



## ZEBRA CASE STUDY

### Zebra helps Cingular Wireless send the right RFID signals

#### Challenge

Cingular Wireless carries voice and data communications for more than 54 million customers around the world each day. But the leading wireless carrier found a challenge in getting RFID smart labels to encode correctly for the cell phones and subscriber identity modules (SIM) it ships to Best Buy and Wal-Mart.

Cingular worked with Fortna and ID Technology, a Zebra Technologies partner, to design and implement an automatic smart label print and apply system that was tightly integrated with warehouse and material handling operations. With the RFID equipment, networks and warehouse management system interface all in place, finding the right smart label was the final detail that made the whole system run reliably and efficiently. Cingular then turned to Mid-South Marking Systems and Zebra to find the best smart media for its products and processes.

“Matching smart labels to the printer/encoder is very, very important,” said Tracy Force, an IT systems analyst at Cingular who is heavily involved with the smart labeling system. “We tried to do it ourselves, but we were going through labels left and right. It got really challenging.”

Even though smart label printer/encoders and media may support the same standards and RFID protocols, they are not necessarily compatible. The position of the RFID chip and antenna inlay within the label material is not the same in all media. If the inlay position isn't matched carefully to the specific make and model of printer/encoder being used, the smart labels may fail to encode properly. Cingular learned this lesson the hard way after experiencing 30 to 50 unencoded inlays per roll of 800 labels.

“If we had tried to find the media by ordering from a catalog or a Web site it would have been horrible,” said Force. “If we hadn't called Mid-South we'd probably still be bumping heads with somebody about this,” said Force. “Mid-South and Zebra got us through the process no problem.”

#### Solution

Orders from Best Buy, Wal-Mart and other national retailers are received by EDI directly into Cingular's warehouse management system (WMS). Workers pick cases of cell phones and place them on automated conveyors for routing and sorting. During this stage, Cingular's Red Prairie WMS generates a SSCC shipping label for each order and assigns a unique EPC serial number to each carton of cell phones and SIMs.

The Red Prairie WMS transmits the pick file and label information over Ethernet to the FortnaPlus™, real-time warehouse control system. The Fortna system then sends a message to the pick zone to pick X cartons of a specific stock keeping unit (SKU). Once the SKU has been picked and scanned, the Fortna software takes the data and inserts it into the order line and another message is sent to the conveyor system to look for the carton and route it down one of the print-and-apply (PNA) lines which are equipped with Zebra PAX4 RFID print engines integrated with Model 250 automatic label applicators from ID Technology. Fortna led the system design and integration, and engaged ID Technology, a labeling and marking specialist, for the print-and-apply portion of the project.

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“Smart labels take about 150 milliseconds longer to produce than regular bar code labels because of the time required to encode the RFID tag. You need to account for that when you design a print-and-apply system to work with automated conveyors,” said Mark Bowden of ID Technology. “Having reliable equipment and supplies is the key. If you have a reliable printer/encoder and good tags, you can solve the challenge.

The message from the WMS to the conveyor system directs the automated print-and-apply system to sense the boxes coming down the line, print and encode the RFID smart label for the carton, and attach it to the carton as it goes by. FortnaPlus then sends Red Prairie a “PNA complete” message that initiates normal processing the WMS performs to route the carton to the truck.

Zebra and Red Prairie have previously collaborated to ensure Zebra printer/encoders can tightly integrate with the Red Prairie software environment. “We weren’t going to bring in any printer that hadn’t been thoroughly tested and proven with the Red Prairie WMS. Bringing in a printer/encoder that hadn’t already been tested probably would have tripled our support requirements,” said Force.

The R110PAX4 validates that the inlay was encoded prior to the label being applied. The labeled carton then continues down the conveyor line and passes through RFID antennas that read the smart labels and reports the information to the WMS for a second check. Cingular has Zebra R110Xi tabletop printer/encoders for use as backups in case of problems with the high-speed printer/applicator system, but the R110Xi units have rarely been used since Mid-South and Zebra solved the media selection challenge.

“Cingular is doing more volume than most smart label applications, but this still isn’t considered high-volume for automatic print-and-apply systems,” noted Bowden of ID Technology. “Print-and-apply systems are capable of much higher speeds. With RFID smart labeling, the key is to prevent a bad tag from being applied to the carton. The Zebra print engine has an automatic safeguard for this, so it’s a very good fit for an automated system.”

## Results

“Now we’re pretty much running trouble-free,” said Force. Read rates on the conveyor are close to 100 percent and the number of inlays that fail to encode has been significantly reduced.

Cingular has an R110PAX4 printer/encoder and applicator on three conveyor lines, and is producing about 67,000 labels per quarter. All the printer/encoders were upgraded after initial installation to support Cingular’s planned transition to the EPC Gen 2 RFID protocol in May, 2006.

“The transition to Gen 2 was completely seamless. We can’t afford any disruptions in our warehouse, and we didn’t have any,” said Force. We have used Zebra bar code printers for a long time with great results, so I expected their RFID printer/encoders to work well too.”

The R110Xi and R110PAX4 have software-defined radios (SDR) that can be upgraded to support new protocols with a firmware download and can be configured remotely. No replacement parts or hardware changeover was required to upgrade the Cingular printer/encoders to support Gen 2, and the printer encoders can also still encode other protocols. Cingular also takes advantage of the network connectivity built into its smart label printer/encoders to view configurations and conduct other management activity.

Another way to prevent problems is to work with printing and media specialists from the beginning, said Force. “If we had this project to do over again, we would have involved Mid-South and Zebra a lot sooner,” she said. “I’d rather pay three or four cents more for a label and know that it’s right for our printer/encoders, than using something that’s cheaper and isn’t going to work as well and will take a lot of my time to correct.”

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