

Getting Started with Zebra Printers and Apps

Overview

This Application Note outlines the basics for printing to and developing apps for Zebra printers. It details the process of setting up and beginning to use a Zebra printer.

This document includes the following sections:

- [1. Setting Up Your Zebra Printer](#)
- [2. Connecting Your Printer](#)
- [3. Testing the Connection](#)
- [4. Configuring Your Printer](#)
- [5. Designing Your Label](#)
- [6. Using Development Tools to Create Your Printer App](#)
- [7. Testing Your Printer App](#)

Also for common terms, refer to [Appendix – Common Terms](#).

Target Audience

This document is for developers with little to no experience using Zebra printers or who need to develop an app to print barcode labels, receipts, RFID tags, or other tracking labels.

Technical Requirements

The information in this Application Note assumes you have technical competence with core programming concepts and rationales.

Note: It is recommended that you use a PC, because Zebra does not support all of the resources required to set up and use Zebra printers on Macs.

Resources

This section contains useful resources for your development efforts.

Note: Some of these resource downloads ask for a login to www.zebra.com. It is free and easy to register for a login – just follow the [registration link](#).

Zebra Link-OS Multiplatform SDK

The Link-OS Multiplatform SDK contains the tools needed for writing apps that access Zebra network-enabled printers. It supports the most popular operating systems, such as iOS and Android.

Download the [Zebra Link-OS Multiplatform SDK](#).

ZDownloader and Firmware

ZDownloader is a program you can use to send firmware and files to Zebra printers. To download,

1. Go to www.zebra.com.
2. Click Support & Downloads.
3. Type your printer's name or model number and select your printer from the result list.
4. Click Software & Utilities.
5. Locate **ZDownloader Utility** to download.

Note: The latest version of the printer's firmware is recommended. To get the latest firmware for your printer, select **Firmware** on this same page and download the latest version available.

Zebra Network-Enabled Printer

Though not necessary for app development, a Zebra printer is necessary for complete app testing and to print.

Zebra Utilities

The Zebra Utilities app connects with a Zebra printer over Bluetooth or WLAN and sends it labels and receipts. It is primarily used for testing connections or demoing printing capabilities to customers. It is available for free on both [Google Play](#) and [iTunes](#).

Zebra Printer Setup Utility

The Zebra Printer Setup Utility app allows you to set up a wireless connection with a printer without using the computer. It can connect to a printer using Tap and Pair, Bluetooth, or a USB connection. It is available for free on [Google Play](#).

The following downloads are also available:

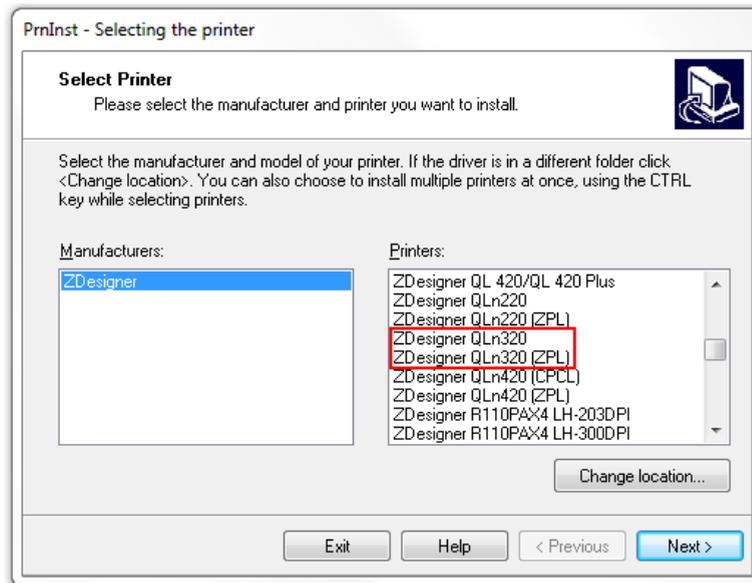
- PCs – Download [Zebra Setup Utilities](#). It is an application that enables you to set up and communicate with Zebra printers.
- Macs
 - Download [CUPS](#). This is the Common Unix Printing System (CUPS) driver, which is a printing system specifically for Unix OS. It allows the computer to act as a print server and sort out print jobs being sent through it. If necessary, get [help](#) with installation.
 - (Optional) Download [Zebra Setup Utilities for OSX/Mac](#) for \$9.99. This is an application that allows you to set up and reconfigure Zebra Printers. More [information](#) on the app and its developer is also available.

The following are other useful resources:

- [ZPL Programming Guide for Link-OS Enabled Printers](#)
- [CPCL Programming Guide for Link-OS Enabled Printers](#)
- [CUPS Software Documentation](#)

- Select **Install Printer**
- Select your printer from the list on the right and click **Next**

Note: There are sometimes multiple versions of the same printer model listed. The only difference is that some have “(ZPL)” or “(CPCL)” after the printer model.



The different versions represent the different printer control languages that the model of the printer supports. If the listed printer has no language listed after it, then that version uses its default printer language.

- ZPL stands for Zebra Printer Language. Zebra recommends you select this version, because ZPL is updated and fixed continuously. Tabletop and Desktop Zebra printers use this language by default.
- CPCL stands for Comtec Printer Control Language. Mobile Zebra printers use this language as their default language.
- Click **Next**.
- Click **Finish**.

The Zebra Setup Utilities manual printer installation is complete.

Note: For Macs, before plugging in your printer, make sure you download and install the CUPS driver. You need this driver to properly configure your printer. For instruction on how to connect a printer over USB to a Mac, see [To Install or Add a Zebra Printer](#).

2. Connecting Your Printer

This section contains the steps to set up your printer to enable it to connect to a device over Bluetooth or Wi-Fi.

Note: Not all printers have all the radios on by default so you may need to turn this function on.

Also, there are many ways to set up a Wi-Fi network. These are some steps to help you set up the printer for your network. The steps assume you can connect the printer over USB to a

PC or Android device (with a USB On The Go cable) to complete this setup using the Zebra Printer Setup Utility.

Set up Bluetooth Connectivity

You can connect to a printer via Bluetooth by PC, Android device, and Wi-Fi.

Note: Some Zebra printers ship with Bluetooth enabled. However, printers that are both WLAN and Bluetooth capable ship with Bluetooth disabled. The user must enable Bluetooth before being able to use it.

Connect Using a PC

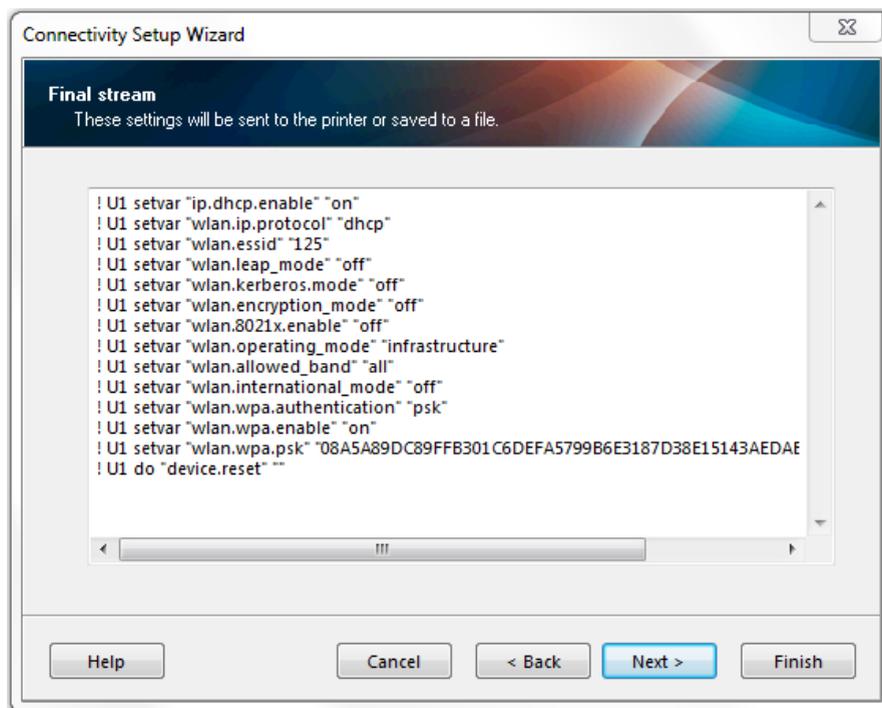
1. Open Zebra Setup Utilities.
2. Highlight your printer and click **Configure Printer Connectivity**.
3. Select **Bluetooth** and click **Next**.
4. Ensure that Discoverable is on and that Enabled is checked. Set the Friendly Name to something identifiable.
5. Click **Finish**.

Connect Using an Android Device

1. Connect a USB On the Go cable from the Android device to the printer with the Host end going into the Android.
2. Run the Zebra Printer Setup Utility app.
3. Select Discover Printers.
4. Under Discovered Printers, choose the printer to connect.
5. Select Connectivity Settings.
6. Select Bluetooth.
7. Ensure that Bluetooth and Discoverable are both on. Set Friendly Name to something identifiable.
8. Click **Next** twice.
9. Click **Apply**.

Set up Wi-Fi Connectivity

1. Open Zebra Setup Utilities.
2. Select your printer and click **Configure Printer Connectivity**.
3. Select **Wireless** and click **Next**.
4. Use the next five windows to input your specific wireless network settings.
5. When you see the printer code, click **Finish**.



Note: You can also connect a printer using an Ethernet cable. By default, printers attempt to get an IP address via DHCP. You can also create a static IP address for the printer using Zebra Setup Utilities.

3. Testing the Connection

Once you connect the printer, you are able to print to it. To test the connection:

1. Open the **Zebra Utilities** app on a smartphone or mobile computer.

Note: On iOS – if you are using a Bluetooth connection, you must go into the device's Bluetooth settings and pair the device to the printer first.
2. Touch the hard or soft menu button.
3. Tap Choose Printer.
4. Select the printer with which you wish to communicate. If the printer is using Bluetooth, make sure the Bluetooth setting on your smartphone or mobile computer is on. If you are using Wi-Fi, make sure you are connected to the same network as the printer.
5. Select Asset Tag.
6. Select any of the listed tools.
7. Select **Print**.

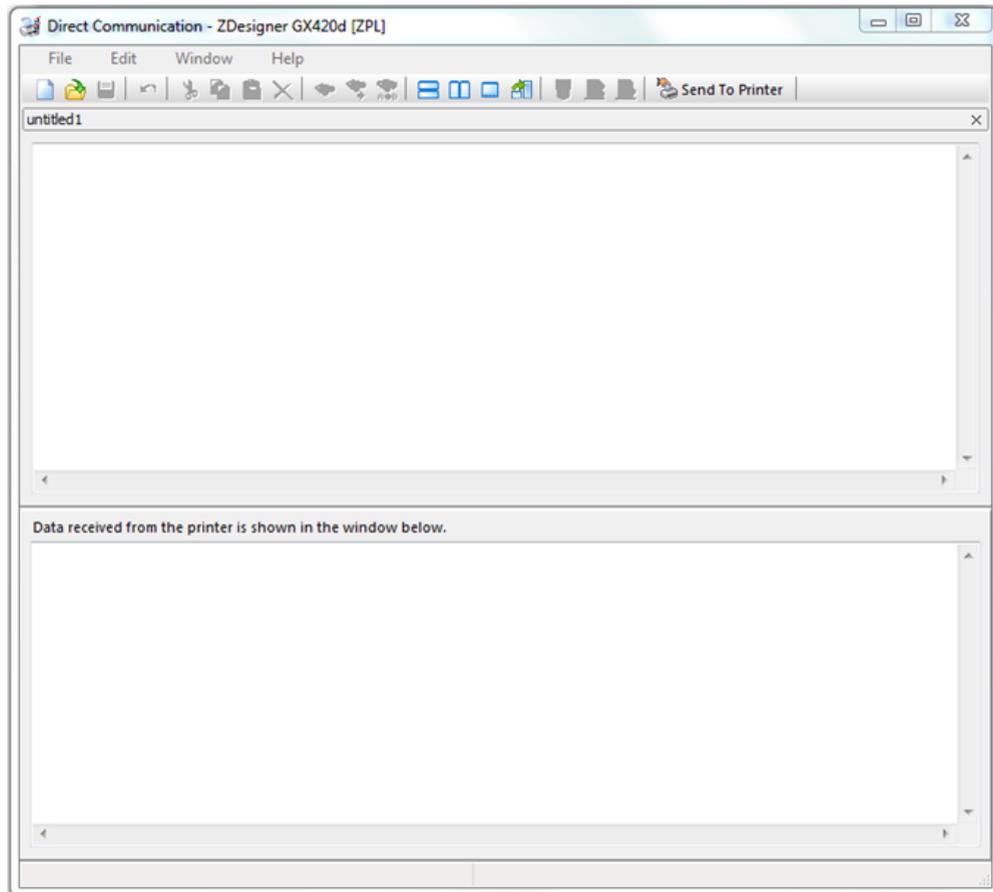
The printer now prints the tool's label.

Communicating with the Printer

This section demonstrates how to communicate with the printer from a PC or Mac.

For PCs

1. Open **Zebra Setup Utilities** and select the printer with which you want to communicate from the Printers section.
2. Click **Open Communication With Printer**.



3. Enter your printer commands in the top box. The input is in ZPL or another printer control language, depending on which version of the driver you are using. After entering a command, click **Send To Printer**. The bottom box displays what the printer returns as a result. To test this, you can send “~HI” without quotes to see the basic printer information.

Note: Any commands beginning with a tilde (~) are immediate commands. The printer processes these commands immediately. Other commands must start with “^XA” and end with “^XZ”.

For Macs

For information on how to communicate with your printer using Zebra Setup Utilities for OSX/Mac, watch this [video](#). For help communicating with your printer using CUPS, refer to [Command Line Printing and Options](#).

Connect to a Mac over Bluetooth

1. Open **System Preferences** on the computer.
2. Click Bluetooth.
3. Click Connect.

- The computer then searches for any discoverable Bluetooth printers in the area. Select the printer you want to pair with.

Connect to a Mac over a network

- Connect your printer to your wireless network.

For further instructions, go to [Connect an AirPrint printer to a Wi-Fi network](#)

- On the computer, open **System Preferences**.
- Select **Printers & Scanners**.
- If the printer is not listed, click **Add (+)** at the bottom of the list of printers.
- Select the printer from the list of printers on your network and click **Add**.

Note: If the printer does not appear on the list of printers, add it as an IP printer:

To add an IP printer:

- In Printers & Scanners, click **Add (+)**.
- Select **IP Printer**.
- Enter the printer's IP address in the Address field.
- In the Protocol menu, select **Line Printer Daemon (LPD)**.
- In the Name field, enter an identifiable name, such as the printer's model.
- Click **Add**.

4. Configuring Your Printer

Use the following commands to help configure your printer:

- Configuration Label Return
- Set Media Sensor Calibration
- Print Configuration Label

You can also configure your networked printer using the printer's webpage as an alternate method (ideal for non-PC users).

Configuration Label Return

Configuration Label Return (^HH) is a ZPL command that returns the specifications of the printer. To use this command, open either Zebra Setup Utilities and use "Open Communication with Printer" or CUPS. Then send "^XA^HH^XZ" to the printer.

The printer returns the configuration label.

Here is a part of a returned configuration label:

CONTINUOUS	MEDIA TYPE
WEB	SENSOR TYPE
AUTO	SENSOR SELECT
609	PRINT WIDTH
0416	LABEL LENGTH

The right column lists the different settings and the left column lists what they are set to. For example, the “MEDIA TYPE” is set to “CONTINUOUS”, meaning that the printer media is a continuous roll of paper, as opposed to a roll of non-continuous labels.

For more information on this command, go to the [ZPL Programming Guide for Link-OS Enabled Printers](#), page 217.

Set Media Sensor Calibration

Set Media Sensor Calibration (~JC) is another ZPL immediate command. It causes the printer to produce its media to determine the type and specifications of that media. If you are using labels, it is necessary to do this in order to help the printer determine the size of the labels. Anytime you change the media, run this command. To use this command, open either Zebra Setup Utilities or CUPS. Then send “~JC” to the printer. Zebra Setup Utilities also has a function in the “Open Printer Tools” menu under “Action”->“Calibrate Media”

For more information on this command, go to the [ZPL Programming Guide for Link-OS Enabled Printers](#), page 247.

Print Configuration Label

Print Configuration Label (~WC) is a ZPL immediate command. It does the same thing as Configuration Label Return, except it prints out the configuration label instead of displaying it onscreen. To use this command, open either Zebra Setup Utilities or CUPS. Then send “~WC” to the printer.

For more information on this command, go to the [ZPL Programming Guide for Link-OS Enabled Printers](#), page 355.

Alternate for Non-PC Users

You can also use the printer webpage for configuring your printer if it is connected using an Ethernet cable. Just use your browser to go to <http://printerIpAddress/index.html>, where printerIpAddress is the IP address of the printer with no leading zeros included. The default password is always 1234, but can be changed. You can view the printer configuration, set up the print settings, and calibrate your media.

5. Designing Your Label

The following steps allow you to design and use your new label:

- Zebra Designer
- Print Preview
- Export to Printer
- Printer Webpage

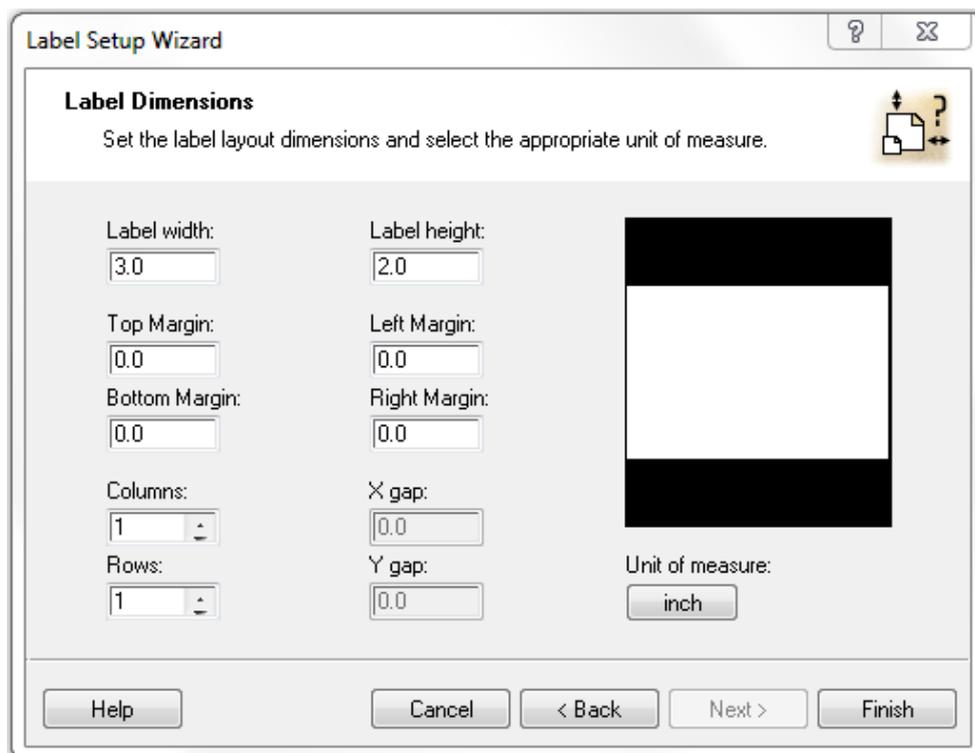
Zebra Designer

ZebraDesigner is a tool for designing labels and formats for labels. To begin designing a label,

1. Open **ZebraDesigner**.
2. Select **Create New Label** and click **Next**.
3. Find the driver for the printer you want to use and click **Next**.

Note: The printer you choose tells Zebra Designer what printer control language to use for your label.

Later in the setup wizard, you can set the height and width of the label.



4. If you are satisfied, click **Finish**.

Now you have a blank label. Design your label using the tools on the left.

When the label is done, there are two ways of printing it:

Print Preview

Using Print Preview allows you to view and alter the printer code before actually sending it to the printer.

1. In Zebra Designer, go to **File > Print Preview**.
2. Check **Print to File**.
3. Click **Print**.
4. Save your label's code.

5. Open **Zebra Setup Utilities** or **CUPS**, and open the file you saved from Zebra Designer. If necessary, you can alter the code.
6. Send the label to the printer.

The label prints.

Export to Printer

Exporting the label to the printer stores the label in the printer's internal storage.

To export to a printer,

1. In Zebra Designer, go to **File > Export to Printer**.
2. Select **Internal Flash** and click **OK**.
Note: This stores the label on the printer.
3. Open **Zebra Setup Utilities** or **CUPS**.
4. Send “`^XA^XFE:`” followed by what you named the label, followed by “`.ZPL^FS^XZ`” to the printer.

Example: If the file was named Test, then “`^XA^XFE:Test.ZPL^FS^XZ`” makes the file print.

The printer should print the label.

Printer Webpage

Another option is to use the printer's webpage to design and print a label. The [Alternate for Non-PC Users](#) section contains instructions on how to access the page.

To print from the web page,

1. Click **Directory Listing**.
2. Click **Create New Script**.
3. Name the label and click **Edit**.
4. Enter the ZPL for the label.

For instructions on how to create a label using ZPL, refer to the [ZPL Programming Guide for Link-OS Enabled Printers](#) pages 43-52.

Preview Label lets you see what the label will look like when it prints, and Print Label prints the label. You may also save the ZPL for the label to the printer for future use.

Formats

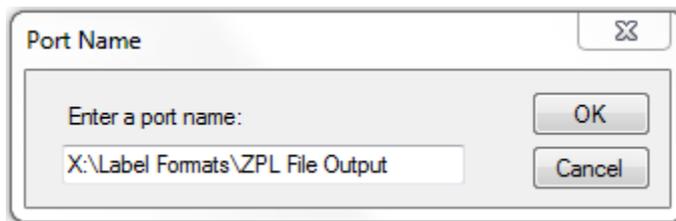
ZebraDesigner also offers the capability to create label formats; that is, it can create a label design with fields that you can alter and print with different values. Say you need to print name tags for 30 people. You could create separate name tags for all 30 people, or you could create one name tag format and just enter everyone's name individually.

Create an Output Location

This is an optional step, but it is encouraged if you want to be able to access and alter the code of a label format in the future.

You create a printer that does not physically exist; the printer is stored within your computer and will output to a file. To create a file output location,

1. Open the Devices and Printers utility on your computer.
2. Click **Add a printer**.
3. Select **Add a local printer**.
4. Select **Create a new port**.
5. Choose **Local Port** and click **Next**.
6. Type a full file path into the port name text box, including the name of the printer you are creating, and click **OK**.



7. Select ZDesigner from the left column and the printer you are using from the right column.
8. Click **Next** twice.
9. Change the printer name to what you used in your file path. Using the file path above, the printer name would be "ZPL File Output".
10. Click **Next** twice.
11. Uncheck the Set as the default printer box and click **Finish**.

Using a Format

To learn how to create and implement a format in Zebra Designer, [Store Label Format and Recall for Printing using ZebraDesigner](#).

6. Using Development Tools to Create Your Printer App

Android Studio

Android Studio is an IDE for creating Android apps. Click [here](#) for help getting started with Android Studio and [here](#) for help getting started with the Zebra Android Link-OS SDK.

Windows Visual Studio/Xamarin

Microsoft Visual Studio is another IDE capable of creating applications for Microsoft Windows. Xamarin is a plug-in for Visual Studio, allowing the user to create apps across different platforms like Android and iOS using the same programming language, namely C#. Click [here](#) for help getting started creating apps in Visual Studio using Xamarin. Zebra has Xamarin support in its Link-OS Multiplatform SDK.

iOS Objective-C Using XCode

Xcode is an IDE that can only be run on Mac OSX, meant for creating iOS and OS X apps. Click [here](#) for help getting started using Xcode and [here](#) for help integrating the Link-OS SDK into Xcode.

7. Testing Your Printer App

Every aspect of a written app should be tested to ensure it works. This includes any buttons or options within the app itself, but this also includes physical factors that can cause errors. According to Zebra Best Practices for Printing Apps, an app should:

- Work with a printer out of the box. Different Zebra printers ship with different default settings. An app should work properly with the default settings of all printers with which it is compatible.
- Print properly, meaning that the print output is exactly what it should be.
- Check printer formatting language. If the printer is set to the wrong language, the app should change it to the correct one before attempting to print.
- Check the status of the printer before sending it the print job.
- Display useful error messages. Not only should the app display error messages when errors occur, but the messages should specify what caused the error.
- Meet Zebra Technologies Global Brand Standards if the app uses Zebra printer branding.

Alternatively, an app should not crash or freeze if:

- The printer is unreachable.
- The printer is out of media.
- The printer's media door is open.

Appendix – Common Terms

This Appendix contains common terms when discussing printers or apps.

Term	Description
Comtec Printer Control Language (CPCL)	CPCL is another printing language, like ZPL. It accomplishes the same thing, but the syntax is different.
Direct Thermal	Direct thermal printers require a special kind of paper. This paper is coated with ink and an acid. When heated, the two melt and mix together and become colored. A direct thermal printer heats tiny dots that trigger this process and result in words and images.
Driver	A program that runs in the background of a computer, allowing a computer to communicate with a device or program. Drivers make it easier for a computer to communicate with a printer or smartphone.
Firmware	Firmware is low-level software permanently installed into computers, printers, and other hardware devices. It provides basic control over the device. While a device's firmware can never be changed out, most can be updated over time.
Integrated Development Environment (IDE)	An IDE is a program, such as Android Studio or Visual Studio that allows developers to write and test software. IDEs usually contain a text editor, compiler, interpreter, and debugger.
Media	Media is what the printer is printing on, such as a roll of paper or a roll of labels.
Software Development Kit (SDK)	An SDK is a set of tools to be used in applications. They enable developers to use different aspects of a software package or device. SDKs usually consist of libraries and supporting documentation.
Thermal Printer	Thermal printers use heat, not ink, to print. They either burn dots onto a special coated paper or heat a ribbon to transfer wax-based ink onto regular paper. Zebra Technologies only produces thermal printers.
Thermal Transfer	Thermal transfer printers use a ribbon coated in wax-based ink. The printer melts this wax to transfer it from a ribbon onto paper. This type of printing does not require any special paper, just occasional ribbon replacements.
Zebra Printing Language (ZPL)	ZPL is a language for communicating with Zebra printers. Printers cannot process documents or regular programming languages, so when something is sent to be printed, it must first be converted into ZPL or some other printing language the printer understands.

See Also

- For any further information, sample code and solutions or to request further content, visit the [Zebra Developer Portal](#).

Document Control

Version	Date	Description
1	July, 2016	Initial release
2	2 nd October 2017	Updated URLs

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Created for Zebra Global ISV Program by Zebra Development Services.