Geomotion
AUSTRALIA

loadsensing
WORLDSENSING

WIRELESS MONITORING SYSTEM

loadsensing

WORLDSENSING

THE CONNECTED INFRASTRUCTURE SOLUTION
MONITORING HOW STRUCTURES EVOLVE

Loadsensing is a data acquisition and monitoring system which combines state-of-the-art wireless monitoring and advanced software tools. It is widely recognized as the leading solution for connecting and monitoring infrastructures in remote locations.

Loadsensing devices are battery-powered and equipped with long-range, low-power wide area network (LPWA) radio communications and are compatible with a wide range of geotechnical sensors. The software suite is web-based and facilitates real-time data capture and analytics. It is also possible to set automatic alarms to make operations safer.

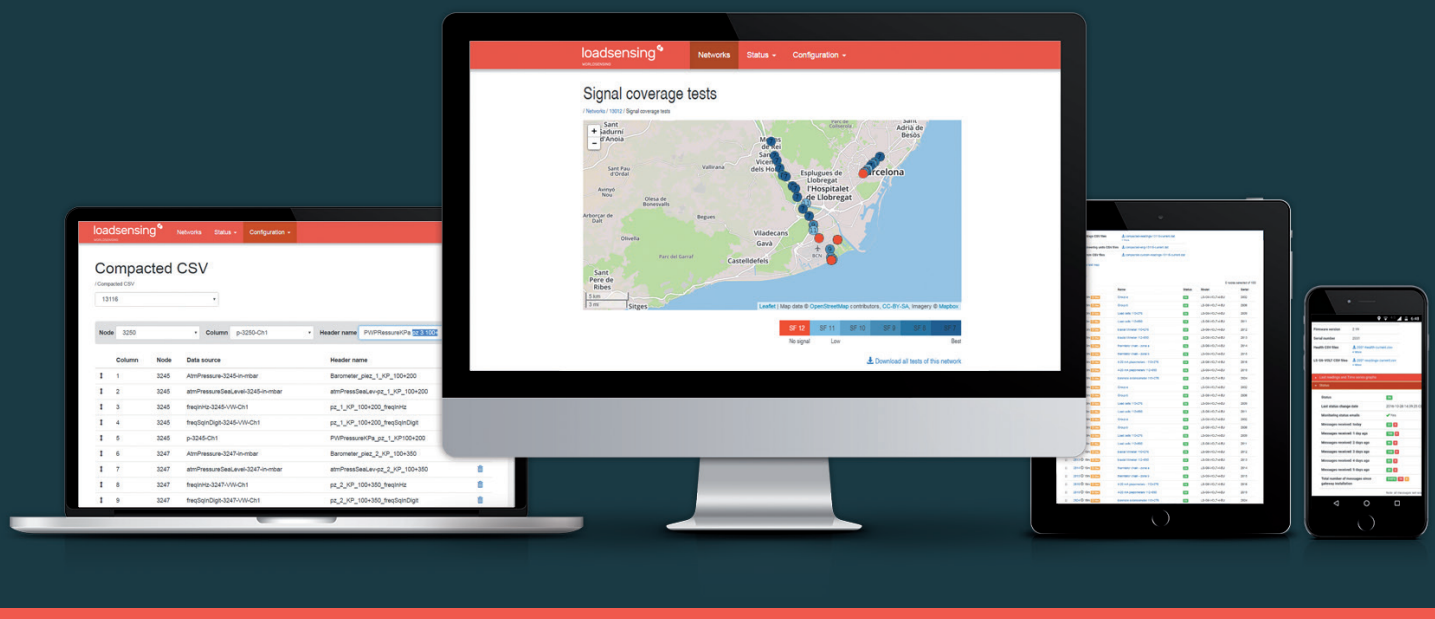
Mining and construction companies and operators of bridges, tunnels, dams, railways and many other inaccessible assets can now work with reliable data. Having access to this information and real-time insights enables operators to anticipate needs, manage their workforce, diminish risks, and even prevent disasters.

FEATURES

- Long-range communication of over 9 miles / 15km
- Truly low-power, 10 years of unattended runtime
- Wireless LPWA communication
- Supports most structural and geotechnical sensors (vibrating wire, digital, analog)
- Wireless tiltmeter
- Integrated alarm system
- User-friendly web software

BENEFITS

- Leverage already formatted data to optimize operations
- Remotely monitor hard-to-access infrastructures
- Cover a wide area with geotechnical sensors
- Easily add sensors to extend measurement range
- Save resources through fast implementation
- Decrease costs through easy maintenance
- Diminish risks and make operations safer

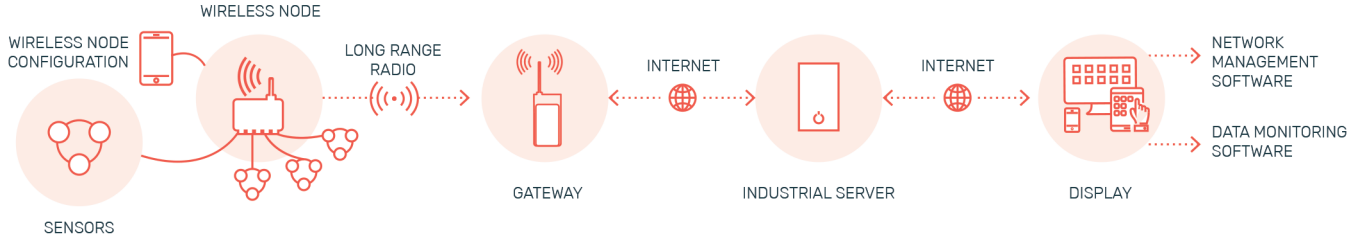


SOFTWARE SUITE - GEOMOTION CLOUD

NETWORK AND ASSET MANAGEMENT SOFTWARE
Network communications configuration and control
Wireless data unit and sensor attributes display
Wireless data unit configuration
Sensor data in near real time
Conversion of raw sensor data in engineering units
Manual and automatic data download in .csv
Data transmitted in a secure manner
Remote change of sensor's sampling rate
Data accessible through Modbus TCP
Able to push data on user FTP

DATA MANAGEMENT SOFTWARE
Sensor data visualization and download (tables and graphs)
Topological view
Creation of virtual variables
Configuration of alarm thresholds
Alarms sent to stakeholders by email
Automatically generated reports (tables, graphs and notes)

HOW IT WORKS



Operational Intelligence for Mines and Industrial Companies

Worldsensing is not only among the best in the world at connecting distributed infrastructures with smart devices, we also know how to extract intelligence from collected data to transform operations. Our software solutions combine location intelligence with infrastructure monitoring.

NODE: LS-G6-INC15
BOX DIMENSIONS (WxLxH): 100x100x61 mm
OVERALL DIMENSIONS: 150x120x61 mm (excluding antenna)
EXTERNAL ANTENNA: 100 mm length (including connector)
HOUSING MATERIAL: Aluminium alloy
Internal C-size 3.6 V High power batteries, from 1 up to 2 batteries

NODE: LS-G6-VW-1P (POLYCARBONATE)
BOX DIMENSIONS (WxLxH): 151x80x60 mm
OVERALL DIMENSIONS: 160x85x60 mm
INTERNAL ANTENNA
RADIO COVERAGE: 60 % of the achieved with the external antenna
WITHOUT GROUNDING
HOUSING MATERIAL: Polycarbonate
Internal C-size 3.6 V High power batteries, 1 battery

WIRELESS TILTMETER
LS-G6-INC15

APPLICATIONS

Remote tilt monitoring from retaining and building walls
Landslide monitoring
Bridge pier monitoring
Structural load monitoring
Ground subsidence

SPECIFICATIONS

Type:	MEMS (Micro-Electro-Mechanical) Inclinometer
Range:	± 15°
Accuracy (± 5°):	0.03% FS / 0.004°
Accuracy full range:	0.17% FS / 0.025°
Resolution:	0.001°
Repeatability:	0.005°
Axes:	Two (biaxial)
Temperature sensor resolution:	0.1 °C
Temperature sensor accuracy:	±0.5 °C

BATTERY LIFE ESTIMATION Wireless tiltmeter

SAMPLING RATE	Barcelona temperature profile*	Singapore temperature profile*
5 min	1.2 years	1.1 years
1 h	5.8 years	4.7 years
6 h	8.3 years	6.4 years

* Estimations for 2 x saft LSH 14 batteries

VIBRATING WIRE 1ch and 5ch NODES
LS-G6-VW-1P, LS-G6-VW-1M, LS-G6-VW-5

VIBRATING WIRE NODE 1ch and 5ch

VIBRATING WIRE	
Measurement method: Embedded algorithms increasing immunity to noise	
Excitation wave:	+/- 5 V
Measurement range:	300 to 7,000 Hz
Resolution (-40 to +85°C):	0.12 Hz
Accuracy (-40 to +85°C):	0.018 % FS
THERMISTOR	
Measurement range:	0 ohm to 4 Mohm
Resolution:	1 ohm
Accuracy (20°C):	0.05°C (0.04 % FS)
BAROMETER	
Pressure Range:	300 to 1,100 hPa
Relative Accuracy (950 to 1,050 hPa at 25°C):	±0.12 hPa

BATTERY LIFE ESTIMATION Vibrating wire nodes

CHANNELS & SAMPLING	BATTERIES*	BATTERY LIFE ESTIMATION*
1 CH 5 min	1 cell	0.9 years
1 CH 1 hr	1 cell	3.5 years
1 CH 6 hr	1 cell	4.6 years
5 CH 5 min	4 cells	2.2 years
5 CH 1 hr	4 cells	7.1 years
5 CH 6 hr	4 cells	>10 years

*Estimations for Saft LSH 14 batteries. Typical Europe radio configuration. Spreading factor 9, radio transmit power 14dBm. Considering laboratory conditions. Consumption varies depending on the sensor used, sampling rate and environmental and wireless network conditions.

Nodes: LS-G6-ANALOG-4, LS-G6-DIG-2 and LS-G6-VW 5 ch
BOX DIMENSIONS (WxLxH): 100x200x61 mm
OVERALL DIMENSIONS: 140x220x61 mm (excluding antenna)
EXTERNAL ANTENNA: 114 mm length (including connector)
HOUSING MATERIAL: Aluminium alloy
Internal C-size 3.6 V High power batteries, from 1 up to 4 batteries

NODE: LS-G6-VW-1M (ALUMINIUM)
BOX DIMENSIONS (WxLxH): 100x100x61 mm
OVERALL DIMENSIONS: 140x120x61 mm (excluding antenna)
EXTERNAL ANTENNA: 114 mm length (including connector)
HOUSING MATERIAL: Aluminium alloy
Internal C-size 3.6 V High power batteries, 1 battery

ANALOG NODE
LS-G6-ANALOG-4

ANALOG NODE 4ch

Each channel is individually configured by the user

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 (8x)

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 (POT)

Accuracy (0 to +50°C): +/- 0.02 % FS

FULL WHEATSTONE BRIDGE (FWB)

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

BATTERY LIFE ESTIMATION **

Channels & Sampling	Current @12V@24mA	Current @24V@24mA	Voltage @12V@24mA	FWB@5V@0.7 k	Pot@5V@1.5 k
Warm up time	1 second	1 second	1 second		
1 CH 5 min	6 months	4 months	5 months	1.5 years	1.5 years
1 CH 6 hours	>10 years	>10 years	>10 years	8.5 years	>10 years
4 CH 5 min	1.5 months	39 days	2 months	1.5 months	7 months
4 CH 6 hours	8 years	6.5 years	>10 years	8.5 years	>10 years

** Estimations for 4 x saft LSH 14 batteries.
Considering laboratory conditions

DIGITAL NODE
LS-G6-DIG-2

DIGITAL NODE

One RS485 channel and two SDI-12 channels

Power supply: 12 V DC up to 120 mA

RS485 full or half duplex supported

Suitable for a chain of in-place inclinometers

Modbus RTU RS485

Supported sensors: RTS, Sisgeo and Geosense digital inclinometers

BATTERY LIFE ESTIMATION **
RST and Sisgeo chains of Inclinometers

Number of sensor	Sampling rate		
	6 hours	30 minutes	3 minutes
10 (RST)	>10 years	2.5 years	4 months
30 (RST)	5.2 years	4 months	26 days
10 (SISGEO)	4 years	5 months	30 days

SHARED SPECIFICATIONS

INTERNAL DATA STORAGE

Up to 72,500 readings including time and 5 sensors

Up to 200,000 readings including time and 1 sensor

Sampling rate: 30 seconds to 1 day

Time synchronization by radio: Time discipline better than ± 10 seconds

Operating temperature: -40°C to 80°C (-40°F to 175°F)

Weather protection: IP67

ACCESSORIES

ACCESSORIES

Saft LSH 14 C-size spiral cell

Node-mobile cable

External mounting brackets for wall mounting

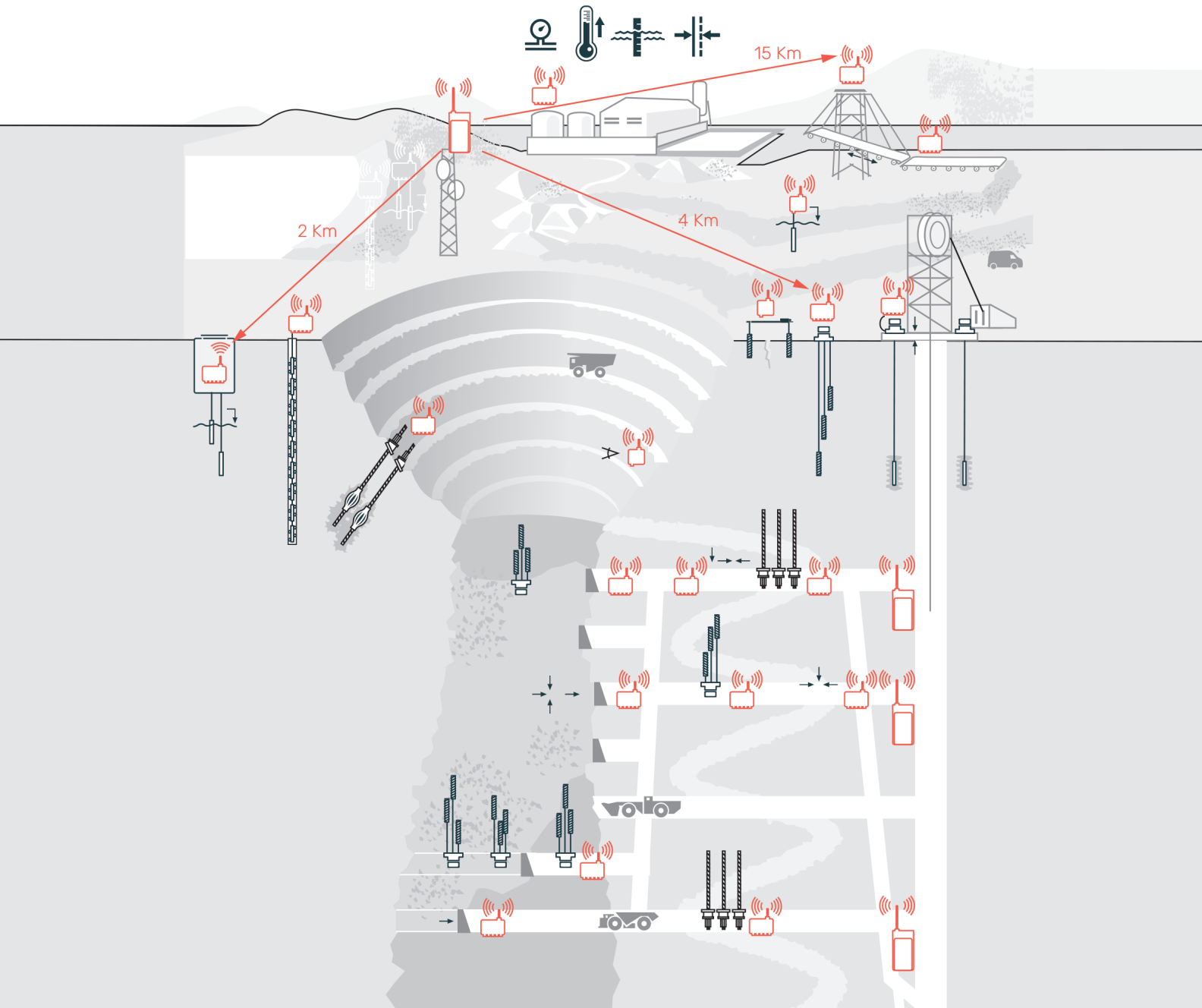
Plate for pole mounting

Tiltmeter horizontal mounting plate

Tiltmeter vertical mounting bracket

Specifications are subject to review and change without notice

HOW IT WORKS IN MINES



CONFIGURATION APP

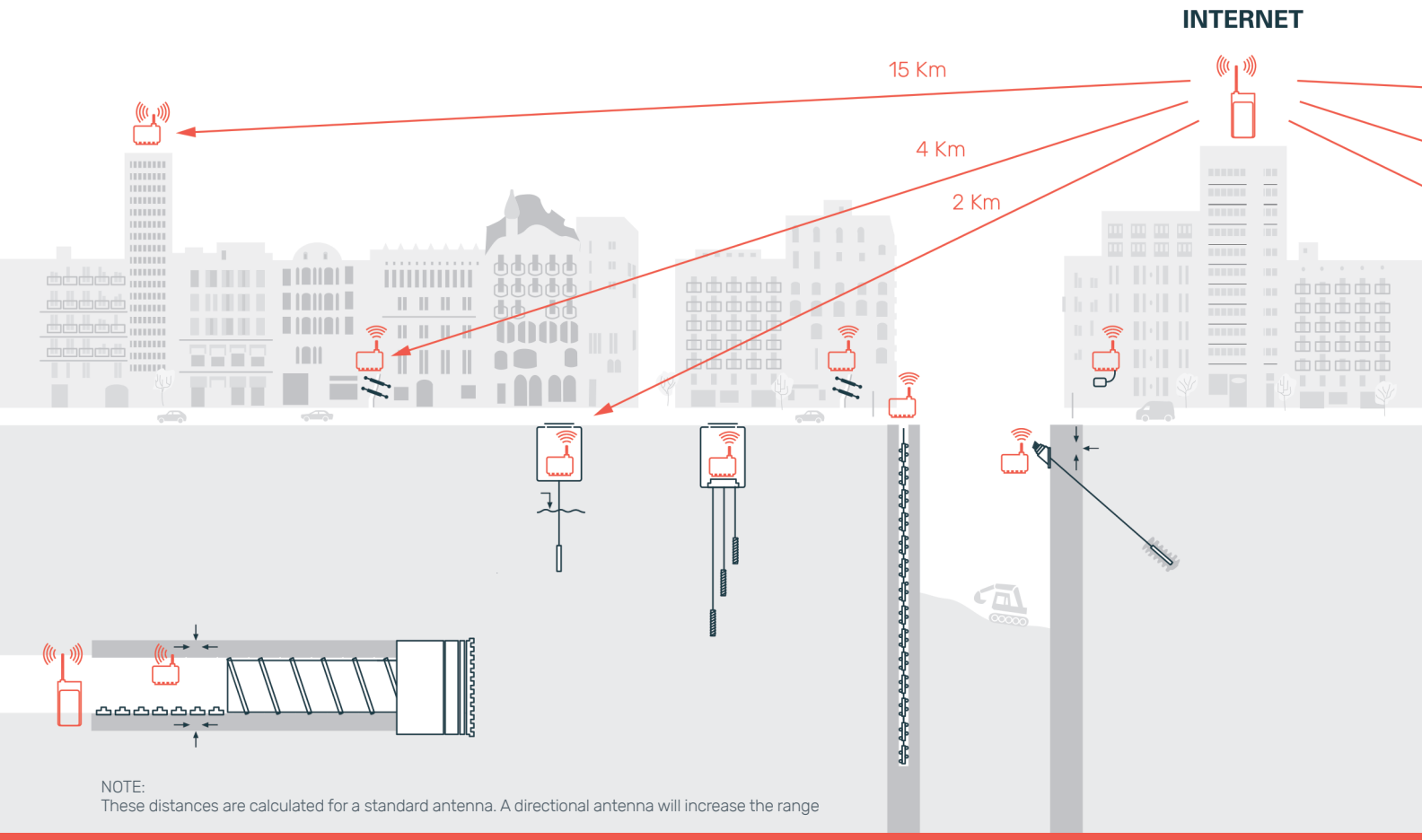
DLOG APP
Simple and fast connection to wireless node
Runs on Android devices
Easy sensor configuration: ID, sampling rate, frequency sweep, interface type, etc.
Checks radio signal coverage
Records coordinates (GPS)
Downloads data from wireless node and sends by e-mail or saves it on the Android device
Takes current reading
Updates wireless node firmware

GATEWAY

BASE STATION
ISM Sub 1 GHz band, sensitivity: down to -137 dBm
Detachable omnidirectional ½ dipole
Integrated GPS antenna
GNSS High Sensitivity GPS module
POWER
Power supply: 48 V DC PoE
Nominal: 3 Watts
DC power supply (ex.: solar panel use): 11 to 30 Volts
MECHANICAL
Size: 210 x 310 x 170 mm, including mounting kit
Weight: 2 kg including mounting kit
IP67 rating
Operating range: -20 to + 60 °C
NETWORK INTERFACES
10/100 Ethernet WAN (RJ45 PoE)
Integrated 3G Modem & Antenna (HSDPA, EDGE, GPRS) quad band

LS gateways:
868 MHz ISM band
915 MHz FCC ISM band
915-928 MHz ISM band

HOW IT WORKS IN CITIES



RADIO & APPLICATIONS

LONG RANGE RADIO	
OPEN FIELD:	15 km
CITY STREET:	4 km
MANHOLE IN A CITY STREET:	2 km
TUNNEL:	4 km

RADIO SPECS
ISM sub 1 GHz operating frequency bands adjustable to each territory requirements
No repeaters needed
High sensitivity: down to -137 dBm
Transmission: +14 dBm high efficiency / +20 dBm
Maximum link budget: 151 dB / 157 dB
Remote sampling rate change
Bidirectional communications capabilities

WORLD SENSING
CONNECTED OPERATIONAL INTELLIGENCE

Geomotion
AUSTRALIA

BARCELONA
Viriat 47, Edificio Numancia 1, 10th floor,
08014 Barcelona, Spain
(+34) 93 418 05 85
sales@worldsensing.com
www.worldsensing.com

SYDNEY
9/31-33 Chapflffin Drffive
Lane Cove West, NSW, 2066
(+61) 2 9693 5493
salesnsw@geomotion.com.au
www.geomotion.com.au

MELBOURNE
22/15 Earsdon Street
Yarrville, VIC, 3013
(+61) 3 8060 7969
salesvic@geomotion.com.au

PERTH
2/34 Millrose Drive
Malaga, WA, 6090
(+61) 8 9284 0244
sales@geomotion.com.au