When, Where, How and Why To Use Wireless Printers

Wireless printers offer all the capabilities and performance of their cabled counterparts, with the added advantages of flexibility and convenience. This white paper is designed to explore the benefits from today's technological advances in wireless printing to improve workflow, efficiency, accuracy and productivity.

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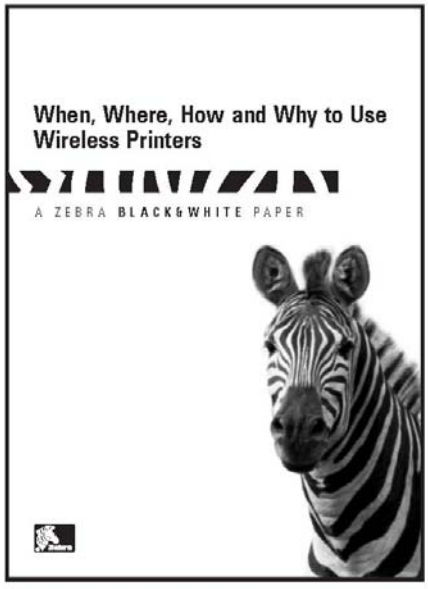

Introduction

Cables can't go all the places where organizations need to produce labels, receipts, invoices and other printed documentation. So, organizations must choose whether to base operations around where they can cable a printer, or use wireless connectivity so printing can be done wherever it's needed. Wireless printing provides flexibility for facility layout and workflow, while improving printer ease of use and reliability by eliminating cables. It can also reduce the inefficient labor practice of having workers go to a central printer to pick up labels and forms.

Wireless thermal printers can be used in environments ranging from offices and shops to factories and fleets, and can produce a variety of specialized output including bar code and radio frequency identification (RFID) labels, tags, tickets, receipts, invoices and wristbands. They are proven time savers and reduce costs in many applications, while performing reliably without specialized or excessive IT support. This white paper covers the fundamentals of wireless thermal printing technology and applications. The paper:

- Explains wireless connectivity options for thermal printers, including Bluetooth® and 802.11-standard networking;
- Describes how stationary, cart-mounted and mobile printers can be wireless-enabled;
- Highlights security capabilities and options for wireless printers;
- Describes wireless printing applications;
- Documents the labor savings, cost reductions and other benefits of wireless printing, including examples from real-world users.

Basics: The Two Types of Wireless Connectivity

A printer may use a wireless interface for network connectivity to a wireless LAN, or as a cable replacement for communication with a handheld computer or other device. Multiple technologies and standards are supported within each of the two main categories.

Cable Replacement

Wireless connectivity for cable replacement is common when the printer is carried, worn, or mounted in a vehicle. In these operations, the printer often interfaces with a handheld or vehicle-mounted computer. Common applications include route accounting, direct store delivery (DSD), field service and forklift-based printing operations. Output may include invoices, receipts, delivery confirmation notices and order forms, plus picking, putaway and shipment labels.

In cable-replacement applications, there is a direct wireless connection between the printer and computer with no communication through an access point, server or hub. Bluetooth® is very popular and effective for cable replacement, and adoption continues to grow rapidly. A Bluetooth-enabled printer can connect easily and securely with a variety of other standardized Bluetooth devices, including handheld and vehicle-mounted computers, laptops, PDAs, smart phones, and even electronic scales and other peripherals. Bluetooth can be used concurrently in environments where 802.11-standard wireless LANs are operating.

In contrast to wireless LAN technology, Bluetooth poses a very low security risk because its limited range (typically 30 feet or less) requires would-be hackers to remain very close to the devices to attempt to intercept transmission, and their presence would likely be noticed in most business environments. Bluetooth's relatively slow transmission speeds and the limited amount of data typically exchanged also make hacking difficult.

Nonetheless, Zebra has implemented several security measures in its Bluetooth wireless printers. First, Zebra® Bluetooth printers only support the Serial Port Profile (SPP), which somewhat limits the devices they can associate with. The Discovery Mode is turned off in the default configuration, which means the printer itself will never initiate a link with another Bluetooth device. It will only communicate if a handheld computer initiates the exchange, and the printer can be configured to authenticate the computer. Zebra Bluetooth printers automatically provide 128-bit authentication, and support data encryption up to 128 bits. Bluetooth devices can also be configured to require a PIN code every time they attempt to associate with a new device.

Wireless Networking

Printers connected to enterprise wireless networks can receive print jobs directly from ERP, WMS and other enterprise applications and be monitored with legacy network management systems. Wireless LAN connectivity is available for mobile, stationary and cart-mounted printers. Like wireless networking technology itself, wireless printers have evolved to support the latest standards for connectivity, security and management.

Printers communicate to the wireless network either by an internal radio card or a wireless print server, which can be an internal or external configuration. Printers that support IEEE 802.11b and 802.11g networking standards are widely available.

Internal radios and print servers provide a direct connection between the printer and the wireless network. Internal print servers are boards installed inside the printer that are compatible with multiple radio types and provide additional connectivity features. They are typically used in stationary, tabletop printers.

Zebra high-performance and industrial/commercial tabletop printer families and OEM print engines can connect to 802.11b/g networks through a print server installed on the printer. Wireless security for tabletop printers and print engines depends on the version of the print server used and the radio (older print servers supported multiple radio options).

- ZebraNet® Internal Wireless Plus is Zebra's newest print server, released in spring of 2008. It provides 802.11b and 802.11g network connectivity. The ZebraNet Internal Wireless Plus print server features an internal radio that supports the same securities as Zebra's advanced mobile printers, including 802.11i, WPA2, and VPN compatibility. Previous-generation protocols like WPA, LEAP and WEP are also supported.

- ZebraNet® Wireless Plus, released in 2007, has some support for WPA2 protocols (support varies by radio) and older securities.

- ZebraNet® Wireless Print Server is Zebra's original print server and has been discontinued. It supports WPA, LEAP, WEP and other 802.11b-standard securities.

Zebra developed an external print server to meet the special needs of cart-mounted wireless printing applications, the ZebraNet® PS 4000™. Cart-mounted printers connect to the ZebraNet PS4000 by USB cable. Up to four different printers can share one print server and a single IP address. The print server handles all secure communication with the wireless network and directs print jobs to the appropriate printer ports.

Network Security

There is no reason for a printer to be a weak link in wireless network security. Wireless printers are fully capable of supporting the leading protocols and architectures used to protect enterprise wireless networks today, including virtual private networks (VPNs), and WPA, WPA2, 802.11x, 802.11i, and LEAP among other security protocols for 802.11b and 802.11g networks. Therefore, system administrators should not compromise on printer security and should commit to hardware that supports the enterprise's preferred security protocols.

Security support varies according to the printer model and its firmware, the radio used and the print server, if a print server is used. Available support also changes frequently as new networking and security technologies are developed. Zebra's white paper Securing Zebra Wireless Printers provides a comprehensive guide to security options for wireless printing, and our Web site, www.zebra.com, has the most up-to-date information about supported security protocols.

Wireless Printer Management

Wireless thermal printers can be managed the way enterprises like to manage - whether through general IT asset management application like HP's OpenView™ portfolio or IBM® Tivoli®. Management applications developed for mobile and wireless devices, such as Motorola's Mobility Services Platform (MSP) or Wavelink Avalanche® software, also can be used to manage wireless mobile printers. Printer-specific management systems are also available. Printer management applications should support common networking, interface and security protocols, and take advantage of them to leverage legacy IT management resources as much as possible. These management capabilities do exist for thermal printers, although they are frequently overlooked or misunderstood.

IT administrators can use their favorite and familiar general-purpose IT management programs to monitor wireless thermal printers, but these applications provide very limited control over thermal printers and their specific settings. Similarly, management systems developed for mobile and wireless devices don't provide control over all the features and settings for optimizing thermal print quality, such as printhead temperature, print speed, bar code scaling and more. Management applications developed by the printer manufacturer provide the most control, but may not support other wireless devices, although some can be used together with other IT management applications.

For a complete overview of printer management options, including examples and formulas for comparing printer management costs associated with each, see Zebra's white paper Managing Printers for Maximum Reliability, Performance and Value.

Applications and Benefits

There are few limitations on where bar codes and RFID tags can go. They can be read at assembly lines, shipping and receiving docks, patient bedsides, retail checkouts, offices-practically anywhere information is needed. The traditional limitation on bar code systems has been the location where the symbols could be produced. By eliminating the need for a hardwired connection, wireless printers remove the final obstacle to creating bar code and RFID smart labels in real time where they are needed.

As with most technology, many of the benefits users receive from wireless printing are derived from the new business processes it enables. Wireless network connection allows printing to be done in places where it was not possible before. Changing procedures and business practices to take advantage of this capability can produce strong efficiency and quality improvements. Following are some examples of how different industries can benefit from wireless printing.

Manufacturing

Assembly line workers typically walk to a central computer and printing station to pick up the labels, or use preprinted labels stored at their workstations. Installing a wireless printer at the point of activity is an improvement over either of these procedures.

Requiring workers to leave their assembly stations to pick up labels results in nonproductive time being built into every product. Even if the printing station is nearby, label pickups may serve as unscheduled breaks as workers converse around the printer. If workers gather labels for several items at a time, they run the risk of mislabeling, which defeats the tracking system. The results may seem inconsequential when observed during a few shifts, but over the course of time the minutes saved for each worker translate into significant productivity gains and labor cost savings.

"When we used stationary bar code printers throughout our facility, workers had to walk to a central print station when they needed a shipping label. More often than not, this meant waiting in line behind two or three other users while their print jobs were being processed," said the network administrator at Four Seasons, an automotive parts manufacturer that raised productivity by installing wireless cart-mounted printers (see box).

Using preprinted labels at the workstation eliminates distractions and lost productivity, but at a cost. Preprinted labels cannot carry variable information, such as the date of manufacture or identification of the worker who made or inspected the product. The ability to produce variable-information labels in real time is critical in many automated production environments, particularly for ERP systems and ISO-certified operations. In addition, preprinted labels must be held in inventory to ensure adequate supplies, leading to ordering, processing, and storage expenses.

Wireless printers are advantageous to manufacturers that change their production lines or use flexible work cells. By not having to retool and set up workstations based on the availability of cabled network connections, manufacturers can greatly reduce their changeover time and take full advantage of their facility space and flexibility options.

Manufacturers also can use wireless printers at testing and quality control stations to ensure items are identified and tracked correctly. More applications exist for materials management, finished goods inventory, asset management, and other operations.

Shipping and Receiving

A technology manufacturer conducted a time-motion study of receiving operations, in which the warehouse worker only had to take nine steps to travel from the pallet with items to be labeled to the workstation where labels were printed. Pallets were labeled in 42 percent less time (28.11 seconds compared to 49.74) when wireless mobile printers were used to eliminate the short walk to the central printing station. Putaway transactions were completed 62 percent faster, even though the stationary printer previously used for putaway labels was only one aisle away from the putaway location. Based on the volume of materials processed at that particular distribution center, managers quickly determined that a mobile printing system would provide significant productivity gains and a rapid return on investment.

Wireless printers also are valuable when used to support cross docking. A wireless printer at the receiving area can be used for relabeling incoming shipments. By eliminating the need for workers to go inside for labels, wireless printers provide the time savings and responsiveness demanded by cross-docking operations. The printers also can be used to generate manifests, safety labels, or temporary ID badges for delivery drivers.

For traditional receiving, wireless printers can be used to relabel incoming pallets or create new identification labels for cases and individual items when pallets are broken down for item putaway. For large items stored outside of the warehouse, wireless printers can be installed in the receiving yard to label items as they enter the facility-without requiring a trip inside to pick up a label.

Driscoll Strawberry Associates is a produce supplier that receives strawberries from growers. Operations get very busy at peak harvest times, and because the products are highly perishable, efficient operations are crucial. Using wireless printers at the receiving dock to issue goods receipts to growers, instead of processing paperwork in a central office, helped Driscoll reduce the time needed to process receiving transactions by 25 percent, which produced a rapid return on investment. The full case study, "Driscoll Picks Perfect Mobile Solution for Distribution Account Reconciliation," is available at www.zebra.com.

Wireless printers can also aid busy shipping operations. If a surge of orders exceeds the capacity of a company's shipment labeling system, wireless printers can be temporarily deployed to meet the increased demand. Operations and IT professionals appreciate how quickly wireless printers can be set up and configured in busy times, especially when compared with traditional wired models. See Zebra's white paper Productivity Through Portability: Mobile Printing Delivers ROI in the Warehouse for more application ideas and user profiles.

Retail

Mobile wireless printers are widely used by retailers for shelf price labeling, returns processing, inter-store transfer labeling, price auditing, portable POS, item marking, signage, and other applications. Wearable, handheld and cart-mounted models are all widely used for retail operations. Stationary wireless printers may also be installed with scales for bulk-food sales or other self-service applications to create accurate price labels. Retailers that frequently reconfigure their stores or set up temporary POS or returns processing stations after the holidays are good candidates for wireless printing.

Jumbo, the largest toy retailer in Greece, provides a good example of the accuracy and labor efficiency that wireless mobile printing provides. Store associates walk through store aisles to monitor which items need to be replenished on the shelf. Jumbo equipped its store associates with handheld computers and belt-worn printers so it could automate and decentralize its price labeling. Associates now produce price, promotional, and markdown labels while they are in the aisle. Jumbo reports associates are 80 percent more productive and save between 45 and 90 minutes per day by avoiding walking back and forth to the central office. Plus, pricing errors have been reduced by 80 percent.

A major supermarket chain eliminated a 20-person, six-hour night shift after changing processes that included switching to wireless mobile printers to create new shelf labels and conduct price audits. Now, a smaller team completes the same work in just one hour before the store opens using Zebra mobile label printers. Many additional retail case studies and white papers are available at www.zebra.com.

Hospitality

Hotels, conference facilities, and convention centers easily can set up extra registration and VIP check-in/checkout stations virtually anywhere by using computers and printers on a wireless network. Wireless printers can produce name tags, admission tickets, and other materials on demand, saving the expense of printing and transporting materials for registered guests who never check in. At front desks and other check-in/checkout locations, wireless networks enable multiple users to share a printer without running a tangle of ugly cable. With their advanced bar code and graphics capabilities, wireless printers also can be used to create short-term security passes, eliminating the security risks associated with keeping an inventory of preprinted, non-personalized passes. Mobile printers are commonly used with mobile computers for hospitality foodservice operations to take orders and process payments at tableside, poolside, lounge and other convenient locations. More uses and considerations are presented in Zebra's white paper Printing Technology for Hospitality Venues.

Conclusion

Wireless printers offer all the capabilities and performance of their cabled counterparts, with the added advantages of flexibility and convenience. When you remove cables, you gain flexibility. Using wireless connectivity to enable printing at the point of activity reduces the chance of mislabeling and makes workers more productive. Gaining these benefits does not require a trade off in IT support, because enterprise network management and security systems can be leveraged and extended to wireless printers.

Freedom from network cables also makes it easy to add new printers to the workplace. If operations expand or more printing capacity is temporarily needed, new printers can be up and running in minutes, instead of waiting hours or even days for busy IT staff to run cables to the work area.

Zebra Technologies was the first printer manufacturer to offer integrated wireless capabilities, and its products work with products from all of the leading network technology vendors. Zebra also has a staff of engineers constantly developing to meet emerging wireless and security standards, making Zebra products the broadest and most secure wireless offering in the industry. Zebra has the experience, partners, and comprehensive product line to help you create the optimal wireless printing system. Contact Zebra at +1 800 423 0442 or visit its Web site at www.zebra.com for more information regarding wireless printing.

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