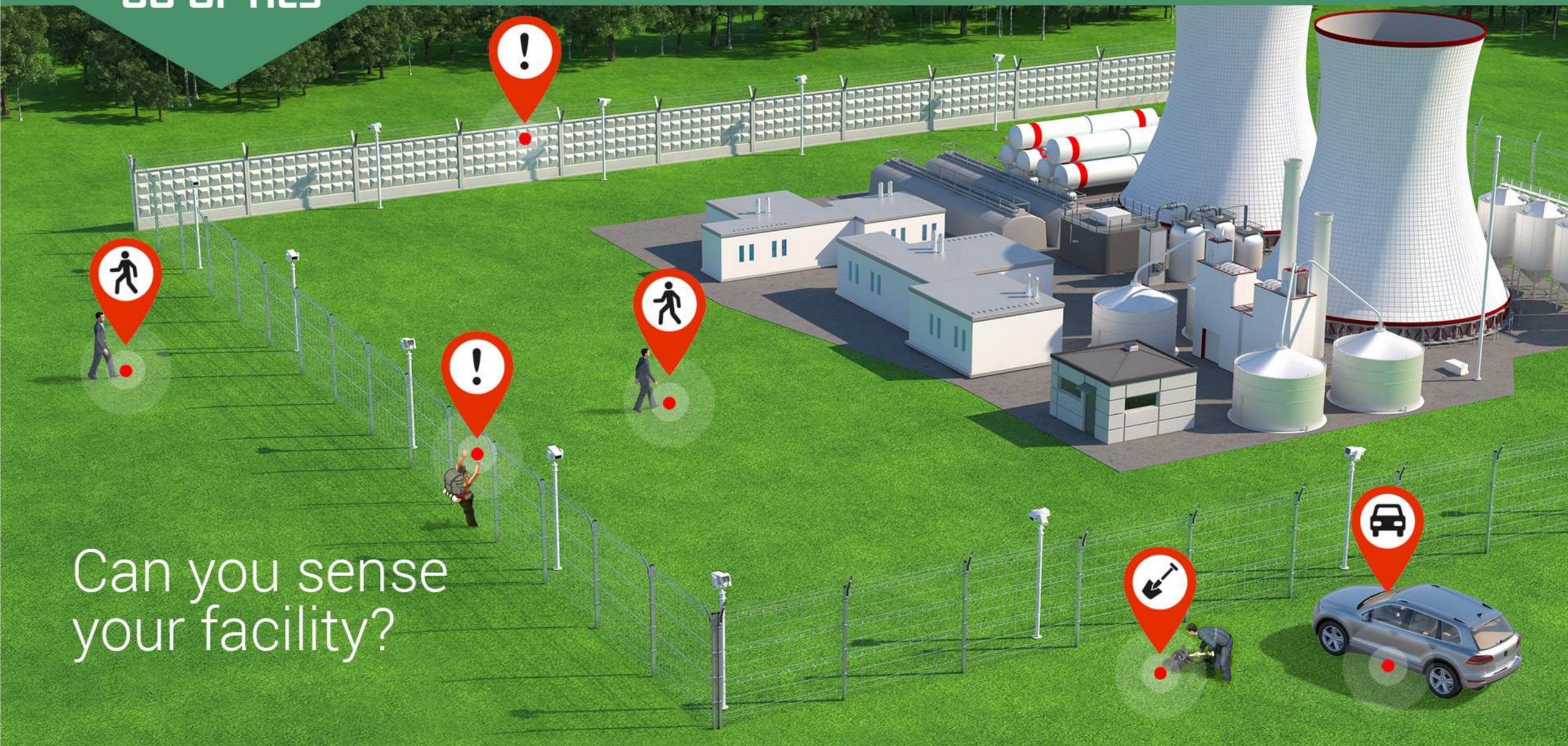
What is the problem?

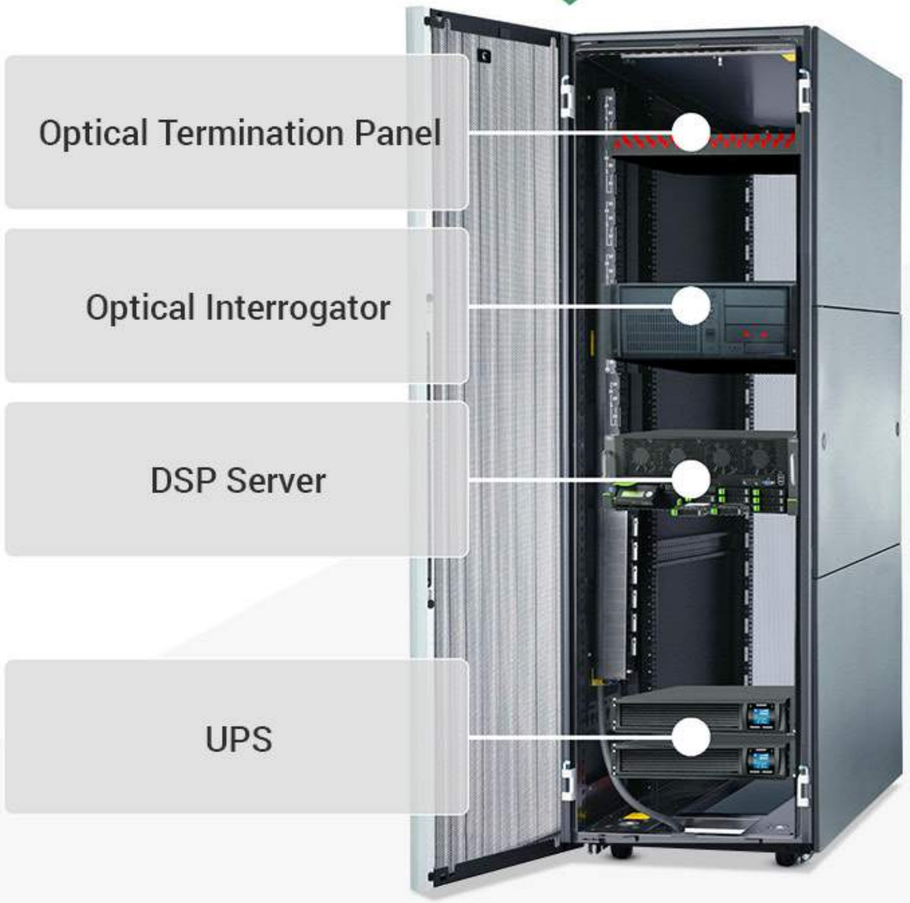


Can you sense your facility?

WOLF – the latest advancement in fiber optic sensing

- Wide functionality range – warning, detection, identification, tracking
- Broad application range – from data providers to top level security installations
- Any type of installation – underground, fence, wall, pipeline
- In-house R&D – highly customizable
- Full production cycle from idea to hardware and software implementation
- Extensively tested in the world's harshest conditions
- The latest detection algorithm
- Self-learning and self-healing design
- Complete integration with any means of secondary detection, such Video, Radar, etc

Typical WOLF hardware configuration



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WOLF – infrastructure security protection

Multiple types of key infrastructure assets and facilities have unique requirements. For example:

FENCED INSTALLATIONS

- Early warning
- Fence intrusion
- Intruder tracking
- Robust to deception tactics
- Complete site monitoring

PIPELINES

- Tap in activities prevention
- Terrorist attach prevention
- Reliable remote monitoring
- Underground, overhead pipelines

LONG-DISTANCE INFRASTRUCTURE

- Railway and data communication lines
- Train localisation
- Border security
- Human and animal movement

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Industries

CRITICAL INFRASTRUCTURE

PETROCHEMICALS

MILITARY

TRANSPORT

PENITENTIARY SYSTEM

BORDER SECURITY

GOVERNMENT

PIPELINES

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Applications

Early intruder warning

Key infrastructure security – Intrusion detection and classification

Pipeline integrity

Excavation and digging activity

Object tracking

FO Cable network localization and mapping

Border security

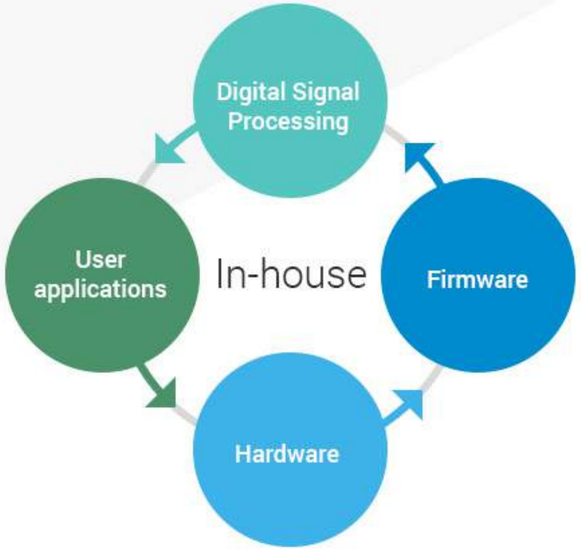
Gas storage tanks structural integrity monitoring

Telecommunications – data link mapping and monitoring

Buildings, bridges and facilities deformation monitoring

Underwater activity monitoring

About us



The team:

- 30 dedicated engineers
- 10 PhDs
- Years of experience of product development and testing
- International team of engineers and product managers

- Quantum optics
- UAV
- Radars
- Application software

- In-house R&D and production
- Hardware and component design
- Proprietary signal processing algorithms
- Test sites

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WOLF pids suite

WOLF-PRIME

All-in-one: Warning, Detection, Tracking

Buried, fenced, embedded in a wall, underwater

Target classification

Threat grading

S+U+W

Layered protection system, top of the range
–S, –U, and –W feature together, plus total integration and global analytics of the events

Best for fenced installations to provide comprehensive security sensing

WOLF-U

- Underground buried sensing
- Detection of ground activity – footsteps, animals, vehicles, digging, excavation
- Learning mechanism
- Best for pipelines, border, railways, vicinity warning

WOLF-S

- Fence-mount PIDS
- Features – detection of intrusion, fence cut, climb, ladder, tempering
- Immune to wind, rain, hail, trains, other nuisance triggers
- Best for fenced installations

WOLF-W

- Wall-mount PIDS
- High precision wall activity sensor
- Detection of climbs and break-ins
- Best for walled up top security installations

WOLF-T

- Intruder 1D, 1D-directional, and 2D tracking
- High-accuracy tracking
- On foot and vehicle identification
- Best for key installation where security or safety is top priority

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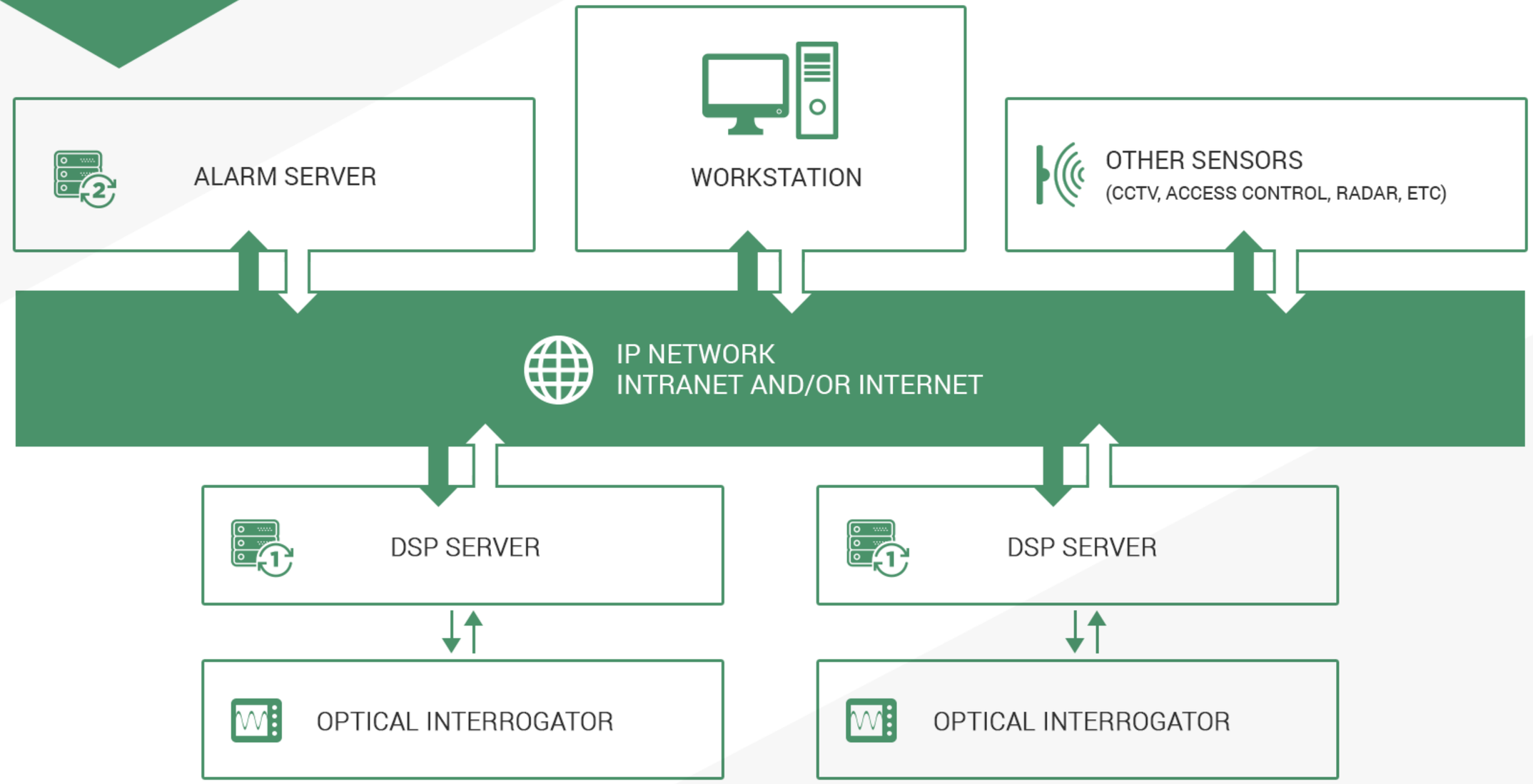
WOLF system architecture



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Fenced security protection – options

CCTV

- Minimum required solution.
- Cost varies from low to very high.
- Reliability is low due to active elements.
- Vulnerable to defeat.
- Requires good lighting.
- False alarms can be high.
- Heavy maintenance due to active elements.
- Susceptible to env-l conditions.

Buried Leaky Coax

- Not precise.
- High false alarm rate.
- Susceptible to lightning strikes, RFI/EMI, bad weather, leaves, wind, etc.
- Requires both power and data cables.
- Can't detect slow or very fast moving objects.
- Total solution is costly due to installation complexity.

Zonal Fiber

300 m

- Large zones of 100-300m.
- Scalable.
- Has difficulties detecting silent climbs, and silent cuts.
- If cable is cut, the entire zone is down.
- Persistent and high false alarm rate, which is adjusted by reduction in sensitivity.
- Outdoor power is required

Microphonic/Seismic

- No pinpoint accuracy.
- Large zones of 300m.
- Susceptible to RFI/EMI.
- Can't work in highly noisy environment.
- Power cable is required to be placed outdoors.
- Susceptible to direct and indirect lightning strikes.
- Extra maintenance is required.
- Cheap.

Fence-mount FBG

- Very expensive solution.
- Not suitable for extended perimeters, railways or pipelines.
- Pinpoint accuracy, low false alarm rate.
- Easy to install, however configuration and commissioning required long time.
- Custom-made, only manufacturer can fix cuts.

Radar

- Unusable for all areas, due to blind spots.
- Susceptible to damage due to direct or indirect lightning strikes.
- Susceptible to RFI/EMI.
- Outdoor electronics require extra maintenance.
- Outdoor power is required.
- Expensive equipment and installation.

Fiber-optic

- The most complete solution.
- Provides warning, intrusion detection and intruder tracking inside protected area.
- Precise, long-distance, simple to install, hard to defeat.
- Adaptive recognition algorithms are required to reach full potential. Inexpensive.

Good security installation will always have two independent security alarm systems integrated at decision making level – one of them is typically CCTV for visibility, while the other provides sensitivity.

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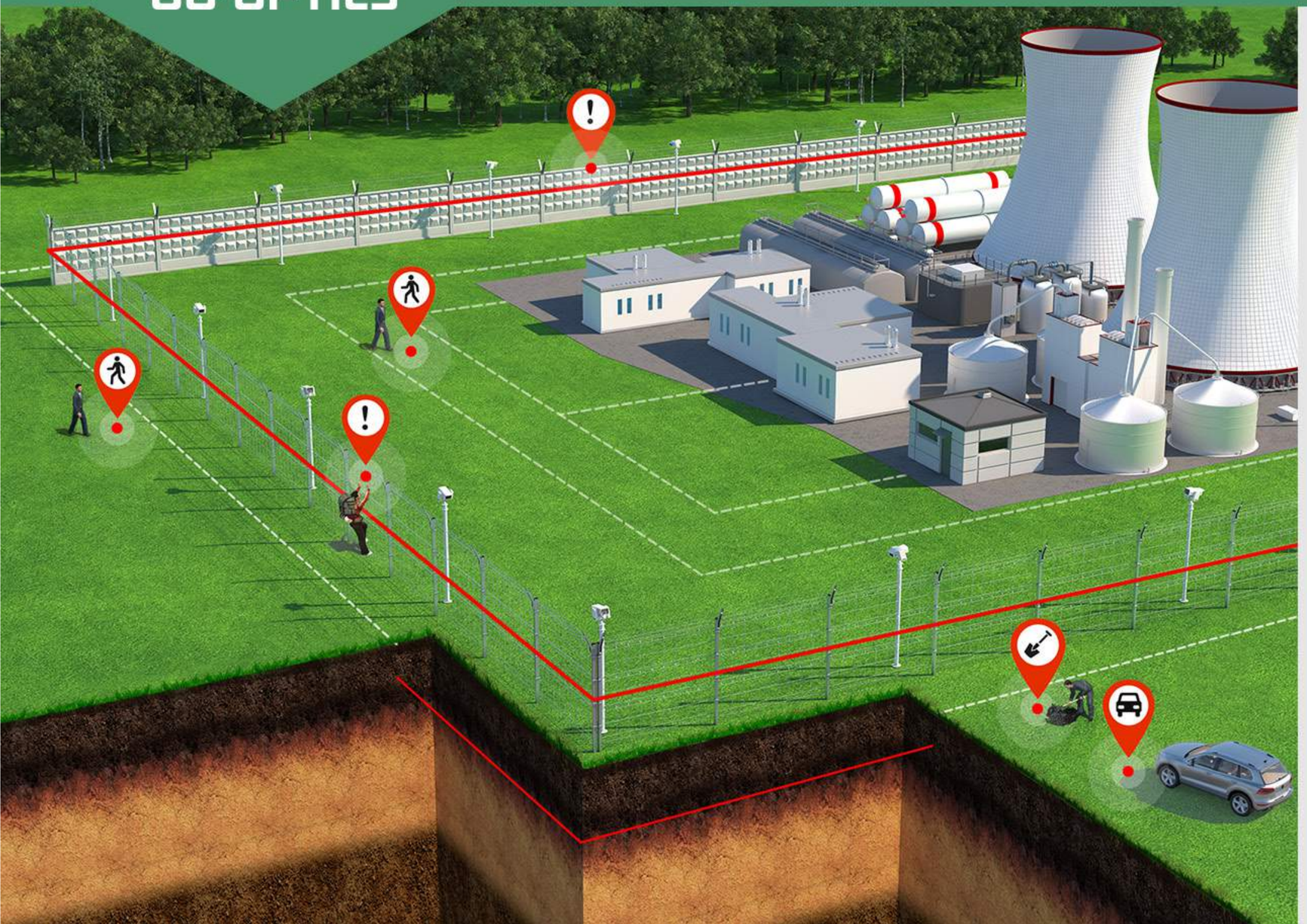
WOLF – fenced installations protection



- The most complete solution on the market
- High probability of detection
- Low false alarm rate
- Cut immunity
- Multiple target detection and tracking
- Layered protection:
  - Warning layer – before perimeter, monitors intruder approach
  - Fence layer – on perimeter, detects intrusion
  - Tracking layer – intruder movement inside
- Provides complete security solution against all types of intrusion: on foot, in vehicles, underground
- Simple and quick installation and repair
- Unlimited perimeter length
- One sensor cable can detect and track simultaneously
- Multi-site capability
- Integration with new or existing systems (e.g. CCTV, etc)

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Pipeline protection – options

1 Parametric pipeline condition monitoring system

Currently parametric control systems is the main pipeline condition monitoring technology used

- no new equipment required

2 Infrasound Monitoring System

Infrasound sonar antennas are used as sensors responsible to measure the pressure inside the pipeline wave

- long distance between sonar antennas (up to 50km)
- high sensitivity (leaks up to 0.5m 3/h) and high spatial accuracy (up to 50m)

3 Distributed Fiber Optic Temperature Sensing

A fiber optical cable placed at some distance away from the pipeline is used as a sensing element. The principle of operation of such systems is based on measuring the temperature change around the cable

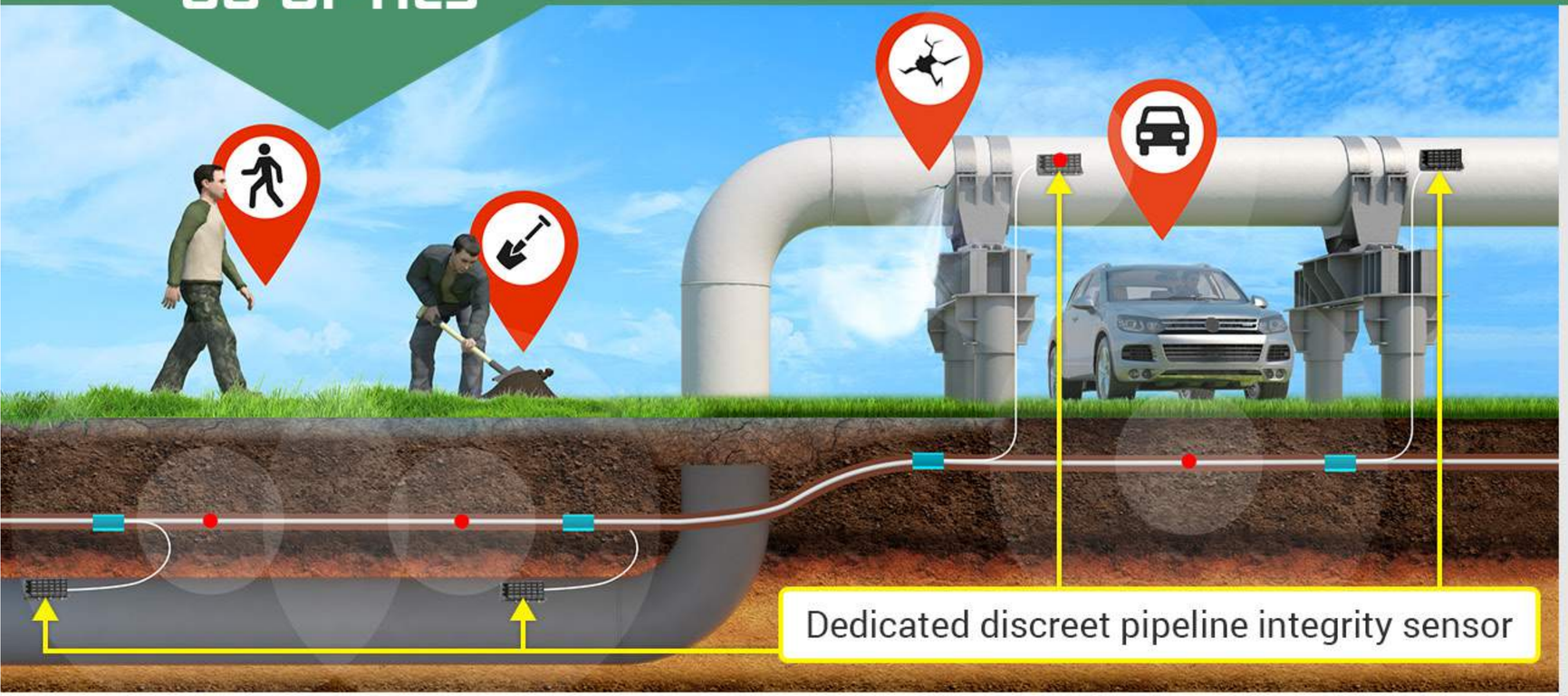
- long controlled distance using one sensing unti (up to 30km)
- high spatial accuracy (up to 5m)

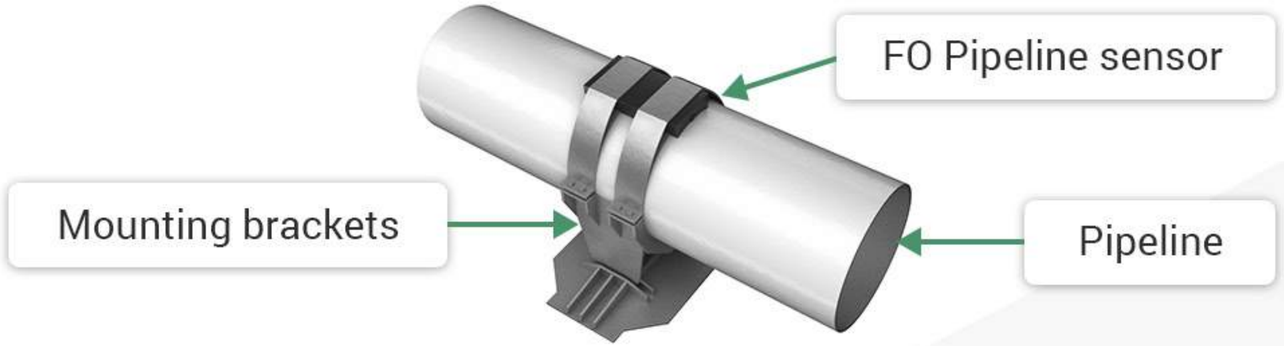
4 Distributed Acoustic Fiber Optic Sensing

A fiber optical cable placed at some distance away from the pipeline is used as a sensing element. The principle of operation of such systems is based on measuring the acoustic vibrations around the cable

- long controlled distance using one sensing unti (up to 100km)
- high spatial accuracy (up to 10m)

WOLF – pipeline protection





- Multiplexed sensors
- Distributed sensor/s – to detect external activity
- Network of discreet sensors – to detect leakage and tap-ins
- Digging, excavation, tap-ins, illegal trespassing, leaks
- A network of signal processing servers integrated with alarm forming servers at control center
- Unlimited pipeline length
- One site for signal processing can cover up to 100 km of pipeline length
- Sensor cable can be used for high-speed data
- Highly scalable

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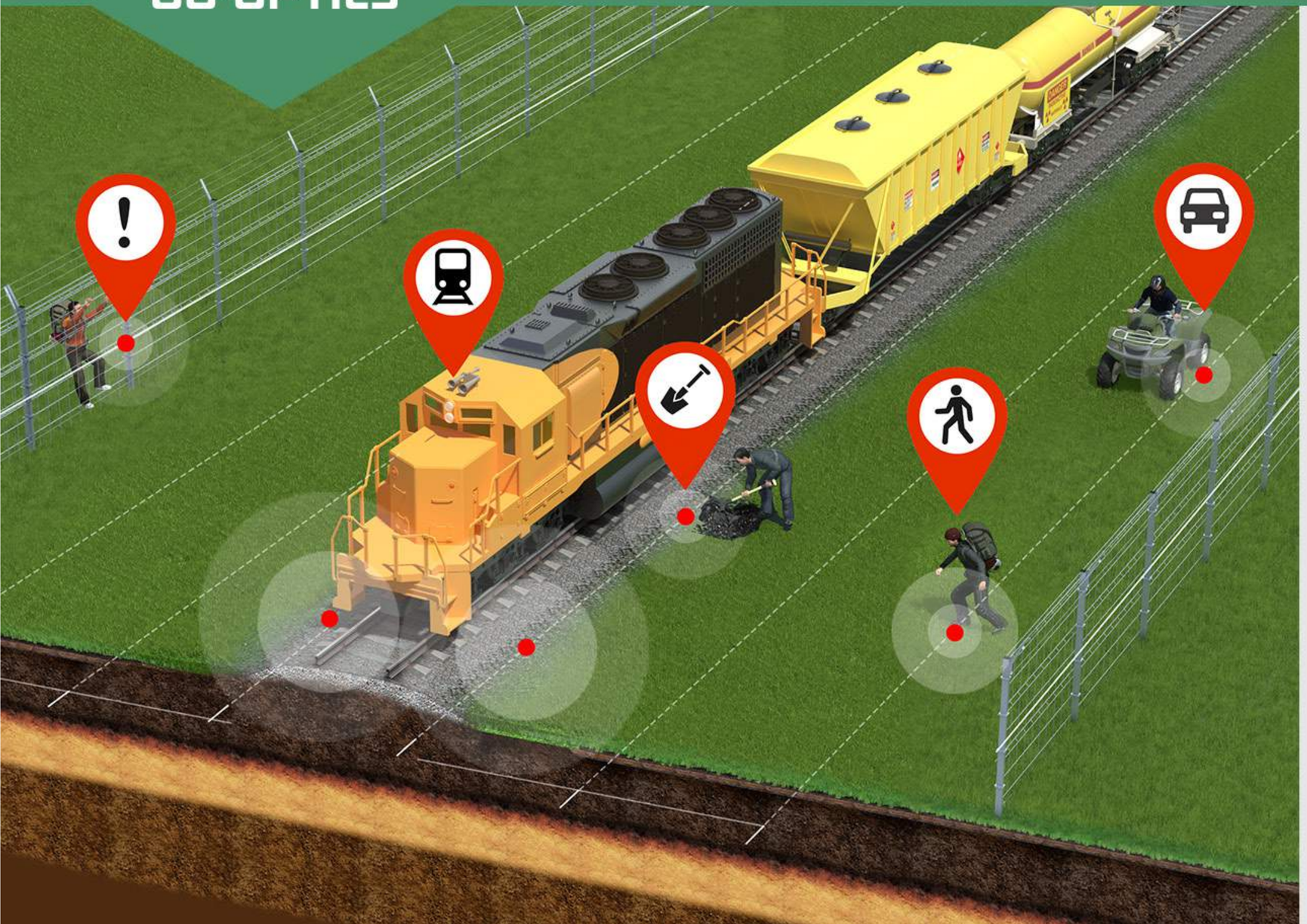
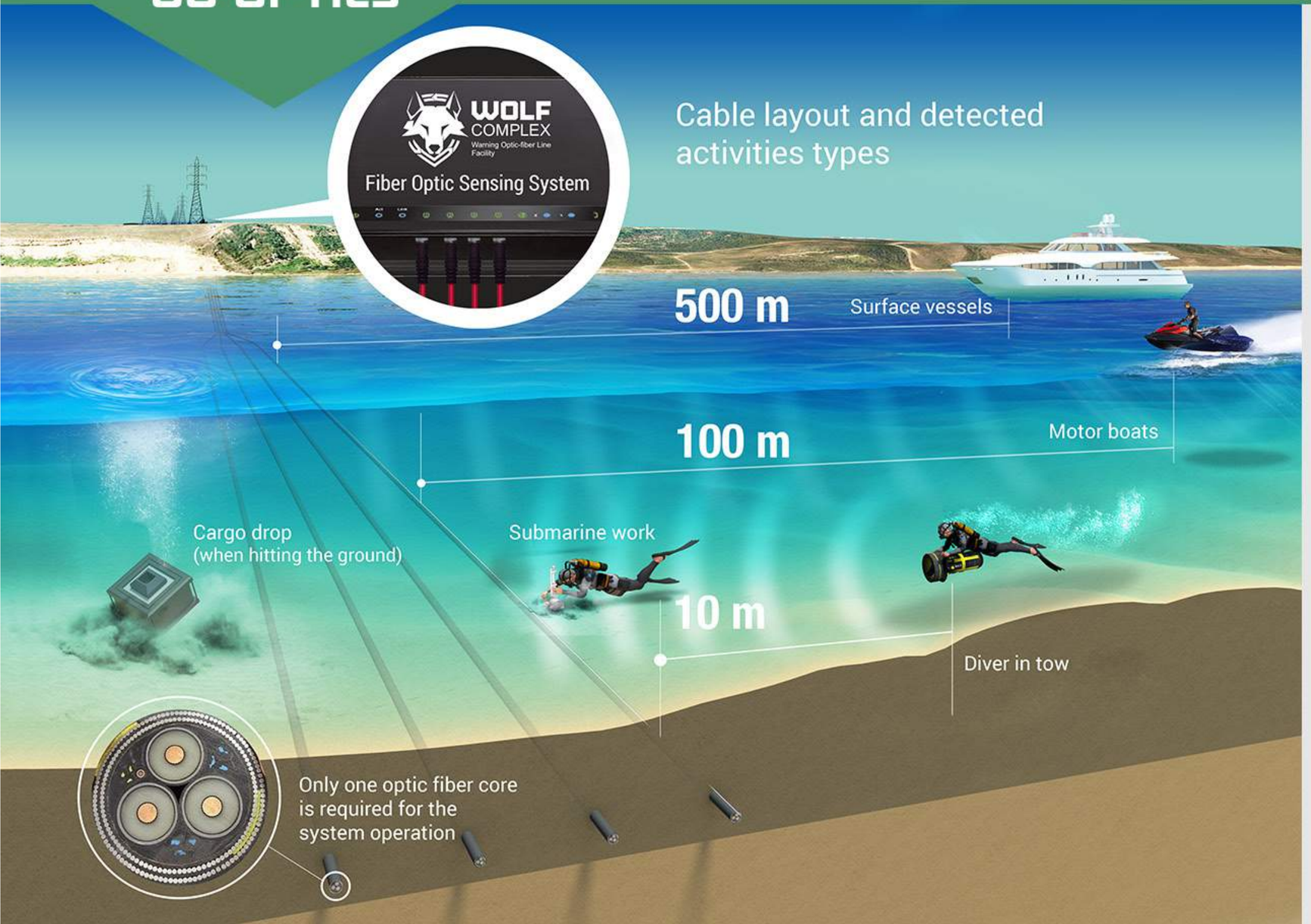
WOLF – long distance installations protection



- High probability of detection
- Learning algorithms to minimize false alarms
- Integration with CCTV
- Highly customizable
- Detection of:
  - Perimeter intrusion (if available)
  - Walking humans and animals (with modified surface)
  - Movement of vehicles and machinery
  - Digging near the railway tracks – prevention of terrorist attacks
  - Train localization
- Provides complete security solution against all types of intrusion: on foot, in vehicles, underground
- Simple and quick installation and repair
- Unlimited rail length – all alarms are aggregated in operation control center and disseminated to local authorities

WOLF – underwater protection



- Detection of:
  - Divers tempering with infrastructure
  - Divers in tow
  - Motor boats
  - Surface vessels
  - Cargo drops
- Long distance of up to 40km
- Can be embedded with power or data cables
- Completely passive system

WOLF features

100 m

Up to 50km of continuous line sensing. Up to 100km of straight line monitoring per server installation

Detection of: walking, hand shovel digging, excavation, continuous track vehicles, cars, trucks, 1D, 1D-directional and 2D tracking, structural deformation, underwater trespassing

Resistance to environmental conditions: EMI, RFI, rain, hail, lightning, etc

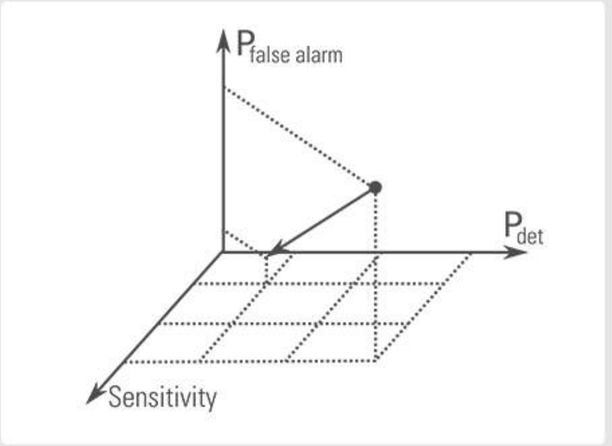
0.5 sec

Fast response time – less than 0.5 sec

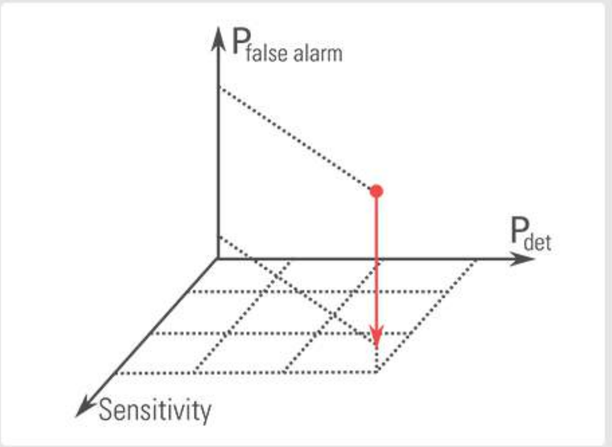
Dynamic adjustment to environmental conditions

Standardized sensor cable – off-the-shelf equipment brings total life-cycle cost down

Typical Trade-off



Ideal System Performance



WOLF – underwater protection

- Completely passive on-site system – no active elements in sensing network
- Used software of the logic Installation simplicity
- One time configuration
- Zero on-site maintenance. All minimized maintenance to be done in server room
- Remote alarm monitoring from tablets and mobile phones on iOS and Android
- Pin-point accuracy perpetrator detection – +/-5m
- Proprietary signal processing and alarm forming algorithms that allow to maintain high Probability of Detection while reducing the Probability of False Alarm without reduction in Sensor Sensitivity Level
- Minimized system setup during commissioning

WOLF workstation and mobile viewer

Wide range of visualization options:

- Geographical localization based on new or existing maps
- Indication of alarms, target types, etc
- Full history log
- Dedicated screens for operator, maintenance crew, and engineering support team
- Option for mobile devices to connect

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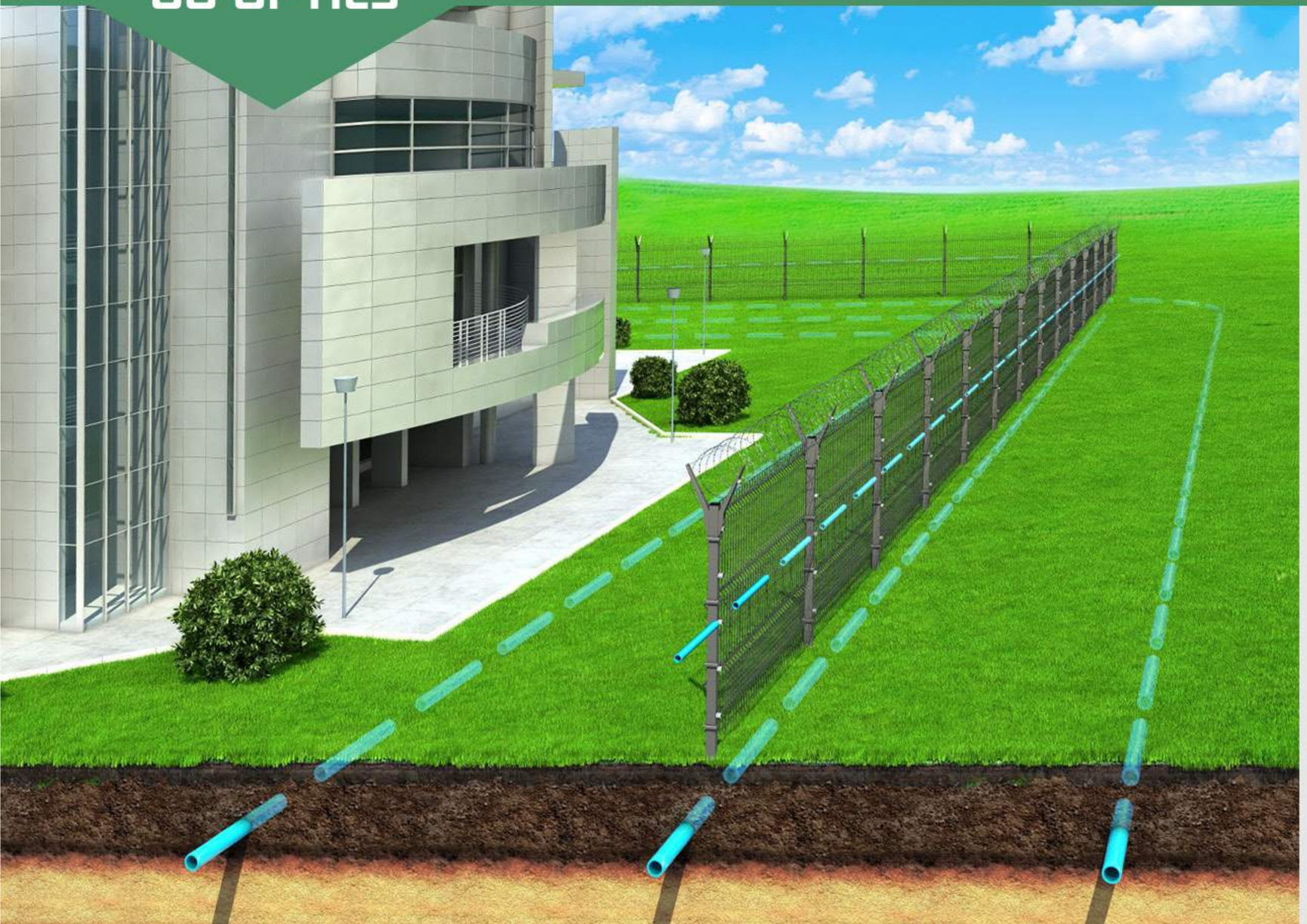
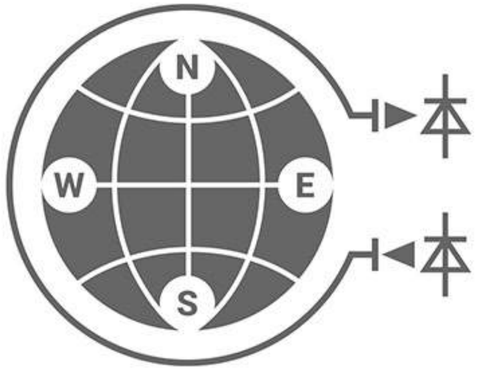
WOLF installation



In contrast to existing security systems, WOLF does not require complicated construction and installation work. The thickness of the soil layer required for the installation of the system is from 0.3 to 0.7 m. The cable is simply placed inside the trench and covered with soil.

The usual procedure for installing the system is the following:

- Integration and installation of the system logic module together with the operator's console;
- cabling and connection of the fiber-optic cable-sensor;
- binding the distance channels of the cable-sensor to the geographical coordinates;
- in the case of accidental or intentional damage to the cable-sensor, repair is performed by welding the ends of the sensor using standard equipment and can be lengthen, if necessary.



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Thank you