

INTRUSION DETECTION SYSTEMS (IDS)

Contents

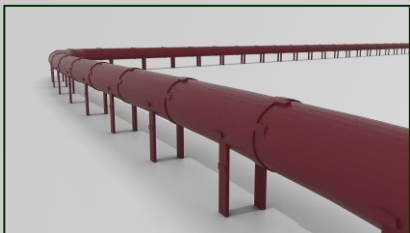
- Our Background
- Our Completed Projects
- Our Monitoring Components & Specifications
- Activity Detection Function
- Installation options
- Redundancy & Information Protection
- Integration
- Operational Display Examples
- Operational Requirements
- Main benefits of system use
- Competitive advantage

Our Background

- ▶ **“Petrofibre” LTD**, our Russian Parent Company, was formed in 2008, specializing in the design, development and production of fibre optic leak detection and monitoring systems.
- ▶ Our systems successfully gained recognition on the Russian market and were applied to a variety of infrastructures across various sectors:
 - Oil and Gas Pipelines
 - Oil and Gas wells (conventional, horizontal and injection)
 - Refineries
 - Airports
 - Railroads
- ▶ Currently, our company group is targeting opportunities on the Algerian market through our subsidiary – **Petrofibre Algerie**, located in Algeria.



Our Completed Projects



- Transneft. Eastern Siberian - Pacific Gas Line 2 - 2050km
- Transneft. Baltic Transportation Gas Line - 1001km
- Transneft. Samotlor Gas Line - 429km
- Transneft. Tupase Gas Line 2 - 350km
- Transneft. Tikhoretsk Gas Line - 325km
- Transneft. Obvodnoi Pipeline - 250km
- Transneft. Irkutsk Gas Line - 250km
- Transneft. Purpe Gas Line - 200km
- Transneft. Tichoretsk Gas Line- 250km

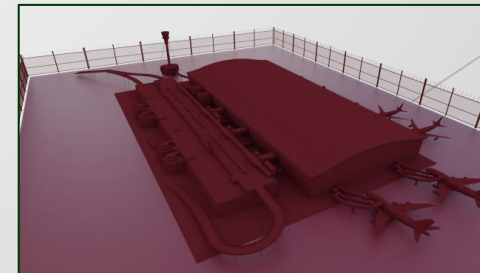
- Tatneft Shashin, Republic of Tartarstan, 205 wells
- Lukoil, Western Siberia, 25 wells
- Gazprom, Western Siberia, 6 wells
- Rosneft, Sakhalin, 5 wells
- Rosneft, Eastern Siberia, 2 wells



- Rosaviatsia - Pulkovo Airport, St Petersburg - Perimeter
- Rosaviatsia - Magas Airport, Ingushetia - Perimeter
- Russian Rail, central Russia, 140km of Railway



- Sibur, Tobolskii gas and chemical complex product line - 417km
- Novatek - Total. Pyreinoe Gas Line - 250km
- Novatek - Total. Termokarstvov field gas lines - 300km
- Novatek - Total. Yarudeiskii field gas line - 350km
- Novatek - Total. Yakhinskii field gas lines - 180km
- Novatek - Total. Norther Khichinskii field gas lines - 100km



Our Monitoring Components & Specifications



VOSK – A

- Acoustic monitoring unit
- Real time acoustic monitoring
- Primary designation is the monitoring of activity, however, can perform leak detection tasks on oil and gas pipelines
- Is able to identify and distinguish following activity in real time mode: human traffic, vehicle traffic, animal traffic, attempted work with tools/excavation attempts
- Linear range is on 100km, can be programmed into zones and adjusted
- Accuracy of location of impact is +/- 5 meters
- Is able to detect human up to 3 meters away from the cable, SUV up to 15 meters and heavy digging machinery up to 50 meters
- Spatial resolution +/- 5 meters



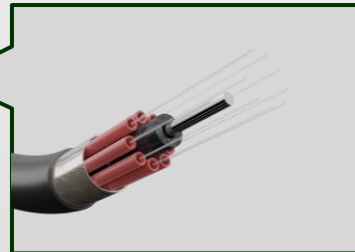
VOSK SERVER UNIT

Information received from the VOSK units is transferred to the VOSK-S Server for output, it is a closed server which minimizes risk of hacking. Connected can be established via cable route, or wirelessly, with the use information encryption devices, providing wireless safety

AWP DISPLAY UNIT

An operator's display is present on site, typically we locate these in control rooms on site. However, monitoring can be done remotely through methods mentioned above

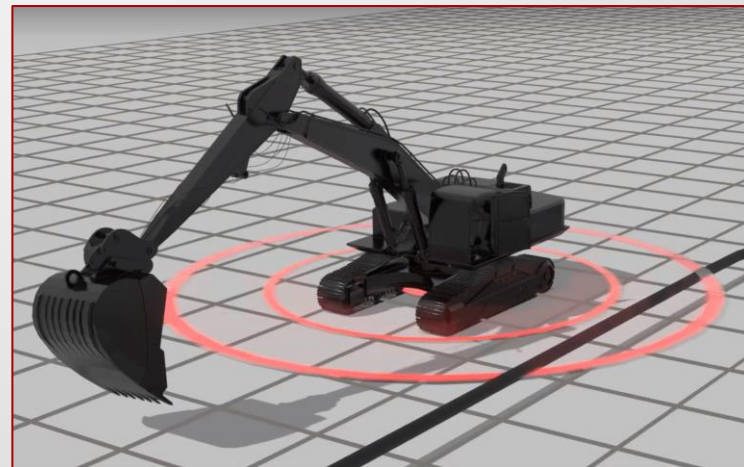
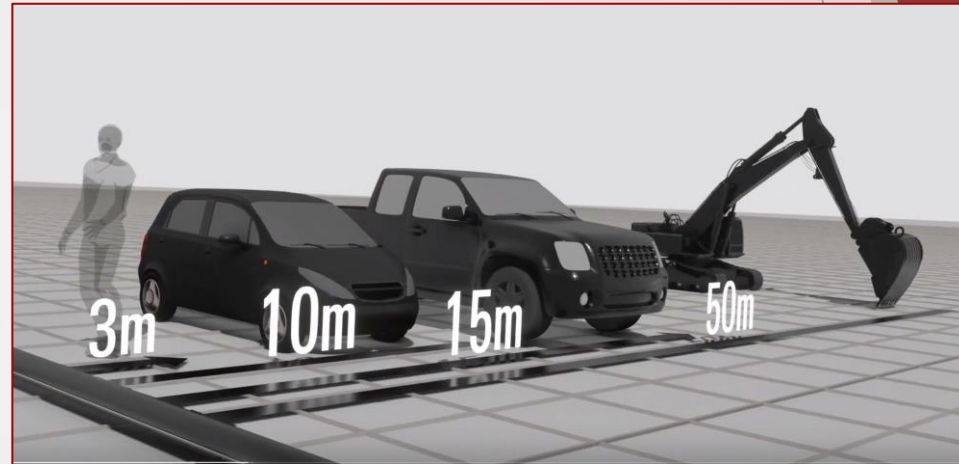
VOSK-A forms part of our FOSM Complex. The FOSM Complex includes all of the necessary accessories for system operation, as well as slots for additional VOSK units, this allows to integrate reserve VOSK units into the complex, adding redundancy. The units and accessories are enclosed in our All Weather Field Cabinet (AWFC) which can tolerate temperatures of up to 80°C. An indefinite amount of VOSK units can be connected in linear chain fashion, allowing the system to monitor an infinite linear range



Our system uses an armoured fibre optic cable, single mode and preferably with 8 fibre cores available (minimum 4). Already existing on site cable can be used

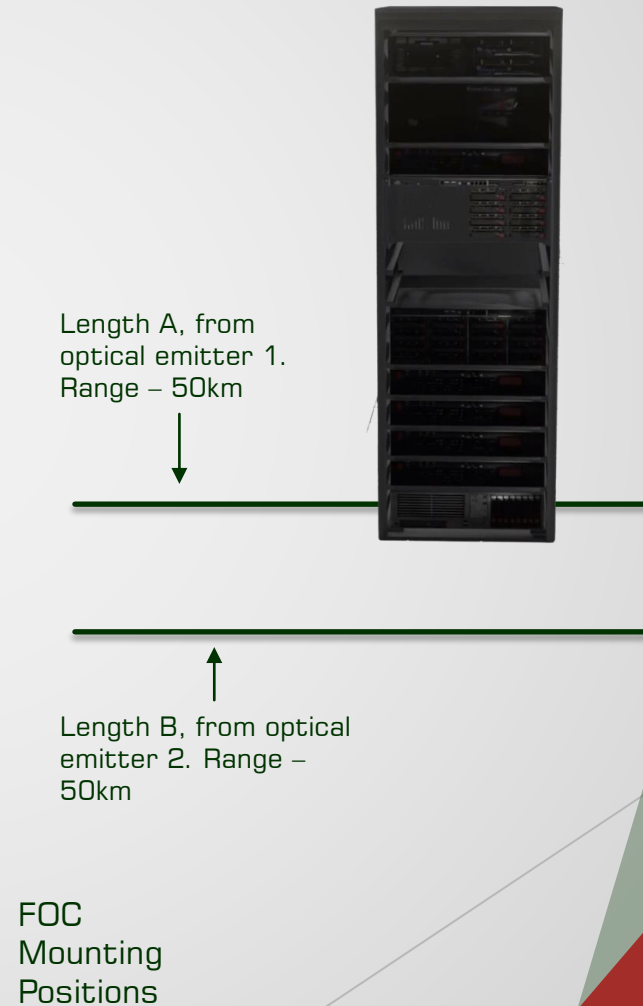
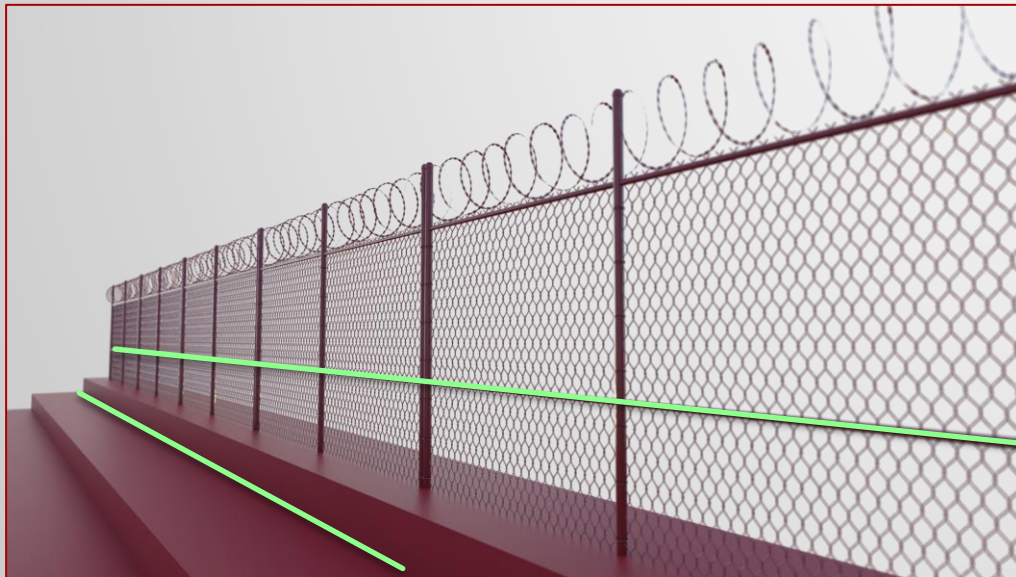
Activity Detection Function

- ▶ Our designated IDS unit is VOSK-A. VOSK-A uses distributed acoustic sensing (DAS), monitoring the acoustic waves and patterns created by objects approaching the cable. The VOSK-A unit sends light signals down the FOC, once these light signals are altered by activity, upon return to the VOSK unit, they are analysed and classified, this process occurs in real time. VOSK-A is able to reliably detect and classify in real time the following types of activity:
 - Human traffic – detectable up to 3 meters away from the cable
 - Light vehicle traffic – detectable up to 10 meters away from the cable
 - Heavy vehicle traffic - detectable up to 15 meters away from the cable
 - Earth digging machinery - detectable up to 50 meters away from the cable
- ▶ Specifically for IDS, VOSK-A has the ability to be programmed into zones. Furthermore, sensitivity can be adjusted, enabling the system to alert of certain types of activity, whilst ignoring others. For example, if a specific zone is expected to have much pedestrian traffic due to onsite workers, yet vehicles are restricted, the system can be programmed to alert of vehicle traffic, yet ignore human traffic



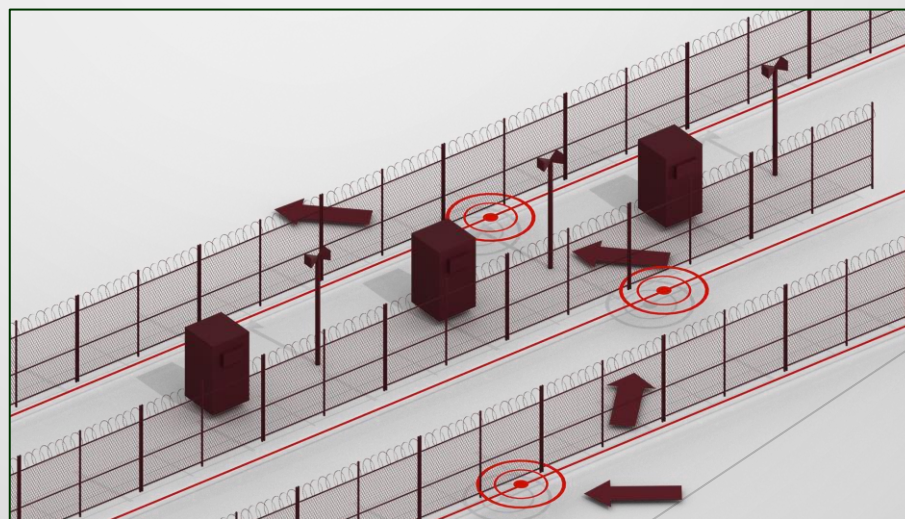
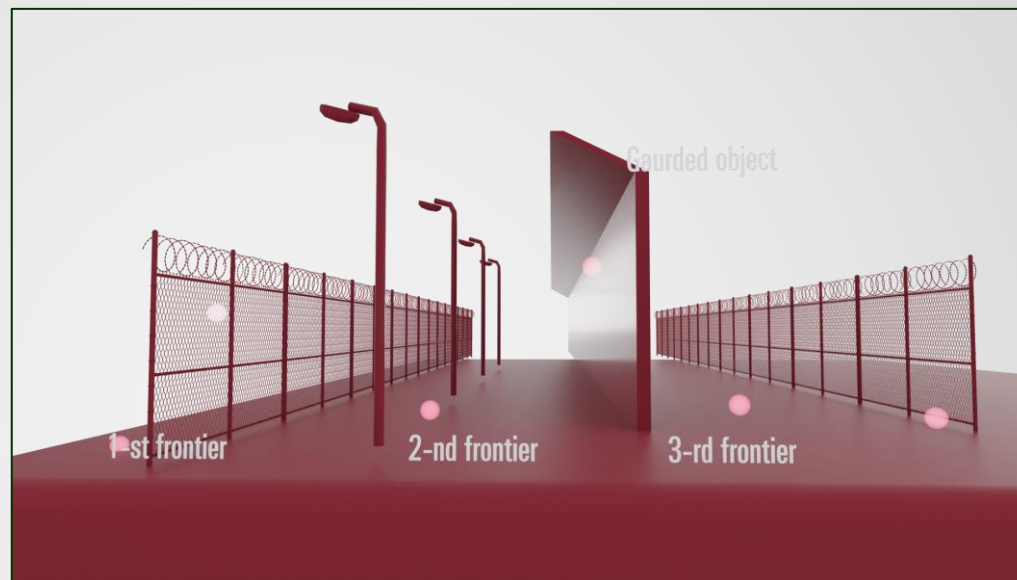
Installation Options

- For IDS applications, we recommend installing the FOC in a dual parallel fashion: length A of the FOC is mounted directly onto the fence of a perimeter (the fence acts as a conductor of vibro-acoustic waves, providing very accurate results), whilst length B of the FOC is mounted directly below the fence to protect against dug outs attempts



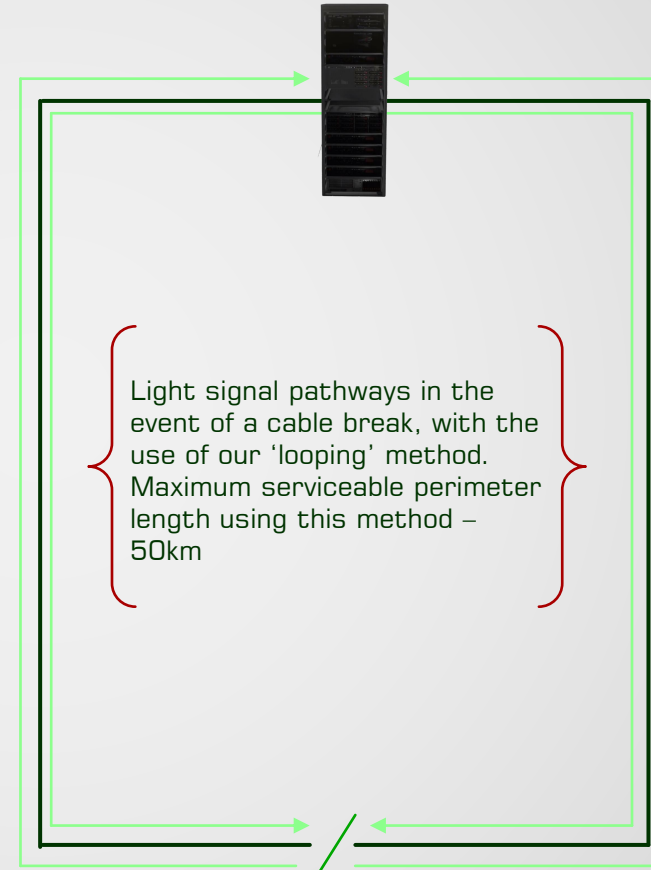
Installation Options

- ▶ Additionally, for the protection of perimeters, we recommend the use of our 'layered defence' method. This installation method includes the layered installation of the FOC – one length at the perimeter fence, next length 25 meters from the fence, third length at 50 meters from the fence.
- ▶ This method not only allows to program the system into zones along the guarded perimeter, but also allows to program zones outwards from the protected perimeter, establishing different threat levels according to distance from guarded fence.
- ▶ Moreover, this allows to monitor the trajectory of the intruder and allows for real time tracking within the detection zone



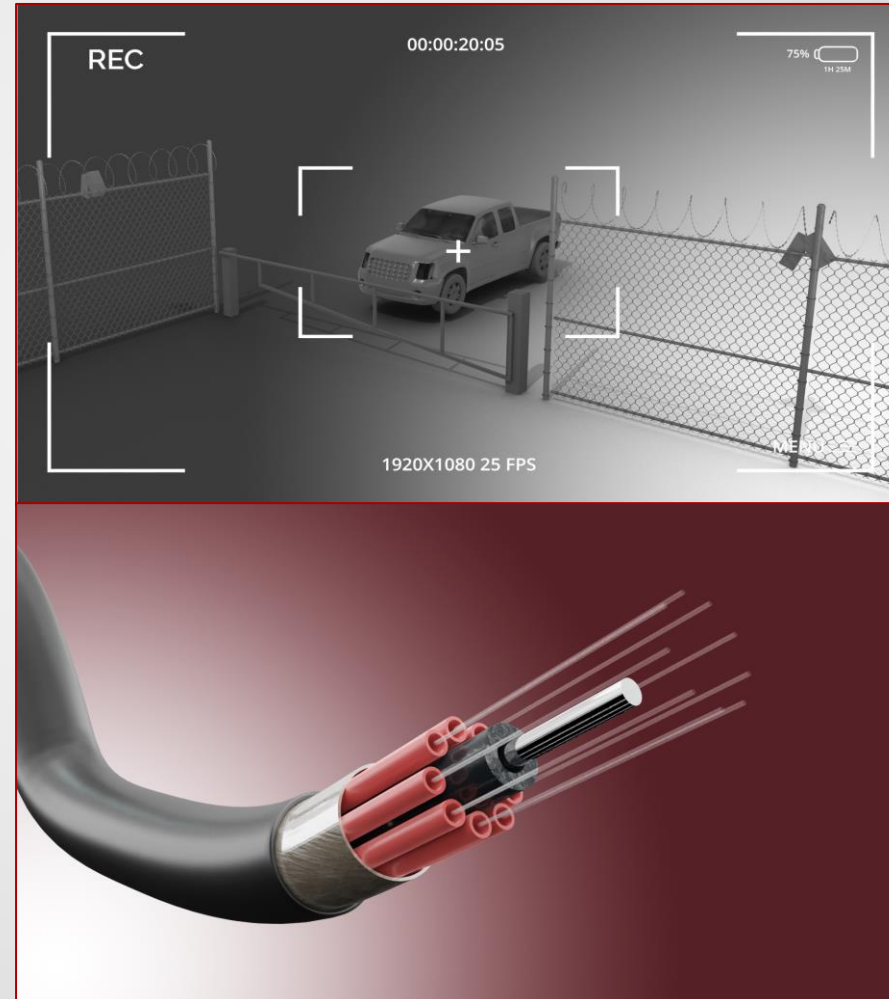
Redundancy & Information Protection

- ▶ Our FOSM features the possibility of the additional of reserve VOSK units. These units would be programmed to take over operations instantly if the main units were to suffer critical failure. The information from the original units is constantly backed up, therefore no loss of data would occur
- ▶ Additionally, since the range of VOSK-A is greater than the perimeter of most guarded objects, we recommend 'looping' one of the FOC lengths and connecting it to the second emitter. This allows for light signals to be sent and received at both end of the cable. Therefore, even if a cable break occurs, the system will not lose any operational capability
- ▶ As previously mentioned, our system uses a closed VOSK Server without an open connection to the net, meaning sensitive files cannot be compromised by hacking, unless there is physical access to the VOSK units. For remote monitoring, we offer the option of cable connected monitoring, however, if this is not available, we offer encryption devices, which would encrypt sent data and decrypt the data on the receiving end

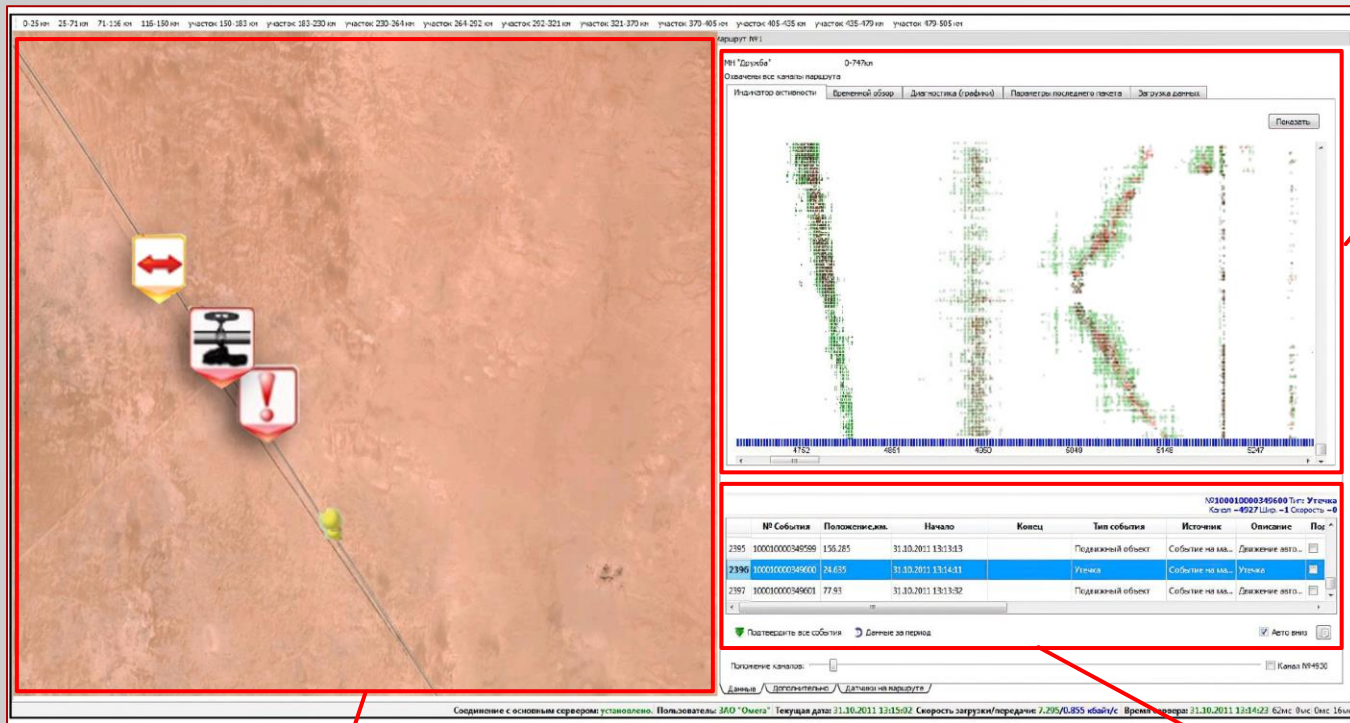


Integration

- ▶ Our system uses OPC as its base protocol system. This allows for the system to be integrated into existing monitoring systems such as CCTV or Infrared Sensors and existing SCADA programs
- ▶ The software used by our VOSK modules is designed and produced by Petrofibre. If the client requests the protocol to be changed to suit their needs and requirements, this possibility exists
- ▶ Moreover, since our system uses a limited amount of strands in the FOC, the remaining strands are at the disposal of our client for transmitting communications, or to integrate additional monitoring instruments



Operational Display Examples



Map showing positioning of FOC. Once an event occurs, it is classified and displayed on the map with an accuracy of 50 meters +/- . In the given example the right icon represents activity with tools, the centre icon represents a leak and the left icon represents vehicle movement detection. The icon will follow the detected intruder on the GPS Map.

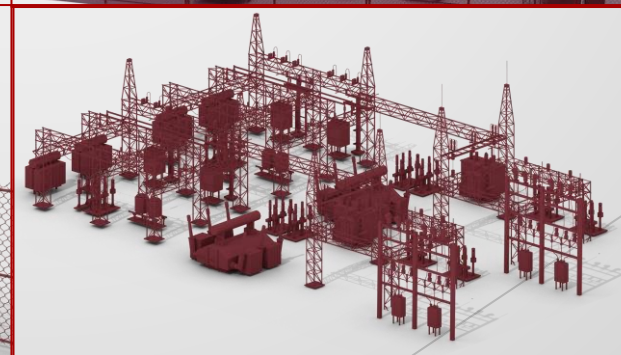
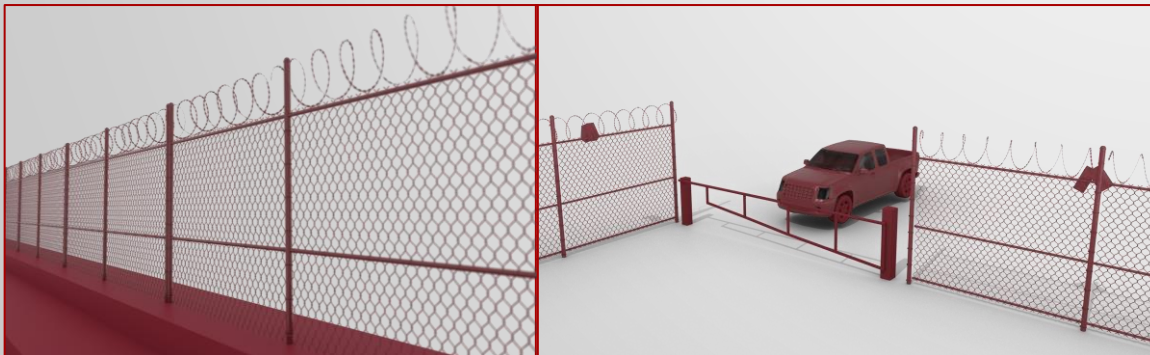
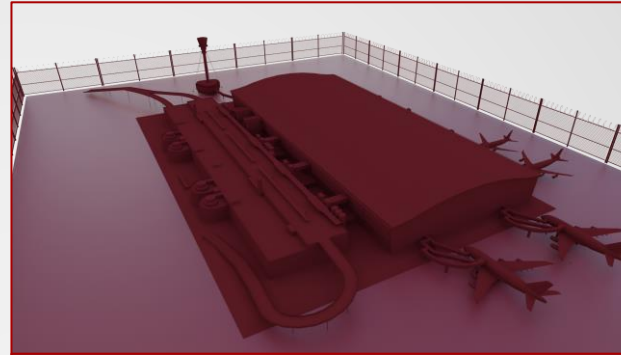
The entire display is fully customizable to the user's preference. Current display shows use of acoustic and temperature units on a pipeline

Activity Graph – each microevent is registered with a mark on the graph. The X Axis shows the location along the FOC route, the Y Axis shows the duration of the event. In the given example, the left column of activity shows attempted work with tools (minor positional change and heavy vibro-acoustic activity), the central column shows a leak in progress (no change to position of activity, constant activity) and the right column shows a vehicle approaching the FOC and moving away (change in activity position in relation to time). The system will classify the activity and provide a reliable output on activity type

Events Log – each activity is registered and stored for a minimum of 2 years. The operator is required to enter the decisions made when an event has occurred, leading to an increase in accountability

Operational Requirements

- ▶ The system can tolerate up to 80°C thanks to our All Weather Field Cabinet (AWFC). The system also requires minimal maintenance – a simple dust off twice a year is sufficient
- ▶ Our FOC cable requires no power to operate, consequently it is electrically passive. The VOSK unit required a power source of 200VA (Maximum)
- ▶ For IDS applications, we would typically place the units in the onsite server room or control building



Main Benefits of System Use

- ▶ Increase in the safety and awareness of the guarded perimeter by providing reliable data in real time
- ▶ Increased response time and effectiveness due to system's accuracy and by being able to classify incidents, reacting with precision and stopping intrusion attempts at the earliest possible stage
- ▶ Monitoring method not based on individual sensors, nullifies false alarm incidents, results in a more efficient flow of operations with minimal shutdown time
- ▶ Ability to integrate – provides the opportunity to incorporate into existing SCADA & Monitoring units and monitor multiple perimeters, from one location
- ▶ Electrically passive and will not be deterred by electrical equipment on site
- ▶ Provides high redundancy and is able to fully function even when cable is cut – security is not compromised
- ▶ Adaptable to any perimeter layout
- ▶ Ability to program zones and multi layered defence method
- ▶ Provides safeguarding for collected data and immune to hacking attempts
- ▶ Multifunctional
- ▶ Low maintenance and operational costs
- ▶ A redundant and innovative solution

Competitive Advantage

Technological Advantages

- ▶ More accurate and precise data
- ▶ Redundancy and reliability
- ▶ Significant reduction in false alarm incidents
- ▶ Multifunctionality
- ▶ Integration and connectivity
- ▶ Flexibility and adaptability
- ▶ Low operational costs and maintenance
- ▶ Informational safety

Service Advantages

- ▶ We build to customer specification – unique and custom fitted design, engineering and technical solutions for any of our client's needs
- ▶ We offer a 2 year warranty period for any damaged or malfunctioning units
- ▶ Our aftersales services include full technical installation and training sessions for system operators
- ▶ Quick and effective tech-support and spare parts package