LOADSENSING

Star Wireless Monitoring System

Long-range radio data acquisition systems are a new tool in the geotechnical and structural monitoring world. The Loadsensing (LS) systems help users:

- Better manage their structure or project by providing data from the instruments of their choice;
- Improve the protection of large structure by connecting large arrays of instruments;
- Lower costs by connecting instruments over long distances without the need for cabling.

LS package:
node, gateway, Android device and visualization platform (RDMS)

Why use LOADSENSING?

Engineers and project owners can obtain long-term, reliable, and more comprehensive coverage of the structures or areas they wish to monitor at a lower cost. While the DL Series can connect a large number of instruments in a small area more efficiently, difficulties quickly arise when projects contain large areas or structures. The cost of running instrument cables in large-scale instrumentation projects is often prohibitive and becomes a deterrent to the installation of robust and thorough monitoring systems. Deploying the LS and taking advantage of its kilometer-range radio reduces costs for a wide range of projects.

How do they work?

GEO-Instruments' long-range systems integrate a new high-range, low-power radio with state-of-the-art geotechnical sensors. The system is built around a nodes-gateway structure. Instruments are directly wired connected to nodes, which acquire and transfer data over long distances to a gateway where all data is centralized and accessible.

Example applications

Mine tailings

Mine tailings often require a large number of instruments spread out over a large area. A common situation is to have wells instrumented with piezometers along a several-kilometer-long dike. Using the LS makes it possible to cover distances up to 15 km (with a free line of sight) to transmit measurements to a base station.

Structural health

Structures such as bridges, railways, and highways often span long distances. With the LS, a wide range of instruments, including tiltmeters and settlement systems, can all be linked to a central station (the gateway).

Urban tunneling

Large tunnels in urban environments can pose challenges with regard to the protection of surrounding buildings. To monitor their effects, a large number of instruments, such as tiltmeters, are attached to buildings and structures. Running cables up and down buildings and across streets back to a central logger is expensive and sometimes simply not possible. Implementation of an LS system can cover a large number of buildings in a 600 square kilometer area for a fraction of the cost of standard instrumentation.

Technical Features

LOADSENSING

Gateway

The gateway receives data and coordinates the nodes in its network. Up to 100 nodes can be connected to a single gateway. Its large on-board memory can store years of readings.

It hosts a cellular modem, ensuring permanent connectivity. The gateway regularly uploads its data GEO-Instruments' servers for analysis and visualization on our remote data management server (RDMS).

Nodes

Nodes contain an on-board circuit that performs measurement on many types of instruments. They hold several years' worth of data.

They can be connected locally and configured using a USB cable and an Android application. During deployment, this application provides immediate information on radio signal strength back to the gateway, eliminating all the risk of installing a radio-enabled system with a signal that is too weak.

Options

Local data logger

Nodes can be used as a local data logger system without the use of a gateway to remotely retrieve data. This cost-effective option is convenient for localized monitoring where real-time is not required.

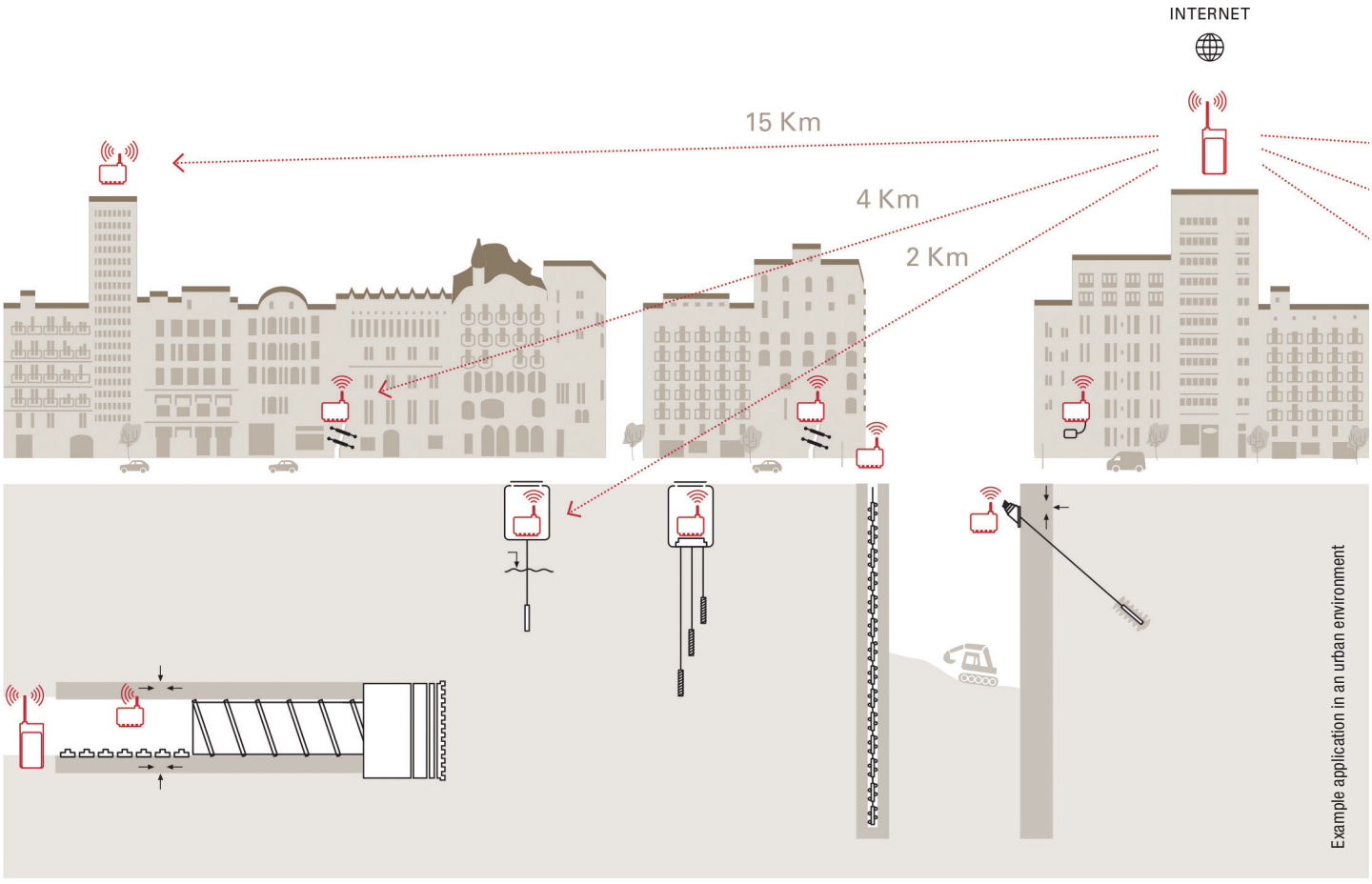
Gateway Connections

In most applications, the data is uploaded by the gateway through its on-board cellular modem.

Other connection options, such as a direct local connection or connection through a company network, are available for the gateway.

Gateway Power

The gateway is powered by a solar panel and battery or 120-220 V AC.



Technical Information

Battery life

Up to 10 years

Data storage

Each node can store up to 200,000 readings.
The gateway has 8 Gb of on-board memory.

Radio range

Up to 15 km

Temperature range

-40 to 50 °C

Environmental protection rating

IP67

Compatible instruments

Vibrating wire instruments (1- and 5-channel options)

Analog instruments (4 channels)

- Thermistors
- RTDs
- Bridge Strain gages
- Thermocouples
- Potentiometers
- ±10 V
- 4-20 mA

Digital Instruments

- SAA
- Geokon
- Geosense
- Sisgeo
- MDT

Vibrating wire Node

Excitation voltage: ..... ±5 V
Measurement range: ..... 300 to 7000 Hz
Resolution (-40 to 85 °C): ..... 0.12 Hz
Accuracy (-40 to 85 °C): ..... 0.018% FS

Thermistor

Measurement range: ..... 0 Ω to 4 MΩ
Resolution: ..... 1 Ω
Accuracy (20 °C): ..... 0.05 °C

Barometer

Pressure range: ..... 300 to 1100 hPa

Tiltmeter Node

Type: ..... MEMS (Micro-Electro-Mechanical System)
Inclinometer Range: ..... ±15°
Accuracy (±5°): ..... 0.003°
Accuracy (±15°): ..... 0.001°
Resolution: ..... 0.001°
Repeatability: ..... 0.002°
Axes: ..... Biaxial
Temperature sensor resolution: ..... 0.1 °C
Temperature sensor accuracy: ..... ±0.5 °C

Analog node

Power supply:
5 V DC / 12 V DC / 24 V DC up to 60 mA selectable for each channel

Voltage

Measuring ranges [V DC]: ..... ±10; ±1.25
Accuracy (-40 to 85 °C): ..... ±0.05% FS

Current loop (2-3 wires)

Measuring range: ..... 4-20 mA
Accuracy (0 to 50 °C): ..... 0.05% FS

Potentiometer

Accuracy (0 to 50 °C): ..... ±0.02% FS

Full wheatstone bridge

Accuracy (0 to -50 °C): ..... ±0.1% FS

Thermistor

Accuracy (0 to 50 °C): ..... ±0.2 °C

PT 100

Accuracy (20 °C): ..... ±0.8 °C

Laser Distance Node

Built-in Tilmeter
Typical range: ..... 150 m
Typical accuracy: ..... 1 mm
Repeatability: ..... 0.15 mm

LS Wireless tiltmeter node

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