

Bar Code & RFID Label Printing: Options for Printing from SAP



WHITE PAPER

Generating bar code and RFID labels from the SAP environment is not always a straightforward process. The various versions and generations of SAP solutions are oriented to document printing and do not offer native support for most the specialized thermal printers used for bar code and RFID labeling. That means either the SAP solution or the printer has to be enabled to be compatible.

Over the years, many enabling solutions and workarounds have been created to enable bar code and RFID label output from SAP. There is no single or best way to enable SAP label printing. The suitability of each option varies according to the SAP environment (e.g. R/3, Auto-ID Infrastructure [AI]), and SAP Business Suite), and the enterprise's preference for how the solution will be implemented and supported. In general, the more components and process steps that come between the SAP application and the printed label, the more complexity, cost and risk the solution entails.

This white paper profiles the SAP output options for Intermec bar code and RFID label printers. It provides an overview of the five primary methods for producing bar code and RFID labels from the SAP environment (direct connection, SAPscript programming, XML printing, printer emulation and middleware); explains which of these options are available for SAP R/3, SAP All and SAP Business Suite users; and details how Intermec supports each method.

SAP Label Printing Primer

SAP has proprietary data formats, which printers will not recognize unless SAP provides native support. In SAP terminology, natively supported printers are called "certified device types." SAP performs compatibility and performance testing to certify device types. SAP primarily supports inkjet and laser printers and includes drivers for the most popular protocols. Support for thermal printers, which are the best option for producing bar code and RFID labels, is more limited. Because of this, users cannot print labels on thermal printers the same way they print documents and labels on inkjet and laser models.

If the SAP system does not recognize the printer as a certified device type, data streams and print commands need to be translated into a format the printer can recognize. Because thermal printers use proprietary printer control languages (there is no PostScript, HP PCL or other equivalent for thermal printers), SAP label printing solutions may not be interoperable with different brands of thermal printers, or even for all specific products within the brand.

In summary, proprietary SAP data streams need to be translated to a proprietary thermal printer control language. The translation can be handled several ways. The most common are:

- **Direct connection** – SAP has native support for the printer, which is recognized as a certified device type. The "translation" occurs within SAP before the print job is transmitted to the printer.
- **SAPscript** – Specially programmed label formats are written and embedded into the SAP solution to provide compatibility with the desired printer type.
- **XML** – XML is used as a common ground between SAP and the printer. Label formats are developed in the printer's native control language and stored in the printer, and SAP data streams are output as XML.

- **Emulation** – The printer runs an emulator that suppresses its own control language and emulates one that is supported by SAP.
- **Middleware** – SAP output is directed to software installed on a server, instead of going directly from SAP to the printer. The middleware translates the SAP output into a format the printer can recognize.

These options are not universally available for all SAP versions or thermal printer models. While each method can successfully output data from an SAP solution onto a bar code or RFID label, the methods vary considerably in required software and integration, and the ability to manage printers and use all of their features. Because of these differences in printer performance and total cost of ownership for the solution, output methods must be carefully matched to each user's SAP environment, application requirements and preferred printers.

The following sections provide more information about each output method and how it can be used with Intermec printers.

Direct Connection

When labels are printed using the direct connection method, print commands and data streams pass directly from SAP to the printer and do not require any additional processing, translation or middleware. True direct connection is only possible if SAP has designated the printer as a certified device type. This method is commonly used with SMart Forms and SAP Business Suite.

Direct connection between the SAP solution and the label printer is the most convenient and cost-effective method to output labels. The method does not require user to develop, purchase and maintain additional software. Because printers are natively supported, they can operate at peak speed and efficiency and maintain their features and functionality. The simple architecture also promotes high reliability and printer throughput. For these reasons, direct connection is the quickest method to implement and provides superior total cost of ownership (TCO) over the life of the printing system.

The primary disadvantage to direct connection is its limited availability. SAP has only certified a few thermal label printers for direct connection. SAP users have many options for directly connecting document printers, but label printer options are limited.

Intermec Support for Direct Connection

Intermec is a certified member of the [SAP Printer Vendor Program](#) and certified Intermec device types in 2013, which means SAP has tested Intermec's solutions and compatibility to ensure their printers can be used with SAP right out of the box. Certified device types for Intermec printers support the Direct Protocol (DP) printer control language. This includes numerous industrial, desktop and rugged mobile models, including RFID printer/encoders. For more information about Intermec device types and compatible printers see the technology brief *Installing and Configuring Intermec Device Types for SAP*.

SAPscript

SAPscript programming is used in the R/3 environment. In this method, the R/3 environment is modified with SAPscript code that enables it to print to specific printer types. A script is developed for each model of printer to be supported and required

label formats are also developed. The printer support and label formats are then loaded into the R/3 system. From that point forward, the R/3 system has native support for the printer and label types that have been programmed.

After the initial development and integration work, printing via SAPscript programming is transparent to users. It enables excellent printer performance because there is direct communication between the R/3 system and the printer. SAPscript programming is a good alternative for organizations in the R/3 environment whose printer and label formats rarely change.

The main drawback to this approach is that it requires specialized programming. Many SAP system administrators are reluctant to modify the R/3 system with additional coding. Software developers may need to be hired to develop the printing capability, which introduces an expense and ongoing support issues. It is important to note that SAPscript programming is specific to the R/3 environments. If All or SAP Business Suite are also used, the organization will need an additional label output solution for those environments.

Intermec Support for SAPscript

Intermec's preferred solution for customers that want to embed label printing capabilities in their R/3 systems is to use [BarTender](#) label design software from Seagull Scientific, an Intermec partner. BarTender provides a WYSIWYG environment for users to design R/3-compatible label templates and an easy-to-use development environment to create and upload the SAPscript programs for R/3. BarTender includes drivers for Intermec printers and also supports later versions of SAP.

XML

The SAP Auto-ID Infrastructure supports XML data streams. XML-compatible printers loaded with XML label templates can process XML data streams output from the SAP system to produce bar code and RFID labels without accessing and processing proprietary SAP data formats. This solution requires XML label templates and a printer capable of storing the templates and processing XML data streams. There is no middleware or other layer required between SAP All and the printer.

First, XML label formats are created with design software and are uploaded to the printer. When labels are requested, Auto-ID Infrastructure sends the print request and associated data to the printer in XML format. The printer processes the incoming data, uses it to populate the data fields in the stored label format, then prints the label.

XML printing is open and flexible. It can be used to support print output from non-SAP applications that also support XML, including Oracle Mobile Supply Chain Applications (MSCA) and Oracle WMS. Because XML is used as a common language, SAP does not require drivers for specific printers. Any XML-enabled printer with appropriate label formats can process the XML output, so different makes and models of printers can be used in the same system.

Although XML printing enables direct communications between SAP and the printer, it does require a third-party software solution for XML label design. This approach is limited to the Auto-ID Infrastructure environment because R/3 and SAP Business Suite do not support XML printing.

Intermec Support for XML

All Intermec printers with Direct Protocol support XML-enabled printing, which enables SAP users to output labels on industrial, desktop and mobile models. Several Intermec partners provide XML label design and output management solutions. [Seagull Scientific](#) is Intermec's preferred partner for XML label design.

Emulation

Emulation is similar to direct connection and is available for some printers that do not have a certified connection to SAP. In this method, the printer emulates a model that SAP does directly support. This is accomplished by disabling the printer's native control language and running an emulated printer control language in its place. The emulation is typically developed and installed by the printer manufacturer, but third-party developers can also create emulation. To the SAP system, the emulating printer appears as a natively supported device.

Emulation has several characteristics that are favorable to other non-native SAP label printing methods. It enables a simple print system architecture. After the emulation is developed and activated on the printer, no additional modifications or system components are needed to enable label printing. Emulation also broadens the printer hardware options and lets organizations operate a multi-vendor printer environment, without having to develop separate label templates for each printer type.

Emulation also introduces some limitations for printer performance. Each printer control language has characteristics and enables features that are unique to that brand of printer. Emulating the control language for one printer family on the hardware platform of another may result in the loss of some features. Loss of functionality is common for smart printers that are programmable and can run software applications to interface with devices and accessories (e.g. label cutters, automated applicators) and enable the printer to be monitored and controlled remotely through a device management system. Label output can also suffer as printers typically run slower in emulation mode than when operating in their native control language. Printers cannot toggle between their native and emulated control languages to support different applications.

Intermec Support for Emulation

Intermec offers ZPL emulation so Intermec printers can be used in systems and applications that were developed for that language. Intermec printers with emulation can replace ZPL printers or work alongside them in a multi-vendor environment. Intermec does not recommend ZPL emulation because it prevents Intermec printers from using the SmartSystems solution for provisioning, deployment, monitoring and remote troubleshooting solution. Running Intermec printers in emulation mode does not provide any performance advantage compared to connecting them directly to SAP with Intermec device types.

Middleware

As the name implies, middleware solutions are installed between the SAP system and label printer. Middleware solutions typically include two components: 1) design software for developing label formats that are compatible with the desired SAP environment and printer models; 2) print job management and queuing, and other benefits including load management, print status and verification. In a common setup, first label formats are designed and stored in

the middleware. When a label is needed, the print request goes to the middleware on a server. The middleware selects the appropriate printer (based on location, label size, required resolution, etc.) and label format, and converts the data stream to a format the printer can understand. The data stream populates fields in the stored format, and the label is printed.

Middleware solutions are available for all SAP environments and support numerous label printers. This flexibility makes the approach popular with organizations that want to support a heterogeneous printer environment, and those that may need to support multiple versions of SAP.

Middleware functions very well but it adds a layer to the printing architecture, along with associated costs and support requirements. Additional servers in particular add to the TCO for the solution and introduce a hardware component that requires IT management.

Intermec Support for Middleware

Intermec partners with software providers that provide SAP-certified label printing solutions including Seagull Scientific, Loftware and NiceWare International. Each partner has solutions for the SAP R/3, Auto-ID Infrastructure and Business Suite environments. For more information about SAP support, contact the software vendors directly.

- [Loftware](#)
- [NiceWare International](#)
- [Seagull Scientific](#)

The table below summarizes how Intermec supports the various SAP label output methods.

| Output Method | Available Intermec printers | Recommended Partner Solution | Available for R/3? | Available for All? | Available for SAP Business Suite? |
|-------------------|---|--|--------------------|--------------------|-----------------------------------|
| Direct Connection | All Direct Protocol models, includes industrial, desktop and rugged mobile models | Not required | No | No | Yes |
| SAPscript | Industrial, desktop and rugged mobile models | Seagull Scientific | Yes | No | No |
| XML | All Direct Protocol models, includes industrial, desktop and rugged mobile models | Seagull Scientific | No | Yes | No |
| Emulation | ZPL emulation available on industrial, desktop and rugged mobile models | Not required | Yes | No | Yes |
| Middleware | All industrial, desktop and rugged mobile models | Seagull Scientific Loftware NiceWare | Yes | Yes | Yes |

Deciding Which Approach is Best

As the preceding overviews showed, users have multiple options for label printing regardless of their SAP environment. All methods can be highly effective and some are very well suited for specific roles and environments. Available options are primarily limited by the version of SAP the enterprise is running and the specific printers it wants to use. To determine which method is best for a specific facility or enterprise, organizations

must consider their SAP environment, the staff and expertise available to support the printing system, and requirements for printer performance and supported label formats. The following questions will help organizations gather the information and insight needed to select the appropriate output method.

- **What SAP environments must be supported?**
 - If SAP Business Suite isn't being used today, if we migrate to it will the printers need to be replaced?
 - Is a mixed SAP environment possible?
- **What printers need to be supported?**
 - By printer type (industrial, desktop, mobile, RFID, etc.)
 - By printer manufacturer
 - By specific model
 - Does the organization use printers from different manufacturers, or does it want to have the option?
 - Will printers be included in a remote management system?
- **What are the output requirements, including:**
 - Label sizes
 - Bar code formats
 - RFID encoding
 - Label volume
 - Throughput and speed
 - Supported fonts
 - International characters

Organizations need a firm understanding of their requirements so they can identify the most appropriate printers and select an SAP labeling solution that is compatible with them. Because of the many options available, organizations should not have to make tradeoffs between the printer performance they desire and the printer types the SAP system can support.

Conclusion

SAP users have multiple options for bar code and RFID label printing. The options vary considerably by complexity, integration requirements, the requirement for and convenience of making updates, and printer performance. Each method can be highly effective and has a niche in the wide range of environments that result from the many versions of SAP in use and the dozens of thermal label printers available in the market. Because the SAP system is essential to the enterprise and label printing is often a business-critical function that impacts production, shipping and supply chain operations, it

is good practice to keep labeling systems as simple as possible to promote reliability and ease of use.

When organizations have the choice, direct connection between the SAP system and the printer is usually the best option for label printing from SAP. Direct connection to natively supported SAP printers is the easiest method to implement, which results in the fastest deployment times and lowest integration costs.

The method is advantageous at all stages of the print system lifecycle, from development and deployment to day-to-day use to ongoing support.

Intermec has proven bar code, RFID, mobile and wireless label printing solutions for the SAP R/3, All and Smart Forms and mySAP Business Suite environments. Intermec has the experience, products and partners to help companies identify and integrate the most appropriate and efficient label printing solution for their specific environment, having helped thousands of companies to deploy label printing systems in manufacturing, warehouse and other industrial environments. Intermec is a Silver Level member of the SAP Printer Vendor Program and in 2013, Intermec printers earned device certification from SAP. As certified device types, Intermec printers can connect directly with the SAP system and output bar code and RFID labels without any additional development, middleware or processing. For more information about Intermec support for printing with SAP visit www.intermec.com/SAP.

Intermec invented the first on-demand bar code label printer in 1971. Today Intermec label, ticket and tag printers cover every type of application, from economical low-volume needs to

rugged, industrial-strength printing and applicators. Recognized for quality, durability and reliability, Intermec printers offer a wide range of features including multiple protocol support, programmability, Internet printing and management, wireless, internal Ethernet support, RFID, and liner-less technology. Our connectivity support and software resources make it easy to set up and use Intermec printers right out of the box in industrial, distribution, retail, office, healthcare and other environments. To learn more about the complete Intermec printer product line, complementary software and accessories, and to review case studies and white papers about successful printing programs visit www.intermec.com/products/printers_media/index.aspx.

Intermec Inc. (NYSE:IN) develops and integrates products, services and technologies that identify, track and manage supply chain assets and information. Core technologies include rugged mobile computing and data collection systems, voice solutions that increase business performance, bar code printers, label media, and RFID. The Company's products and services are used by customers in many industries worldwide to improve the productivity, quality and responsiveness of business operations. For more information about Intermec, visit www.intermec.com or call 800-347-2636.

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