

the professional  
labeling software

[www.nicelabel.com](http://www.nicelabel.com)  
[info@nicelabel.com](mailto:info@nicelabel.com)

NiceLabel 

# NiceLabel RFID Technology

## White Paper

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[www.nicelabel.com](http://www.nicelabel.com)



**Head Office**  
Euro Plus d.o.o.  
Ulica Lojzeta Hrovata 4c  
SI-4000 Kranj, Slovenia  
Tel.: +386 4 280 50 00  
Fax: +386 4 233 11 48  
[www.europlus.si](http://www.europlus.si)  
[info@europlus.si](mailto:info@europlus.si)



Nice Software. Nice Partner. Nice Value.

**North American Office**  
Niceware International, LLC  
10437 Innovation Drive, Suite 147  
Milwaukee, WI 53226  
Tel.: +1 414 476 6423  
Fax: +1 414 4767955  
[www.nicewareintl.com](http://www.nicewareintl.com)  
[info@nicewareintl.com](mailto:info@nicewareintl.com)

# Table of Contents

<b>Executive Summary .....</b>	<b>3</b>
<b>Introduction to RFID .....</b>	<b>4</b>
Technology .....	4
Application .....	4
Trends .....	4
<b>Smart Label versus Bar Code Labeling .....</b>	<b>5</b>
<b>Application: Patient Identification with Smart Labels.....</b>	<b>6</b>
<b>NiceLabel Software for Your RFID Solution.....</b>	<b>6</b>
Smart Label Encoding with NiceLabel.....	6
Smart Label Printing with NiceLabel.....	7
<b>Smart Label Deployment with NiceLabel.....</b>	<b>8</b>
Database connectivity.....	8
Data stream connectivity .....	9
Print engine – software to software connectivity .....	9
<b>Easy and User-friendly Smart Label Design with NiceLabel.....</b>	<b>10</b>
<b>Smart Label System Requirements.....</b>	<b>11</b>
<b>NiceLabel RFID Smart Labeling Solutions .....</b>	<b>11</b>
NiceLabel Suite.....	11
NiceLabel Pro .....	12
NiceLabel Pocket PC Designer .....	12
NiceLabel SDK .....	12
<b>Conclusion .....</b>	<b>13</b>
<b>Appendix .....</b>	<b>14</b>
Euro Plus d.o.o. and Niceware International, LLC .....	14
NiceLabel Product Overview .....	14

## Executive Summary

Radio frequency identification (RFID) refers to technologies that use radio waves to automatically identify individual or groups of items. RFID has become one of the fastest growing technologies in the automatic identification and data collection (AIDC) industry. RFID provides opportunities to improve service, reduce costs, and make business processes such as product warehousing, shipping, identification, and tracking more effective and efficient.

Since Wal-Mart, the U.S. Department of Defense, and others require their suppliers to use RFID technology as intelligent packaging tools, the RFID market has experienced rapid growth. However, suppliers still face huge costs in implementing RFID technology and are overwhelmed in deciding among the different software, hardware solutions, and standards. NiceLabel offers an easy-to-use, cost effective smart labeling solution that meets the latest standards of current RFID tags and printers, including the latest RFID Tags Class 1 Gen 2 support.

NiceLabel is the most advanced labeling software available for desktop, enterprise, and mobile users supporting both traditional bar code and RFID-based smart label design and printing. NiceLabel offers an easy-to-use label design solution that enables you to transfer easily and cost-effectively from traditional (bar code) labeling to smart tag labeling. Using NiceLabel in connection with RFID technology, you benefit from the following:

- Simple label design and printing of bar code and RFID smart labels
- Multiple connectivity options
- Cost-effective transition from traditional bar code labeling to smart labeling
- Widest range of tag and printer support

# Introduction to RFID

## Technology

Radio frequency identification (RFID) uses small devices to store information that can be transmitted wirelessly through many forms of obstruction in an automated fashion to specialized RFID readers. Unlike bar codes, the data transmission process between smart label and RFID reader works regardless of the orientation of RFID devices and presence of dirt or obstructions.

Smart labels include implants containing arrays of micro wires, thin films, or integrated circuits that are attached to thin antennas. The information is stored in the wired implant and sent to the receiver via the antenna. The smart labels can be integrated into the product or as part of the packaging.

Currently, the market offers different types of smart labels. According to cost, operating range, and purpose of RFID application, companies can choose between passive and active tags as well as read-only and read-write tags. Regarding NiceLabel's capability for label design and data storage of smart labels, different label types do not make a difference. NiceLabel supports design and data storage for most smart label types.

Because standards are still being established, RFID applications use different low-, high-, and ultra-high radio frequencies. Again, NiceLabel's easy-to-use label design and tag programming solution can be applied regardless of the frequency level of the smart label. The only limitation NiceLabel faces in the design and printing of RFID smart labels is determined by the type of RFID printer you are using. Specially developed NiceDrivers for all leading RFID smart label printers enable you to use all the functions in RFID smart label design and printing that your RFID printer supports.

## Application

The most common applications of RFID technology and smart labels are tracking goods in the supply chain, tracking assets, tracking parts moving to a manufacturing production line, security (including controlling access to buildings and networks), and payment systems that let customers pay for items without using cash.

In addition, RFID is commonly used in the healthcare industry on patient wristbands to provide tamper-proof, accurate identification for facility access control and security. Hospitals also use RFID to track medication dispensing, laboratory samples, and blood bags. RFID saves time and improves accuracy because it automatically records all item movements and does not require human intervention to record data on a form.

Regardless of the application context, NiceLabel is your tool of choice for any smart labeling application. NiceLabel supports smart label design and tag programming for manufacturing, supply chain, and patient identification applications.

## Trends

Market research estimates that spending in the global RFID market will grow to more than \$3.1 billion by 2008, from about \$1.3 billion in 2003. Industries that will increase spending include consumer packaged goods and retail, automotive, military, and homeland defense.<sup>1</sup> Other reports estimate that through the year 2007, the total U.S. market for smart labels will grow more than 23

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<sup>1</sup> Collins, Jonathan. "Smart Labels Set to Soar." *RFID Journal* 23 Dec. 2003. <<http://www.rfidjournal.com/>>.

percent annually, approaching 11 billion units and a value of \$460 million. By 2008, the RFID label market is estimated to grow 180 percent annually from around 10 million RFID labels sold in 2002.<sup>2</sup>

The military and retail industry have been the driving forces in the RFID market. Late 2002, the U.S. Department of Defense required that all goods can be tracked with RFID tags. The commercial sector has increased spending in RFID because standards have been established, the cost of RFID technologies is decreasing, and vendors are teaming up to offer integrated packages that include installation, software, and hardware components. Since Wal-Mart and other retailers are driving RFID initiatives to track pallet and cases, highest growth rates are expected in the consumer packaged goods and retail verticals.

Sectors also showing high growth potential for RFID technology and smart labeling are the automotive, pharmaceuticals, and health care industries. Niceware and Euro Plus cooperate with partners in all industries that use smart labeling. NiceLabel is your solution for smart label design and printing regardless of industry and application environment.

## Smart Label versus Bar Code Labeling

Today, manufacturers would not think of operating their distribution centers without bar codes because of the proven efficiency improvements the technology provides. RFID promises the same potential to improve operations. However, RFID will not replace bar code technology but can effectively enhance bar code-based data collection systems where additional visibility or automated processing is desirable.

RFID is not necessarily "better" than bar codes. RFID smart labels and bar code labels are two different technologies and have different applications that sometimes overlap. The main differences are the required hardware tools and the way both technologies exchange data.

Bar code is an optical technology and RFID is a radio technology. Bar codes are line-of-sight technology and require a scanner that has to "see" the bar code in order to read it. However, radio frequency identification does not require line of sight. RFID tags can be read as long as they are within range of a reader. Bar codes have other shortcomings as well. If a label is ripped, soiled or falls off, there is usually no way to scan the item. In addition, standard bar codes identify only the manufacturer and product, not the unique item. The bar code on one cereal box is the same as every other, making it impossible to identify which one might pass its expiration date first.

As a radio technology, RFID requires no line-of-sight between the reader and the tag to exchange data. RFID tags therefore can be read through packaging, including cardboard containers and plastic wrap used to seal pallets. RFID tags enable unattended reading, are reusable and can improve efficiency in many operations by reducing labor and materials costs. However, RFID is subject to interference, in particular from metal. When implementing RFID, companies must recognize and avoid potential sources of interference.

Many companies use smart labels to tag, monitor, and identify their products. Smart label printers encode the RFID chip inside of the label and print text, bar codes, and graphics on the outside. NiceLabel is the software tool that helps you design and organize the data storage for both the traditional bar code and smart label. Note that RFID compliance labeling initiatives are not aiming to replace bar codes. In contrary, companies will still require both bar coded data labeling and RFID smart labeling. NiceLabel is your solution of choice for both bar code and smart labeling.

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<sup>2</sup> Zaragoza, Sandra. "RFID – Smarter Than the Average Chip." Dallas Business Journal 06 Oct. 2003. <[www.bizjournals.com](http://www.bizjournals.com)>.

## Application: Patient Identification with Smart Labels

An easy way to improve patient care is by ensuring that staff can easily identify patients before providing treatment. NiceLabel Pro includes a feature that is a simple yet powerful solution for improving patient identification. Using NiceLabel Pro, programmers can design and program smart label wristbands with RFID tags and bar codes that symbolize the patient's medical record or patient visit number. NiceLabel offers a perfect way to ensure easy patient identification. Clearly imaged text, including patient name, DOB, medical record number, and other identifiers give caregivers the information they need in crisp print with a clear laminate to protect the image.

Whether you are trying to improve compliance with the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) patient identification requirements, thinking about moving to a smart label point-of-care system, or are simply frustrated with maintaining the "blue card" system and paying for its costly consumables, the self-laminating wristband and NiceLabel Pro software are your best solutions. This state-of-the-art patient identification system is "forward compatible" with new technologies – a key consideration when you invest in new technology.

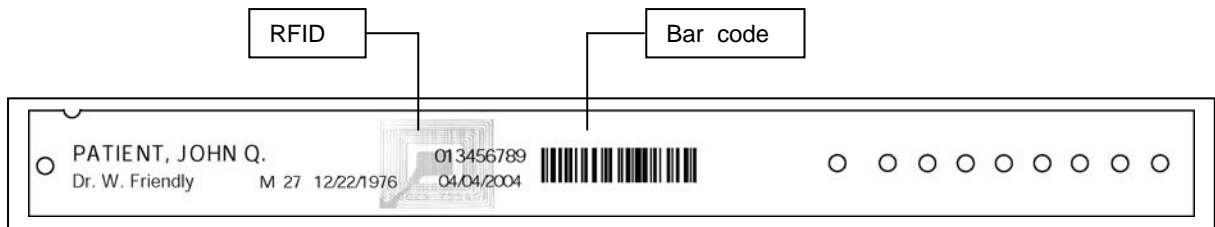


Figure: Patient ID wristband with embedded RFID tag and bar code

## NiceLabel Software for Your RFID Solution

NiceLabel is a family of the most advanced professional labeling software products for desktop, enterprise, and mobile users that provides complete solutions for both bar code and smart label printing. NiceLabel supports the widest range of RFID printers and tags in the industry as well as the most cost effective integration tools available. Regardless of RFID tag type and frequency used, NiceLabel enables you to design and print virtually any type of smart label.

### Smart Label Encoding with NiceLabel

NiceLabel supports any type of RFID tag that most smart label printers can print. Due to the fast development of the RFID technology, check our Web site at [www.nicelabel.com/applications/app\\_rfid.php](http://www.nicelabel.com/applications/app_rfid.php) for the latest list of RFID tag types that are supported by NiceLabel.

#### ➤ RFID Tag Support

- 64 and 96 UHF tag support
- UHF support for Class 0, Class 0+, Class 1, UCODE and ISO 1800-6B
- HF support for Phillips I-Code, TI Tag-it, My-d, Pico Tag and ISO 15693
- Configurable RFID interface for creating any tag structure
- Class 1 Gen 2 support

➤ **EPC Encoding Wizard Compliance**

The Electronic Product Code (EPC) is an identification scheme to identify physical objects via RFID tags. The standard EPC data consists of an EPC (or EPC Identifier) that uniquely identifies an individual object and an optional filter value to enable efficient reading of the EPC tags. The EPC Identifier is a meta-coding scheme designed to support the needs of various industries by accommodating both existing coding schemes where possible and defining new schemes where necessary. EPC represents a family of coding schemes and a means to make them unique across all possible EPC-compliant tags. NiceLabel supports the following EPC types:

- **64 bit:** DoD-64, GIAI-64, GRAI-64, SGLN-64, SGTIN-64, SSCC-64
- **96 bit:** DoD-96, GIAI-96, GID-96, GRAI-96, SGLN-96, SGTIN-96, SSCC-96

➤ **Custom Encoding**

INI file configuration enables users to create a wizard for their own tag structure for custom encoding.

## **Smart Label Printing with NiceLabel**

RFID technology has created demand for a printer capable of simultaneously printing bar codes, text, and graphics on the surface of the label in addition to reading, programming, and verifying the RFID tag embedded in the label. RFID printers have to accomplish both traditional bar code label printing and RFID tag data encoding. Smart label printers function as traditional printers when creating bar codes, graphics, and human-readable text. However, they also have RFID encoders and readers embedded inside. Before the printer outputs the label, the RFID data is encoded, copied to and from printed and non-printed fields in the label templates. NiceLabel links the printer with your data repository, thus accomplishing data selection for both encoding and label surface design.

NiceLabel supports industry leading RFID printers from the following manufacturers:

- Avery
- Cognitive
- Datamax
- Imaje
- Intermec
- Markpoint
- Novexx
- Printronix
- Sato
- Zebra

To enable NiceLabel to code and print RFID smart labels, you have to install the NiceDriver for the RFID printer you are using. At the time of label design, you select the NiceDriver of your RFID printer and NiceLabel Pro enables the RFID Tag coding function.

Please visit our Web site at [www.nicelabel.com/nicedrivers/ndriv\\_overview.php](http://www.nicelabel.com/nicedrivers/ndriv_overview.php) to receive the latest list of printers that NiceLabel supports.

## Smart Label Deployment with NiceLabel

NiceLabel offers several connectivity options of how to retrieve data for your smart label and print these data to a client or network printer. NiceLabel enables you to retrieve data from any type of database, data stream, or another software application.

The NiceLabel Suite edition offers the NiceWatch module that is an excellent tool to apply smart label printing in an environment where only a limited number of RFID printers are available. NiceWatch is an event-driven application capable of monitoring and detecting data in many different formats to trigger the start of label production. At times, automated printing is required in a multi-operating system environment (Unix, AS/400, etc.) or complex application environment (ERP, WMS, etc.) where it is not possible to write program code using automation commands.

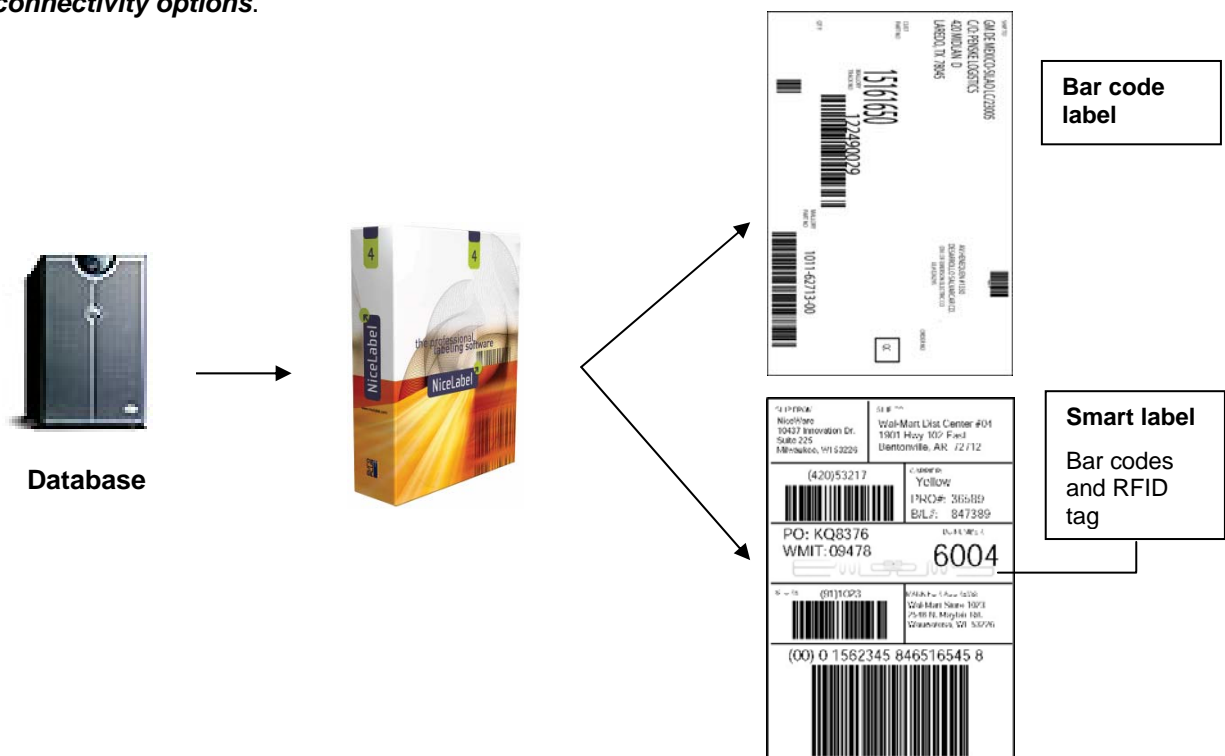
NiceWatch can monitor and detect data in many different formats to trigger the start of label production without operator intervention. For example, NiceWatch provides an affordable solution which enables writing data or command files from an ERP system to a shared network drive and printing from other local or remote applications running within local area or wide area networks.

NiceLabel ensures connectivity without limitations between the following:

- Database and smart label printing
- Host computer, variable data stream, and smart label printing
- Software application, print engine, and smart label printing

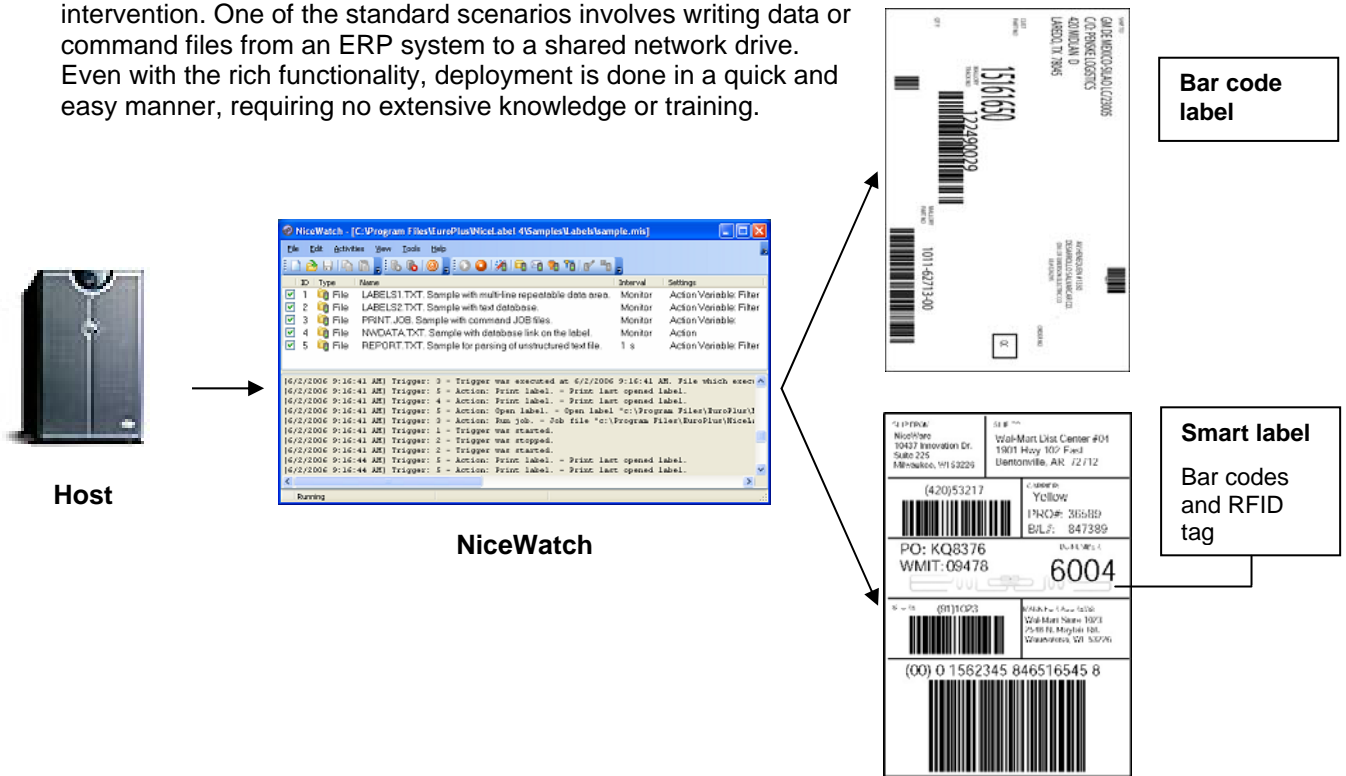
### Database Connectivity

Information scanned from a RFID label can **easily be saved to a database**. The data can be extracted partially or fully from all components of the RFID information. A user-friendly database wizard, built-in query builder, and even a custom SQL scripting are available **to retrieve data from any type of database** – enterprise or local. Whether the database is a plain ASCII text file, Excel spreadsheet, or enterprise database (like Oracle or SQL Server), there are **no limitations to connectivity options**.



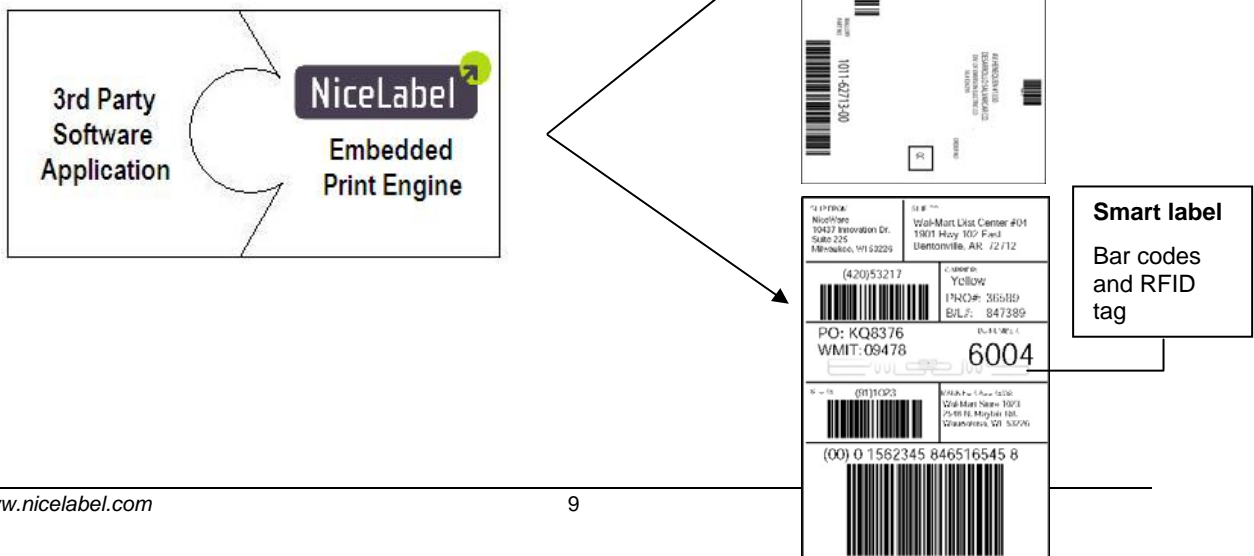
## Data Stream Connectivity

NiceWatch provides an affordable middle-ware solution when **automated printing** is required in a multi-operating system network or complex application environments. NiceWatch can monitor and detect **data in many different formats** to trigger the start of label production without operator intervention. One of the standard scenarios involves writing data or command files from an ERP system to a shared network drive. Even with the rich functionality, deployment is done in a quick and easy manner, requiring no extensive knowledge or training.



## Print Engine – Software to Software Connectivity

Using NiceLabel as a print engine running in the background, application developers can call NiceLabel through a rich ActiveX programming interface. You can even print bar code and smart labels directly from your SAP R/3 system utilizing NiceLabel only as a label design tool and printing without need for a middle-ware solution.





## Smart Label System Requirements

There are several reasons why companies implement RFID technology. Companies can benefit from RFID technology in any process where items are moved, identified, and tracked. Key drivers for RFID implementation are supply chain requirements of large organizations such as the U.S. Department of Defense or Wal-Mart. In addition to meeting RFID tag performance and data requirements, companies must comply with all relevant international regulations that govern electronic data communication. As with bar code labels, companies may develop proprietary smart label formats or base formats on international or industry standards.

EPCglobal is the leading organization for the development of industry-driven standards for the Electronic Product Code (EPC) Network and has developed specifications and standards how to use RFID technology. EPC is a number designed to uniquely identify a specific item in the supply chain. The EPC number sits on the RFID tag which is communicated to a reader that passes the number to a computer or local application system. The number tells the computer systems where to locate information, such as when and where the item was produced, on the network.

Successful RFID implementation requires planning for RFID tag encoding, RFID media selection and the right software solution. Labeling software has to support smart labeling and RFID encoding. NiceLabel offers a variety of modules that support smart label design and printing as well as RFID encoding. NiceLabel supports the latest RFID smart labeling standards including EPC Gen 2.

## NiceLabel RFID Smart Labeling Solutions

NiceLabel supports RFID smart label printing from a single desktop computer, complex enterprise network systems, and mobile application environments. In addition, software developers can deploy the NiceLabel print engine to print bar code and RFID smart labels from a third party application.

### NiceLabel Suite

NiceLabel Suite is the premier label printing solution for both desktop and mobile label printing. NiceLabel Suite offers a wide range of RFID smart label printing options for desktop, server and mobile printing applications. The NiceLabel Suite software offers the following modules (among others) that you can use for your RFID smart label printing solution:

- **NiceLabel Pro:** Full-featured label design and printing software that you use to create and print RFID smart label (.LBL) files with your desktop computer.
- **NiceForm:** A front-end labeling application generator for desktop and mobile label printing environments. NiceForm provides operators a simple and pre-defined label printing interface that simplifies data input and reduces errors in data processing and label printing. Pocket NiceForm is the front-end label application for mobile label printing and included in Pocket NiceLabel.
- **NiceWatch:** A centralized print server to automate RFID smart label printing operations. NiceWatch accepts a print request from any mobile, desktop, ERP or WMS application to automate label printing without user intervention.
- **Pocket NiceLabel:** A mobile client that executes the label and form designs that were created on a desktop PC.

The NiceLabel software family offers non-programmers the ability to develop a solution for any RFID smart label printing environment. Using NiceLabel Pro or NiceForm, you have an interface similar to Windows Office that makes label and form design easy for your RFID smart label printing application.

## NiceLabel Pro

NiceLabel Pro is the labeling software for professional label design and printing. NiceLabel Pro is an easy-to-use, wizard-driven tool for any labeling requirement and includes complete database support, full integration capabilities, RFID smart labeling, compliance labeling, Unicode and multi-language labeling, and more.

## NiceLabel Pocket PC Designer

NiceLabel Pocket PC Designer enables you to create mobile printing applications that print directly from the Mobile Device to the printer through Wi-Fi (TCP/IP), Bluetooth, COM (serial) or IR communication. The NiceLabel Pocket PC Designer is a mobile label printing application only. You cannot use the NiceLabel Pocket PC Designer for desktop label printing. NiceLabel Pocket PC Designer includes the following:

- **NiceLabel Pro:** Full-featured label design and printing software that you use to create RFID smart label (.LBL) files with your desktop computer.
- **NiceForm:** A **limited** version of the standard NiceForm that allows rapid user interface design for a Mobile Device only. Interface design for a desktop PC is not enabled.
- **Pocket NiceLabel:** A mobile client that executes the label and form designs that were created on a desktop PC.

## NiceLabel SDK

NiceLabel SDK is an affordable solution when software publishers want to integrate bar code and RFID smart label printing into their Windows applications. NiceLabel SDK provides an opportunity to software publishers who are looking for a way to reduce their label printing development costs and who want to add additional value to their products.

NiceLabel can be used as a "print-engine" that runs in the background of your application and is invisible to the end user. Using NiceLabel SDK you can develop label printing solutions for desktop, enterprise and mobile applications. You can integrate the NiceLabel software to other Windows based applications through the .NET or ActiveX (OLE Automation) programming interfaces. Other applications can take full control of NiceLabel label design and printing.

## Conclusion

The NiceLabel software family offers bar code and RFID smart label printing in any kind of desktop, mobile, and network environment. Smart label deployment with NiceLabel through API integration, integration middleware (NiceWatch) and direct printing methods provide flexibility that is unmatched in the automatic identification and data collection industry.

If you want to learn more about the RFID smart labeling with NiceLabel and the NiceLabel product range in general, visit the NiceLabel Web site at [www.nicelabel.com](http://www.nicelabel.com) or contact one of our offices below.

### NiceLabel Products

[www.nicelabel.com](http://www.nicelabel.com)

#### Head Office

##### **Euro Plus d.o.o.**

Ulica Lojzeta Hrovata 4c  
SI-4000 Kranj, Slovenia  
+386 4 280 50 00 Tel  
+386 4 233 11 48 Fax

[www.europlus.si](http://www.europlus.si)  
[info@europlus.si](mailto:info@europlus.si)

#### North American Office

##### **Niceware International, LLC**

10437 Innovation Drive, Suite 147  
Milwaukee, WI 53226  
+1 414 476 6423 Tel  
+1 414 476 7955 Fax

[www.nicewareintl.com](http://www.nicewareintl.com)  
[sales@nicewareintl.com](mailto:sales@nicewareintl.com)  
[support@nicewareintl.com](mailto:support@nicewareintl.com)

#### French Office

Cobarsoft SARL  
Le rempart  
32320 Montesquiou  
France  
+33 (0) 562 709 201 Tel  
+33 (0) 562 708 004 Fax

[support@nicelabel.fr](mailto:support@nicelabel.fr)  
[www.nicelabel.fr](http://www.nicelabel.fr)

## Appendix

### Euro Plus d.o.o. and Niceware International, LLC

Euro Plus d.o.o. and Niceware International, LLC develop, supply and support software for automatic identification and data collection (AIDC) solutions on the desktop PC, the corporate server or the mobile enterprise environment. Our flagship product NiceLabel has become one of the world's major label design and printing software combining easy-to-use interfaces with the integration of advanced thermal transfer technology, ERP systems solutions, RFID technology and data collection tools. NiceLabel cooperates with printer manufacturers, partners and customers from all over the world.

Microsoft has certified all NiceLabel products with the "Designed for Windows XP, 2000, ME, 98 & NT" logo, indicating reliability and operational compliance in the latest Windows environments. As a Microsoft Certified Partner, Niceware and Euro Plus present an excellent business opportunity for all those searching for a reliable, high-tech and advanced partner in the automatic identification and data collection industry.

### NiceLabel Product Overview

NiceLabel is the most advanced professional labeling software for desktop and enterprise users. NiceLabel offers an easy-to-use interface and meets any label design and printing requirement for efficient label printing solutions to users in retail, logistics, health care, chemical, automotive and other industries. The main product lines include NiceLabel Suite, NiceLabel Pro, NiceLabel Express and Pocket NiceLabel.

**NiceLabel Suite:** Complete software solution for any type of label design and print requirement. Multiple connectivity options allow users to perform stand-alone printing or integrate label printing into any network environment. NiceForm is a module in NiceLabel Suite that allows creating data entry and printing applications to make label production simple and error free. NiceLabel Suite includes NiceLabel Pro, NiceWatch, NiceForm, NicePrint and Windows CE support to create mobile printing applications.

**NiceLabel Pro:** Full-featured software designed for professional label design and printing, including complete database support and integration options. A wide range of features and options make NiceLabel Pro a perfect and easy-to-use tool for any labeling requirement. NiceLabel Pro includes NiceData and NiceMemMaster.

**NiceLabel Express:** Wizard-based software that fulfills basic bar code labeling needs. This entry-level software includes many design elements from the Pro edition with the emphasis on simplified user interaction.

**Pocket NiceLabel:** Software package for Windows CE and Pocket PC terminals for bar code label printing in a mobile environment. Pocket NiceLabel enables Windows CE compatible computers and terminals to print bar code labels on any type of thermal printer that is supported by NiceLabel printer drivers.

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