

DATA SHEET



Nodes



Gateway

WIRELESS MONITORING SOLUTION (RF)

*For Geotechnical, Structural
& Environmental Sensors*

OVERVIEW

Wireless sensor network are vital in monitoring construction sites, large structures and landslide areas. They are extensively used in applications where geotechnical and other sensors are used for data collection and transfer to a central server for access by multiple users.

Encardio-rite offers an innovative long range radio network solution that allows real-time monitoring of geotechnical and structural sensors in challenging conditions with reliable data transfer without any delay. With real-time data collected from the wireless system, the project owner, consultants and contractors remain aware of the slightest change in the data. Early warning system allows timely decisions, increased safety, reduction in project delays and consequently cost effectiveness.

FEATURES

- Provides reliable and high resolution readings with long term stability
- Innovative wireless data collection protocol that provides seamless connectivity in large sites and tunnels
- Easy to install and monitor hard to access sites and tunnels remotely
- Wireless data transfer over long distances
- Battery life 6 – 60 months depending upon application.

APPLICATION

- Critical applications where real time monitoring and early warning is required in order to protect life and valuable assets.
- Large civil engineering projects
- Dams, barrage, mines, tunneling, structural, landslide, bridge monitoring
- Deformation of embankment retaining wall monitoring



WIRELESS SYSTEM

In our end-to-end wireless monitoring system, the sensors are interfaced with the long range, low power wireless network through nodes that send recorded data to the Gateway with utmost reliability. Gateway uploads the collected sensor data to the central/cloud server.

The long range radio frequency based wireless data collection network provides complete automation of monitoring with seamless connectivity in large construction sites, tunnels and landslide projects. The wireless system eliminates the need for running lengthy cables. It is especially useful at locations where sensors are distributed over wide areas and running cable lengths to long distances can be tricky and/or at locations where construction activity can damage the running sensor cables.

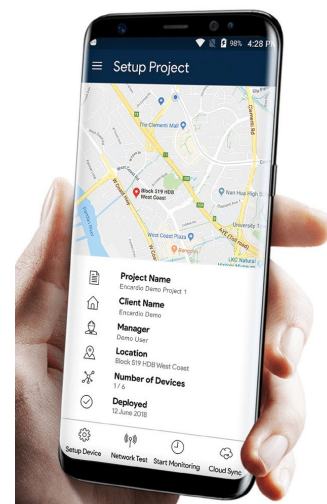
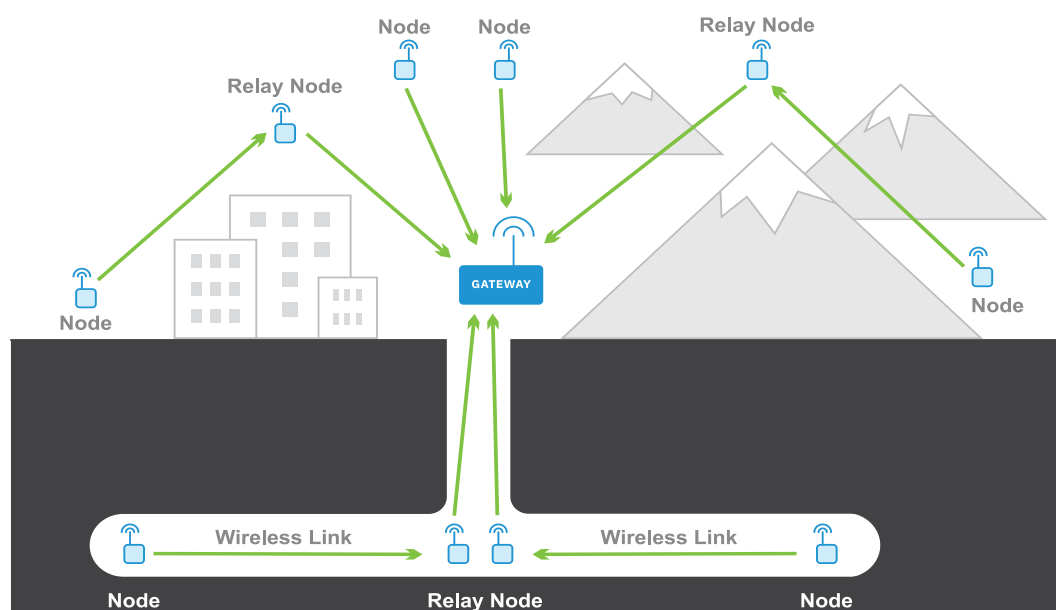
Encardio-rite wireless system is a highly scalable system. It allows client to add or replace nodes in an ongoing project, without compromising data integrity.

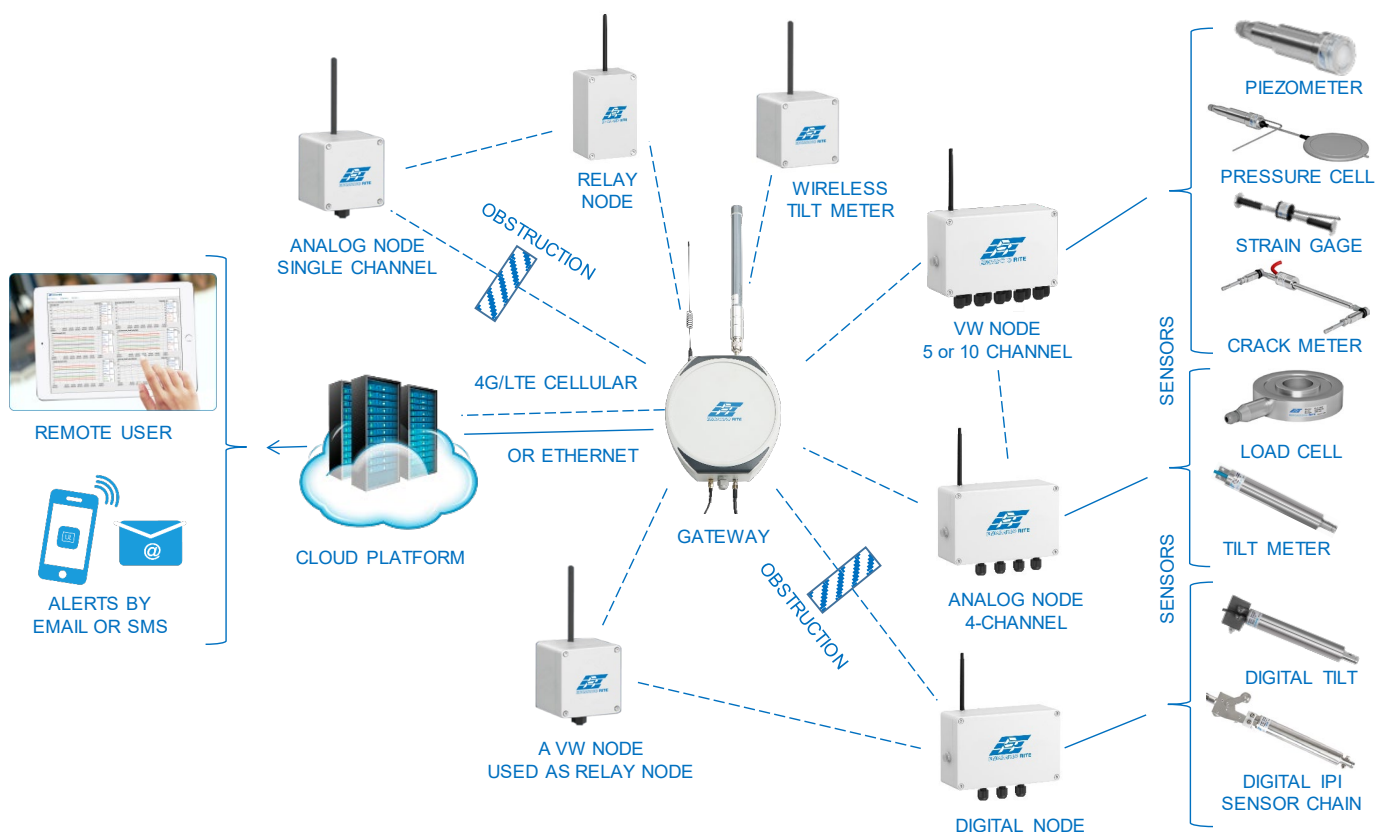
The nodes can be configured to scan and transmit data at any frequency between 2 minutes to 2 hours, depending on site requirements. The system automatically mitigates well-known wireless problems like signal blockages and interference, allowing the sensors to reliably send their data to the gateway every time. Every single radio transmission in the system is secured using AES-128 encryption to maximize security of the sensor data gathered by the system.

Encardio-rite offers following range of wireless products:

EWN-01V	Vibrating wire node - 1 channel. To be used with vibrating wire sensor
EWN-05V	Vibrating wire - 5 channel. To be used with vibrating wire sensor
EWN-10V	Vibrating wire - 10 channel. To be used with vibrating wire sensor
EWN-01D	Digital node. To be used with SDI-12 interface sensors
EWN-01A	Analog node - 1 channel. Suitable for sensors with millivolt, voltage, 4-20 mA, wheatstone bridge outputs
EWN-04A	Analog node - 4 channel. Suitable for sensors with millivolt, voltage, 4-20 mA, wheatstone bridge outputs
EWN-01R	Relay node. To enhance range of any node
EWG-01	Gateway. To collect sensor data from nodes, upload collected data to Encardio-rite cloud server or a third party server
EAN-95MW	Wireless tilt meter. It is a complete unit including the sensor and the node

Model EWG-01 gateway acts as a network node for communication with different types of nodes (vibrating wire, analog, digital and relay nodes) having altogether different transmission protocols.





CONFIGURATION AND DATABASE MANAGEMENT SOFTWARE

A cloud-hosted data management and configuration software is provided to manage the wireless network. The configuration can be done with an easy to use smartphone application that comes free with the system.

The application provides step-by-step instructions. It also displays whether the radio signals or battery strength is good enough.

NODES

Encardio-rite nodes are designed to expand the data collection possibilities from geotechnical and structural sensors via wireless network.

The wireless node is a highly integrated system which collects sensor data and transmits measurements through long range radio frequency wireless communication network to the Gateway. The node basically consists a radio-transceiver with an antenna, a microcontroller, an electronic circuit for interfacing with the sensors and an energy source.

The node is tested in terms of its measurement precision and its wireless communication performance. It is housed in a rugged enclosure designed for use in harsh environments with wide temperature tolerance with resistance to moisture and humidity.

Model EWN-01V/05V/10V vibrating wire node

Model EWN-01V/05V/10V node is suitable for vibrating wire sensors. It is available in variants to connect a single (model EWN-01V) to five or ten (model EWN-05V/10V) sensors with inbuilt thermistor. The node is capable of exciting and sampling vibrating wire sensors.



VW piezometer connected to model EWN-01V vw node



Resistive strain gage type center hole load cell connected to model EWN-04A analog node



The complete range of vibrating wire sensors can be connected to wireless node including:

- Piezometer, water level sensor
- Strain gage
- Pressure cell
- Displacement sensor, extensometer, crack meter, joint meter
- Temperature meter
- Settlement monitoring sensor

Model EWN-01A/04A analog node

Model EWN-01A/04A node is suitable for sensors with millivolt, voltage, 4-20 mA, wheatstone bridge outputs.

Two variants are available to connect a single (model EWN-01A) to four (model EWN-04A) analog sensors.

The complete range of analog sensors can be connected to wireless node including:

- Resistive strain gage type load cell
- MEMS tilt meter
- Electrolytic level (EL) tilt meter
- Thermistor
- Sensor with millivolt output
- Sensor with 4-20 mA output

Model EWN-01D wireless digital node

Model EWN-01D digital node is suitable for digital sensors (with SDI-12 interface) like model EAN-52M and EAN-56M in-place inclinometer systems. It can also be connected to sensors with RS232 and ModBus/RS385 outputs.

The digital node has three channels and each channel can be interfaced with up to 32 sensors.

Model EWN-01R wireless relay node

Model EWN-01R relay nodes are used to extend the wireless range of the nodes.

Relay node is useful in situation where a node is unable to find a network path to reach the gateway, either due to long distance between them, or due to some obstruction in the line of sight. A relay node is then placed between the node and gateway to allow the node to communicate with the gateway.

GATEWAY

Model EWG-01 gateway is used as a networking device for communication with different types of nodes (vibrating wire, analog, digital and relay nodes) having altogether different transmission protocols. It is ideally installed at a location with cellular network, in line of sight of the installed nodes.

The gateway serves as an exit point/central hub for wireless data obtained from the sensors as the readings pass through or communicate with the gateway prior to being routed to a FTP or cloud server.

The gateway uploads data gathered from all the sensors to the Encardio-rite cloud server or a third party central server. In addition it passes control messages through the network to ensure seamless operation.

SPECIFICATIONS

NODE	
Internal non-rechargeable batteries	D-Cell Lithium Thionyl Chloride (Li-SOCl ₂) 3.6 V Nominal Voltage, 14 Ah batteries: 1 no. in model EWN-01V and EWN-01A, EWN-01R nodes 2 no. in model EWN-05V/10V, EWN-04A, EWN-01D nodes and EAN-95MW wireless tilt meter
Operating Temp.	-40°C to +85°C
RADIO FREQUENCY	
Radio bands	Sub-1 GHz band – complies with unlicensed ISM band specifications in most countries
Link data speed	625 bps – 2.5 kbps variable bitrate
Data security	AES128 encrypted end to end data
GATEWAY	
Nodes per Gateway	Up to 50
Power supply	12 V DC @ 2 A nominal, Solar panel
Battery	2 no. D-cell Li-SOCl ₂ 3.6 V 14 Ah batteries.
Typical current drain	200 mA typical operating current
Internet connectivity	In-built 4G modem, Ethernet



REAL-TIME WEB-BASED DATA MANAGEMENT SYSTEM

Drishti, a cloud-hosted data management software is available to process and manage the huge data collected at project site. The database management system allows analysis and visualization of the sensor data collected from project site/installation locations.

The data is accessible 24 x 7, in meaningful visual formats, to all the related authorities. The system can generate automatic reports and provide automated alerts over SMS or email for any reading crossing the pre-defined alert levels.

The data management system includes everything needed to publish monitored data in real time on internet. Users can interact with software using their web-browser, when connected to the internet, from any location in the world. It allows multiple authorized users at different locations to view any data or report from the same project site simultaneously. The real time display, graphs & reports can be viewed using popular web browsers like Microsoft Internet Explorer or Mozilla Fire Fox amongst others.

Data from Encardio-rite cloud based web monitoring service can be accessed from any type of device, like a desktop or laptop, tablet, smart phone, etc., that supports a standard web browser.

Encardio-rite cloud services work on a rental model. User has to pay a small setup fee for first time and then a monthly rental has to be paid for accessing the data over the cloud as long as required.



*All specifications are subject to change without prior

DATASHEET | 1913-19 R03.1



TUNNELS



HYDROELECTRIC



CONSTRUCTION



STRUCTURAL



METRO & RAIL



BRIDGES



MINING

Encardio-Rite Group - India | Bhutan | Bahrain | Qatar | Saudi Arabia | UAE | Greece | Spain | UK | USA

Encardio-Rite Electronics Pvt. Ltd. A-7, Industrial Estate, Talkatora Road, Lucknow, UP-226011, India | geotech@encardio.com | www.encardio.com