



Product Tutorial

Introduction to GeoNet Networks



Network Features

- Wireless data acquisition
- Simple to deploy
- Efficiently collect data from many points
- Low power consumption for long battery life



Network Features (Continued)

- Especially beneficial in locations where running cables would be difficult, time consuming, or impossible, due to challenging geography or wide instrument spacing
- Up to 12 Networks can be deployed in the same area by utilizing different operating frequencies



Network Features (Continued)

- A rugged, RFI shielded, IP66 die cast aluminum enclosure protects internal components from environmental factors, outside interference, and transient voltages caused by lightning strikes
- Operates at temperatures as low as -40°C and as high as $+85^{\circ}\text{C}$



Network Features (Continued)

- Self-healing, self-configuring Network
- Capable of self-reconfiguration after temporary Network disturbances
- Built on top of the IEEE 802.15.4 standard



Network Features (Continued)

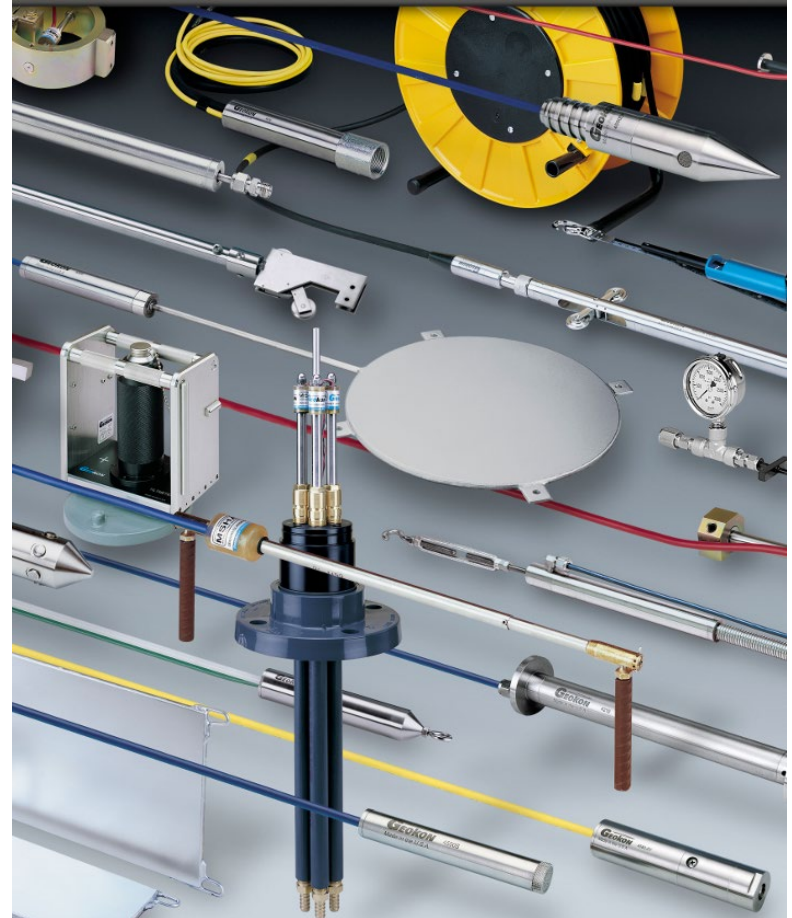
- Sensor readings synchronized across the entire Network
- Readings can occur at intervals between 10-minutes and 24-hours (Faster scan intervals are available; contact GEOKON for more information)
- All data is stored in nonvolatile flash memory



Compatibility

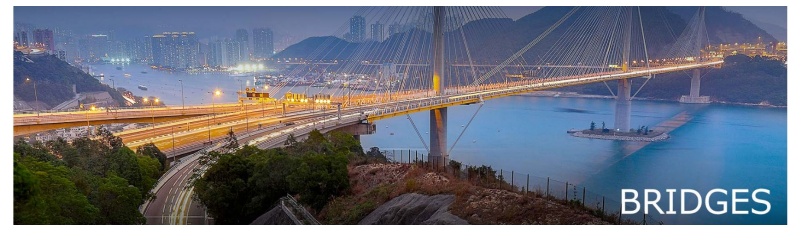
GeoNet data acquisition
Networks are compatible with:

- All vibrating wire instruments
- Addressable MEMS sensors
- Addressable Thermistor Strings
- GeoNet Biaxial Tiltmeter Nodes
- sensemetrics Sensor Management Platform



Typical Applications

- Slope Stability
- Groundwater monitoring
- Mine Stability
- Dams
- Structural monitoring of:
 - ▶ Buildings
 - ▶ Bridges
 - ▶ Excavations
 - ▶ Tunnels
 - ▶ Historic structures

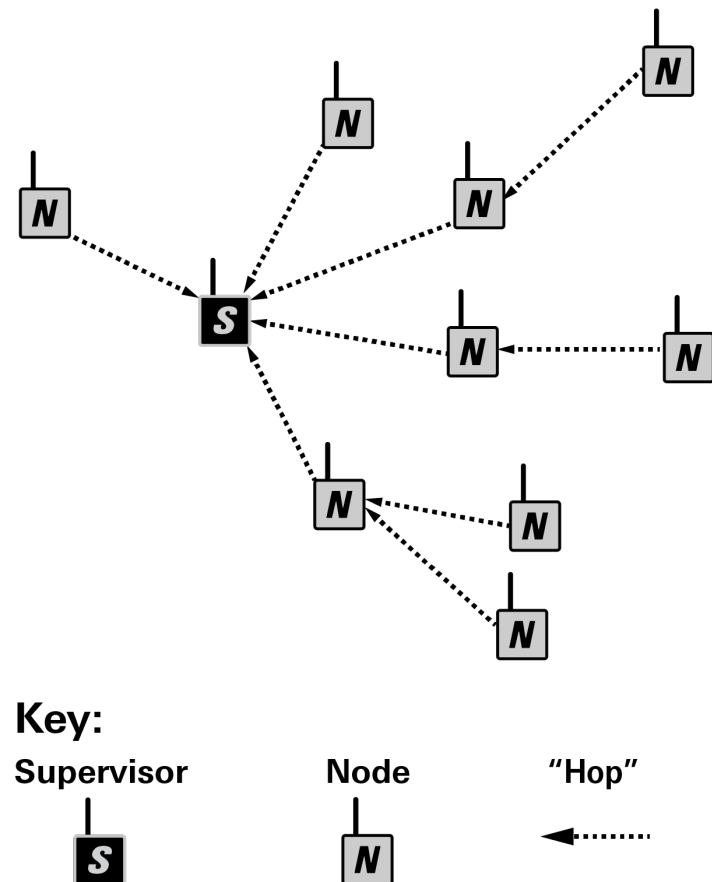


Network Topology

The system topology takes the form of a mesh, or cluster tree

- Maximum outdoor range*:
900 MHz radios = 26 km
(6500 meters per hop)
2.4 GHz radios = 3 km
(750 meters per hop)
- Max indoor/urban range*:
900 MHz radios = 1220 m
(305 meters per hop)
2.4 GHz radios = 240 m
(60 meters per hop)

**Line-of-sight, maximum 4 hops*



Network Components: The Network Supervisor

- Controls the Network
- Aggregator of all the data collected by the Nodes
- One per Network
- Compatible with up to 100 single channel Nodes



Network Components:

Sensor Nodes

- Collects data from a sensor and stores it in non-volatile memory
- Forwards the collected data to the Network Supervisor
- Memory capacity of more than one million data arrays
- When separated from the Network, Sensor Nodes collect and store data autonomously, and will automatically begin transmitting data to the Supervisor when the Network connection is reestablished



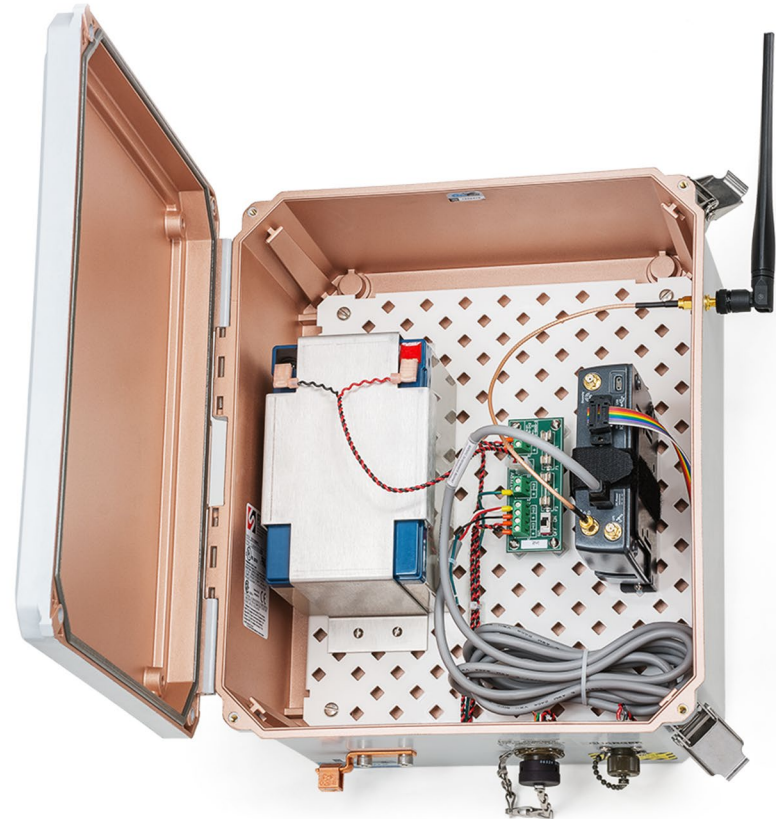
Network Components: Multi-Channel Nodes

- A single Multi-Channel Node can read 4 or 8 sensors (depends on model purchased)
- Required for multi-sensor instruments, such as vibrating wire load cells, biaxial stressmeters, multipoint borehole extensometers, and multilevel piezometers
- Can also be used for clusters of closely spaced instruments



Optional Network Components: Cell Modem & Ethernet Compatibility

- Add-on modules are available which enable the Network Supervisor to wirelessly connect to a PC via a networked connection such as a serial server or cellular modem
- Modules are Housed in a rugged fiberglass enclosure
- A 7-amp hour battery, battery charger, and interface cable are included



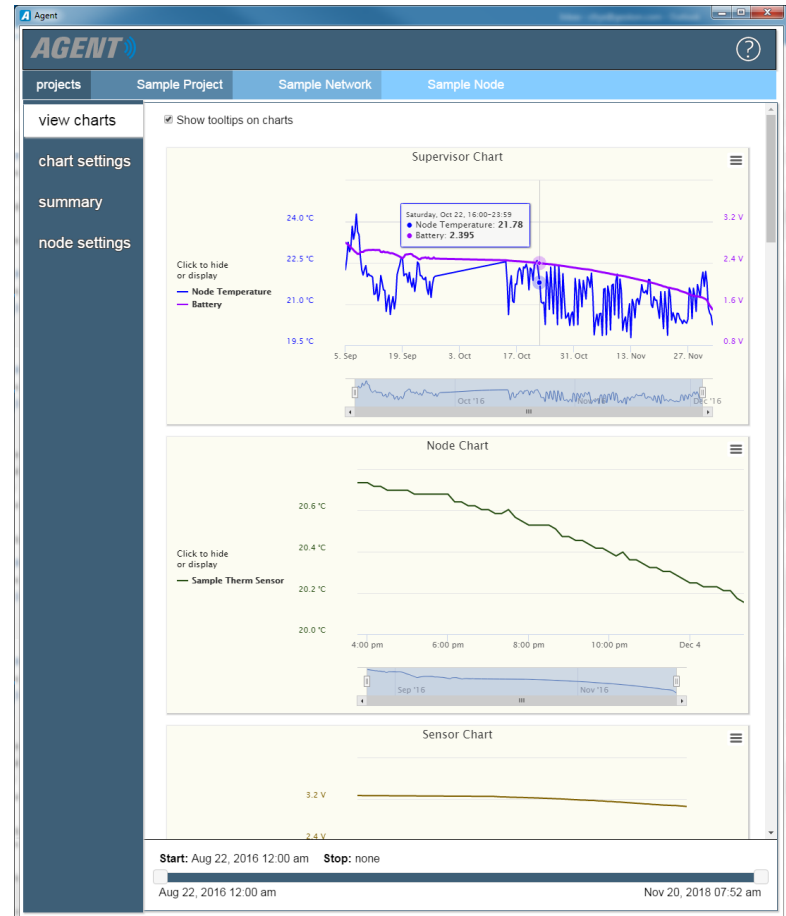
Communications

- The Supervisor communicates with the PC via a direct cable connection
- Wireless communication is possible with a cell modem or Ethernet add-on module
- The Supervisor protocol is Modbus® RTU over RS-232 or USB as a virtual COM port
- Devices capable of functioning as a Modbus master can be programmed to collect data from the Network



“Agent” Data Collection Software

- Used for Network configuration and data collection
- Handles the conversion of raw data to engineering units
- Data can be viewed inside Agent as a chart, or it may be exported for use in other data management applications
- Can be configured to collect and export data automatically



For more information...

- Consult the GeoNet and Agent instruction manuals.
- Instruction manuals are available for download at:
www.geokon.com/Manuals
- Please visit www.geokon.com/Tutorials for more tutorials