ZEBRA BAR CODE PRODUCTS

Evolving technologies to maximize your bar code printing capabilities

- *Mobile Print Status Error Alert*
- *Hub Based Print Monitoring & Control*
- *Wired & Wireless Portable Printing*

Zebra®

When it's on the line.™

How "Mission-Critical" is Mission-Critical?

Mission-critical operations should never fail, but they occasionally do—usually at the most inopportune time. In an industrial setting, continuous operations are the ideal, but due to routine maintenance requirements and unforeseen developments, the term "mission-critical" has evolved to mean any activity that is essential for business function. In short, when the system goes down, the company loses money.

The modern Internet economy has expanded our view of mission-critical functions. Uninterruptible Power Supplies (UPS)—once seen only in government operations, hospitals and supercomputer centers—are now commonplace in most corporate networks. Most companies have implemented intricate data backup systems and servers that automatically restart after power outages to ensure that any unplanned system failure has minimal impact. To further allay the fear of system downtime, most companies with 24-hour shift cycles staff network administration positions around-the-clock to address issues as quickly as possible.

Despite all of these attempts to keep systems running, systems still fail on occasion. The only way to prepare for such failures is to a) set up the system with the most reliable equipment available and b) closely monitor the system and respond to errors as quickly as possible.

Bar Coding as a Mission-Critical IT Function

In most industrial organizations, bar coding is a mission-critical task. If the bar code system goes down, the entire production line, warehouse and/or receiving/shipping dock are likely to stall as well. In a company with 24-hour operations, the task of monitoring the system can be daunting. With multi-site or multi-national operations, the task may seem impossible.

Despite the increasing demand for communication between bar coding systems and legacy/enterprise systems to provide improved data management, data integrity and operational efficiency, integration of these systems has been slow to develop. Because of the delayed adoption of bar code printers in corporate networks, bar code systems have come to be viewed as manufacturing equipment rather than IT equipment. As such, network administrators have seen bar code printing as outside their scope of responsibility.

The advent of easy-to-implement bar code integration solutions, such as Zebra's BAR-ONE® software, has linked bar code printers physically and organizationally with the enterprise network. As bar code integration becomes more widespread, network administrators are becoming increasingly responsible for bar coding operations as well as more typical network management. This change is forcing administrators to either become familiar with new software or try to adapt existing software to the task of printer management.

Neither solution is ideal. Network administrators constantly look for solutions that simplify their duties. Many have neither the time nor the desire for training on additional software specializing in bar code printer management. Although networked bar code printers on an Ethernet network can sometimes be monitored by a common printer management application such as Hewlett Packard's HP JetAdmin™, the resulting alert usually does not provide sufficient details or may not even report errors unless manually prompted to do so.

Real-Time Printer Monitoring for Mission-Critical Applications

In a perfect world, network administrators would receive instant feedback from printers when an error occurs. Without such feedback, many companies still depend on employees to notify the administrator when a printer is not working. In some large companies, this can shut down an operation anywhere from several minutes to several hours. If the incident occurs overnight, even a simple error could halt operations until the following morning.

With the development of wired and wireless networking technologies, real-time printer monitoring now is a reality. For example, an advanced error detection system developed by Zebra Technologies Corporation, actively searches for, and immediately reports, printer and networking errors or warning conditions. Networked systems provide organizations with the ability to link a variety of important devices and share valuable imformation. In today's fast-paced workplace, minutes of downtime from mission critical devices means products can't be manufactured or shipped—resulting in lost productivity. The growth of wired and wireless networking technology in the factory environment now makes real-time monitoring of one critical component, a bar code label printer, a reality. In addition to the simple on-line/off-line notifications that have been available for some time, it allows network administrators to use familiar tools such as HP JetAdmin, HP Web-Admin or Zebra's own ZebraNet™ Alert to quickly identify

the printer's location, the time the incident occurred, and to furnish additional, detailed information describing the error. This technology gives network administrators the power to respond immediately—before they run a risk of costly downtime, missed deadlines or wasted time.

Mobile Notification of Printer Errors

Using network administration software to receive real-time notification of printer errors is only effective if the network administrator is seated at his or her desk. In most computing environments, this is rarely the case.

Accessibility to wireless technology has created new opportunities for business management and controls. It is not uncommon for cellular phone users to receive voice mail, e-mail and other forms of messaging via their phones from anywhere in the country. Several companies offer solutions that link mobile phones, laptop computers or handheld computers (personal digital assistants) with corporate enterprises to provide instant mobile access to corporate databases.

Today, this technology has progressed one step further. Systems Administrators are now able to use networked PCs or networked wireless devices to monitor, control and configure network devices—such as bar code printers—from anywhere in the world.

The incorporation of wireless technology into the reporting features of modern, mission-critical bar code printers removes all barriers of error notification. Not only can network administrators receive alerts on the same central workstation that they use for routine system management, but they can be alerted also to error or warning conditions via e-mail, pagers and cellular phone messaging systems.

While this solution is effective within a single country, there are some inherent limitations. The biggest disadvantage is that most cellular technologies are not globally standardized, making this approach ineffective for international support. Fortunately, there is another solution: the Internet.

Web-Based Printer Monitoring and Control

Including an integrated Web server in a printer's operating system provides each TCP/IP Ethernet-configured printer with its own IP (Internet Protocol) address, and enables network managers to monitor and adjust printer settings using common Web browsers that feature advanced security and encryption, such as the latest versions of Netscape Navigator and Microsoft® Internet Explorer.

Under this scenario, each printer produces real-time reports of its current state, including online/off-line status, error conditions and all printing parameters. Most parameters can be adjusted by using simple pull-down menus within the Web page. The Internet even enables users to manage stored fonts, graphics and label formats.

The web gives administrators and systems integrators with a common browser, the ability to monitor and configure barcode printers. It also provides a new tool to configure all networked bar code printers at once. Via the Web, administrators and integrators can "clone" printer parameters such as network configuration, printer darkness, label size, etc.. These parameters can be quickly and uniformly applied to printers at different sites around the globe.

For example, a company with several manufacturing plants requires all finished goods—regardless of their manufacturing location—to be uniformly tagged with a label that meets strict specifications from a large retailer. If the labels do not meet the retailer's specifications, the company risks receiving costly "chargebacks" for each unreadable or out-of-spec compliance label. To avoid this penalty, administrators can set up the parameters for each printer—including the printhead temperature, printing resolution, printing speed and label format—from one central location. When specifications change, these alterations too can be made from the central location, thereby ensuring that every printer on the network receives the modification.

All of these tools enable system administrators to monitor networked bar code printers just as they would any other mission-critical device in the enterprise. This capability increases productivity by freeing up staff to perform other, value-added tasks and reducing downtime and maintenance-related expenses. The use of another productivity–increasing technology —portable printing—is also on the rise among virtually all segments of the market.

Label Printing on the Go

Portable printers are everywhere. Warehouses, retail stores, hospitals and delivery trucks are just a few of the places where they can be spotted *en masse*. But why are portable

printers—long viewed as more of a clever gadget than a valuable tool—gaining popularity in such a diverse array of applications?

The answer is simple yet definitive: portable printers offer the most convenient and efficient way of printing bar code information on the spot without having to make frequent trips to the printer.

Although users are discovering quickly the benefits of mobile printing, they are learning also that transmitting information to the printer can be a complicated task. Or is it?

When portable printers were first introduced, they were heavy, provided poor print quality, had a short battery life and featured few connectivity options. In fact, on the earliest models, the only way to transmit information to the printer was by connecting it to a mobile computer or portable data terminal. Later models enabled users to connect the printer to a terminal, download printing instructions, disconnect the printer and print labels on-demand. Unfortunately, this method often proved to be prohibitively rigid; if one serialized label was lost, the user was required to return to the terminal and access the information again.

The latest wave of portable printers offers superior print quality, an extended battery life and a smaller size when compared to its predecessors. The newest units also offer a variety of connectivity options, enabling users to select the data communication method that best suits their particular application. Using just one printer, users can select between wired and wireless communications and—within the classification of "wireless"—network radio, short-range radio or infrared communications.

Which Communication Method Should You Use?

The most appropriate communication method depends on the intended use of the printer and the infrastructure in which the printer will operate. Because infrastructures and printer

use can change over time, the best printer is one that can effectively communicate via a variety of methods.

Despite all of the recent hype surrounding wireless technology, wired communication is still the most prevalent form of connectivity for mobile users of portable printers—and probably will remain so for the foreseeable future. Since a portable printer is nearly always used with a single portable data terminal, a serial cable is a convenient way to link the two devices. Besides convenience, wired systems also offer superior reliability, ease of set-up and represent the least expensive connectivity solution.

Wired Connectivity Applications

Example: A Loading Dock

In just-in-time manufacturing environments it is essential that all incoming parts be labeled accurately. If a part is labeled incorrectly, an inventory measurement also will be incorrect, and the material may run out unexpectedly—resulting in a shutdown of manufacturing operations until additional material can be procured.

On the receiving dock, users typically need to print out individual labels as they process each incoming item; therefore, they need a connectivity solution that enables them to print variable data quickly and repeatedly. Rather than taking note of incoming items, running a series of labels from a printer, carrying the labels over the incoming items and placing them on each product, workers can use portable printers—wired to handheld terminals—to enter the product information into the terminal and print the appropriate label on the spot. A wired connection provides rapid synchronization between workers' handheld terminals and portable printers, enabling them to print variable data quickly, and thereby enhancing overall productivity.

Example: A Picking Operation

Portable printers can also serve as an effective option for order-picking applications. In the warehouse of a book distributor, for example, a user walking up and down the aisles while selecting appropriate books for shipment needs a quick, easy way to print out the shipping

labels denoting the fulfillment of each order. Cable connectivity, with its rapid response time and ease of use, provides the best solution.

Example: Military Asset Tracking

When assisting with overseas relief efforts, the military must set up remote bases from which to dispense manpower and equipment to the task at hand. These installments may or may not have an extensive network established, but regardless, they must manage the flow of supplies into and out of the camp.

As goods come in, they feature bar coded labels, but these labels usually to denote only the generic name of the product, such as "axe" or "helmet." Prior to assigning the equipment to personnel, each item must be recorded and serialized so it can be tracked individually. Using handheld data terminals, the equipment can be logged into a central database—individually or by the crate—and reassigned a new serialized identification. That information can then be printed onto a bar coded label so that the items can be recorded when they are distributed—and when they are returned. Such a process ensures that assets are efficiently tracked and that a need for additional materials can be identified and acted upon quickly.

Introduction to Wireless Communications

In certain settings—such as industrial environments—cables can be cumbersome and vulnerable to breakage. Moreover, the mobile user may need to repeatedly return to the source of the cable connection in order to retrieve updated information. For these reasons, wireless connectivity is becoming an increasingly popular option for many applications.

Though the U.S. Department of Defense has utilized wireless communication for more than 50 years, until recently the number of commercial applications has been limited by a lack of accepted standards, high costs and implementation challenges. During the past five years, standards have begun to emerge, costs have fallen, and pre-configured solutions have become available, causing industry analysts to boldly predict the broad acceptance of various forms of wireless connectivity.

Radio Frequency Data Collection (RFDC) refers to the process of using radio transmitters and receivers to send information from one place to another—without necessitating direct contact

or line-of-sight between components. RFDC primarily takes place within a local area network (RFLAN) with the assistance of advanced software or a third-party service provider.

Among the many benefits that RFDC offers are high reliability, low error rates, real-time access to data, increased freedom of movement—and often, a relatively easy system integration. In addition, RFDC provides increased flexibility and convenience on the factory floor, eliminating the need for lengthy or breakable cables.

Yet despite early predictions that the advent of sophisticated networking technology would result in fewer paper-based transactions, we have found the opposite to be true. As additional transactions are performed digitally, users and organizations are increasingly demanding paper as a way to record the events that transpire. Portable printing has become a natural tool for producing a physical record of transactions—particularly in mobile applications where a desktop printer is infeasible or impractical.

Wireless Connectivity Applications

Example: A Grocery Store

One common application for RFDC is retail shelf labeling. In a grocery store, for example, a user with a handheld scanner incorporated into a simple portable data terminal can scan each shelf tag to verify that the scanned price—downloaded from the current price list—is the same as the price printed on the tag. Should there be a discrepancy between the scanned price and the printed price, the user can simply print out a new shelf label for that item. The user's automated direction to print a new tag is then forwarded to the host computer via an RFDC network. The network sends this information to the printer via RFDC, and the portable printer outputs a new label with the correct price. Without this capability, the user would be required to walk over to the printer—perhaps located at the other end of the store—to enter the information and remove the printed label, then walk back to the store shelf to replace the existing label.

Many shelf-labeling applications also utilize a second, short-range radio system to transmit data from the terminal to the printer. The second radio system gives users the ability to scan existing shelf labels and print out the new labels without requiring that the user maintain a

three- to six-foot proximity to the printer. The result is increased freedom of movement and increased productivity.

Infrared, another form of wireless communication, uses light-emitting and receiving devices to send information from one place to another. There have been proprietary ways of transmitting data using infrared light for a while, but during the past five years industry standards have emerged to regulate how computer devices share information. The latest standard applying to printers is the Infrared Data Association (IrDA) Line Printer version 1.1 (IrDA LPT 1.1). Since IrDA is light-based, line-of-sight is a formidable restriction. Once the line of sight is broken, it can take up to eight seconds for the devices to reestablish that connection. Nevertheless, IrDA is a cost-effective, practical solution for applications in which mobile users process batches of information and later print labels in bulk, or occasionally print single labels only.

Example: A Hospital

Specimen labeling in a hospital is one of the fastest-growing applications for portable printers. At the beginning of a shift, laboratory technicians synchronize their handheld terminal computers with the hospital database, downloading vital information about each of the patients that they will visit. The technicians then scan patients' wristbands to verify their identification and to call up the required series of tests. As each sample is drawn, the technician uses the terminal and printer's IrDA capabilities to transfer data about the patient and the required test to the printer, and immediately labels the specimen vial. The specimen labels are then scanned in the lab to obtain information about the patients and the tests to be performed. By eliminating the delay between sample taking and vial labeling, the chances of human error are minimized.

Example: A Delivery Truck

Delivery services, such as the delivery of bottled water to an office, can use portable printers to instantly generate a receipt/invoice of the transaction. As the delivery driver arrives, empty bottles are collected and new bottles are delivered based on prior use patterns, seasonal trends and other factors. After completing the delivery, the delivery driver can enter usage information into a data terminal and produce the receipt/invoice at the delivery location, avoiding any possibility of accounting discrepancies and shortening the billing cycle.

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