GEONET WIRELESS DATA HOSTING SYSTEM

GEOKON®

Mesh Addressable Logger

Cellular Gateway

Secure Cellular (LTE-M/3G)

GEOKON® Server + OpenAPI

8-Channel Mesh VW Logger

Secure data access and visualization via GEOKON AGENT software or optional third party software

The Model 8900 Series GeoNet Wireless Data Hosting System: a typical network configuration of Loggers, 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.[1] Multi-Channel Loggers expand the capacity at each Logger, 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.

[1]900 MHz (North America) | 868 Mhz (Europe). For range information, refer to the Specifications Section

MCL **Multi-Channel Logger**   G **Gateway**   L **Logger**
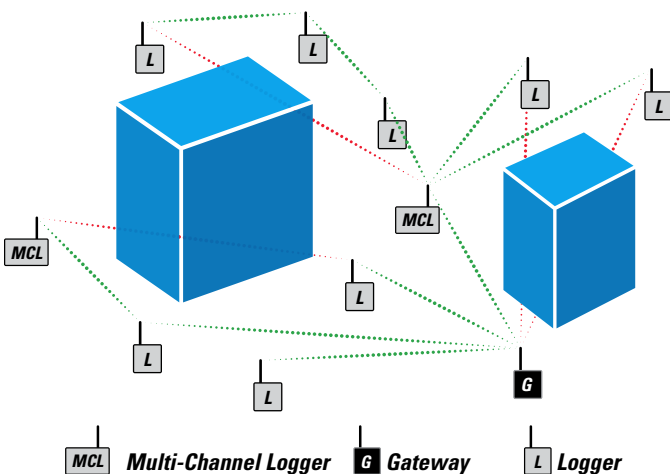
Model 8900 Mesh Topology

INTRODUCTION

The GeoNet system consists of a Cellular Gateway and subordinate Loggers that supply data collected from the sensors. The Gateway controls the network and is the aggregator of all the data from the Loggers. The Cellular Gateway transfers the collected data to a cloud-based storage platform, where it can be securely accessed for viewing or exporting. A Local Gateway is available for applications where the data is to remain on site. Tilt loggers, which combine the functionality of a biaxial tiltmeter and a GEONET logger, are also available.

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

[2]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 Loggers that comprise the network wake from sleep to communicate or collect data, and then return to sleep when finished. Loggers 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 Gateway where it is stored. Each Logger 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 Gateway through the GEOKON open API, over RS-232 or USB, or network serial servers. Data collected by the network consists of instrument, Logger, and network status data.

ENVIRONMENT

GeoNet Loggers, Multi-Channel Loggers and Gateways 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 is powered by an AC adapter (provided), optional solar panel, or other external 12V source for ongoing usage.

Loggers and Local Gateways are powered by two D cell batteries, either Lithium or Alkaline, or by an external source up to 12V.

SOFTWARE

GEOKON Agent software[3] is used for network configuration and data collection. For networks utilizing a Cellular Gateway, data is stored in a cloud-based platform that can be accessed remotely. Networks using a Local Gateway require a direct cable connection to download data onto the 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.

[3]GEOKON Agent software can be downloaded at www.geokon.com/software

GATEWAY 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) D Cell, Alkaline or Lithium (2x), or 12V External (Local Gateway)
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) 120 × 122 × 91 mm (Local Gateway)

LOGGER 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 LOGGER 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[1]	±90°
Axis	2

[1]Calibrated range: ±30°

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[1]	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)

[1]Line-of-Sight, maximum 4 hops.

ORDERING INFORMATION

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

MODEL/REGION:
8901-NA: North America
8901-BZ: Brazil
8903-EU: Europe

LOGGER TYPE:
01C: Single-Channel Mesh VW Logger
ADR: Mesh Addressable Logger
04C: Four-Channel Mesh VW Logger
08C: Eight-Channel Mesh VW Logger
TLT: Mesh Tilt Logger

SENSOR CONNECTION:
CBL: Cable Gland
10P: 10-Pin
NAP: No Access Point

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

MODEL/REGION:
8901-NA: North America
8901-BZ: Brazil
8903-EU: Europe

GATEWAY TYPE:
LTM: Cellular Gateway for LTE-M networks
03G: Cellular Gateway for 3G networks
SUP: Local Gateway

PC CONNECTION:
USB: USB cable
232: RS-232 cable

Note: Not all models available in all areas