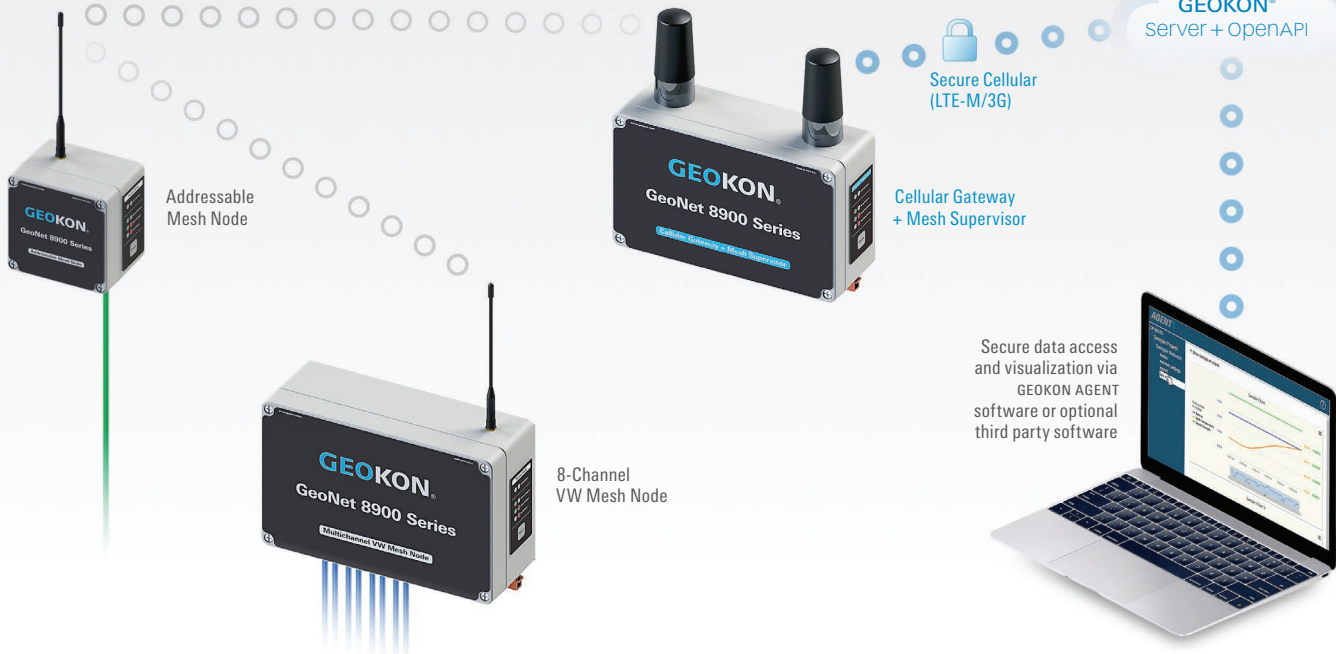


# GEONET WIRELESS DATA HOSTING SYSTEM

**GEOKON®**

## MODEL 8900 SERIES



The Model 8900 Series GeoNet Wireless Data Hosting System: a typical network configuration of Nodes, a Cellular Gateway and Cloud integration with secure data access

### APPLICATIONS

Typical applications include...

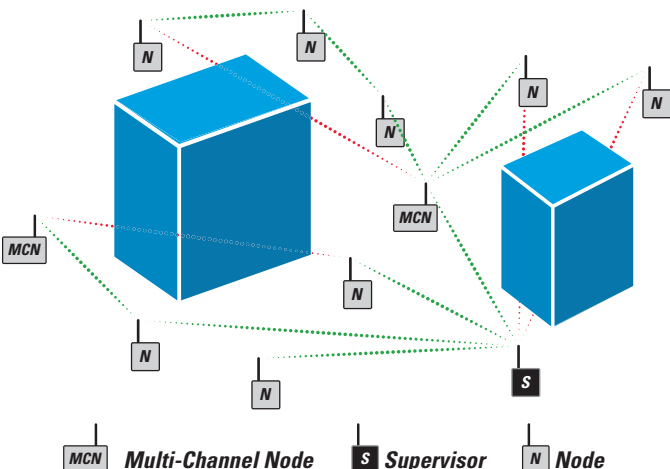
- Groundwater monitoring
- Tailings dams
- Mining/slope stability
- Structural monitoring of buildings, bridges, excavations and tunnels
- Historical structures

### TOPOLOGY

The system topology takes the form of a star, mesh, or cluster tree, with a range dependent on the region.<sup>1</sup> Multi-channel Nodes expand the capacity at each Node, thereby allowing clusters of closely spaced

sensors to be added to the system, or to add vibrating wire load cells, multi-point borehole extensometers or multi-level piezometers.

<sup>1</sup>900 MHz (North America) | 868 Mhz (Europe).  
For range information, refer to the Specifications Section



Model 8900 Mesh Topology

### INTRODUCTION

The GeoNet system consists of a Cellular Gateway + Mesh Supervisor and subordinate Nodes that supply data collected from the sensors. The Supervisor controls the network and is the aggregator of all the data from the Nodes. The Cellular Gateway transfers the collected data to a cloud-based storage platform, where it can be securely accessed for viewing or exporting. A non-cellular Supervisor is available for applications where

the data is to remain local. Tilt nodes, which combine the functionality of a biaxial tiltmeter and a GEONET node, are also available.

The system is compatible with all GEOKON Vibrating Wire instruments and addressable sensor strings (MEMS, VW, and thermistor)<sup>2</sup> Sensor cables are connected through cable glands or 10-pin bulkhead connectors.

<sup>2</sup>Other sensor types will be added in the future

### OPERATING PRINCIPLE

The GeoNet network is self-healing and will reconfigure itself, if possible, to tolerate disturbances to the physical environment or changes to the network configuration. Up to 12 networks can exist within radio range of one another by setting each to a different operating channel.

The Nodes that comprise the network

wake from sleep to communicate or collect data, and then return to sleep when finished. Nodes separated from the network will continue to collect and store data autonomously as a datalogger. When network connectivity is re-established, the data collected is transmitted to the Supervisor where it is stored. Each Node retains a copy of its data.

### COMMUNICATIONS

Configuration of the network and collection of data is accomplished via a PC client program by connecting to the network Supervisor through the GEOKON open API, over RS-232 or

USB, or network serial servers. Data collected by the network consists of instrument, Node, and network status data.

## ENVIRONMENT

GeoNet Nodes, multi-channel Nodes and Supervisors are enclosed in die-cast aluminum enclosures, which are suitable for use in harsh environments. The conductive enclosures protect the internal components and signals from outside interference and offer protection from transient events caused by nearby lightning strikes.

## POWER

The Cellular Gateway + Mesh Supervisor is powered by an AC adapter (provided), optional solar panel, or other external 12V source for ongoing usage.

Non-cellular Supervisor and Nodes are powered by two D cell batteries, either Lithium or Alkaline, or by an external source up to 12V.

## SOFTWARE

GEOKON Agent software<sup>3</sup> is used for network configuration and data collection. For systems utilizing a Cellular Gateway + Mesh Supervisor, data is stored in a cloud-based platform that can be accessed remotely. For systems without cellular capability, a direct cable connection is required to download data onto a local host computer. In both cases,

GEOKON Agent software manages the conversion of the raw data to engineering units. Data can be exported from GEOKON Agent for use in other data management applications; and configured to automatically expedite this process.

<sup>3</sup>GEOKON Agent software can be downloaded at [www.geokon.com/software](http://www.geokon.com/software)

## SUPERVISOR SPECIFICATIONS

Data Memory	32 MB
Storage Capacity	> 1.04 M Arrays
Communication Type	USB, RS-232
Communication Speed	115.2 kBits/second
Communication Parameters	8, N, 1 (data bits, parity, stop bits)
Scan Interval	10–1440 Minutes
USB Driver	FTDI
Power Supply	Battery pack, or 9-24V External (Cellular Gateway + Mesh Supervisor) D Cell, Alkaline or Lithium (2x), or 12V External (non-cellular Supervisor)
Operating Time	Please contact GEOKON
Operating Temperature	–40° C to +85° C (range varies by power source)
(L × W × H)	160 × 260 × 91 mm (Cellular Gateway + Mesh Supervisor) 120 × 122 × 91 mm (Mesh Supervisor)

## NODE SPECIFICATIONS

Data memory	32 MB
Storage Capacity	Varies by model
Trueness	0.082 Hz
Frequency Precision	±0.146 Hz (99% CI)
Frequency Resolution	±0.002 Hz
Thermistor Accuracy	1% (0.5° C thermistor point match)
Thermistor Resolution	0.032° C
Scan Interval	10-1440 Minutes
Power Supply	2x D cell, Alkaline or Lithium, 12V Auxiliary
Operating Temperature	–40° C to +85° C (range varies by power source)
VW Frequency Range	400–5000 Hz
Battery Life	Please contact GEOKON
Dimensions (L × W × H)	120 × 122 × 91 mm (single-channel, addressable, tilt) 160 × 260 × 91 mm (four-channel) 180 × 280 × 101 mm (eight-channel)

## TILT NODE SPECIFICATIONS

Precision	±26.9 Arcseconds (0.0075°)
Non-Linearity	±0.005° across ±30° range (±0.09 mm/m)
Temperature-Dependent Uncertainty	68.8 Arcseconds (0.019°)
Angle Resolution	0.9 Arcseconds (0.00025°)
Tilt Range	±90°
Axis	2

## NETWORK SPECIFICATIONS

Topology	Star/Mesh/Cluster Tree (Auto)
Radio Technology	FHSS
Radio Frequency, ISM Band	902–928 MHz (North America) 863–870 MHz (Europe) 902–906, 915–928 MHz (Brazil)
Channels	12
Range <sup>1</sup>	Up to 60 km (15 km x 4 hops) (North America, Brazil) Up to 22 km (5.5 km x 4 hops) (Europe)
Transmit Power	1 W (North America, Brazil) 20 mW (Europe)
Receiver Sensitivity	–106 dBm
Antenna (Half-Wave Dipole)	2.1 dBi (North America, Brazil) 1.6 dBi (Europe)

<sup>1</sup>Line-of-Sight, maximum 4 hops.

## ORDERING INFORMATION

Example Part Number for a Node: 8901-NA-01C-CBL

### MODEL/REGION:

8901-NA: North America

8901-BZ: Brazil

8903-EU: Europe

### NODE TYPE:

01C: Single-Channel Node

ADR: Single-Channel Addressable Node

04C: Four-Channel Addressable Node

08C: Eight-Channel Addressable Node

TLT: Tilt Node

### SENSOR CONNECTION:

CBL: Cable Gland

10P: 10-Pin

NAP: No Access Point

Example Part Number for a Supervisor: 8901-NA-LTM-USB

### MODEL/REGION:

8901-NA: North America

8901-BZ: Brazil

8903-EU: Europe

### SUPERVISOR TYPE:

LTM: Cellular Gateway + Mesh Supervisor for LTE-M networks

03G: Cellular Gateway + Mesh Supervisor for 3G networks

SUP: Mesh Supervisor (Non-cellular)

### PC CONNECTION:

USB: USB cable

232: RS-232 cable

Note: Not all models available in all areas

