



A Zebra Technologies White Paper

# Managing Printers for Maximum Reliability, Performance, and Value





# Executive Summary

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In most manufacturing, logistics, and retail businesses, bar coding and RFID tagging is a mission-critical task. If the bar code or RFID system goes down, the entire production line, warehouse, and/or receiving/shipping dock are likely to fail as well. In a company with 24/7/365 operations, the task of monitoring the system can be daunting. In a company with multisite or multinational operations, the task may seem impossible.

Critical systems can sometimes experience issues—usually at the most inopportune time. In business, continuous operations are the ideal, but because of routine maintenance requirements and unforeseen developments, the term “mission-critical” has evolved to mean any activity that is essential for business to function. In short, when the system is not producing, the company loses money.

Despite all of these attempts to keep systems running, systems still fail on occasion. The only way to prepare for such failures is to:

- Set up the system with the most reliable equipment available
- Closely monitor and proactively manage the system.

This white paper discusses how thermal printer features affect printing and support operations, and presents different IT management options for maximizing thermal printer availability and value.

## Introduction

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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 for several minutes to several hours. If the incident occurs overnight, even a simple error could halt operations until the following morning.

Consider two thermal printers that work side-by-side to produce shipping labels at a busy distribution center. The printers are very comparable. The main difference between the two printers is in how the IT department manages them.

Printer A uses its network connection to send status reports to the system administrator or to a remote management application. Performance and diagnostic information transmits using SNMP or network connection to a console application the network administrator uses. Ethernet connectivity to Printer B provides one-way communication of print jobs.

An hour before the daily shipping deadline, each printer begins to run low on label media. Printer A detects this and automatically sends an alert through its management application. The IT administrator uses a custom application to divert print jobs temporarily to another printer and automatically forward low media alerts to a worker on the floor, who drops in a new roll of labels in less than a minute, resulting in no meaningful disruption to activity.

Minutes later, Printer B’s label roll runs empty. The condition goes unnoticed until unlabeled cartons pile up at the printing station. An operator then hastily adds a label roll and starts the process of determining which labels belong on which boxes. The delay threatens the same-day shipping status of some orders and will result in rush shipping charges if the cartons are not sorted, identified and labeled in time for the scheduled

pickup. This time, shipping clerks fix the problem in time, but eventually, media will run out at an inopportune moment and create a missed shipment.

“Supportability” and “uptime” do not show up on thermal printer spec sheets for easy comparison like other key attributes, such as connectivity options, bar code types, RFID encoding, print dimensions, or price. However, the ease with which IT departments can manage thermal printers has one of the biggest impacts on the value they provide. Printer compatibility with enterprise IT support protocols and preferences has a strong, direct impact on reliability, support time requirements and total cost of ownership (TCO).

## Let Specialization Become a Differentiator

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Thermal printers provide diverse output (bar code and RFID labels, tags, wristbands, receipts, tickets, etc.) that require special features (heat settings, print speed) that common document printers do not offer. Therefore, mainstream printer utilities and IT management systems cannot provide full control over thermal printers. Thermal printers need their own management resources for optimal performance and reliability, but that does not mean thermal printers cannot be compatible with IT and network standards and protocols.

Optimally, thermal printer management should operate the same as enterprises do—whether through general IT asset management applications like IBM’s Tivoli™ or HP® Network Node Manager™, through an SNMP connection to a homegrown management application, or for advanced control with a management system specific to the printer. Printer management should support common networking, interface, and security protocols, and leverage legacy IT management resources. These features and capabilities do exist for thermal printers. The sections that follow present various printer management features and options. First, here are some questions to ask for determining what functionality and level of control is necessary for managing thermal printers throughout the enterprise.

- How long does it take to install and configure a new printer?
- How do we discover if a printer goes offline or becomes disabled?
- How long can we afford to have a printer offline before knowing about it?
- What happens to operations if a printer stops working or the media runs out?
- If RFID requirements change, can our printer/encoders be modified to support different RFID protocols and standards through a remote firmware upgrade?
- How many people do we want to train and make available to perform common printer maintenance, such as setting heat and darkness settings, performing calibration, testing the printhead, etc.?
- How much time do we spend on these tasks? Could any of these activities be automated?
- How do we make sure settings and firmware are consistent across the printer population?
- How often do we add new fonts, graphics, bar code symbols, or label formats?
- Could our legacy management applications provide basic status information about thermal printers, if the printers could connect?
- Can we remotely adjust printhead settings and other features specific to thermal printers?
- Are specialized management tools available for our thermal printers?
- Are our printers network addressable? Do they support our security and connectivity protocols?

- Are printers sometimes moved within the facility, or would it be helpful to do so? How much installation and provisioning time does that take?

Answers to these questions will determine the features and level of control enterprises need from their printer management systems. Monitoring printer network status and general IT management applications addresses some of these needs, but many scenarios require management resources developed specifically to meet the needs of thermal printers.

An online tool in the Resource Library section of [www.zebra.com](http://www.zebra.com) helps identify the costs and impact of various printer support activities, and calculates the impact a thermal printer management solution can make on operations. Access the ROI calculator at: [www.zebra.com/id/zebra/na/en/index/resource\\_library/roi\\_calculators/zebranet\\_bridge\\_enterprise.html](http://www.zebra.com/id/zebra/na/en/index/resource_library/roi_calculators/zebranet_bridge_enterprise.html).

## Management Options

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Management capabilities have a large effect on printer value, even in low-volume operations not commonly under time or performance pressure. For example, printers with remote support capability can provide a tremendous total cost of ownership advantage just from the timesaving they provide from initial installation and configuration. The value grows for larger printer populations or when printing is part of mission-critical business operations.

### Management Starts with the Printer

Most thermal printers connect to networks, which are the foundation for monitoring and management. Printers can provide more than basic connectivity to help maintain uptime and support efficient maintenance. For example, there are tools available for printers that support SNMP that monitor status and provide automated alerts to prevent downtime. SNMP also provides a gateway for including printers in a variety of packaged and custom IT asset management and control applications.

Printers should be good network citizens, supporting enterprise standards and preferences for security and connectivity. Wireless printers are no exception. Leading wireless security protocols run on 802.11-standard printers, so organizations should choose wireless printers that support their preferred security.

Ideally, printer manufacturers support backwards compatibility in their firmware, so customizations and applications developed for legacy printers also support new models without requiring redevelopment. Printer firmware itself should be easy to install so users can take advantage of upgrades.

Printers that are deficient in these areas take longer to maintain and support, and may make administrators reluctant to change settings, customize applications, or install upgrades because of the inconvenience, time and expense. These factors contribute hidden costs to total cost of ownership and can undermine performance and reliability. The following sections profile the various options for managing thermal printers in an enterprise.

### General IT Tools

Mainstream enterprise IT management systems have set a high standard for functionality, user interfaces, and convenience. System administrators rely on these tools to manage most of their IT resources. Folding label printers into this management environment gives administrators the advantage of using a single, familiar environment to manage label and document printers, along with computers and other equipment. However, enterprise IT asset management systems provide only limited support for specialty label printers and

cannot optimize performance.

Many features that are specific to bar code, RFID, mobile and card printers are not supported in general purpose management applications. These applications are further limited because thermal printers also have specialized printer control languages (ZPL<sup>®</sup> for Zebra printers) that provide more control and flexibility for bar code printing than the common document printer languages such as PostScript<sup>®</sup> and PCL<sup>®</sup>. The proprietary control languages for thermal printers contain optimizations to provide high-quality bar code printing and smart label encoding. They support specific features like temperature and darkness settings, print speed, bar code symbology support, and special graphics and font handling performance that mission-critical label printing requires.

## **Printer Utilities**

Thermal printer utilities provide a distinct alternative to enterprise IT applications for printer management. Utilities contain optimizations to support specific thermal printers, but lack many of the scalability and centralized management advantages of mainstream solutions. The ZebraNet<sup>™</sup> Utilities for Zebra printers is an excellent example. ZebraNet Utilities provide monitoring and alerts for specific label printing conditions, but the applications work best in local rather than large, distributed enterprise environments. ZebraNet Utilities take advantage of SNMP support native to Zebra printers to provide monitoring and management capabilities, which are extremely valuable for improving uptime, and reliability. See [www.zebra.com](http://www.zebra.com) for the latest information about ZebraNet<sup>™</sup> Utilities.

ZebraNet Utilities are a convenient way to configure Zebra printers and often are sufficient for companies that operate a few label printers at a single location. However, 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. In a distributed environment, IT professionals tend to value the functions found in general-purpose IT management applications.

## **ZebraNet<sup>™</sup> Bridge Enterprise**

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. ZebraNet Bridge Enterprise is exclusively for Zebra printers and ZebraNet<sup>®</sup> print servers. With ZebraNet Bridge Enterprise, users can manage all their networked Zebra printers around the world from a single desktop application, and “push” changes to printers as needs. Features include grouping, for managing multiple printers, remote configuration changes, real-time status monitoring, remote label format, font and firmware installation and more.

ZebraNet Bridge Enterprise supports printers using the ZPL command language and firmware version X.10 and higher, which makes it backward compatible with many legacy Zebra wired and wireless printers. Unlike other printer management applications, ZebraNet Bridge Enterprise enables management of Zebra’s mobile printers and provides limited support for print servers used with Zebra printers using the EPL<sup>™</sup> command language. It also provides limited management control for Zebra card printers, when used with a ZebraNet print server.

## ZebraLink Mirror

Automatically managing printer configurations using a “pull” networking task can save operations and IT staff time and money, and ensure printers are functioning with the right configuration at the right time. ZebraLink Mirror automatically ensures printers are functioning with the latest intended information to keep operations running smoothly. IT administrators can configure and load important printer information on a networked server once, then allow the printers to pull the data as needed.

With Mirror, printers can pull settings, objects, and even firmware from a centralized FTP server. Administrators can synchronize the printers with specific files maintained on a server using several scenarios including when the printer powers up, at specified time intervals, both on power up and at time intervals, or on command.

## ZebraLink WebView

WebView provides a browser-based graphical interface for managing printers across the enterprise. When a Zebra printer is connected a TCP/IP Ethernet network with a Zebra print server, the printer’s embedded Web server allows a network administrator to point a Web browser to the Zebra printer’s URL just as one would point to a page on the Internet. The printer’s Web server then responds by sending a Web page to the network administrator’s browser, thus providing real-time, viewable and configurable record of the printer’s status, settings, and printing parameters.

ZebraLink WebView allows administrators to 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, IT departments only need to make these alterations once, thereby ensuring that every printer on the network receives the modification.

## Custom and Hybrid Solutions

Administrators can also manage printers using a combination of the aforementioned resources and legacy, customized management applications. Printers that support enterprise standards and protocols let organizations leverage their legacy management environment and IT skills. Printer support for standard protocols and connectivity options are vital for maintaining compatibility with many custom management applications.

## Printer Management Improves Reliability and Reduces Costs

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The example discussed at the beginning of this white paper illustrated how effective printer management can prevent a common occurrence like running out of media from escalating into a company-wide problem. Below are some more anecdotes and calculations that illustrate how printer management features contribute to reliability, uptime, and total cost of operation (TCO).

The ability to designate and manage printers in multiple, non-exclusive groups helps ensure consistency that prevents many one-off problems that occur when configurations differ across printer populations. Grouping, which is a key feature of ZebraNet Bridge Enterprise and ZebraLink Mirror, also makes it easier and less time-consuming to support printing.

There are many ways to group printers to save administrative time. All wireless printers support placement in a group to simplify security upgrades. RFID smart label printer/encoders allow grouping because of the specialty output they provide. There are benefits to grouping for more common applications. For example, printers used to create work-in-process tracking labels for components perform differently from the printers used to create large shipping labels for the finished product.

Imagine if users noticed a change in the bar-code reading performance of their work-in-process labels. A simple analysis could find the problem, and users could fix the problem by printing bar codes slightly darker, which requires an adjustment to the print temperature. The system administrator could make the adjustment on the ZebraNet Bridge Enterprise or ZebraLink Mirror console and load it to all printers used to produce WIP labels within a facility, or to factories around the world. Meanwhile, printers for shipping labels and other uses would retain the settings optimized for their applications. The grouping feature also enables download of new customer label formats to shipping label printers at only the facilities that supply the specific customer, which saves memory on unaffected printers.

Grouping eliminates redundancy from configuration, which provides valuable time savings. It takes practically the same amount of time to optimize a group of printers as it does to change settings on a single device. Users can frequently update and modify their printers to take advantage of new developments, without paying a penalty in excessive administrative time requirements.

A team responsible for maintaining a large population of Zebra printers at a busy distribution center estimated that it took approximately 20 seconds to find a specific printer on the network and view its settings using ZebraNet Bridge Enterprise, compared to about 45 seconds using previous methods. Changing settings and saving them to the printer takes about 40 seconds. If administrators used ZebraNet Bridge Enterprise or ZebraLink Mirror to manage the entire population, configuration changes execute in about a minute. Without centralized management, the time required would be a minute per printer.

The table below uses these baseline figures to calculate the difference in support time central management and grouping creates for a population of 50 printers.

**Table 1: Printer Management Time Savings**

Activity	Time Required if Printers Serviced Individually	Time Required if Printers Serviced by Grouping	Time Savings by Grouping (50-printer population)
Find printer on network	20 seconds	37.5 minutes	37.3 minutes
Change configuration	40 seconds	33.3 minutes	32.7 minutes
Total	1 minute	1 hour, 11 minutes	1 hour, 10 minutes (1.17 hours)

Multiply the time savings by the labor cost for IT support to calculate the financial savings grouping provides for each activity. These calculations help show how printers that can be managed separately and support innovative features like grouping can provide a significant total cost of ownership advantage over the life of the printer. For example, if administrators adjust settings only every six months, and add just one new font or label format annually, the centrally managed printer may cost several hundred dollars less to support each year.

Centralized management also allows organizations to consolidate support operations, further reducing administrative expenses. Consider a company that uses Zebra printers at three locations and wants to take advantage of a free firmware upgrade to enhance its printer capabilities (for example, to add international language support or a new bar code symbology). Previously, administrators at all three locations would go from printer to printer to install the firmware, or a specialist would travel to each location to perform the task.

With remote configuration, administrators could install the firmware at a single location, and push the new information using ZebraNet Bridge Enterprise for simultaneous installation to all printers on the network.

ZebraNet Mirror enables the printers to pull the information from the server, on demand. Doing so requires about the same amount of time to upgrade all printers as it would a single device—without the travel or the involvement of additional administrators. It is now much more cost-effective to upgrade, modify, and optimize printer settings, because the time and labor expenses associated with doing so are significantly reduced.

Simplifying management also promotes improved printer reliability by making it practical and cost-effective to keep printers up to date. Inconsistencies in label files, firmware, and settings can lead to less-than-optimal printer performance, and cause unusual error conditions that can be difficult to diagnose and correct. Many mission-critical printing operations cannot afford these kinds of problems, so it is important to take proactive steps to keep printers running reliably.

Reliability has different value for different companies. For example, a printer that develops an error condition and goes offline at one company may only lead to an inconvenience and some additional IT support. At another, it may cause express freight expenses to meet same-day shipping commitments. At a third, the inability to print bar codes may cause a production line shutdown, costing thousands of dollars in lost productivity and idle equipment costs each hour. The questions raised earlier will help determine the impact of printing problems so organizations can put a value on reliability.

## Conclusion

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It is easier for enterprises to figure out their printer output and performance needs than it is to determine the best way to manage printers. However, it is also important to take time to consider printer management scenarios and options, because management has a tremendous impact on printer reliability, output quality, and TCO. In many operations, printers are only as valuable as they are reliable. Using a convenient and comprehensive management system increases uptime and reliability without requiring a corresponding increase in support time and expense.

One of the reasons Zebra printers deliver extreme reliability is because Zebra offers a full assortment of printer management options, including SNMP connectivity built into printers, a variety of printer utilities, and the comprehensive ZebraNet Bridge Enterprise and ZebraLink Mirror printer management solutions.

Zebra Technologies Corporation (NASDAQ: ZBRA) provides the broadest range of innovative technology solutions to identify, track, manage, and optimize the deployment of critical assets for improved business efficiency. Zebra's core technologies include reliable on-demand printer and state-of-the-art software and hardware solutions. By enabling improvements in sourcing, visibility, security and accuracy, Zebra helps its customers to put the right asset in the right place at the right time. Zebra operates in over 100 countries and serves more than 90 percent of Fortune 500 companies worldwide. For more information about Zebra's solutions visit [www.zebra.com](http://www.zebra.com).

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