



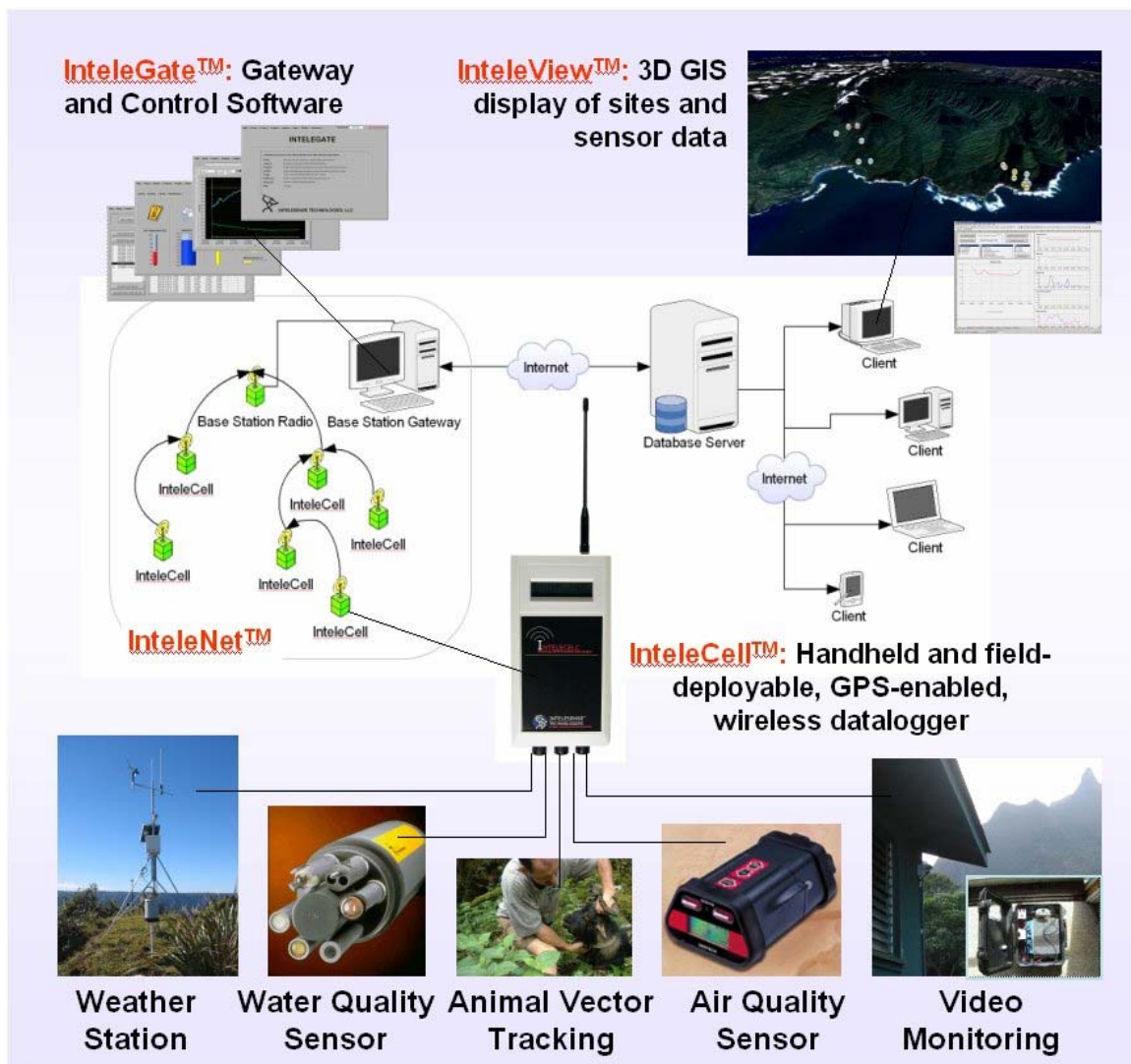
# INTELESENSE TECHNOLOGIES

*Global Integrated Monitoring™*

## *Global Integrated Monitoring*

### *Overview*

Intelesense Technologies provides global integrated monitoring products and services for environmental, public health, and other data. We develop technologies for real-world wireless sensor networks for air, water, weather, and imagery that communicate their data over the Internet from anywhere in the world, integrates with data from many other sources automatically and provides real-time advanced visualization. This global IntelNet forms an integrated *georepository* of all relevant information for a particular region. At the same time it provides wireless communication infrastructure for remote areas.





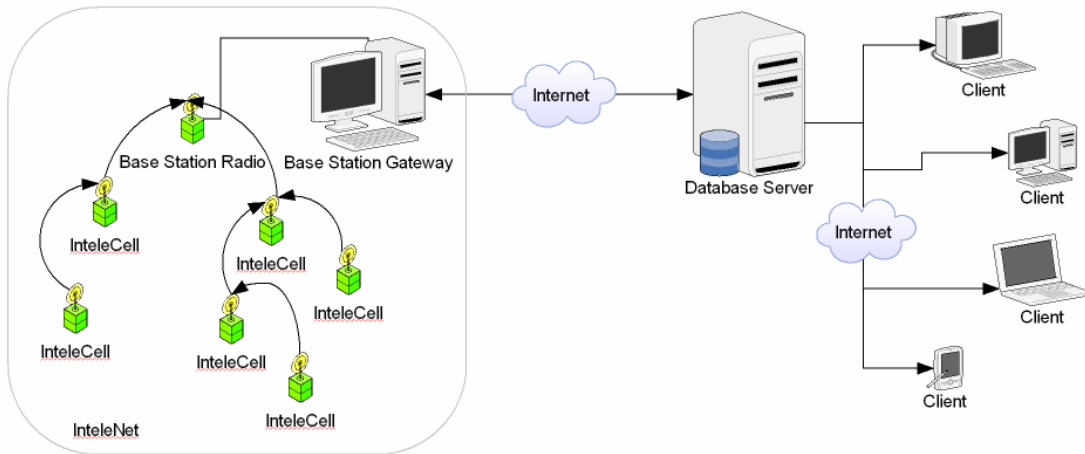
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The system can be used for a wide range of applications, including weather monitoring, water and air quality monitoring, biotelemetry, imagery and audio capture, field data collection, earthquake monitoring, buoy networks, tsunami warning, and emergency telemedicine and disaster response.

## *InteleNet™*

The InteleNet™ is a global smart wireless sensor network capable of collecting data from a multitude of sensors, sending this information to a database over the Internet, and giving users secure, real-time access to their data integrated with other information sources. The system provides advanced visualization and analysis capabilities both through the web and through a state-of-the-art 3D mapping software tool.



Intelesense Technologies takes environmental monitoring to a new level. The InteleNet combines disparate data sources such as weather, water quality and flow, soil moisture, animal biotelemetry, seismic and earth magnetic field readings, video, audio, GPS-mapped human field observations and field research data, and even human knowledge and historical information to capture the environment on a scale that has never been attempted before. The Intelesense system represents the next generation of global wireless distributed mesh networks for data collection, integration, visualization, and analysis. Intelesense provides access to data anywhere in the world.

## *InteleCell™ – Intelligent Hardware Platform for Remote Data Collection*

To accomplish this, we developed the InteleCell, a small, ultra-low power device that collects sensor data. The InteleCell is a wireless, GPS-enabled data acquisition platform that interfaces to a number of sensors and provides unattended monitoring at programmable





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intervals. But it can also be used as a handheld GIS information device or data logger to feed data into the IntelNet in the field. Multiple IntelCells form a self-organizing network (the *IntelNet™*), each collecting and routing data from one or more sensors. The IntelCell was designed to address the challenges of deploying real-world, long-range, unattended networks in areas that are difficult to access. It combines the advantages of today's popular self-organizing mesh networks with long-range wireless transmitters, ultra-low power consumption through several sleep modes, remote programmability, remote firmware upgrade, secure data transmission, and high reliability even in the toughest environments.

## ***Open Architecture and Open Source***

The Intelesense system was designed from the outset to be very open and expandable by our user community. The IntelCell hardware and firmware can be extended to support additional sensors or new features, the server can both import and export user data to facilitate advanced visualization and modeling research, and the visualizer is based on an open-source platform with a strong developer community. As the Intelesense community adds more and more features and enhancements, all users will benefit from our combined efforts.

The majority of environmental monitoring technology available today is focused on one type of data only, for instance weather station networks. While a few companies offer data loggers that offer more flexibility and support various types of sensors, often the users don't have the needed engineering background to accomplish these complex tasks. Intelesense Technologies makes it easy for anyone to deploy their own monitoring network by providing support for the majority of environmental sensors, providing custom firmware upgrades for new sensors, and allowing advanced users to customize and expand the system for their specific applications.

## ***Long-Range Wireless Access***

Each IntelCell has built-in wireless networking capabilities, offering data rates up to 115.2kbps and a line-of-sight range of up to 40 miles between individual IntelCells. This enables a single IntelNet to cover hundreds of miles. If needed, the IntelCell can also interface to an existing wired or wireless network, and even apply its advanced power management schemes and other features.

## ***Ease of Use***

Installation and setup of the IntelCell is made easy by providing standardized plug-and-play connectors for serial and analog sensors and adapter cables for all sensors that are supported. The firmware can be remotely upgraded, using the same wireless communications link that is used for transmitting sensor data. Once deployed, the IntelCell is a set-and-forget device. The alphanumeric LCD display allows local readout of not only sensor data when the IntelCell is used as a handheld device, but more



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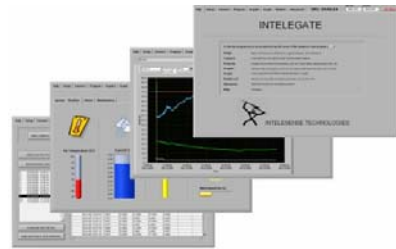
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importantly to get information on system status parameters such as battery voltage or signal quality of the wireless link.

## *IntelGate™ – Internet Gateway to the Database*

All IntelCells in a local network self-organize into a mesh network and are configured and controlled by IntelGate, a computer program that is running on a local, Internet-enabled PC. Data is routed from IntelCell to IntelCell until it gets to the IntelGate base station. Each IntelCell serves both as data collection point as well as data repeater for all neighboring IntelCells. The self-organizing mesh network feature of the IntelNet makes adding additional sensors easy. Any IntelCell that has been added to the network will automatically configure itself to use neighboring nodes to relay its data.

The IntelGate collects data from all IntelCells periodically (e.g. once an hour), packages the data, and sends it on to an Intelesense database, which can either reside on one of our Intelesense servers, or, if the user prefers to manage their own independent system, on a server owned and maintained by the user. The database keeps track and stores data from a number of local networks distributed all over the world. Each local network consists of one or more IntelCells and a base station PC that runs the IntelGate software for data collection.

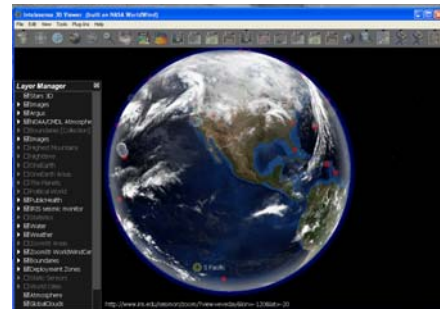


To view and analyze the data stored in the database, Intelesense offers two options: a web based interface available on our website, and a powerful software application that allows 3D mapping of real-time data in unique ways – IntelView™.

## *IntelView™ – 3D Data Visualization and Analysis Tool*

Visualizing and analyzing large amounts of data from a number of different data sources effectively, on a global scale, and in real-time requires a powerful GIS tool. To accomplish that, we developed IntelView (based on NASA WorldWind) that displays data on high-resolution satellite maps, on a global scale, in 3D, and in real-time.

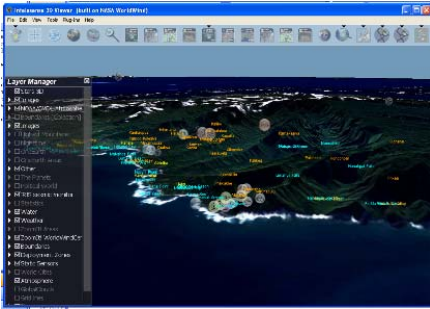
IntelView allows the user to “zoom in” to anywhere on the planet and pull down many different types of satellite imagery from servers located anywhere over the Internet. Users may tilt down and “fly” around the terrain, investigate line-of-sight issues, examine topological changes and their potential impact, and integrate many data sources into the same, interactive 3D world. Icons displayed on the map of the IntelNet deployment zone depict real locations of water and weather sensors, tracked animal collars, wireless video cameras, as well as repeater nodes and the base station. The user can click on any icon to pop up an interactive web page showing the sensor information (photo, sensor type/info, calibration





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information, etc), as well as the live data (sensor values) and charts for trend analysis, or tip down the view to fly through the 3D terrain in real-time. It is important to point out that this new visualization tool works, literally, for anywhere on the planet and pulls the highest resolution satellite or aerial imagery available for that particular region. In this way, sensors may be deployed anywhere on the planet and immediately have real-time visualization of their location and full interactivity with the sensors automatically, within minutes. This is an extremely powerful visualization tool which allows users to bring up any location on the planet and overlay their own sensor data, as well as data from other sources. This integrated *geo-repository* is a powerful and effective tool useful in understanding environmental trends, impacts of human development, and their interaction.

## *About Intelesense*

Intelesense Technologies provides global integrated monitoring products and services for environmental, public health, and other data. Intelesense develops technologies for real-world wireless sensor networks for air, water, weather, and imagery that communicate their data over the Internet from anywhere in the world, integrates with data from many other sources automatically and provides real-time advanced visualization. This global IntelNet forms an integrated *georepository* of all relevant information for a particular region. At the same time it provides wireless communication infrastructure for remote areas.

Intelesense Technologies was founded in early 2005 to enable worldwide integrated monitoring of the environment and its inhabitants. A global network of wireless sensors that are integrated with many other data sources helps to better understand their interrelationships. The IntelNet technology is currently deployed in multiple sites in Hawaii (Kauai, Oahu, and Maui), in the continental US (California), and in Asia (Vietnam). Planning for future deployments in other areas of the Pacific (Palau, Palmyra, Okinawa), Asia (Thailand), and Africa (Ethiopia) is currently underway.

Intelesense currently has a corporate office in Honolulu, Hawaii; Research and Development offices in Silicon Valley, California; and field offices with collaborative partners in each of the deployment zones listed above.

Current projects range from protecting some of the most beautiful and biodiverse places on our planet, to tracking emerging infectious diseases (e.g. bird flu), to helping children from around the world to connect and interact with each other, and better understand their environment.