



GS1 DataBar™ 2010 Sunrise

An Explanation from a Retailer's Perspective

A White Paper from Datalogic Mobile



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GSI DataBar™ 2010 Sunrise

The Future of Retail Product Identification

Introduction

A new type of bar code, GSI DataBar, has been approved for marking trade items in the retail supply chain. GSI, 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 GSI 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, 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.

GSI DataBar™ 2010 Sunrise Requirements

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

BRUSSELS, Belgium, June 12, 2006 – GSI, 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 GSI Application Identifiers...

BRUSSELS, Belgium, February 27, 2007 – GSI announced today the adoption of the name “GSI 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 GSI 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 GSI DataBar codes, such as weight, price, and expiration date, which are identified with GSI Application Identifiers (AIs).

Note that this is a **global** initiative. GSI 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 GSI DataBar codes.

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

Why Change Now?

The GSI 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 GSI-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 GSI 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 GSI 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:* GSI 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 GSI 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:* GSI 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 Code 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 GSI DataBar family includes bar codes that can encode much more than just a GTIN. For

variable-measure foods, for example, the GSI 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 Code 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 GSI 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 GSI 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 need to 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:* GSI 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 and Small Health Care Items

- *Problem:* Currently small medication packages and health care 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 GSI DataBar are already being adopted for these small items, as is GSI DataMatrix, a 2D symbology. These smaller bar codes are intended for reading on handheld laser or imaging scanners.

We've reviewed six reasons why GSI (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 GSI 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 GSI 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 GSI 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 GSI 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 GSI 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.

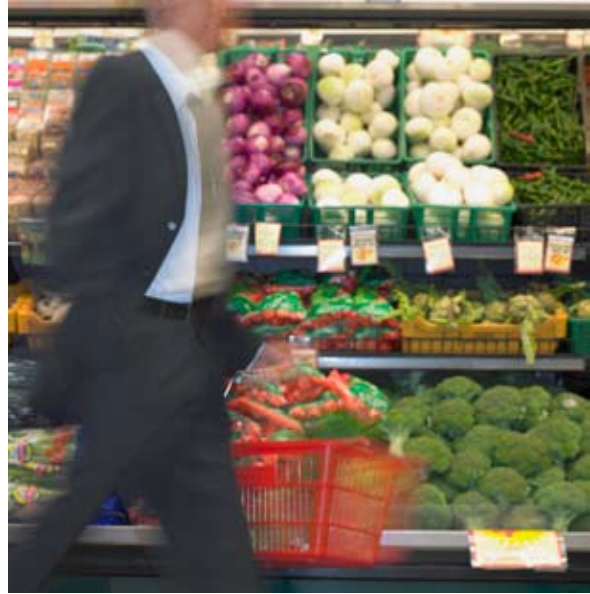
The GTIN has two main components – the Company Prefix of the manufacturer (assigned to it by GSI) and an Item Reference Number assigned by the manufacturer. Every bar code on a trade item encodes a GTIN. But different bar code types have different capacities, so GTINs come in various lengths.

| Bar Code Symbology | Capacity | GTIN Type |
|--------------------|----------|-----------|
| UPC-A | 12 | GTIN-12 |
| UPC-E | 8 | GTIN-12 |
| EAN-13 | 13 | GTIN-13 |
| EAN-8 | 8 | GTIN-8 |
| GSI DataBar™ | 14++ | GTIN-14 |

Since the Uniform Code Council 2005 Sunrise date, 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 note that the 2010 Sunrise does **not** require retailers to accept GTIN-14. Although the GSI 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 GSI DataBar until such later time as trading partners agree to it.

The GTIN is just one of over 100 Application Identifiers (AIs) defined in GSI 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 number 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 GSI systems, including bar codes, EPC tags, Data Synchronization, and Electronic Commerce.



Variations of the GSI DataBar

GSI 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 |
|-----------------------------------------|-----------------|-----|--------------------------------|--------|
| GSI DataBar™ Omnidirectional | 16 digits | Yes | Packaged goods | |
| GSI DataBar™ Stacked Omnidirectional | 16 digits | Yes | Produce, packaged goods | |
| GSI DataBar™ Expanded | Up to 74 digits | Yes | Variable-measure food, Coupons | |
| GSI DataBar™ Expanded Stacked | Up to 74 digits | Yes | Variable-measure food, Coupons | |
| GSI DataBar™ Truncated | 16 digits | No | Health care items | |
| GSI DataBar™ Stacked | 16 digits | No | Health care items | |
| GSI DataBar™ Limited | 16 digits | No | Health care 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-of-sale. 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 GSI DataBar over the current EAN/UPC symbols are that GSI 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.

| | | |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EAN-13 encoding a GTIN |  <p>2 112345 834566</p> |  <p>EAN-13 Symbol Area</p> |
| GSI DataBar™ encoding a GTIN | <p>GSI DataBar™ Omnidirectional</p>  <p>(01)00212345834565</p> | <p>GSI DataBar™ Stacked Omnidirectional</p>  <p>(01)00212345834565</p> |
| GSI DataBar™ encoding a GTIN and Serial Number | <p>GSI DataBar™ Expanded</p>  <p>0190012345678915211122233</p> | <p>GSI DataBar™ Expanded Stacked</p>  <p>0190012345678915211122233</p> |

GSI DataBar™ – A Brief History

Up to now we've talked about what GSI 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 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 GSI changed the name of RSS to GSI 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 GSI DataBar codes, and GSI 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 GSI 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 GSI 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.

GSI 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, GSI DataBar codes can serve to backup the information contained in EPC tags.

Initiatives and Applications for GSI DataBar™

As described earlier, there are six major applications to which GSI DataBar will be applied. Only one, packaged goods, is required to be in place by the GSI DataBar 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 GSI DataBar. Starting in 2010 manufacturers around the globe are permitted to mark their packages with GSI 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 GSI DataBar, and GSI DataBar must be enabled for reading on every point-of-sale scanner, as well as any other scanners 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 GSI 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 GSI DataBar for produce in the timeframe that works best for it.

Impact: Converting from PLU numbers to GSI 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 GSI 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 distinct 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 and more accurate 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 GSI DataBar for marking all types of variable-measure foods – meat, poultry, fish, deli, bakery, dairy, etc. GSI has formed a Fresh Foods Community, and the Food Marketing Institute has formed a Fresh Foods Committee, both working towards application guidelines for GSI DataBar. A few retailers have completed pilot tests utilizing GSI 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 GSI 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 GSI 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 GSI US and the Joint Industry Coupon Committee (JICC) sponsored a coupon re-engineering project, which resulted in a detailed specification for GSI 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 GSI 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 GSI 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 GSI 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.



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-



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 GSI 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

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 newer scanners perform better.

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

Impact: If the industry defines a GSI 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 GSI DataBar code.

Benefits: Since the GSI 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 GSI DataBar codes before they are ready to support GSI DataBar? Generally there should not be a problem, but retailers should consider and plan for the following scenarios.

GSI DataBar supported on scanners but not yet enabled (pre 2010): Any product with a GSI 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 GSI DataBar reading.

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

- *Fresh produce with GSI DataBar labels:* If the retailer is prepared for this, there will be no problems. Or if the suppliers refrain from including GSI DataBar codes on their produce stickers, that will work as well. But if suppliers incorporate GSI DataBar labels for selected customers and ship the same product to other unprepared customers, checkers (or self-checkout customers) may unintentionally scan the GSI 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 GSI DataBar label and not-on-file error. Or produce

suppliers can be instructed not to ship product with GSI DataBar labels, even though some of their other customers require it. Neither is a great solution.

- *Variable-weight food with GSI 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 GSI DataBar codes until it is ready to read and process them. But a supplier could deliver variable-weight product pre-marked with GSI DataBar labels before the retailer is ready. The retailer could instruct the supplier not to do that. Or the retailer could disable decoding of GSI DataBar Expanded labels, while leaving GSI 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 GSI 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 GSI DataBar label. With both UPC-A and GSI 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 GSI DataBar Expanded labels.



Datalogic Mobile Readiness Report

Datalogic Mobile provides a wide range of mobile computers suitable to meeting any retail application and performance requirements. What is required in these products to fully support GSI DataBar 2010 Sunrise and to support all of the coming applications for GSI DataBar?

Well, it's quite simple: The mobile computers must be able to read all seven variants of GSI DataBar, and scanners must be able to return data in the form of GSI Application Identifiers with accompanying data. All current Datalogic Windows CE and Windows Mobile products meet these requirements.

| GSI DataBar Support for Datalogic Mobile | | |
|------------------------------------------|-------|-----------|
| Product Family | Laser | 2D Imager |
| Datalogic Memor | ✓ | N/A |
| Datalogic Skorpio | ✓ | N/A |
| Datalogic JET | ✓ | ✓ |
| Datalogic Pegaso | ✓ | N/A |
| Datalogic Falcon 4400 | ✓ | ✓ |
| Datalogic Kyman | ✓ | ✓ |

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 GSI 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 GSI DataBar for labeling of all types of retail products.

In summary, that's what the GSI DataBar 2010 Sunrise is all about. Starting in 2010 manufacturers will have the option to mark their products with GSI DataBar codes as an alternative to the EAN/UPC codes they use today. All retail trading partners need to be able to scan GSI 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 GSI Application Identifier-based data encoded in the GSI DataBar codes, and upgrade their application software to process this new information.

If you'd like more information about the GSI DataBar 2010 Sunrise or about any of the new applications for GSI DataBar, please contact your Datalogic Mobile representative. And you can learn more about Datalogic Mobile products at www.mobile.datalogic.com. You also can learn more about the GSI DataBar 2010 Sunrise and the other DataBar initiatives at GSI's special DataBar web site, www.gsi.org/databar.



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