



## IN THE NEWS

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## Wellspring Switches to a ZigBee – Cellular Hybrid System

### *Demonstration Kits Are Now Available*

Bristol PA (February 20, 2006)—Wellspring Wireless today explained its reasons for abandoning its tried and true 915 MHz point-to-point radio design, in favor of a more robust, lower cost ZigBee – cellular hybrid network. Wellspring completed its first installation using the new system on a boiler energy sub-metering project with 590 apartment units in Rochester NY last month.

Since 2000, Wellspring has produced 120,000 meters that are installed and operating, which they still read every day. But keeping those meters on line has been a constant battle. Base stations are unplugged by customers. Modems are disconnected. Antennae are moved, or discarded. Wires are cut. Interference sources crop up. Remodeling moves meters from one apartment to the next. Construction alters the radio environment. And some residents tamper with the meters.

The result that matters has been a constant battle to keep data recovery rates up. “We changed our business focus in 2005, when we sold our metering service company to Conservice, so we could concentrate on being a product supplier. That meant we had to change our product line – people need to know when they buy our products, that the system will deliver data 100% of the time, with fewer service calls.”

Tim Matt, Wellspring’s CTO explained how they decided what to change. “As part of our effort to improve data recovery rates in 2004, we did a “Pareto” analysis, to rank causes of data loss in order of their greatest impact. You may be surprised at what we found, and the solutions we have implemented in our new system.”

1. “Disconnected phone lines were responsible for over  $\frac{1}{2}$  of our data loss. In response, we established a relationship with Motient, that allows us to deploy a cell-modem at each base station or transceiver, and connect permanently to the internet, paying only for the data we transfer. This was both a quality improvement and a cost reduction.
2. “Base stations that are unplugged ranked second. So, in our new system, we eliminated the base station. This is another cost reduction and performance improvement. To add reliability, we now recommend the use of two radio-gateways, each with its own cell-modem. The cost of 100% redundancy is less when there is no base station, and it can be worth the investment to save data loss and service calls.
3. “Transceivers that are unplugged ranked third. Never mind that we protect the power cube with a cover, they get unplugged anyway. So transceivers have been replaced by a less power hungry solar recharged battery operated “router”, which can be placed anywhere outside. No power wires or cords to run – no power to be disconnected. Another cost reduction and performance improvement. We decided to use an open protocol ZigBee mesh, which provides full router redundancy – every meter has more than one router to talk to. If one router is dead, data can still be retrieved. Again, redundancy is cheap enough in ZigBee, because routers are not nearly as costly as transceivers in our old system.
4. “Moved antennae ranked next. In our old system, the base transceiver had a large  $\frac{1}{2}$  wave antenna, which had to be near the wired phone connection to the base station – which made it vulnerable to inadvertent movement. For example, the cable guy may come in and put his box where your antenna was. Now we can keep the gateway in isolated space, because we are making a cell connection, so we can locate anywhere.
5. “Remodeling cuts wires, moves meters, moves transceivers and literally discards meters to the trash. We no longer use wired connections anywhere. And we label every meter “DO NOT REMOVE” with language like you find on your sofa cushion. We boosted the radio power output of each meter, and made the routers with variable power up to 100 mW with CDMA signal spreading – a more robust system all around.
6. “And finally, we’ve concluded that the radio environment at every one of our sites was degrading over time. Cordless phones, Wi-Fi networks and construction take their toll to reduce the distances of every radio network. We’ve seen the 902-928 band clogged by utility metering systems, and we’ve been stepped on by failing pager towers with malfunctioning frequency filters that are not repaired. We have seen the radio traffic in every city climb steadily, no more so than in the area between Washington National and the Pentagon. Bottom line – the distance you could get when the system is installed is not the distance you will get 5 years later. ZigBee compensates for these challenges with a fully redundant self configuring, self healing mesh network, using CDMA spreading, power agility up to

100mW, and an ability to change frequency, choosing any of 16 channels between 2.4 and 2.5 GHz. NONE of these strategies are present in legacy radio systems. “

Tim added, “We choose ZigBee in 2.4 GHz, because we can easily get around weak residential systems that are common in this band, with message acknowledgment, and message retry algorithms that can change frequency (16 bands available), change power levels, and exploit the ability of CDMA spreading to extract data from below the noise floor. We spent the last 5 years in the 902-928 MHz band – too close to the paging networks, utility metering and other industrial applications that operate at much higher power levels. The 2.4 Gig band works for us, and gives us more flexibility to deal with relatively benign interference sources.”

To learn more about Wellspring’s ZigBee implementation, please refer to their ZigBee Buyers Guide, which can be downloaded from their web site at [www.wellspringwireless.com](http://www.wellspringwireless.com) .

### **Demonstration Kits Now Available**

Wellspring now offers demo kits to prospective dealers who have a need for the Wellspring line. A demo kit will allow interested parties to set up a small mesh network, and meter energy, water, or wet energy – allow operation of a battery operated water shut off on command or just evaluate the radio for any reasonable application.

Tim Matt, Wellspring CTO added, “As you consider this – please consider the base design architecture of Wellspring’s system – which is a small 4 layer circuit board with 10K of free program space, 10 input or output points, a serial link, and a ZigBee compliant two-way radio. We add firmware and populate the points we need for a host of applications – water submetering, energy monitoring, energy or water flow control, remote sensing, routing or gateway – whatever we may need. Our base product is made in high volumes to keep cost down, with the flexibility to configure the product as you like it – we can do just about anything, if the volume is there to justify the engineering work.”

### About Wellspring Wireless

Wellspring Wireless offers the nation’s most complete line of water and energy sub-utility products for all building types. Wellspring is based in Bristol Pennsylvania. For more information, call 215-788-8485 or visit [www.wellspringwireless.com](http://www.wellspringwireless.com).

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