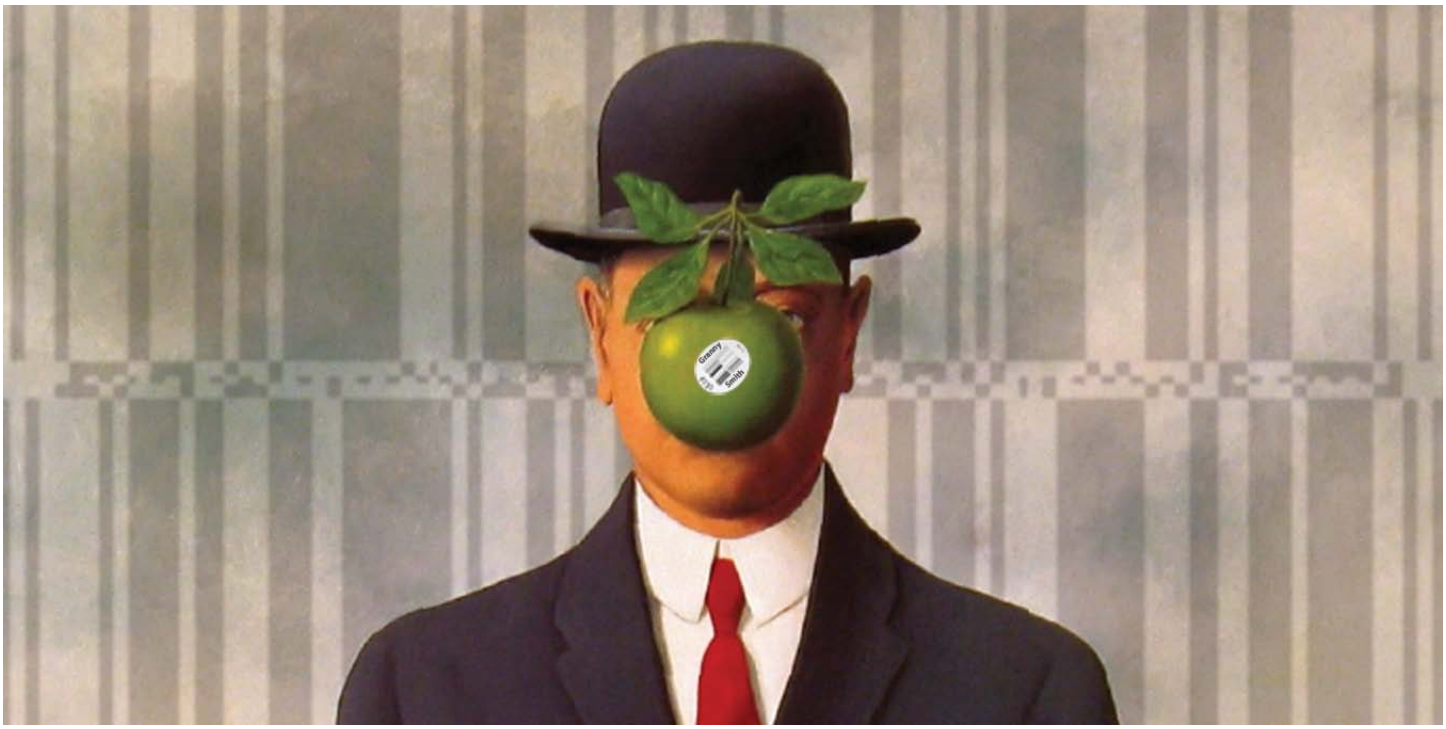
WHITE PAPER

DATALOGIC™



GS1 DataBar™ 2010 Sunrise
An Explanation from a Retailer's Perspective

Introduction

A new type of bar code, GS1 DataBar™, has been approved for marking trade items in the retail supply chain. GS1, the global retail standards-setting organization formerly known as EAN International and Uniform Code Council, has set January 1, 2010 as the "sunrise" mandate for global adoption of this new bar code type.

As of 2010 all manufacturers, worldwide, will have the option of marking their packages with GS1 DataBar codes – as an alternative to the EAN/UPC bar codes used today. Retailers must be ready to scan these packages at the point-of-sale sale, on the shelf, in the stockroom, and elsewhere within their logistics systems.

This change is a critical step that enables future standards improvements for several important retail applications, such as coupons and marking of fresh foods.

That's the essence of the 2010 Sunrise mandate. Read onward for the details.

GS1 DataBar 2010 Sunrise Requirements

GS1 announced the 2010 Sunrise with two press releases, excerpted here:

1. BRUSSELS, Belgium, June 12, 2006 – GS1, a not-for-profit standards organization, today announced a global sunrise date of Jan 1, 2010 for a new bar code called Reduced Space Symbology (RSS)... The adoption date of 2010 sets the goal for bar code systems to be capable of scanning RSS bar codes and processing GS1 Application Identifiers…
2. BRUSSELS, Belgium, February 27, 2007 – GS1 announced today the adoption of the name "GS1 DataBar" for its new Bar Code, in replacement of the previously used "RSS" (Reduced Space Symbology), as the symbol enters the broad adoption phase…

For retailers there are two requirements for meeting the 2010 sunrise mandate:

1. All retail systems that scan trade item bar codes must be capable of scanning the new family of GS1 DataBar codes, which encode the same data (the Global Trade Item Number or GTIN) as encoded in EAN/UPC bar codes today.
2. And scanning systems must be capable of recognizing additional types of data possibly encoded in GS1 DataBar codes, such as weight, price, and expiration date, which are identified with GS1 Application Identifiers (AIs).

Note that this is a ***global*** initiative. GS1 is a global organization with over 100 member organizations spread around the world, and over a million supplier/retailer members. Starting in 2010, trading partners

across the globe will be printing and reading the new GS1 DataBar codes.

Also note that GS1 DataBar is intended for marking trade items only, not for marking other logistics items such as cases and pallets. Existing GS1 authorized solutions such as the ITF-14 and GS1-128 bar codes will continue to be used for marking cases and pallets.

Why Change Now?

The GS1 standard for marking trade items, centered around EAN/UPC bar codes, has been evolving for over 30 years. As described below, there are several retail application systems that worked well ten or twenty years ago, but which are no longer robust enough to meet today's business needs. After extensive research and discussion, a GS1-led task force of business leaders from both retailing and manufacturing companies concluded that it is time for the industry to take this major step. The adoption of GS1 DataBar builds the foundation for addressing many limitations with current retail systems.

In the following list of applications, ***only the first*** is mandated by the GS1 DataBar 2010 Sunrise. There are several committees actively developing guidelines for the other applications, each of which will have its own "sunrise" date.

Small Packaged Trade Items

Problem: It is difficult to place a bar code that is big enough to be easily readable on very small items. The EAN-8 and UPC-E bar codes are intentionally smaller and intended for marking small items, but there are a limited number of values possible with only eight digits. This forces many manufacturers to use very truncated forms of EAN-13 and UPC-A bar codes, which are difficult for high-end point-of-sale scanners to read (although no problem for handheld or mobile scanners.

Solution: GS1 DataBar is capable of encoding a full GTIN in about half the space required by EAN-13 and UPC-A bar codes. Starting in 2010 manufacturers are enabled and expected to switch to GS1 DataBar for marking many of their products, small and large.

Fresh Produce

Problem: With increased consumer interest in an expanding variety of fresh produce, it is increasingly important that such products be unambiguously identified. Stickers with Price Look-up (PLU) numbers help, but there aren't enough PLU values to go around, and PLU numbers don't identify the source of the produce.

Solution: GS1 DataBar codes can be printed to fit on a produce sticker. A full GTIN is encoded, which means the product type can be specified unambiguously, and the supplier uniquely identified.

Variable-Measure Fresh Foods

Problem: The existing Number System 2 UPC-A bar codes used to mark variable weight packages (such as meat and deli) provide the price, but suffer the same problems seen in fresh produce – neither the precise product type nor the manufacturer can be captured in the bar code.

Solution: The GS1 DataBar family includes bar codes that can encode much more than just a GTIN. For variable-measure foods, for example, the GS1 DataBar could encode a GTIN, the weight, the price, and a sell-by date. Now the full product and manufacturer identification are provided, as well as additional essential information that will support compliance with the expected FDA requirements for food tracking and traceability in the grocery retail sector.

Coupons

Problem: The Number System 5 UPC-A coupon codes issued in North America are also showing their age. Among many limitations are the inability to fully identify the issuer of the coupon and the restriction to only 100 specific purchase requirement and cents off combinations.

Solution: The GS1 DataBar is capable of encoding up to 70 digits of information, and a coupon re-engineering committee has defined a very robust coupon solution that uses GS1 DataBar to overcome all of the limitations with the current system.

Scan-Based Trading

Problem: Retailers with Scan-Based Trading relationships with suppliers of periodicals and books today often read UPC-A bar codes with accompanying 2 and 5 digit add-ons. Although modern scanners handle this pretty well, there are concerns about capture rate of the add-ons and scanning performance degradation with multi-line laser scanners.

Solution: GS1 DataBar symbols can be defined to contain both the GTIN value and the add-on value in a single bar code. This completely eliminates the performance and capture rate concerns of the current system.

Pharmacy & Small Healthcare Items

Problem: Currently small medication packages and healthcare items are marked with very truncated, hard to read bar codes (of various symbologies) or not marked at all (increasing the risk of incorrect patient delivery).

Solution: The smaller versions of GS1 DataBar are already being adopted for these small items, as is GS1 Data Matrix™, a 2D symbology. These smaller bar codes are intended for reading on handheld laser or imaging scanners.

We've reviewed six reasons why GS1 (and the retailers and manufacturers it supports) feel the urgent need to enhance the current system of retail standards. Without the universal and global commitment to GS1 DataBar, these six problems will remain unsolved.

It's very important to note, however, that the 2010 Sunrise date does not require retailers to do anything new in handling fresh produce, variable-measure foods, coupons, or Scan-Based Trading data. Adoption of GS1 DataBar for these applications will occur over time when workgroups in the four areas release standards, and only when retailers decide it makes business sense to change. The status of these application standards efforts is presented later in this paper.

To reiterate, starting in 2010 manufacturers are authorized to mark their retail packages with GS1 DataBar codes. Therefore, by 2010 retailers must ensure that all point-of-sale scanners (and any other scanners that scan trade items, such as inventory, receiving, mobile POS, line busting, self shopping) are capable of and enabled to read GS1 DataBar codes. And they must verify that these scanners are also capable of reading and delivering the additional AI-based information that may be encoded on future DataBar codes. That's it. Nothing more.

A Word About GTINs and Application Identifiers

The Global Trade Item Number (GTIN) provides unique identification for every trade item in the global supply chain. A box of cereal from General Mills has a different GTIN than a box of similar private label cereal. But fresh foods are different. Since they aren't marked with GTINs today, there is no automated way to differentiate a banana from Del Monte from a banana from Dole.

The GTIN has two main components – the Company Prefix of the manufacturer (assigned to it by GS1) and an Item Reference Number assigned by the manufacturer. Every bar code on a trade item encodes a GTIN. But different bar code types have different capacities, so GTINs come in various lengths.

BAR CODE	CAPACITY	GTIN TYPE
UPC-A	12	GTIN-12
UPC-E	8	GTIN-12
EAN-13	13	GTIN-13
EAN-8	8	GTIN-8
GS1 DataBar™	14++	GTIN-14

Since the Uniform Code Council 2005 Sunrise, all North American retailers have been capable of reading, storing and processing of GTIN-8, GTIN-12, and GTIN-13 identifiers. (Retailers in the rest of the world have always had this capability.) Although it was highly recommended by the UCC at the time, there is no assurance that retailers have upgraded their systems to handle the GTIN-14.

Thus it is important to point out that the 2010 Sunrise does ***not*** require retailers to accept GTIN-14. Although the GS1 DataBar can encode the GTIN-14, it can also encode GTIN-8, GTIN-12, and GTIN-13. 2010 Sunrise specifically prohibits the encoding of GTIN-14 in GS1 DataBar until such later time as trading partners agree to it.

The GTIN is just one of over 100 Applications Identifiers (AIs) defined in GS1 global trading standards. Each AI consists of a two to four digit identifier, followed by multiple digits of data. For example, the GTIN has a two-digit identifier of "01" and 14 digits of data. AIs are either keys (like trade item or location) or attributes of those keys (like serial number, lot number, weight, price). The set of AIs as a whole forms a consistent "data dictionary" used across multiple GS1 systems, including bar codes, EPC tags, Data Synchronization, and Electronic Commerce.

Variations of the GS1 DataBar

GS1 DataBar is really a family of bar code symbologies. Some are very small, intended for produce and small consumer packages. And some are larger, intended to carry more data needed for identifying variable-measure foods and for specifying coupon requirements.

VARIANT	CAPACITY	POS	POTENTIAL APPLICATIONS	SAMPLE
GS1 DataBar™ Omnidirectional	16 digits	Yes	Packaged goods	
GS1 DataBar™ Stacked Omnidirectional	16 digits	Yes	Produce, packaged goods	
GS1 DataBar™ Expanded	Up to 74 digits	Yes	Variable-measure food, Coupons	
GS1 DataBar™ Expanded Stacked	Up to 74 digits	Yes	Variable-measure food, Coupons	
GS1 DataBar™ Truncated	16 digits	No	Healthcare items	
GS1 DataBar™ Stacked	16 digits	No	Healthcare items	
GS1 DataBar™ Limited	16 digits	No	Healthcare items	

Note that the capacity numbers above include the AI identifier digits as well as data digits. (The GTIN consists of a two-digit AI identifier and 14 data digits.) Only the four variants marked "Yes" under POS are designed for reading by high-end multi-line laser scanners at the point-The other three variants are not authorized by 2010 Sunrise for marking any products that may be scanned at the point-of-sale.

All seven variants can be easily read by handheld laser or imaging scanners.

Size Matters

Two major advantages of GS1 DataBar over the current EAN/UPC symbols are that GS1 DataBar can encode the same amount of data in a smaller space, or it can encode more data in the same space as EAN/UPC, as shown in the following illustration.

GS1 DataBar – A Brief History

Up to now we've talked about what GS1 DataBar is, but how did it come to be? In the early 1990s the Uniform Code Council's Symbology Technology Advisory Committee (STAC) started searching for solutions to the variable-measure fresh foods problem. They considered solutions with existing EAN/UPC and UCC/EAN-128 bar codes, but none were acceptable in

SYMBOL TYPE	SAMPLE	SAMPLE
EAN-13 encoding a GTIN	2 112345 834566	EAN-13 Symbol Area
GS1 DataBar™ encoding a GTIN	GS1 DataBar Omnidirectional (01)00212345834565	GS1 DataBar Stacked Omnidirectional (01)00212345834565
GS1 DataBar™ encoding a GTIN and Serial Number	GS1 DataBar Expanded 01900123456789152111122233	GS1 DataBar Expanded Stacked 01900123456789152111122233

terms of performance at the point-of-sale. The decision was made to invest in a new bar code symbology that could encode more data in less space without degradation of performance at the point-of-sale.

The Technical Symbology Committee (TSC) of AIM Global was asked to lead the design of this new symbology, with the real work contracted to Ted Williams, an expert symbology designer. After a lot of hard work involving AIM's TSC, UCC's Global Symbology Committee (GSC, formerly STAC), and bar code solution providers (including Datalogic), the complete specification for a new Reduced Space Symbology (RSS) was released as an AIM specification in October of 1999. In the years since then no significant problems have been found with the symbology, and bar code solution providers have implemented it in most of their current products.

In 2007 GS1 changed the name of RSS to GS1 DataBar. This was done to reduce confusion with other uses of the acronym RSS and to better emphasize the important advantages of this new symbology beyond simply reducing space. Today more than 60% of installed retail scanners are capable of reading GS1 DataBar codes, and GS1 expects that number to exceed 85% by 2010.

Where Does RFID Fit?

There's a lot of talk about RFID and EPC (Electronic Product Code) from EPCglobal. Is the adoption of GS1 DataBar really necessary? Or should we just wait for RFID?

The answer is that both new technologies are coming and both are critical, but for different reasons. Driven by Wal-Mart and others, EPC tags will increasingly be seen on cases and pallets traveling the supply chain. EPC tags may even be seen at the retail point-of-sale on unique categories of products – large expensive items (TVs), some types of clothing, video rentals, etc.

But bar codes are not going to disappear from the vast bulk of retail trade items. They are an inexpensive and well-established solution. But they are getting a little old. The GS1 DataBar 2010 Sunrise provides a much-needed boost to ensure that bar codes remain the most cost effective way to meet business needs across a wide range of retail applications.

GS1 is integrating EPC and bar codes into their unified system of standards. Both data carriers encode Application Identifiers, so both can be used to convey the same information. Indeed, GS1 DataBar codes can serve to backup the information contained in EPC tags.

Initiatives and Applications for GS1 DataBar

As described earlier, there are six major applications to which GS1 DataBar will be applied. Only one, packaged goods, is required to be in place by the 2010 Sunrise date. The others will be phased in after completion of initiatives defining their respective requirements. The status of these initiatives is described here.

Packaged Goods

Current status: Fixed-weight packaged goods is the simplest application for GS1 DataBar. Starting in 2010 manufacturers around the globe are permitted to mark their packages with GS1 DataBar codes encoding a GTIN-8, GTIN-12, or GTIN-13. These data structures are already universally understood and processed by retailers.

Impact: The only change is that retailers must have readers capable of reading GS1 DataBar, and GS1 DataBar must be enabled for reading on every point-of-sale scanner, as well as any other readers in the supply chain used to read trade items.

Benefits: A primary benefit goes to manufacturers, who may now utilize a smaller bar code to mark smaller packages or to leave more room for product information on larger packages. But there is also a large benefit for retailers, since manufacturers will be less likely to mark their packages with small out-of-spec EAN/UPC labels, which noticeably reduce productivity at the point-of-sale.

Fresh Produce

Current status: Several initiatives are currently underway at major retailers to demonstrate the feasibility of marking fresh produce with GS1 DataBar codes. This requires coordinating with suppliers to add the bar code to their PLU stickers. The stickers will continue to include the current PLU number in addition to the new bar code. Thus a retailer is not forced to change, and can decide to switch to GS1 DataBar for produce in the timeframe that works best for it.

Impact: Converting from PLU numbers to GS1 DataBar codes will require some store system upgrades. There will be a change in the scan/weigh cycle at the point-of-sale. But more significantly, the produce bar codes will ***not*** encode the current PLU number.

Rather, they will encode a GTIN, which includes the unique Company Prefix of the supplier and an Item Reference number selected by the supplier. Different suppliers that provide the same commodity produce item will have different GTINs, even though the PLU number for their two produce items would be the same. The retailer will likely create a many-to-one database relationship between the new supplier GTINs and the current PLU numbers. This will add to the number of distinct products in the retailer's system and perhaps complicate ordering processes.

Benefits: Despite the work required by retailers to adopt GS1 DataBar for fresh produce, the benefits should be substantial. Just as is currently true for packaged goods, produce sales will be accurately tracked. There will be no shrinkage due to miss-identified items, which often happens if there are several similar products that look the same, especially in identifying organic produce. Current inventory will be more accurately measured. Meaningful category management will now be possible. Recalls limited to specific suppliers will be practical. Self-checkout customers will appreciate scanning bar codes, which is easier than entering PLU numbers.

Variable-Measure Fresh Foods

Current status: An association of US trade organizations representing the various

categories of fresh foods has issued a white paper encouraging their members to adopt GS1 DataBar for marking all types of variable-measure foods – meat, poultry, fish, deli, bakery, dairy, etc.

GS1 has formed a Fresh Foods Community, and the Food Marketing Institute has formed a Fresh Foods Committee, both working towards application guidelines for GS1 DataBar. A few retailers have completed pilot tests utilizing GS1 DataBar Expanded labels encoding the supplier's GTIN, weight, price, and sell-by date.

Impact: Due to the 2010 Sunrise mandate, retailers will have the capability of reading GS1 DataBar codes, including various Applications Identifiers, within their stores. Relatively small changes will be required to a store's application software to deal with a different format for item identification and price. More work, as described above for fresh produce, will be required to map the GTIN identification to the existing structure of PLU numbers. And additional software will be required to take advantage of new information encoded in the GS1 DataBar, such as sell-by date and lot number.

Benefits: Each category of variable-measure foods has a limited number of PLU numbers to assign to an expanding number of distinct products. Migration to GTIN-based identification will allow an unlimited number of innovative products to be uniquely identified. And GTINs unambiguously identify the source of the product, greatly enhancing traceability. Automated checking of sell-by dates will prevent sale of outdated products. Very accurate data will be available for category management and shrink control.

Coupons

Current status: In 2003 GS1 US and the Joint Industry Coupon Committee (JICC) sponsored a coupon re-engineering project, which resulted in a detailed specification for GS1 DataBar-based coupons, which is being adopted today. Several tests have been completed to demonstrate the feasibility and performance of the new solution.

The first phase of a two-phase rollout started on January 1, 2008. Manufacturers are now printing an "interim" coupon format that includes both the current UPC-A bar code and a new GS1 DataBar Expanded code. Since retailers today read only the UPC-A bar code, this change will have no immediate impact on them. The JICC has set January 1, 2010 as the date to migrate to coupons containing only the GS1 DataBar code, another sunrise date retailers need to plan for. A group of point-of-sale software providers has written an implementation guide to ensure that all retailers will get the same results when validating coupons.

Impact: By 2010 retailers must be able to read GS1 DataBar codes at the point-of-sale. They will have to upgrade their coupon processing software to handle a different format of the information that appears on today's coupons. The new coupons will also contain much more robust offer information and allow much more complete offer validation, which will require more store software upgrades.

Benefits: The current coupon standard has not kept up with changes in the GS1 system, in particular the increasing length of Company Prefixes. The new system can store the entire Company Prefix (a part of the GTIN). The current system allows only 100 purchase requirement and cents off combinations. The new system allows detailed specification for offer requirements involving up to three product purchases, and permits any desired coupon value. The new system also facilitates complete validation of the coupon at the point-of-sale, which is rarely done today.

Scan-Based Trading

Current status: There is a growing trend in adopting Scan-Based Trading for periodicals, paperback books, and other

merchandise, in which suppliers retain ownership of inventory on the retailer's site until it is scanned at the point-of-sale. This requires reading the 2 and 5 digit supplemental codes printed next to the UPC-A codes. This old technology of reading two different bar codes can suffer from capture-rate and performance problems when using older multi-line laser scanners, although on newer scanners perform better.

It would be easy to encode the same GTIN and supplemental information in a single GS1 DataBar code, completely eliminating the problems with today's solution. Although the idea has been proposed, there is no current industry initiative to apply GS1 DataBar to resolve the current two bar code problem.

Impact: If the industry defines a GS1 DataBar solution incorporating the same data as in today's UPC-A-plus-supplemental bar codes, there would be minimum impact for retailers other than modifying their systems to receive supplemental data in the form of an AI encoded in a GS1 DataBar code.

Benefits: Since the GS1 DataBar solution eliminates the performance and capture rate concerns, Scan-Based Trading partners can count on 100% scanning success rate. Also retailers will not need to re-label products to eliminate the dual bar code problem, as they often do today. This will eliminate a current barrier to wider adoption of Scan-Based Trading.

Possible Adoption Conflicts

What will happen if retailers receive products or coupons containing GS1 DataBar codes before they are ready to support GS1 DataBar? Generally there should not be a problem, but retailers should consider and plan for the following scenarios.

GS1 DataBar supported on scanners but not yet enabled (pre 2010): Any product with a GS1 DataBar label will not be read. Retailers need to stay coordinated with suppliers to ensure their suppliers don't ship such products until the 2010 Sunrise date, or earlier if by mutual agreement and they are ready to enable GS1 DataBar reading.

GS1 DataBar enabled, as required after January 1, 2010: Packaged goods with GS1 DataBar labels will read fine. But there are three more cases:

Fresh produce with GS1 DataBar labels: If the retailer is prepared for this, there will be no problems. Or if the suppliers refrain from including GS1 DataBar codes on their produce stickers, that will work as well. But if suppliers incorporate GS1 DataBar labels for selected customers and ship the same product to other unprepared customers, checkers (or self-checkout customers) may unintentionally scan the GS1 DataBar code (e.g. while weighing the produce) and get a not-on-file response. Checkers and customers can be trained to enter the PLU number and ignore the GS1 DataBar label and not-on-file error. Or produce suppliers can be instructed not to ship product with GS1 DataBar labels, even though some of their other customers require it. Neither is a great solution.

Variable-weight food with GS1 DataBar labels: The retailer controls the majority of variable-weight labeling, since it typically occurs in its own meat and deli departments. Obviously the retailer will not start printing GS1 DataBar codes until it is ready to read and process them. But a supplier could deliver variable-weight product pre-marked with GS1 DataBar labels before the retailer is ready. The retailer could instruct the supplier not to do that. Or the retailer could disable decoding of GS1 DataBar Expanded labels, while leaving GS1 DataBar Omnidirectional enabled. This would allow most packaged goods and produce labels to be read, but disable variable-weight and coupon labels. Other scanner configuration options are also possible.

Coupons with GS1 DataBar labels: These are real today and have been seen since January 1, 2008, as manufacturers enter the "interim" phase of the new coupon standard. Up until January 1, 2010 retailers may continue reading the UPC-A coupon code and ignore the GS1 DataBar label. With both UPC-A and GS1 DataBar Expanded labels printed on coupons, scanners will require special logic to report only the UPC-A. Or scanners can be configured to ignore all GS1 DataBar Expanded labels.

Datalogic Scanning Readiness Report

Datalogic Scanning provides a wide range of fixed retail, general purpose, and industrial handheld scanners suitable for any retail application and performance requirements. All Datalogic Scanning products can be easily enabled to read GS1 DataBar codes.

Summary

We've covered a lot of information in this white paper. Clearly the retail sales environment is increasing in sophistication and in application of new technologies, and it is vital that the global standards followed by retail trading partners keep up with this changing environment. As we have seen, the GS1 DataBar symbology is the key that will enable significant progress in several retail applications. The first and essential step is for the industry to fully commit to GS1 DataBar for labeling of all types of retail products.

In summary, that's what the GS1 DataBar 2010 Sunrise is all about. Starting in 2010 manufacturers will have the option to mark their products with GS1 DataBar codes as an alternative to the EAN/UPC codes they use today. All retail trading partners need to be able to scan GS1 DataBar codes by that date. And that's it. No new data, no new applications. But more change is coming – in the marking of fresh produce, variable-weight foods, and coupons. As application standards are completed, retailers will be required to read the additional GS1 Application Identifier-based data encoded in the GS1 DataBar codes, and upgrade their application software to process this new information.

If you'd like more information about the GS1 DataBar 2010 Sunrise or about any of the new applications for GS1 DataBar, please contact your Datalogic Scanning representative. You also can learn more about the GS1 DataBar 2010 Sunrise and the other initiatives at the GS1 web site: www.gs1.org/databar.

www.scanning.datalogic.com

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