

Data Loggers and Bluetooth Wireless Communications

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With the increasing use of data loggers to collect information in industrial and environmental monitoring applications, has come a corresponding increase in the use of wireless technology to retrieve the information. The latest of this type of technology to be introduced is called Bluetooth. Its uses are as varied as the number of data monitors located across the world.

What is Bluetooth?

The name "Bluetooth" comes from the 10th century Danish Viking king, Harald Blåtand II (or Bluetooth, in English). The king united and controlled Denmark and Norway, hence the inspiration of the name to unite products through Bluetooth. Bluetooth is a registered trademark owned by the Bluetooth Special Interest Group (SIG), Inc., which established the industry standards for all Bluetooth communications.

A simple two-way wireless (radio) solution that allows different electronic devices to talk to each other without using cables or infrared, Bluetooth is the codename for a technology specification for low-cost, low-power, short-range radio links between mobile PCs, mobile phones, and other portable electronic devices.

There are primarily two classes of Bluetooth. Class 1 is designed to transmit / receive approximately 100 meters, and Class 2 is a transceiver of approximately 10 meters. Bluetooth's low power operations and industry certification standards permit for easy connectivity between any Bluetooth enabled devices.

An adopter member of the Bluetooth SIG, Stevens Water Monitoring Systems, Inc., headquartered in Portland, Oregon, designs and manufactures both a certified Class 1 Bluetooth-enabled data logger and a certified Class 1 RS232 / RS485 Bluetooth serial adapter for the industrial and environmental monitoring market. Its data loggers are used in a number of industries, such as hydrological and meteorological monitoring stations, wastewater, golf courses and vineyards.

Data Loggers and Bluetooth

The Bluetooth technology offers many advantages. For example, it is lower in cost and power consumption than other alternative wireless products used to replace cables and wires connecting portable and/or fixed electronic devices. Connections are established dynamically and automatically only when Bluetooth devices enter and leave the Bluetooth radio's transceiver range.

This advantage works well with the increasing demands placed on data loggers for more information and improved productivity. In order to incorporate quicker and easier communication solutions for data loggers in the field or office, at lower prices and power consumption, many organizations are integrating data loggers with Bluetooth technology.

When combined with data loggers, Bluetooth technology offers many other advantages. The technology combination eliminates the need to open enclosures that house the data logger, in order to establish communications. In environmental monitoring applications, data logger communications also can be established without users leaving their vehicles.

Industrial applications offer easy access as well. Data logger communications can be established without leaving the office. Any industrial equipment / data logger with a serial port can become Bluetooth enabled; therefore, no investment in equipment replacement is required to have Bluetooth compatibility.

Eliminating the cable connection between a data logger and other equipment connected to the data logger's serial port makes for less cumbersome and more productive fieldwork. For example, various governmental agencies have used an RS232 Bluetooth Adapter connected to an instrument on a mini catamaran for river discharge measurement. The Bluetooth wireless data link between the instrument and the user allows for flexible deployment and quick data collection as the mini-catamaran is pulled with a tagline.

In areas that the RF signal is impeded, such as a sewer manhole, valley, or structural interference, a Bluetooth enabled data loggers can wirelessly communicate with a nearby radio, satellite or cell modem for long-range data communication to/from a remote central office monitoring station.

One additional benefit minimizes costs even more. There is no need to purchase expensive environmental rugged computers / PDA enclosures for downloading data.

Bluetooth Data Logger Connections

Bluetooth connectivity with a data logger can be achieved in two basic ways. The data logger can include an internal Bluetooth radio module or an RS232 or RS485 Bluetooth adapter can be adapted to an existing data logger's serial port.

Systems that use an internal Bluetooth radio module include ones such as the Stevens Blue DOT Logger, which is designed with an internal class 1 Bluetooth. The logger enables Bluetooth communications wireless links between the data logger and another Bluetooth enabled computer, PDA, telemetry modem or device without a cable connection to the data logger.



Data logger users can also realize the benefits of Bluetooth technology by using an adapter, such as the one manufactured by Stevens' called "The Shark". Adapters like this one, easily modify data loggers to become Bluetooth enabled.

The Shark uses SPP (serial port profile) protocol to replace RS232 or RS485 cable connections, which is designed to emulate the behavior of a serial port by turning the COM port on only when the Bluetooth connection is established, which is how a serial cable operates. When the Bluetooth connection is closed, the COM port turns off.



Stevens' RS 232 /RS 485 Bluetooth Adapter

The adapter is simply connected to the data logger's RS232 or RS485 serial port and operates on a 6 to 24 Vdc power supply. While the Stevens Bluetooth adapter includes an internal battery and charger to provide up to four hours of continuous transmission without external power, some Class 2 (up to 10 meters communications range) Bluetooth adapters operate using the power supplied through the data logger serial port. This is not the best alternative, however, since it typically requires the data logger to be on and as such, the power supply is variable and not reliable for operations. To ensure reliable operations, even Class 2 Bluetooth adapters should rely on an external power supply.

A USGS office uses a Bluetooth Adapter connected to a data logger located in a stream gage house, which is housed on the opposite side of the river from the access road. An external flush mount antenna connected to the adapter is mounted on the outside of the gage house. As a result of this installation, the USGS is able to communicate wirelessly with the data logger from the access road.

How Bluetooth Works

Each Bluetooth Adapter has a unique device address and the user can set up a user defined device name for the device address. For security, the Bluetooth Adapter can also be configured with password protection. The intended application is for the Bluetooth Adapter to remain connected to the data logger at all times. When the user's Bluetooth enabled computer is within the Bluetooth enabled data logger's class range, the computer is instructed to search for Bluetooth devices. The computer may find one or multiple Bluetooth devices. The name and/or device address of all Bluetooth devices discovered will appear on the computer screen. The user simply selects which Bluetooth device they want to communicate with and connection is established.

It is important to recognize that Bluetooth communication ranges are typically limited to the highest-class radio being used. Therefore, if a Bluetooth adapter on the data logger is Class 1 – which is a 100-meter communication range, and the Bluetooth enabled computer is a Class 2 radio – which is a 10-meter communication range, the user would likely be limited to the 10-meter communication range.

Configuring a permanent connection between a Bluetooth enabled data logger with another Bluetooth enabled telemetry modem with security protection is simple to set up, usually through a Windows-based configuration or similar program.

The robust Bluetooth capabilities enable myriad possibilities for simple, low power and low cost abilities to handle both data and voice transmissions. As it has in the personal connectivity market, it is also revolutionizing the data collection industry, providing freedom from cable and wire connections to data loggers cable connections.

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