



Wireless LAN Networking · Voice-Over-IP · Bar Code Data Collection

# **BAR CODE BASICS: Principles of Bar Code Printing & Scanning**

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Provided By:



[www.advanced-wireless.com](http://www.advanced-wireless.com)  
888.238.9473  
5007 W. Howell Ave., Suite 330  
Milwaukee, WI 53207

## INTRODUCTION:

A bar code is an identification marker used to identify unique products. The series of vertical lines are created and read in specific patterns. These patterns can represent numbers, letters, and other characters. Bar codes rarely contain actual data, but are used as unique identifiers, and once read into a computer; the computer looks up the data associated with the unique label and inputs it into the program.

To help understand the components needed, below is the bar code read and decode process:

1. The bar code label is illuminated with a bright light.
2. A sensor inside the scanner views the reflection of the bright light identifying patterns of reflection contrast (black absorbs light, white reflects light).
3. This pattern is converted to an electrical high/low signal (reflective/non-reflective) signal and sent to a decoder for conversion to the appropriate letters, numbers and/or characters.
4. The decoded data is then sent through the interface to the computer application.

A bar code system consists of the bar code label and symbology, scanner, decoder, and interface

## BAR CODE SYMBOLOGIES:

Bar code symbologies are to bar code labels what English is to language. They are both the forms of the medium and each have unique attributes. As with languages, there are various bar code symbologies (languages or line patterns) that are available. Many of these have been designed for specific tasks. Some symbologies only have patterns that support numbers, other symbologies will support numbers and letters, and yet others, numbers, letters and special characters. In addition these symbologies can range in size and density. For this reason, you will find that different industries tend to use different bar code symbologies. The more popular symbologies include:

### **UPC/EAN:**

Usage: Retail

Data: Numeric

There are various forms of UPC/EAN. To find which form is applicable to you and to register for your unique UPC/EAN codes please visit Uniform Product Council for additional information at: [www.uc-council.org](http://www.uc-council.org)

### **Code 39:**

Usage: Warehouse and manufacturing

Code 39 is an alphanumeric bar code. The symbol can be as long as necessary to store the encoded data. It is designed to encode 26 uppercase letters, 10

digits and 7 special characters. It can be extended to code all 128 ASCII characters by using a two character coding scheme.

**Code 128:**

Usage: Transportation and shipping

Code 128 is a very high density alphanumeric bar code. The symbol can be as long as necessary to store the encoded data. It is designed to encode all 128 ASCII characters, and will use the least amount of space for data of 6 characters or more of any 1-D symbology.

**Interleaved 2 of 5:**

Usage: Warehousing

Interleaved 2 of 5 is a numbers-only bar code. The symbol can be as long as necessary to store the encoded data. The code is a high density code that can hold up to 18 digits per inch when printed using a 7.5 mil X dimension. A check digit is optional.

**BAR CODE SCANNER TYPES:**

There are several forms of bar code scanners, these include pencil wand, charged coupled device (CCD) and laser scanners. While different in function and cost, the method is the same between all of these.

**Pencil Wand:**

A pencil wand is pencil shaped device that emits light out of its tip. The tip also senses the reflected contrast and reports the information back to the computer. Pencil wands are very reliable since there are no moving components, but must touch and be swept across the bar code to work. For this reason, pencil wands are only used in applications that require a bar code to be scanned a limited amount of times since the contact from each scan may damage the bar code.

**Charged Couple Device:**

A charged coupled device illuminates an entire area with light and takes a digital picture. This picture is then scanned for recognized patterns and the signal is transmitted. CCD scanners vary in range from near contact several feet depending on model. CCD scanners are also extremely reliable due to the lack of moving components.

### **Laser Scanner:**

The laser scanner uses a laser to illuminate a bar code and senses the reflection accordingly and transmits the signal for decode. Due to the brightness of the laser scanner, laser scanners can read bar codes from as close as several inches and as far as thirty (30) feet. This range depends on a number of factors, the most important factors listed below:

- Model of laser scanner
- Quality of printed bar code
- Contrast difference between the dark bars and light bars
- Reflectivity of the material the bar code is printed on
- Ambient lighting in the area where the bar code will be scanned
- Angle of scan in relation to the bar code

### **BAR CODE DECODER & INTERFACE OVERVIEW:**

Bar code scanners illuminate a bar code with light and detect the reflective pattern of the bar code. This pattern is converted to an electrical high/low signal (reflective/non-reflective) signal and sent to a decoder for conversion to the appropriate letters, numbers and/or characters.

### **Decoders:**

The decoder accepts the hi/low signals from the scanner and compares them to known bar code patterns, and converts the bar code patterns to numbers, letters and/or special characters depending on the bar code symbology. Decoders can be built into the actual scanner, into a wedge (device that is placed between the scanner and the computer), or directly in to a computer.

Decoders range in capabilities. Depending on the decoder it can:

- Read and decode one (1) or more bar code symbologies and determine which symbology is currently being read
- Remove unwanted characters such as start/stop characters and check digits.
- Replace unwanted characters with preferred characters
- Place prefix and suffix characters to the bar code
- Execute a command upon successful decode of a bar code such as the ENTER or TAB command

### **Interfaces:**

A decoder can interface (connect) via RS232 port, keyboard port, or custom port.

**RS232** - Require software drivers allowing the computer to understand the signal coming from the decoder.

**Keyboard Wedge** - Easy to install and require no additional software. When the decoder is attached to the keyboard and keyboard port, the computer receives the data as if it were typed in via the keyboard.

**Custom Port** – Custom interfaces that are designed specifically for bar code scanners and have the decoder built right into the computer.

### **SUMMARY:**

Bar code technology is proven to improve productivity, increase data integrity while reducing costs resulting in a significant impact on customer satisfaction.