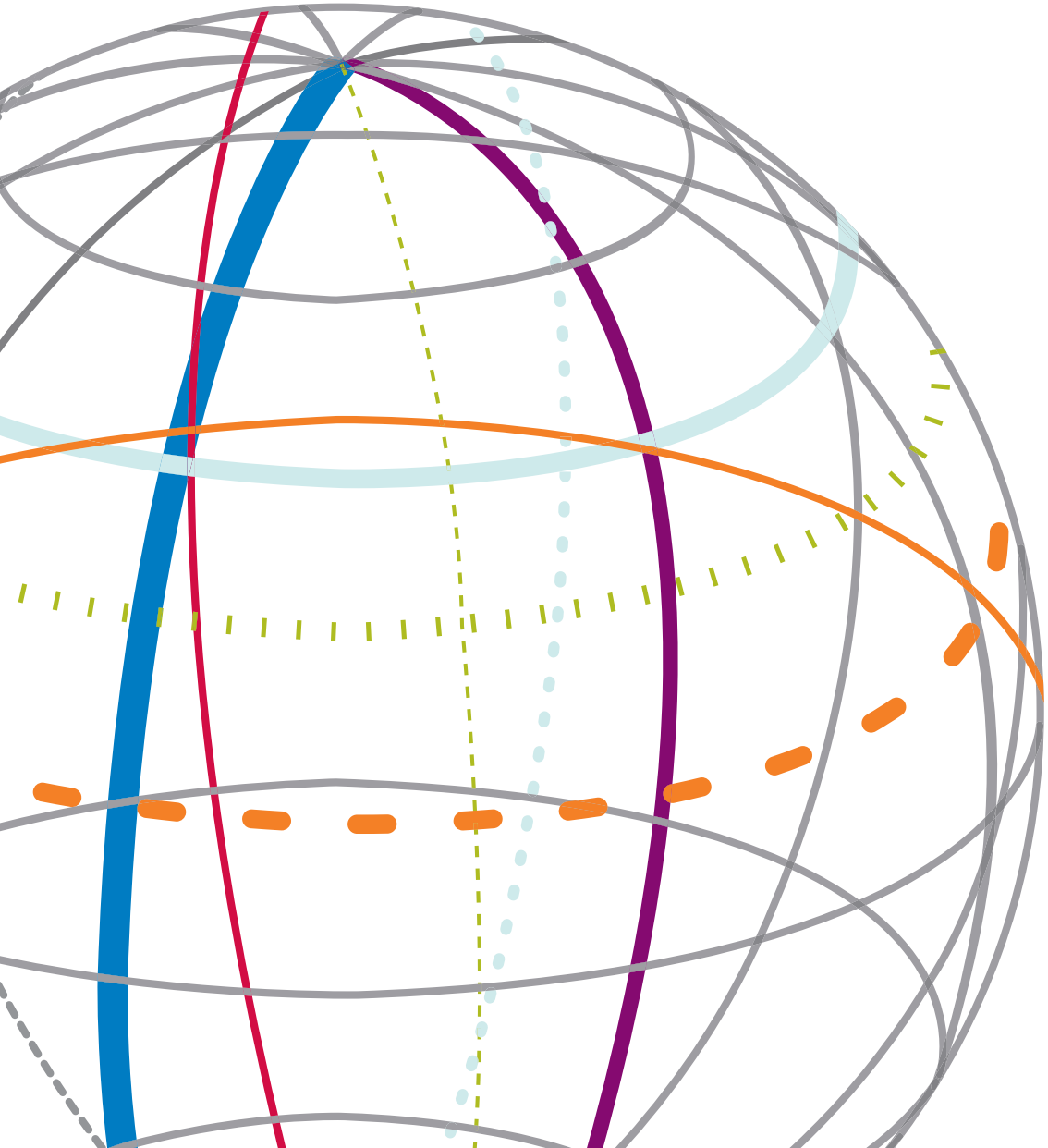
Understanding Mobile Printing Technology and Capabilities

ZEBRA TECHNOLOGIES

SEE MORE. DO MORE.



EXECUTIVE SUMMARY

Throughout a wide range of industries, mobile printers enable an endless array of documentation, ticketing and labeling tasks—from traditional barcodes to advanced radio frequency identification (RFID) tags. Wireless mobile printers include many of the connectivity and convenience features previously found only on stationary models. The evolution in mobile printer functionality gives users the flexibility to print materials on demand, where and when they need them. Seamless mobility can drive new business processes that take advantage of point-of-transaction printing to improve worker productivity, labeling accuracy and responsiveness to customer needs.

Successful mobile printing applications depend on a convenient, intuitive process for workers to follow. IT departments must deploy mobile solutions that are easy to operate and suitable for use in the work environment, whether it is a busy outdoor receiving dock, a medical center or a retail store aisle. There are important distinctions among printers that are "moveable" and "mobile" printers. Understanding the design and performance features that differentiate mobile printers from stationary models is critical to developing beneficial new processes and selecting the optimal solutions.

Fact is, no single printing solution fits all business processes and user tasks. To help businesses make informed choices, this paper presents several informative topics on mobility, including mobile printing and associated wireless technology. Then, it presents example applications for reducing operating costs, increasing labor efficiency and improving customer service.

INTRODUCTION

According to research released by VDC in 2011, the mobile worker population exceeded one billion in 2010.[1] With an increasingly mobile and distributed workforce, this population will grow by over 10 percent during the next three years.[2] Based on these facts alone, it is clear that mobility—and the technology that drives it, including mobile printers—is critical for improving business agility and responsiveness.

Throughout this paper, the term "mobile printer" includes any printer that uses a wireless network connection, from small handheld models to larger, cart-mounted printers. Mobile printing systems offer the quality and convenience necessary to provide documentation for both internal and customer-facing operations. Modern mobile printers deliver high-quality barcode and RFID labels, receipts, invoices and tickets, and receive print jobs through a wireless network.

Mobile printers support many different forms and features, allowing them to perform in a diverse range of environments. By tackling select print jobs with small, mobile printers instead of centrally located stationary units, businesses are making huge strides in staff productivity. Replacing manual hand-written documents such as receipts, tickets and work orders in the field helps eliminate hidden internal costs associated with labeling errors.

Consider the following applications. Industrial companies can use mobile printers for shipping and receiving, putaway, cross-docking, work-in-process (WIP) tracking, and picking and sorting. Retailers can use mobile printers to track inventory with barcode and RFID labels, from the pallet, case, or package to the item level. This includes shelf-edge labeling and price management, returns labeling, mobile point-of-sale

[1] VDC Research, "Mobile Worker Trends: Fears of Managing an Increasing Mobile Workforce", February 2011.
[2] Ibid.

(POS) and line busting. Direct store delivery (DSD) and logistics enterprises also gain from mobile printing, which helps streamline operations and improve mobile worker productivity.

In the healthcare industry, medical staff can label medical specimens at the patient bedside. Hospitality and service industries use mobile printers to speed ticket processing, guest and passenger check-in, and tableside and curbside transactions, as well as on-the-spot delivery confirmation and proof of service receipts.

Beyond the private sector, state and local government agencies are also looking for ways to leverage mobile printing to cut costs and reduce errors. Many precincts are turning to electronic citation (e-citation) systems to meet ever-growing data collection and reporting requirements. Officers can use handheld devices, mobile computers, and printers to complete traffic stops faster, safer, and more efficiently than through manual ticketing.

MOBILE PRINTING TECHNOLOGY BASICS

Today's mobile printers are lightweight, easy to use and durable, and offer rich print quality, along with support for a variety of media previously found only on stationary printers. Most offer an 802.11b/g wireless interface for connecting to a local area network (LAN) and enterprise resource planning (ERP) applications from anywhere in the facility, indoors or out. Many contain integrated credit card readers for fast payment processing.

Mobile printers typically find use in conjunction with handheld, wearable or mountable computers. The printer receives commands from the mobile computer, smart phone or tablet through either a cabled or a wireless connection using short-range Bluetooth® technology. The operator can use the mobile device to generate transaction information and print jobs or receive tasks pushed down directly from the wireless network.

FORM FACTORS AND ERGONOMICS

Mobile printers are available in multiple designs to meet the needs and preferences of a variety of mobile workers. Form factors include devices wearable on a belt or shoulder strap, or securely mounted on a vehicle or a cart. Finding the best form factor requires a clear understanding of the work environment, collecting valuable user input, and establishing procedures for improving printing convenience.

Mobile printers must be comfortable and easy to use, or they will not deliver productivity benefits. While overall weight is important, balance, grip and ease of carrying and operation are also critical. Printers also must efficiently accelerate the transaction, or else operators will not use the technology.

There are several common classes of mobile printers, each of which are described in detail below.

Wearable

Workers can wear printers using either a belt clip or a shoulder strap, giving them the flexibility to keep their hands free for other tasks. Users are able to comfortably carry printers with belt clips or shoulder straps, reducing fatigue, especially in high-use environments. A wireless connection between the wearable printer and the mobile computer maximizes mobility and enhances usability, while eliminating the need for cumbersome communication cables.

Zebra offers many wearable printers in its P4T™/RP4T™, QLn™, iMZ™ and RW™ series of product families. This wide assortment of printers feature durable construction, convenient media handling and battery-saving features, and offer a variety of print widths, media capabilities and other functionality.

The RW 420™ Route Palette and RW 420™ Print Station provide a single, convenient carrier for Zebra's rugged RW 420 mobile printer and a Motorola® handheld mobile computer. Ideal for route accounting, direct store delivery, field service, sales operations, and e-citation, this integrated solution makes mobile workers' jobs easier and more productive. They can use a shoulder strap, or carry it using a solid handle, rather than struggle with separate mobile devices attached to their belt or fixed-mounted in the vehicle.

Vehicle-Mounted

Mobile printers support mounting into most vehicles, including emergency response vehicles, police cruisers, forklifts and delivery trucks. While the mount is permanent and secure in the vehicle, the printer can be easily removed for POS transactions, such as DSD or route accounting operations. Mounted printers may be battery operated or hard-wired to a vehicle power adapter or battery eliminator. Although it is possible to adapt stationary printers for use in trucks and material handling equipment, it is generally preferable to use a mobile printer for the operation.

Ruggedized Zebra mobile printers and vehicle accessories are built to withstand the shock and vibrations of vehicles and have power management, media handling and user interface features optimized for mobile applications. Vehicle mounts are available for Zebra's P4T, QLn420 and RW series mobile printers. With Zebra's RW series printers, users can choose an intuitive pushbutton- or lever-release cradle, which allows for convenient storage and charging in the vehicle and easy removal for bringing along to a customer transaction.

Cart-Mounted

Stationary and tabletop printers offer mobility when users mount them on a movable cart. This configuration is ideal for when the application requires more media capacity or added functionality beyond the capabilities of a smaller mobile printer. Typical applications include print jobs that require high-volume output or a variety of media sizes, colors, formats, etc. Cart-mounted printers require a power or battery supply, as well as a connection to a PC or portable computer through either a communications cable or the 802.11b/g wireless network.

Zebra's ZebraNet® PS4000™ is a mobility-enabling device through which users can convert up to four Zebra stationary printers, like the Xi4™ or ZM400™, into an on-demand mobile printer solution ideal for retail or warehouse applications. When using a Zebra LA-24 battery, users can power up to four printers, allowing businesses to leverage their existing Zebra stationary printers and eliminate the need for power cables and wall outlets.

Printer Accessories

Many accessories are available to make mobile printers more comfortable and convenient to use. Accessories include shoulder straps, belt clips, printer stands, vehicle-mounting units, communications cables, printer charging stations, single- and multi-unit battery chargers, soft cases and more.

WIRELESS COMMUNICATIONS

Using wireless technology for cable replacement improves ergonomics and productivity. Eliminating cables that connect printers to handheld computers helps reduce the risk of tangles and falls. Wireless also improves system reliability, eliminating the chance for cables and pin connectors to break. This is a tremendous advantage in field service and route accounting applications, where users are often miles away from headquarters and lack immediate access to replacement cables and connectors.

Innovative wireless technologies exist for connecting mobile printers to a single device or to multiple devices on a network. Instead of standard serial, parallel or Ethernet communications cables, businesses can use Bluetooth for single device, one-to-one connections and/or 802.11b/g for multiple device connection.

Bluetooth Technology

Bluetooth applications require a Bluetooth radio in the printer as well as the mobile handheld terminal, smart phone or tablet. Bluetooth targets wireless, low-power consumption applications allowing computers, printers and other devices to interface with each other without routing through a centralized hub or server. Maximum range is about 30 feet, enabling mobile printer usage located away from a stationary PC. The main benefit is that once paired, only these two devices can communicate to each other at one point in time, improving security.

Wireless Networking

Mobile printers can use a wireless network connection to receive print jobs, label formats, variable data and other information from host systems or wireless handheld devices. 802.11b/g is the most widely used wireless network standard and offers excellent performance for enterprise applications. It uses the 2.4 GHz frequency band and allows up to 11 Mbps (megabits per second) data rates.

Other standards in the 802.11 wireless networking series include 802.11a and the most recent 802.11n standard, which is available on Zebra's QLn and iMZ series mobile printers. 802.11n delivers faster speeds, greater range and improved reliability—increasing the maximum data rate from 54 Mbit/s to 600 Mbit/s.

Most importantly, 802.11n is backward compatible with 802.11b and 802.11g, which helps protect the enterprise's existing investment in mobile devices and networks.

Zebra supports several leading security protocols, including VPN, WPA, WPA 2, LEAP, Kerberos, EAP-TLS, EAP-TTLS, PCI DSS and more, to meet user preferences for securing wireless transmissions. Through Zebra's involvement with international standards committees and strong relationships with leading wireless technology developers, Zebra will continue to offer advanced wireless security features and new 802.11 enhancements as they are introduced into the market.

Mobile Printer and Device Management

Mobile printers provide diverse output (barcode and RFID labels, tags, receipts, tickets, etc.) that require fine-tuning of special features like the printer's darkness setting and print speed that common office printers do not offer. Mainstream printer utilities and IT management systems cannot provide full control over mobile printers, especially thermal models. Thermal printers need their own management resources for optimal performance and reliability.

ZebraLink™ utilities allow IT staff to centrally deploy, manage and monitor Zebra printers from a single PC anywhere on the network. With the consolidation of operations and headcount that is prevalent in most manufacturing and IT organizations, there is a trend toward centralized management and administration of peripheral equipment, including printers. ZebraLink utilities take advantage of SNMP support native to Zebra printers to provide monitoring and management capabilities, which are extremely valuable for improving printer uptime and reliability.

ZebraNet™ Bridge Enterprise closes the gap between label printer-specific support provided by printer utilities and the centralized management, configuration, and control available in general-purpose management applications. Leveraging the power of ZebraLink, ZebraNet Bridge Enterprise allows users to manage all their networked Zebra printers around the world from a single desktop application, and "push" settings, firmware and files to printers as updates are needed.

In addition, Zebra's new Link-OS™ suite of software and tools enhances the capabilities of Zebra devices to make them significantly easier to integrate, manage and maintain from any location. Available on the iMZ and QLn mobile printers today, Link-OS is an open platform that pairs smart Zebra devices with powerful software applications. For example, developers can connect Link-OS devices securely and directly to Cloud-based applications—for device management, printing or as part of a powerful data collection platform. In addition, users can quickly and easily manage Link-OS devices directly from the AirWatch® system environment using the Windows®-based Link-OS AirWatch Connector solution. This seamless integration to AirWatch eliminates the need to use multiple tools to manage multiple mobile device types. To learn more about Link-OS, visit www.zebra.com/link-os.

PRINT METHODS AND MEDIA

Thermal-based technology is optimal for mobile printing because of the high print quality output, media flexibility and the low-maintenance, durable nature of the equipment. Impact printers break more easily in dynamic and industrial environments, often lack the print quality to produce scannable barcodes, and contain no optimizations for adhesive label media.

There are two thermal printing methods, direct thermal and thermal transfer. Each method uses a thermal printhead that applies heat to the surface undergoing marking. Thermal transfer printing heats a ribbon to melt durable, long-lasting images onto a wide variety of materials. Direct thermal printing does not use a ribbon and instead creates the image directly on the chemically treated label material. Direct thermal media is more sensitive to light, heat and abrasion, which reduces the overall label life.

Direct thermal is the dominant method used in mobile printing because the simplicity and convenience of the technology are true advantages in mobile applications. Additionally, the label, receipt or document printed from a mobile printer typically has a relatively short life, again, proving the need for direct thermal over thermal transfer. However, in applications where a longer-lasting label or more durable label material is needed, Zebra offers the only thermal transfer mobile printer on the market, the P4T.

Direct Thermal Applications

Direct thermal printers can satisfy most mobile application needs. Top-coated media resists ultraviolet light and remains readable for years, eliminating the problem of receipts that fade and curl after a few days. Many types of liner-less media are also available, which eliminate the waste and disposal problems associated with peel-away liners used with adhesive labels.

Thermal Transfer Applications

Thermal label printers are ideal for barcode printing because they produce accurate, high-quality images with excellent edge definition. Thermal printers are engineered to print within tight tolerances and to produce the exact bar widths that successful barcode printing and scanning require. The Zebra P4T/RP4T printer takes thermal transfer technology to the next level by delivering superior image durability (barcodes/text/graphics), optional RFID and advanced wireless connectivity options. Thermal media is also available to resist oil, water, blood, alcohol and common industrial solvents.

Typical mobile printers accept a variety of label, tag, ticket and other media for producing durable receipts, invoices, return labels, inspection labels and other labels and documents. Users can customize blank label, tag and receipt stock to include color, graphics and company logos, with the variable text and barcode printed on-demand from the mobile printer. While the majority of route accounting customers accept 4-inch-wide delivery confirmation receipts, mobile printers can print variable information like invoice amounts or delivery contents on labels that are applied to forms. This satisfies customer desires to keep using familiar forms, while eliminating handwriting and manual recording.

POWER MANAGEMENT

How the mobile printer manages power consumption is important to overall battery life and application effectiveness. It is critically important in remote applications, like route accounting and parcel delivery, to have enough battery life to power printers for the entire shift. Otherwise, workers may not be able to complete their daily jobs.

Battery life varies widely based on how the printer is used. Print volume, label size, the amount of wireless transactions and other factors affect battery recharge and replacement rate. Users should test their applications to ensure that the batteries they use consistently perform as needed and will not contribute hidden expenses to the total cost of ownership. Some mobile printers have adapters so they can be powered from vehicle batteries. A variety of battery chargers are also available.

Optimizing power usage and prolonging battery life is critical for mobile applications. Zebra Power Smart Print Technology™ allows the QLn printer to deliver faster processing and throughput with lower power drain, giving mobile workers higher-quality printing and more uptime on the job. The feature recognizes which printhead elements have already been heated, allocating less power to those print elements. This eliminates the redundancy of delivering the same level of power with each line of printing and saves an estimated 20 to 30 percent of battery power. In addition, Zebra's "smart battery" technology on the Zebra QLn printer displays charge and overall battery health.

DELIVERING REAL BENEFITS FOR THE MOST DEMANDING TASKS

Mobile printers help users gain new levels of control over their warehouse operations by providing the ability to print exactly when and where the material is needed. The best mobile printing applications result from process improvements that take advantage of the convenience mobility provides. New processes only need to save users a little time on each transaction to provide significant productivity gains and labor savings.

Companies that replace handwritten forms with mobile computers and printers for their route sales, delivery and field service operations typically report their drivers are able to serve more customers per shift, which produces revenue gains and enables expansion without adding labor. These applications also create electronic records that do not require transcription and manual data entry at the office, which saves labor and speeds up the billing cycle.

The following section highlights how mobile printing can benefit different operations and industries.

Field Sales and Service

- Slash invoice preparation time with mobile computing and printing systems.
- Improve the cash cycle by accepting payment on delivery or service with a mobile printer containing a magnetic stripe reader.
- Prevent driver delays and wait time at the central facility by wirelessly exchanging work assignments and delivery records at the beginning and end of each shift.
- Mobility also helps improve DSD efficiency with Zebra's interface to the DEX electronic data interchange (EDI) standard that looks up the EDI transaction in the retail-store host system for invoice reconciliation and immediate resolution.

Hospitality

- Prevent lines, speed transactions and improve convenience—especially during busy periods—by printing receipts and tickets wherever they are needed.
- Turn the tables in restaurants quicker with tableside order entry and bill payment systems.
- Process airline transactions and issue receipts for in-flight shopping.

Hospitals and Labs

- Protect patient safety and improve accuracy and efficiency by labeling samples where and when they are drawn and as they are transferred among departments.

Law Enforcement and Security

- Improve safety, enforceability and efficiency by utilizing mobile computers and printers to issue e-citations.
- Reduce manual paperwork and decrease clerical errors by accepting immediate ticket payment at the point of citation with an integrated card reader.
- Improve evidence management by applying barcodes to evidence as it is collected in the field.

Manufacturing

- Reduce labeling errors at cross docking and shipping/receiving by labeling products on the spot.
- Improve accuracy and productivity at picking and putaway.
- Clearly identify samples when they are pulled for inspection, testing and quality control.
- Achieve 100 percent asset visibility with RFID tagging.
- Stock handlers can use forklift-mounted printers for picking and putaway operations, cross-docking incoming shipments and generating shipping labels at parcel pickup in the field or anywhere within the distribution facility.

Postal, Parcel and Logistics

- Streamline documentation by issuing delivery receipts, pick-up notices and other documentation at the point of delivery.
- Offer line-busting mobile POS in retail locations.
- Turn carriers into sales agents by selling postage generated on mobile printers.
- Label parcels at pick up to eliminate backlogs at the distribution center.

Retail

- Significantly reduce in-aisle re-pricing and shelf-edge labeling costs.
- Relieve congestion and increase customer satisfaction with mobile POS and returns processing systems that use mobile printers to issue receipts and process card payments.
- Automate inventory tasks and create “smart shelf” systems that help shoppers locate goods with item-level RFID.

Utilities

- Leverage mobile printers to create legible identification labels and inspection QA stickers.
- Produce service records and invoices for customers.
- Process payments and issue receipts on the spot.

Zebra has developed a series of white papers and case studies that fully explore the applications and benefits of mobile printing in several industries. Browse the white paper section under Research & Learn at www.zebra.com to find these and other resources.

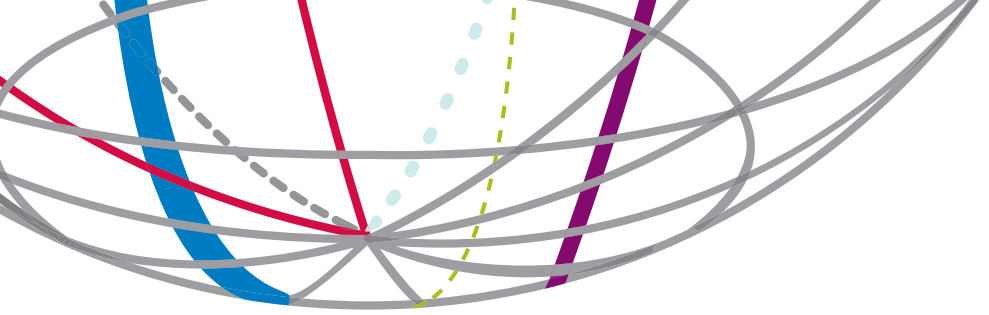
SUMMARY AND CONCLUSION

Today's generation of mobile printers are key enablers for improving business processes. Printing at the point of use can deliver efficiency gains and cost savings to entirely new areas of the enterprise. As a pioneer in wireless printing technology and a leading provider of mobile printing solutions, Zebra Technologies has extensive experience working with its customers to create new systems that deliver measurable business value—whenever and wherever you need it.

A global leader respected for innovation and reliability, Zebra offers technologies that illuminate organizations' operational events involving their assets, people and transactions, allowing them to see opportunities to create new value. We call it the Visible Value Chain.

Zebra's extensive portfolio of marking and printing technologies, including barcode, RFID, GPS and sensoring, turns the physical into the digital to give operational events a virtual voice. This enables organizations to know in real-time the location, condition, timing and accuracy of the events occurring throughout their value chain. Once the events are seen, organizations can create new value from what is already there.

For more information about Zebra's solutions, visit www.zebra.com.



Corporate Headquarters
+1 800 423 0442
inquiry4@zebra.com

Asia-Pacific Headquarters
+65 6858 0722
apacchannelmarketing@zebra.com

EMEA Headquarters
+44 (0)1628 556000
mseurope@zebra.com

Latin America Headquarters
+1 847 955 2283
inquiry4@zebra.com

Other Locations / USA: California, Georgia, Illinois, Rhode Island, Texas, Wisconsin **Europe:** France, Germany, Italy, the Netherlands, Poland, Spain, Sweden, Turkey, United Kingdom **Asia Pacific:** Australia, China, Hong Kong, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, Vietnam **Latin America:** Argentina, Brazil, Colombia, Florida (LA Headquarters in USA), Mexico **Africa/Middle East:** Dubai, South Africa

P1048868 (05/13)