Extending Zebra® Printer Capabilities with ZBI 2.0™ Programming

Introduction

The processors resident within label printers can be used for more than just printing. With programming, printers can process and format input from a variety of sources, interact with databases, and otherwise add intelligence to computing, printing and industrial control systems. Zebra BASIC Interpreter (ZBI) 2.0 is an optional programming environment that can be used to add features to customize and enhance the performance of select printers manufactured by Zebra Technologies. ZBI 2.0 applications work with the printer's processor and the label formatting language so that the printer can recognize and process data streams, including input from database applications, scanners, scales and other common data sources. There are many practical and powerful uses for this functionality, including:

- Creating stand-alone printing applications that don't require the printer to be connected to a PC or network;

- Creating LCD prompts to guide users through operations;

- Connecting a bar code scanner, weigh scale or other peripheral directly to the printer to provide data for labels;

- Recognizing label formats created in other command languages, so Zebra printers can replace other types of printers in legacy applications;

- Interfacing with database applications to format data fields into bar codes or text for label output;

- Processing data input and output from the printer's applicator port;

- And much more….

ZBI 2.0 applications are not required to run Zebra printers and are not a replacement for the ZPL® printer command language. ZBI 2.0 is completely optional and can be ordered with the printer or enabled later by downloading a ZBI 2.0 key from Zebra's Web site.

This white paper provides an overview of ZBI 2.0, explains the requirements for using it, and presents use cases to illustrate ZBI 2.0's possibilities and the value it can provide.

ZBI 2.0 at a Glance	
What is ZBI 2.0?	A programming module to enhance the capabilities of select ZPL-based Zebra printers.
Is ZBI 2.0 required to run Zebra printers?	No
Does ZBI 2.0 replace ZPL?	No
Does ZBI 2.0 require programming?	Yes
Is a label formatting language required to use ZBI?	Yes
What can I do with ZBI 2.0?	Common uses include: • Creating LCD prompts so the printer can work interactively with the operator— without being connected to a PC or network. • Interfacing a printer directly to a scale, bar code scanner, keyboard or other peripheral to provide input for labels. • Programming printers to recognize other document formatting languages, so that Zebra printers can replace other devices in legacy environments—without redeveloping label formats. • Data logging. • Retrieving data from and uploading data to PC-based databases as a part of the label printing process.
What do I need to use ZBI 2.0?	A ZBI 2.0 key is required for each printer that runs ZBI 2.0 applications. Applications can be created with ZBI-Developer, Zebra's free PC-based programming utility.

What is ZBI 2.0?

Zebra BASIC Interpreter (ZBI) 2.0 is programming module that enhances the capabilities of select Zebra printers. ZBI 2.0 is completely optional and is not necessary to run Zebra printers, and it is not a substitute or replacement for the Zebra label formatting languages. ZBI operates between the printer's communications ports and the printer's label format processing engine to interpret and process incoming data streams. ZBI 2.0 applications give printers the ability to recognize a wide variety of data streams, enabling the printer to operate more like a computer than a typical thermal printer that can only process label formats developed in one specific language.

ZBI 2.0 works with the printer's label formatting language to embed data processing, label output, database and peripheral interface capabilities directly into the printer. In many cases ZBI 2.0 programs eliminate the need to control the printer with a PC or to use additional software to manage printing operations.

Two things are necessary to use ZBI 2.0: a ZBI 2.0-enabled printer, and a ZBI 2.0 program running on the printer. Applications are typically created with Zebra's free ZBI-Developer™ programming utility. More details are presented in the How to Use ZBI 2.0 section.

Why Use ZBI 2.0?

Because ZBI 2.0-powered printers can recognize non-ZPL data strings, they can perform more like a computer or terminal. This ability eliminates the need to dedicate a computer or network node to control the printer. ZBI 2.0 programs can be developed to recognize input from bar code scanners, scales, sensors, keyboards and databases, plus label formats developed for other printer brands. ZBI 2.0 can also be used to program the printer's LCD control panel to guide users through various printing activities, and a keyboard, such as the KDU Plus™, can be connected directly to the printer to simplify data entry. The following sections describe some of the ways to create new printing applications that take advantage of the data processing and programming capabilities of ZBI 2.0.

Peripheral Device Integration

In the past, if an application required connecting the printer with a scale, scanner, keyboard or other external device, organizations may have had to spend thousands of dollars for interface development and integration. Because the scale and the printer speak different languages, at the very least, a computer would be needed to interpret the data between the two devices. Printer-peripheral interfaces can be developed much more quickly and cost-effectively with ZBI 2.0, because it enables the printer to recognize proprietary data strings coming in from the peripheral. ZBI applications let peripherals connect directly to the printer, without a PC. Physical connections may not even be required, because many Zebra printers are compatible with 802.11-standard wireless networks and can receive data wirelessly from other networked devices.

ZBI has been widely used to simplify device integration. Here are two examples of common use cases.

Weigh-and-print: Workers place a carton on a weigh scale connected to a Zebra printer. The scale passes the weight measurement to the printer, where a ZBI application receives the incoming data, formats it for printing, and populates appropriate fields in a stored label format. The printer then outputs a shipping label, complete with the variable weight data expressed in text and/or bar code. Another variation of this application is to use a printer connected to a counting scale to produce receipts, tickets or piece-count labels to identify goods counted by the scale.

Scan-and-print: Businesses use bar code readers connected to Zebra printers to automate shipping operations. For example, a worker scans a serialized bar code label on a carton. The data is transferred to the printer, where a ZBI application associates the carton with a specific order or customer. Based on this association, the printer automatically produces a shipping label using a label format and customer address information stored in printer memory. No manual data input or intervening PC is needed to generate the shipping label. Numerous variations of scan-and-print applications have been developed for picking, packing and inventory management.

Data Extraction

When selecting replacement or add-on bar code printers, enterprises have often bypassed the brand and model that was best suited for the job in favor of a model from the legacy brand because of the effort and expense required to convert label formats for use by different printer control languages. One of the most valuable aspects of ZBI 2.0 is that it can be used to write programs that give Zebra printers the ability to receive and interpret proprietary data streams. That means ZBI 2.0-programmed Zebra printers can replace older printers in the office or factory or be added to support expanded operations without having to reprogram legacy label formats in a new printer command language.

For example, consider an aging printer in desperate need of new parts that have been discontinued. The user has no idea who originally programmed the shipping software for the printer, and does not want to program new label formats to support a new printer. A ZBI 2.0 application can be a convenient solution for this all-too-common problem by handling the data conversion. ZBI's data extraction capabilities also enable printers to output labels directed from enterprise applications and databases, as detailed below.

Database Applications

ZBI 2.0's data extraction capabilities can also be used to process data from database applications, and from databases within other software applications. With ZBI programming, networked printers can access databases and retrieve the information such as customer ID numbers, ship-to addresses, order numbers and other data necessary to produce labels. The printer can also update databases about transactions that occur at the printer, such as labels produced, or input received from scales, scanners and other peripherals. For example, an inventory control application may monitor printers to capture shipment information to update inventory levels in real time.

LCD Panel Programming

One of the most popular uses for ZBI 2.0 is to create custom messages and prompts for the LCD panels on Zebra printers. There are a variety of ways to enhance ease of use and productivity with on-screen messages, from a simple operator greeting, to a reminder to clean the printhead, to step-by-step instructions for operators during a labeling operation. Guiding operators with LCD prompts is another way to enable stand-alone printing without requiring a PC. If control-panel buttons can't meet data entry needs, keyboards can connect to printers for additional input options and convenience, with ZBI providing the necessary data interpretation. LCD messages also complement scan-and-print and weigh-and-print applications, by prompting the operator to place items on the scale or scan bar codes at the appropriate times.

Applicator Control

ZBI 2.0 is available for print engines used with automatic label applicators. Print engines typically wait for a signal from a sensor to produce the label for the applicator. ZBI 2.0 programming can give users control over the port that connects the printer to the applicator, so the print engine can be driven by different signals. The increased input options allow users to create more flexible and responsive print triggers. Additionally, the applicator port could be used to interact with other types of devices, thereby converting the printer into a programmable controller system.

These are some of the common ways ZBI 2.0 is used to add customization and control to printing operations. The most important thing to remember is that ZBI programming gives printers the ability to recognize non-ZPL data strings, and therefore enables printers to be driven from a variety of devices and applications.

How to Use ZBI 2.0

ZBI 2.0 is an enhancement that is only available for select Zebra printer models, which are designated as "ZBI-Ready." It can be ordered as a factory-activated option, or added later by purchasing and downloading a key from www.zbi.zebra.com. Once ZBI 2.0 is activated the printer is "ZBI-Enabled." A ZBI 2.0 program needs to be written and installed to provide the desired functionality. Keys and ZBI 2.0 applications can be installed remotely. Additionally, ZBI key kits, in groups of 1, 5 and 25 keys, can be ordered. Zebra offers a ZBI Key Manager utility to handle the task of distributing keys to printers. Once a key has been distributed to a given printer, it cannot be reused for other printers.

The free ZBI-Developer programming utility is used to create most ZBI 2.0 applications. ZBI-Developer is a PC-based package that provides an intuitive interface and plain-language prompts to help create powerful, custom ZBI 2.0 applications. It ships with ZBI-Enabled printers and is available as a free download from www.zebra.com. ZBI programming services are also available from authorized Zebra resellers and Zebra's own Professional Services team.

ZBI-Developer provides users everything they need to create, test and distribute ZBI applications. The development environment is a major departure from typical printer command language programming. ZBI-Developer lets users create and test applications right on their desktops, without needing access to a ZBI-Enabled printer to test programs. The utility reviews applications as they are being developed and provides alerts and prompts if commands are written incorrectly. For example, instead of getting a general "syntax error" message, a ZBI-Developer error message might read "Error on line 10 for accessing printer." Detailed, plain-language error messages help eliminate the trial-and-error approach to problem solving and significantly reduce development time. The included file distribution wizard is another big timesaver, because it allows ZBI 2.0 applications to be quickly distributed to a printer.

Another option is to use Zebra's own Professional Services team or a Zebra authorized reseller to do ZBI development for you. Many resellers already have applications to streamline common printing and data collection applications, and Zebra Professional Services has extensive software development and product engineering capabilities to meet special challenges. Information is available at zbi-experts@zebra.com.

Conclusion

The processor inside a printer can do more than format labels. With proper programming, it can add uprecedented intelligence, control and functionality to printing and associated computing operations. ZBI 2.0 applications extend these abilities to select Zebra printers and enhance their performance. With ZBI 2.0 programming, organizations can avoid the expense and complications of using PCs to direct their printing operations, while gaining more control over the operator interface and interaction with peripheral devices and applications.

To learn more about ZBI 2.0 and related ZebraLink™ solutions that extend and enhance the power of Zebra printers, visit www.zebra.com. Zebra Technologies Corporation helps companies identify, locate and track assets, transactions and people with on-demand specialty digital printing and automatic identification solutions. In more than 100 countries around the world, more than 90 percent of Fortune 500 companies use innovative and reliable Zebra printers, supplies, RFID products and software to increase productivity, improve quality, lower costs, and deliver better customer service. Information about Zebra and Zebra-brand products can be found at http://www.zebra.com.

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