



SecureGas

Securing the European Gas Network



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SecureGas extended components



SecureGas Components

Technologies for situational Awareness and Decision Support for Cyber-Physical Threats

- Safety and Security platform for Gas CI (LDO)
- Autonomous docking station and UAV based asset management (ADPM)
- Onshore Landslide Susceptibility and Alert/Monitoring System (RINA-C)

Technologies for information processing and management

- Cyber physical correlator (WINGS)
- Blockchain for data transmission and integrity verification (GT)
- Cyber Security for IT and OT networks weakness (ELBIT)
- WINGS Platform (WINGS)

Technologies for detection, identification and early warning

- Distributed Acoustic Sensing (DAS) for monitoring of leakages and third party intrusion in Oil & Gas pipelines (RINA-C)
- Cognitive framework for biometrics and video analytics (IDMG)
- Combined analytics for biometrics and video analytics (INNOV)
- Sensors for detection, identification and early warnings (WINGS)

Technologies for Joint Cyber-Physical Security Risk Management and Resilience Modelling

- Cyber-Physical Security Risk and Resilience Modelling and management (EXUS, GAP)
- Gas Network Advanced Modelling and Fast-Dynamics Simulation (FHG, JRC)
- Risk-Aware Information to the population (INNOV)

Distributed Acoustic Sensing (DAS) for monitoring of leakages and third party intrusion in Oil & Gas pipelines

DESCRIPTION

The Distributed Acoustic Sensing (DAS) component is able to detect third-party Interference (TPI) actions (e.g. intrusion in protected areas and soil, impacts, leakages, drilling, digging etc.).

The system is based on DAS technology, which converts a fibre optic cable, laid along the pipeline, into an array of virtual microphones.

The technology is immune to linear variation along the length of the sensor (strong signals near the sensor do not prevent distant quiet signals further along the sensor from being received), immune to external jamming or interference from electromagnetic radiation and intrinsically safe, as it involves no active electronics or electrical signal. The optical fiber is inert and no power is required along the entire sensing length, but only at the interrogator unit.

The system can be integrated in the SCADA system of the asset owner.

The in-service system reports to the operator the presence of specific activity taking place at any monitored point along the asset. Live acoustic feedback can allow the identified activity to be listened to in real time. Typical raw data output from the DAS system are in form of spectrograms and waterfall display, showing the acoustic parameters along distance and time. Proper calibration of the system is necessary in order to associate the “listened” noise to the specific event occurring (classification of the events); this will be achieved by means of specific “known” events, artificially generated at known positions, and consequent signal post-processing.

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BENEFITS

Typical advantages of optical fiber technologies are:

- a) **high resolution, dynamic range and accuracy;**
- b) **immunity to electromagnetic noise;**
- c) **time stability;**
- d) **low signal attenuation;**
- e) **low intrusiveness.**



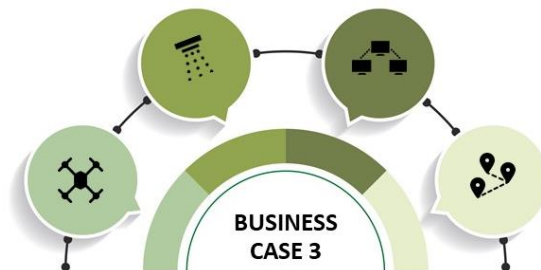
The key benefit of the proposed system is the detection, classification and geo-localization of third-party damages, fluids leaks and ground motion along hundreds of kilometers, in quasi-real time and with an unprecedented level of spatial resolution (below 10 m).

The system can exploit already existing optical fiber infrastructure, typically installed adjacent to the pipeline for communication purposes, allowing users to monitor long linear assets in quasi-real time.

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APPLICATION CASE

- **Business Case 3**



TARGETS

- **Target End Users:** Oil and Gas operators
- **Target Assets:** Oil & Gas infrastructure and any kind of application connected to the monitoring process (e.g. highway traffic monitoring, intrusion prevention monitoring of important sites).



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