



# Industry Roadmap:

## Building the Fresh Foods Supply Chain of the Future



1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

# 1 Executive Summary

**The Problem:** GS1 standards for identification, marking, and tracking of fixed-measure packaged goods are well-defined and widely applied. However, the standards currently in use for random-weight and variable-measure items are not sufficient to meet growing requirements for unambiguous product identification, tracking, and management of fresh foods from source to consumer. GS1 standards and technologies such as Global Trade Identification Numbers (GTIN) and GS1 Data Bar (formerly known as RSS) exist now and can be applied to meet emerging fresh foods supplier and retailer needs.

**The Participants:** This report is the collective work of the major U.S. fresh food trade associations. They are: the American Lamb Board, the Food Marketing Institute, the International Dairy-Deli-Bakery Association, the National Turkey Federation, the National Cattlemen’s Beef Association on behalf of the Beef Board, the National Chicken Council, the National Fisheries Institute, the National Pork Board, and the Produce Marketing Association, with support from GS1 US. We are convinced that a single, integrated solution applied across all categories of fresh food is required.

**Global Standards:** We are committed to the use of global standards—as defined by GS1—to create one communications language for the entire supply chain—suppliers and retailers, fixed-measure and variable-measure, packaged and fresh food. Central to this commitment is the adoption of Global Trade Item Numbers (GTIN) to identify every fresh food product at both the case and item levels.

**The Challenges:** Today the fresh food industry is facing numerous challenges to the effective operation of its supply chain. Foremost is the need for unambiguous product identification to uniquely identify manufacturers and specific items, a requirement that is not met with current PLU numbering schemes. Another common challenge is the need to capture product identification and key product attributes (e.g., lot number, expiration date, etc.) at the point-of-sale. A third challenge is the inability to participate in current supply chain systems, including technologies and initiatives such as electronic commerce, Radio Frequency Identification (RFID), and data synchronization. A challenge that is particularly critical for fresh food is the need to improve traceability of products up and down the supply chain. It is particularly difficult to trace co-mingled products (containing ingredients from multiple sources) that are common in deli, bakery, and meat departments. Finally, an ongoing challenge when adopting new solutions is to retain and incorporate the best parts of current solutions.

**The Solution:** We recommend the adoption of GS1 standards for the fresh food supply chain. Specifically, every product should be identified with a GTIN containing the U.P.C. Company Prefix of the organization that produced it. With the exception of produce, all cases of fresh food should be marked with a barcode or RFID tag containing GTIN, Weight, Lot or Batch Number, and Expiration Date. Produce cases should have a GS1-128 barcode containing the GTIN and the Lot or Batch Number. All random-weight item-level products (except produce) should be marked with a GS1 Data Bar (RSS) Expanded barcode containing, at minimum, GTIN, Weight, Price, Lot or Batch Number, and Expiration Date. (This solution is directional in nature and to be further

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

refined by a more technical group.) Produce items should be marked with a GS1 Data Bar (RSS) barcode containing the GTIN.

**GTIN Assignment:** We recommend that each participant in the fresh food supply chain that produces a product or adds value to an existing product must have a strategy for assigning GTINs. This requires each participant to obtain a U.P.C. Company Prefix, to have a strategy for assigning Item Reference Numbers, and in the case of co-mingled products, to have a system for tracking each ingredient back to its source. Retailers and suppliers will likely choose to maintain a mapping system between current PLU numbering schemes and the new GTIN numbers.

**The Benefits:** Adopting this proposed solution across the entire fresh food industry will yield significant benefits including increased information capture, faster POS throughput, effective category management, effective traceability, fresher product, and reduction in shrink.

**Action Plan:** The changes proposed in this report are simple in concept but expensive to implement. The current fresh food supply chain is not “broken,” but it is inefficient by today’s standards. Change will require adoption of GS1 standards, acquisition or update of hardware, definition of new processes and practices, and development or modification of application software. None of this will be done unless a convincing return-on-investment can be created, so that is our mandatory next step. After strong industry endorsement is attained, detailed technology specifications need to be generated, followed by an implementation plan with sunrise dates for industry-wide use of these new capabilities.

## 2 Introduction

In the early 1970’s, at the request of food manufacturers and retailers, the Uniform Code Council and EAN International were created and tasked with introducing the U.P.C. and EAN barcodes in an effort to create a North American and European solution for product identification. The consumer products and retail industries have used this product identification system for the last 35+ years as the core foundation to identify products (consumer units, cases and pallets) throughout the supply chain at all levels of packaging. The barcode also forms the foundation for category management business processes that are in place today. We believe all trading partners would agree that it would be virtually impossible to effectively manage one’s business without the use of the U.P.C. or EAN barcodes. These barcodes have been one of the most transformational technologies introduced in the last century, benefiting both consumers and businesses.

The system in use today, while not perfect, has been an effective tool for dry grocery products and general merchandise from a product identification perspective. Due to the unique and somewhat more complex nature of the procurement and processing of products, the solutions that were introduced in the early 1970’s were not as well-suited for fresh foods. Because of these complexities, coupled with technology gaps, the fresh food supply chains (specifically meat, poultry, produce, dairy, deli, bakery, and seafood) have lagged significantly behind product identification programs for traditional dry grocery product categories. Additionally, significant progress has been hampered due to the lack of coordinated industry effort and focus.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

This paper is an industry call to action signaling the transformation process that is required to bring the fresh foods supply chain into the 21<sup>st</sup> century. The technological innovations and advancements that are available today should be implemented in North America and across the globe. To achieve this mission requires a heightened awareness of the business opportunities and challenges. Also critical is an understanding of the various technologies that are available today, as well as those currently under development.

Fresh food supply chain transformation requires industry leadership and a commitment to business process change, thereby enabling substantial consumer and business benefits. Our objective in this report is to identify the key business issues, opportunities, benefits, and solutions related to improving the performance of all areas of the fresh food supply chain. We maintain that the fresh foods industry can benefit from one common industry solution relative to product identification, ways to automatically capture information, and e-commerce. As such, we endorse the use of the GS1 standards for product identification across all fresh food sectors. Additionally, the applicability and potential for important technologies such as RFID and GS1 Data Bar (RSS) must also be addressed for fresh foods.

A fully-integrated view of the fresh foods supply chain needs to be developed collaboratively among all key industry stakeholders. This effort is being organized by the fresh foods industry associations and GS1 US in an effort to build momentum and commitment for this much-needed business imperative.

The organizations that are sponsoring this Fresh Foods Initiative include the American Lamb Board, the Food Marketing Institute, the International Dairy-Deli-

Bakery Association, the National Turkey Federation, the National Cattlemen’s Beef Association on behalf of the Beef Board, the National Chicken Council, the National Fisheries Institute, the National Pork Board, and the Produce Marketing Association, with support from the Food Marketing Institute and GS1 US. This report will focus on several key areas:

1. Background on the current status of the fresh food supply chain
2. The importance of global standards
3. A review of standard product identification
4. Fresh food supply chain challenges by commodity group
5. Solutions for fresh foods by commodity group
6. An industry action plan

We believe that by acting now and in a cohesive manner, we will realize the benefits of a world-class fresh food supply chain.



1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

### 3 The Fresh Foods Supply Chain

Today, the fresh foods supply chain is confronted with challenging issues. More than ever, consumers are motivated to find the freshest and safest foods available at a fair price. In addition, versus center store, fresh foods or products located along the perimeter of the store are experiencing increased sales growth based upon the consumer’s desire for fresh items. It can be argued that the growth in fresh foods is one area that provides competitive differentiation for supermarkets versus other classes of trade. While sales of the various fresh food commodities are increasing, so is the challenge of effectively meeting consumer needs with the freshest product and having the right product, at the right place, at the right time.

The fresh food supply chain is not only unique, but very complex as compared to traditional dry grocery products. While the various fresh or perishable product commodities have similarities, they also have distinct differences in several areas. Meat products are handled very differently at store level than fresh produce, as a large portion of meat products are processed in-store. Most fresh food products have temperature control and handling requirements which require their supply chains to be very tightly managed to avoid shrink and to ensure inventories are aggressively managed for product freshness. Reducing fresh food supply chain costs while improving efficiency is a continuous challenge retailers, wholesalers, suppliers, and growers face.

The core issues the fresh food supply chains are confronted with are visibility, transparency, data accuracy, and standardized product identification at the consumer unit, case, and pallet levels. These challenges confront the supply chain at all touchpoints whether

in the field, on the farm, in the warehouse, on the truck, or in the store. Business managers need better tools so they can increase sales, manage distribution and procurement processes, and ensure appropriate inventory levels are addressed while promoting products more effectively to drive profitable sales.

The current fresh food supply chain does not have a standardized product identification system for all commodity groups. There are several factors contributing to this situation; however, the most predominant issue is the legacy of the old system which was developed many years ago without any recent transformational business process change to reflect new technologies or supply channel requirements.

As previously stated, the fresh food supply chain requires business process transformation in the areas of product identification, data transport through Electronic Data Interchange (EDI) and e-commerce applications, and the utilization of emerging technologies like GS1 Data Bar (RSS) and RFID to realize the efficiency benefits. To that end, it is our desire to develop a fully-integrated business-process model for the fresh food supply chain. This would standardize product identification at the item, case, and pallet levels while effectively focusing e-commerce applications with the objective of standardizing applications for data synchronization and data accuracy between trading partners. Standardized product identification and the ability to transport the data through the supply chain will enable significant improvements in distribution, warehousing, inventory control, pricing, merchandising, category management, food safety, and product traceability. All of these improvements are designed to meet the needs of consumers while cutting costs and growing sales.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

It is commonly agreed that the commodity goods of meat, poultry, produce, dairy, deli, bakery, and seafood are fragmented supply chains which do not currently share a common supply chain system, or for that matter, a common supply chain vision for the future. The design of the high-performance fresh food supply chain as a business imperative is long overdue and requires immediate executive-level and industry attention, focus, and commitment. Today we have enabling technologies, namely GS1 Data Bar (RSS) and RFID. The potential of these new technologies is promising; however, they need to be implemented in the context of the entire supply chain. In other words, all the pieces need to fit together in a cohesive manner to ensure a well-developed and thoughtfully-constructed fresh foods supply chain.

Global standards form the framework and foundation for the fresh food supply chain of the future. The balance of this paper will address the need for standards, the role of product identification, and the unique challenges associated with each fresh food commodity group. It is our intent that after a complete review of the facts,



challenges, and opportunities, industry stakeholders will agree that now is the time to capitalize on the significant benefits that fresh food product identification can provide to consumers and trading partners.

## 4 The Key Industry Players

The fresh foods associations are committed to representing and educating their various member groups. They participated in the development of this document and sought input from their members to ensure that the appropriate business considerations are made. The next phase will include moving from an information-gathering role to an educational role by helping members to sort through the changes in existing business and technical practices.

This report is based upon the incorporation of voluntary guidelines. However, marketplace dynamics are starting to dictate the use of GS1 standards at all levels of packaging. By creating this report, each of the trade associations will help members sort through consumer or government mandates, and give them the chance to prepare for a new marketplace. The food marketplace is very different than it was 10 years ago; it now employs new technologies founded on a standard that has been around for over 30 years. The expanded use of these technologies will benefit the entire supply chain. As was the case with barcodes 25 years ago, there is resistance to change. Today, you cannot go into a grocery store without seeing a U.P.C. barcode on the package. Now we are looking at other technologies that will offer even more benefits than the current barcode. The good news is that the U.P.C. barcode has already paved a path to follow.

The industry has a U.P.C. barcode system that has worked effectively for fixed-weight packaged goods, but has not worked effectively for random-weight goods. New technologies could work for all products and give the industry a tremendous number of “upgrades,” but they require the use of the same standard.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

Each trade association will work with GS1 to offer more education to its members. If there are any concerns or questions regarding this document, please contact your corresponding trade association. The following trade associations took part in the creation of this document:

**4.1 Food Marketing Institute**

Food Marketing Institute (FMI) conducts programs in research, education, industry relations, and public affairs on behalf of its 1,500 member companies — food retailers and wholesalers — in the United States and around the world. FMI’s U.S. members operate approximately 26,000 retail food stores with a combined annual sales volume of \$340 billion — three-quarters of all retail food store sales in the United States. FMI’s retail membership is composed of large multi-store chains, regional firms, and independent supermarkets. Its international membership includes 200 companies from 50 countries. Visit their Web site at [www.fmi.org](http://www.fmi.org) or call 202.452.8444.



**4.2 The Produce Marketing Association**

The Produce Marketing Association (PMA), founded in 1949, is a not-for-profit global trade association serving more than 2,100 members. The association exists to sustain and enhance an environment that advances the marketing of produce and related products and services for its members who are involved in the production, distribution, retail, and foodservice sectors of the industry.



The Produce Marketing Association has provided numerous documents to assist members with the incorporation of standards, including the creation of the Pallet and Case Coding: PMA Best Practices document, PMA/CPMA Fresh Produce Traceability: A Guide to Implementation document, ASAP Produce service, ASAP Floral service, RFID In the Produce Supply Chain document, Supply Chain Revolution: RFID in the Produce Industry DVD. EDI White Papers, and other information on standards and industry technologies is on their Website. This document is important as it provides tangible solutions to incorporate GS1 standards into each of the food sectors. PMA will continue to provide educational sessions, webinars, user group meetings, committee meetings, and alerts to help members through the incorporation of these standards. Call 302.738.7100 or visit their website at [www.pma.com](http://www.pma.com).

**4.3 The National Turkey Federation**

The National Turkey Federation (NTF) is the advocate for all segments of the \$8 billion U.S. turkey industry, providing services and conducting activities which increase demand for its members’ products. The NTF works to protect and enhance member’s ability to effectively and profitably provide wholesome, high-quality, nutritious turkey products. As a member of the Fresh Foods Association, NTF is working to ensure technology standards are in place to enable processors and their customers to better manage the meat and poultry category. Visit their Web site at [www.eatturkey.com](http://www.eatturkey.com) or call 202.898.0100.



1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

#### 4.4 American Lamb Board

The American Lamb Board (ALB) is a national promotion, research, and information organization whose purpose is to strengthen the position of lamb and lamb products in domestic and foreign markets, and to develop, maintain, and expand markets for lamb and lamb products. The ALB is a 13-member board comprised of producers, feeders, seedstock producers, and first handlers, appointed by the Secretary of Agriculture to administer the activities of the American Lamb Check-off Program initiated in 2002. Visit their Website at [www.americanlamb.com](http://www.americanlamb.com) or call 866.327.5262 to learn more about this national commodity Checkoff board.



#### 4.5 International Dairy•Deli•Bakery Association

The International Dairy•Deli•Bakery Association™ (IDDBA) is a nonprofit organization that has been serving the educational needs of their industry since 1964. Programs and services include a trade show, seminars, original consumer research, four newsletters, an annual trends report, educational videos, workbooks, CDs, PowerPoint presentations, and a new series of e-learning programs for supermarket dairy, deli, bakery, and cheese departments. The association serves as an informational resource for members and the industry by providing effective and affordable training that teaches basic and advanced product knowledge, enhances selling skills, and develops consumer relationship strategies that increase sales and develop professional staff. Visit the



IDDBA Web site at [www.iddba.org](http://www.iddba.org) or call 608.310.5000.

#### 4.6 National Cattlemen's Beef Association on behalf of the Beef Board

The National Cattlemen's Beef Association (NCBA), on behalf of the Beef Board, is the largest organization representing America's cattle industry. The Beef Board assesses \$1 per head on the sale of live domestic and imported cattle, in addition to a comparable assessment on imported beef and beef products, to fund advertising, marketing partnerships and promotions, public relations, education, research, and new product development programs to improve the marketing climate for beef and build consumer demand. Visit their Web site at [www.BeefRetail.org](http://www.BeefRetail.org) or call 312-670-9215.



#### 4.7 National Chicken Council

The National Chicken Council (NCC) represents companies that produce, process, and market about 95 percent of the young meat chickens (broilers) in the United States. While the National Chicken Council's primary purpose is to improve the legislative and regulatory environment for the chicken industry, NCC also represents the interests of the chicken industry in Washington and across the United States in additional ways. An active, effective public affairs/government relations program is complemented by programs of public relations/crisis communications, consumer education/product promotion, and member services/special assistance. NCC's Web sites ([www.eatchicken.com](http://www.eatchicken.com))



1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

and [www.NationalChickenCouncil.com](http://www.NationalChickenCouncil.com)) provide useful information to consumers, industry managers, and others interested in the U.S. chicken industry. Call 202.296.2622.

**4.8 National Fisheries Institute**



The National Fisheries Institute (NFI) is the nation’s leading advocacy organization for the seafood industry. Its member companies represent every element of the industry from the fishing vessels at sea to the national seafood restaurant chains. This water-to-table diversity allows NFI to speak with authority to decision makers in Washington, D.C., and impact public policy that will help secure a healthy future for all Americans.

NFI and its members are committed to sustainable management of our oceans and being stewards of our environment by endorsing the United Nations’ Principles for Responsible Fisheries. From responsible aquaculture, to a marketplace supporting free trade, to ensuring consumers have the facts on the health benefits of fish and shellfish, NFI members support and promote sound public policy based on science. For more information please visit: [www.aboutseafood.com](http://www.aboutseafood.com) or call 703.752.8880.

**4.9 National Pork Board**



The National Pork Board has responsibility for checkoff-funded research, promotion, and consumer information projects, and for communicating with pork producers and the public. Through a legislative national Pork Checkoff,

pork producers invest \$0.40 for each \$100 value of hogs sold. The Pork Checkoff funds national and state programs in advertising, consumer information, retail and foodservice marketing, export market promotion, production improvement, technology, swine health, and pork safety. Visit their Web site at [www.pork.org](http://www.pork.org) or call 800.456.PORK.

**4.10 GS1**



GS1 is a leading global organization dedicated to the design and implementation of global standards and solutions to improve the efficiency and visibility of supply and demand chains globally and across sectors. The GS1 System of Standards is the most widely-used supply chain standards system in the world. It is a fully-integrated global organization with over 30 years experience in global standards. GS1 is governed by a management board composed of key leaders and drivers from multi-nationals, retailers, manufacturers, and GS1 member organizations. As a result, the GS1 management board has a global, multi-sector make-up. Visit their Web site at [www.GS1.org](http://www.GS1.org) or call +32.2.788.7800.

**4.11 GS1 US**



GS1 US, a not-for-profit standards organization, is a member organization of GS1 (see 4.10). GS1 US leads its membership with true global representation in the GS1 System. The GS1 System of standards includes standards on identification numbers (including the Universal Product Code (U.P.C.)),

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

Electronic Data Interchange (EDI), GS1 Business Message Standards using XML, and other supply chain solutions to enable a more efficient business. GS1 US BarCodes and eCom is the national implementation organization for the GS1 System in the United States across 23 sectors. The BarCodes and eCom Group works with these industry sectors to solve supply chain problems through solutions based on the standards of the GS1 System. For over 30 years, GS1 US has helped companies of every size and industry use the U.P.C., other industry standard barcodes, and electronic commerce. Visit their Web site at <http://barcodes.gs1us.org> or call 609.620.0200.

## 5 The Importance of Global Standards

### 5.1 One Language For The Supply Chain

In order for companies to communicate effectively and not lose meaning in the translation, they have to speak the same language. This holds true for using a standard product identification number when communicating about products. The recommended standard for product identification is the ubiquitous GTIN (Global Trade Item Number – see Section 6.2 for further definition). In simple terms, a buyer should be able to look at the item or case in question, find the item or case number, call the manufacturer, and reference that number to isolate the product being discussed. This number should be shown on the purchase order, on the invoice, and on the item or case. This allows for unambiguous product identification that uniquely identifies the

manufacturer and the specific item. The capture of product identification and key product attributes (e.g., lot number, expiration date, etc.) would improve traceability of products up and down the supply chain and would enable participation in current supply chain systems, including technologies like electronic commerce, RFID, barcoding, and data synchronization.

GS1 US provides a standard numbering system that meets this very need. The GS1 System uses a GS1 or U.P.C. Company Prefix, required to create GS1 identification numbers, which is globally unique and reserved for use by a single company. This U.P.C. Company Prefix, joined by an Item Reference Number, assigned by the owner of the U.P.C. Company Prefix, uniquely identifies that item with that manufacturer anywhere in the world. As such, any time that number is referenced (verbally or electronically), it will be attributed specifically to the owner of that U.P.C. Company Prefix.

### 5.2 One Global Language For Exporting/Importing

The GS1 System is the world’s most accepted standards system. It standardizes identification numbers used on products crossing the point-of-sale and other parts of the supply chain, including numbers used in Electronic Data Interchange (EDI), Business Message Standards using Extensible Markup Language (XML), and GS1’s GDSN (Global Data Synchronization Network). The system is also used for effective traceability, in RFID applications within the EPC (Electronic Product Code), and in many other solutions for a more efficient supply chain.

The GS1 System is currently used by more than one million member companies worldwide in over 100

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

countries across more than 20 different industries. As such, this numbering system allows companies to globally and uniquely identify their physical items and locations (e.g., trade items, shipping facilities) between provider and recipient. With the connection made, one world of global commerce comes into view. This means companies can import and export their products anywhere in the world without worry about duplication with another product. These identification numbers make supply chains much more efficient and responsive to customers and overcome the limitations of using proprietary company or sector-specific coding systems.

### 5.3 Paramount for the Use of Supply Chain Technologies

The majority of supply chain technologies used between trading partners in the food industry requires the use of the GTIN (Global Trade Item Number). All of these technologies, such as e-Commerce, barcoding, GS1 Data Bar (RSS), RFID, and GS1's Data Synchronization,



work more effectively when using a standard product identification number. In addition, it makes tracking and tracing an item much more efficient. It is important to understand this dependence before embarking on the implementation of any of these supply-chain initiatives. As mentioned earlier, the GTIN provides the common language needed to communicate in any of these technologies.

### 5.4 Need for Trading Partner Collaboration

If the industry is to gain from the use of supply-chain technologies, the technologies should be used so that all trading partners can benefit. This requires collaboration between buyers, sellers, and everyone in between. Supply-chain members need to agree about what information is expected beyond the standard product identification number. This ancillary information is discussed later in this document and requires strong endorsement by industry members if companies will benefit from the use of these standards and supply chain technologies.

The most fundamental use of these standards would be identifying a pallet, case, or item with a number that could be used by all trading partners referencing that product. For example, what good would it serve your trading partners if a supplier had to put a proprietary number inside a barcode? Those capable of reading barcodes would read the barcode, only to find a number that means nothing to them. If the GS1 product identification standards were used, all supply-chain partners would be able to scan the barcode and read a number that is identifiable and in accordance with industry standards.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

It is important for trading partners to work together in reaching agreement on what additional information beyond the standard Product identification number should be included. Possible data could include: lot number, expiration date, price, etc. It's important for supply chain members to collaborate on implementation of these technologies to ensure uniformity across trading partners and technologies. Collaboration is key to receiving the greatest possible ROI.

Other pieces of information could be used in addition to the standard Product identification number (e.g., lot number, expiration date, price, etc.). It is important for trading partners to work together in reaching agreement on this information. It is also important for supply-chain members to work together on implementation of these technologies to ensure the protocols used are uniform for all trading partners using these same technologies. Without this collaboration, the return on investment will not be as great.

## 6 Standard Product Identification

### 6.1 Obtaining a U.P.C. Company Prefix from GS1 US

In the United States, the first step to creating a Global Trade Identification Number (GTIN) for products is to obtain a U.P.C. Company Prefix (see membership application on the GS1 US Website <http://barcodes.gs1us.org>). When a company receives its certificate from GS1 US, it has two prefixes on it, one called GS1 Company Prefix, the other called U.P.C. Company Prefix. The U.P.C. Company Prefix is what a company uses to create their U.P.C. number to go into a U.P.C. barcode.

(This U.P.C. number is also known as a GTIN-12). The GS1 Company Prefix is the same number as the U.P.C. Company Prefix but has a zero added to the left of the first digit. The GS1 Company Prefix is NOT used to create a U.P.C. number, but is used to create 13-digit Global Location Numbers and EAN-13 barcodes.

The U.P.C. Company Prefix is assigned in varying lengths, anywhere from 6 to 9 digits depending on the number of products a company will be marking with U.P.C. numbers. In order to complete a U.P.C., a company must assign an Item Reference Number. This Item Reference Number can be 2 to 5 digits in length, so that the U.P.C. Company Prefix and Item Reference Number add to 11 digits. See the steps below:

- A U.P.C. Company Prefix is 6 to 9 digits in length
- A manufacturer then assigns the Item Reference Number of 2 to 5 digits
- Then a Check Digit is calculated, which is a one-digit number that ensures the preceding digits were entered correctly
- The combination of U.P.C. Company Prefix + Item Reference Number + Check Digit = GTIN-12 data structure or U.P.C.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
0	0	CP	CP	CP	CP	CP	CP	CP/IR	CP/IR	CP/IR	IR	IR	CD

- 0: Pad digits to fit U.P.C. number into GTIN-14 data structure (see section 6.2)
- CP: U.P.C. Company Prefix, 6 to 9 digits
- IR: Item Reference Number, 2 to 5 digits
- CD: Check Digit, calculated from digits 1-13

See section 12.2 for a reference further explaining building a GTIN for your U.P.C. barcode.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

## 6.2 The GTIN (Global Trade Item Number)<sup>®</sup>

The GTIN (Global Trade Item Number) is the globally-unique GS1 identification number used to identify trade items (products and services) that are sold, delivered, warehoused, and invoiced. A GTIN is a globally unique 8, 12, 13, or 14-digit data structure that uniquely identifies products.

In order to convert a GTIN-12 (U.P.C.) or GTIN-13 to a 14-digit data structure in a database, simply zero fill one or two zeros to the left, per the example below. The resulting 14-digit data structure (the GTIN-14) is used when creating GS1 Data Bar (RSS) barcodes.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
GTIN-14	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GTIN-13	0	X	X	X	X	X	X	X	X	X	X	X	X	X
GTIN-12	0	0	X	X	X	X	X	X	X	X	X	X	X	X

## 6.3 Application Identifiers

GS1 Application Identifiers (AIs) are a finite set of defined identifiers used to indicate what type of information is encoded in the barcode. They are generally used in GS1 barcodes such as GS1-128 and GS1 Data Bar (RSS) but can also be used via electronic commerce. There are approximately 100 AIs. Each AI has a two, three, or four digit numeric prefix in front of the data to tell what the data means.

**Example:** (10) 784ZF10012207

Each time an AI is used, it is enclosed in parentheses and always comes before the data itself. This will let the scanner know that the number that follows the

parentheses (in the above example) is a Lot Number (e.g., 10=Lot Number). Note that the parentheses are inserted for human-readability purposes only and are, therefore, not included in what is read by the scanner. This is important to remember when counting the total digits that could fit on a barcode because the system allows only a finite number of digits.

For a list of the AIs potentially used in fresh food applications, see section 12.3.

# 7 Supply Chain Challenges

Each of the various fresh food trade associations were asked to solicit input from their members regarding challenges facing their specific sector with regard to product identification. In addition, they were also asked to provide information (both mandatory and optional) that should follow the product through the supply chain. The resulting data were used to determine business requirements and commonality across sectors with the goal of isolating a single solution. This was essential to not only ensure each business sector's requirements were met, but also to ensure one common solution was given to the buying community.

## 7.1 Produce Industry Challenges

For the context of this document, the produce industry has had challenges in three areas: product identification, participation in supply chain technologies, and traceability.

### PRODUCT IDENTIFICATION

The produce industry's products are basically divided into two categories: packaged produce and bulk (or

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

loose) produce. The actual case (i.e., container) that encloses both types of items is not segregated based on the type of product. However, the way in which each category is identified is segregated.

**For Packaged Items**

For a packaged item, the produce industry uses the U.P.C. (Universal Product Code) number or a produce-specific derivation of this number called the “generic” or PEIB (Produce Electronic Identification Board) U.P.C. number. In regards to a U.P.C., a grower/shipper will use their GS1-assigned U.P.C. Company Prefix, along with their particular Item Reference Number for that item, to encode in the barcode affixed to that item. In regards to the “generic” or PEIB U.P.C., the grower/shipper would use the generic Prefix “033383” plus a generic 5-digit Item Reference Number assigned by PMA.

When using a U.P.C. on a packaged item, it gives both the buyer and the seller the opportunity to track by supplier.



This includes product movement to the consumer, as well as the opportunity to track shrink and/or trace back implicated product recalled in a food safety alert.

When using the “generic” or PEIB U.P.C., buyers lose the ability to track or trace the product by grower/shipper, as each company using this particular number uses the same Prefix 033383. Although this number served its purpose when item numbers first came to the produce industry, it is of limited value in category management and traceability applications.

**For Loose Items**

For produce items that are not packaged, the primary number used to identify product is called the PLU (or Price Look Up) code. The PLU code is a 4 or 5 digit number that is used to identify the commodity and variety (sometimes sizes) for an item. The 5<sup>th</sup> digit is only used to segregate an existing commodity from being ORGANIC (by placing a “9” in front of the 4-digit PLU number) or from being genetically modified (by placing an “8” in front of the 4-digit PLU number). Otherwise, only the 4 digits representing the commodity and variety are put on the sticker.

As the PLU number does not include a reference as to who supplied the product, it has the same problem that the “generic” or PEIB U.P.C. number has: companies cannot track or trace the product to a specific grower/shipper. In addition, the PLU number is in human-readable form and has to be manually entered at the cashier stand.

**PARTICIPATION IN SUPPLY-CHAIN TECHNOLOGIES**

The produce industry has severely lagged behind the packaged goods food industry in its participation

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

in various supply-chain technologies and initiatives such as Electronic Commerce, Barcoding, and Data Synchronization. With the recent developments and impending implementations of both RFID and GS1 Data Bar (RSS), the produce industry will lag even further behind, as it is not prepared to use these technologies either.

In a produce survey done in September 2006 by PMA, only 4% of those suppliers surveyed indicated that they were using the standard number needed for all of these supply chain technologies (i.e., the GTIN [Global Trade Item Number]), leaving 96% of the industry using a proprietary number or nothing at all. Only 6% surveyed were using the equivalent standard at the pallet level.

The majority of the supplier community in the produce industry is reluctant to change, as business has been conducted this way for over 15 years. However, the buying community continues to press forward into a more efficient way of doing business, looking for ways to cut costs through efficiency and automation. Their supplier partnerships are now being re-evaluated to not only provide the best-quality product available, but also to build partnerships that will enable both parties to cut costs through the use of supply-chain technologies and tools.

**TRACEABILITY**

As is the case with other fresh foods, the produce industry is confronted with food-safety issues. Recent food-borne illnesses have triggered the produce industry to re-think its processes and practices in order to provide a safer product to the consumer.

In response, PMA and CPMA created a Traceability Best Practices document that was made available at no

charge to its members. These guidelines, if followed, would allow for effective trace back from the case of product to the field and lot number from which the implicated product was grown. These guidelines, however, did not effectively address tracing the consumer item to the case. This was primarily due to the numbers used at the consumer item level. Remember, when using PEIB U.P.C. numbers on packaged produce items, or using the PLU number on loose items, a buyer cannot easily or efficiently track the item back to the grower/shipper.



To allow for effective traceability, certain pieces of information must be attainable at all levels of the supply chain. For produce, this includes the unique item number, the grower/shipper and the Lot Number. Because of space limitations at the item level, the produce industry has never before included all of this information on either a PLU sticker or in a U.P.C. barcode. Even at the case level, where space is not an issue, the produce industry has not incorporated these important elements of traceability.

**7.2 Dairy Industry Challenges**

For the context of this document, the dairy industry has a relatively straight-forward supply chain with challenges in two areas: adequate identification for bulk products and available information at the item level.

**PRODUCT IDENTIFICATION**

At the item level, dairy products are classified in two categories: (1) fixed weight and (2) bulk. Fixed-weight

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

products are typically packed by the producer and sent to the retailer in a pre-packaged format ready for consumer sale. Bulk product, however, is sent from the producer to the retailer in bulk quantity, requiring additional steps by the retailer before it is merchandised to consumers.

**For Fixed-weight Dairy Products**

The majority of fixed-weight dairy products are identified using a traditional U.P.C. containing the producer’s GS1-assigned Company Prefix, plus the producer’s Item Reference Number for that product. As a U.P.C. can only hold 12 digits, these two pieces of information are all the U.P.C. can hold. Fixed-weight products also have a fixed price, which is entered into retailer databases based upon the U.P.C. number given by the producer. Therefore, all items having the same U.P.C. number will have the same price.

**For Bulk Dairy Products**

Items that are sent from the producer to the retailer in bulk are not positioned to be sold directly to the consumer without additional handling by the retailer. Once the retailer receives the bulk product, they will make some additional cuts and re-package the items separately. As each new package has a different weight/count, they each are priced accordingly. Most of these packages are identified using the random-weight U.P.C., including, at minimum, the price of the unit and the commodity code for that item. As the random-weight U.P.C. only holds 12 digits, it cannot fit additional information needed at



point-of-sale. Although the random-weight U.P.C. does allow two digits for a retailer to assign to a specific producer, this simply is not enough space to adequately identify producers across all commodities using the random-weight U.P.C. In fact, not all retailers use these two digits. In addition, it does not allow proper trace back in the event of a recall.

**AVAILABLE INFORMATION AT THE ITEM LEVEL**

The random-weight U.P.C. served its purpose well when it was created many years ago. However, due to today’s increasing demand for new information, new technologies, and the need to quickly and accurately trace and track product to specific producers and isolate the lot it came from, the random-weight U.P.C. is not the solution for today or the future.

Fixed-weight dairy products allow traceability back to a specific producer. Bulk products, however, cannot be accurately traced back to a specific producer, as that information is typically lost once a retail processor breaks the bulk product into separate packages. Key pieces of information that would not only allow for consumer product movement by supplier, but would also allow for effective traceability back to the producer and/or lot would include: U.P.C. Company Prefix (indicating who the producer is), Item Reference Number, and Batch or Lot Number. Due to the restricted size of the random-weight U.P.C., this information cannot fit into a U.P.C. and is not available today.

**7.3 Deli / Bakery Industry Challenges**

The deli and bakery industries have very diverse supply chains, receiving product from several different supply sources and co-mingling with other products. As such,

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

there could be several hand-offs before a product reaches the retail store. The more sophisticated partners are envisioning supply chain efficiencies that would require date of production and date of expiration, not only for replenishment but also for rotation both in the warehouse and in the stores. Usage, location, and quantities of allergens will also need to be tracked.

For the context of this document, the deli/bakery industry has challenges in two key areas: (1) product identification and traceability and (2) co-mingled product identification and traceability.

**PRODUCT IDENTIFICATION**

Many bakery products are provided in fixed count/weight packages marked with a standard U.P.C. code which provides unambiguous manufacturer and product identification. However, most deli and some bakery products are produced in variable-weight or variable count packages by the retailer before being sold to the consumer. The primary form of product identification for the variable weight products has been the use of the random-weight U.P.C. Because of its space constraint of 12 digits, information is limited to the price of the product and a 4-digit commodity code, with only two digits left to identify the manufacturer. This is not adequate to quickly and accurately identify a manufacturer for consumer movement or product trace back.

**PRODUCT IDENTIFICATION FOR CO-MINGLED OR FURTHER-PROCESSED PRODUCT**

In the deli and bakery areas, ingredients from multiple manufacturers may be combined in-store to form products for sale to the consumer. Indeed, mixing ingredients and processing can take place at several points in the supply chain, ranging from manufacturer to



distributor to commissary to in-store. In order to track product movement effectively, or to trace back product to a specific manufacturer, some process must be created to capture ingredient-source information. Currently, once an item is packaged for the consumer by retail personnel, a random-weight U.P.C. is affixed to the container. The random-weight U.P.C., due to space restrictions, cannot adequately allow for proper tracking to each (or multiple) manufacturer(s) or allow for proper trace back in the event of a recall. Therefore, both the deli and bakery industries have two challenges for co-mingled product: (1) creating a process that captures manufacturer information by ingredient and (2) uniquely identifying saleable products for each combination of ingredients.

**7.4 Meat and Poultry Industry Challenges**

Meat and poultry products are sold at retail in several different forms: fixed or random weight that is pre-packaged by the supplier, or random weight that is processed and packaged in the meat department at a

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

retail store. Fixed-weight items using a valid U.P.C. will allow for tracking of product movement by supplier and the ability of the buyer to trace the product back to the supplier. Fixed-weight items do not pose a major challenge. However, this is not the case for random-weight meat and poultry products. For the context of this document, this sector shares the same challenges brought on by the use of the random-weight U.P.C. in the other fresh food sectors, including insufficient product identification, insufficient tracking by supplier, and limited room to hold data.

**PRODUCT IDENTIFICATION**

Most all meat and poultry products that are fixed weight and pre-packaged for consumer sale by suppliers follow GS1 standards in using a U.P.C. number. However, product that is shipped to retailers as primals (bulk), wholesale cuts, or subprimals require additional processing by the retailers and are packaged and priced differently at the retail store. Currently, the random-weight U.P.C. number is used to identify these types of consumer packages. Due to the limited space of the random-weight U.P.C. (12 digits), however, very little information can be included in this format. Most retailers either use a 4-digit commodity code for a specific type of meat or poultry, or use URMIS (Uniform Retail Meat Identity Standards) or poultry numbers for a specific type of meat or poultry in the random-weight U.P.C. format. In its original format, this numbering system is not adequate to track the exact type and cut of meat that is being sold to the consumer. However, advances have been made by the beef and pork industries to expand the 4-digit U.P.C. numbering system to a 5-digit system that provides opportunities to track significantly more information about each cut of meat. While this new coding structure has not been adopted by a majority of

the industry (suppliers or retailers), a growing number of those who have adopted it are able to access more intelligence from their random-weight data. As the industry works to identify a new and common standard for all fresh and random-weight products, it will be important to understand and work to incorporate existing, successful systems, like these where applicable.

**ROOM TO HOLD DATA**

Similar to other fresh food sectors, the use of the random-weight U.P.C. number provides limited room for the needs of the meat and poultry sector. In order to properly trace product back through the supply chain, industry partners would need to know who the supplier is, the item, and the lot or batch number. Currently, at point-of-sale, retailers do not know which individual packages came from which bulk item in the meat department their store, much less the lot or batch number.

**7.5 Seafood Industry Challenges**

The seafood industry has its own set of regulations that require even more information than the other fresh food sectors to be printed on the package itself. Aside from this information, and for the context of this document, the fish industry has challenges identifying the supplier at point-of-sale.



1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

## IDENTIFICATION OF SUPPLIER

As the seafood industry has fairly stringent regulations on the consumer readable portion of the package, the majority of information needed to be encoded for point-of-sale purposes is limited to the following: Country of Origin, Farmed or Wild, Species, PLU number, and Price. The current number being used at point-of-sale for fish products is the 12-digit random-weight U.P.C., which cannot hold all of the information above. Currently, the PLU number (identifying the species) and price is included in the random-weight U.P.C. Adequate room for identifying the supplier is not available. As is the case with other fresh food sectors, having only two digits to identify the supplier will not work in today's marketplace or the future.

The fish and seafood industry has a very diverse and complex supply chain (boats, shellfish harvesters, fish farmers, etc.). It is a business based on some 125 different species of fish and seafood, many of which find their way to the meat department of the store for random-weight cutting and packaging. Labels are being asked to do more and more (i.e., allergens) and yet the system to track this information is not adequate to meet today's data requirements. Because of numbering-system space constraints, the present random-weight U.P.C. number limits the industry in its ability to track traceability and other valuable marketing information through the supply chain.

## 8 Supply Chain Solutions

When evaluating solutions to address the needs of the fresh food sectors, it quickly became evident that there is no one "perfect" solution. However, a solution was identified that would address the majority of



requirements, while allowing for processes to handle what was not addressed. The solution was also created with the fundamental belief that it is superior to what is being used today. It will allow for the benefits associated with tracking product movement by supplier, tracing product back to individual suppliers, better information to create new applications around product freshness, and many other applications that are not available with today's system. All of this is now possible, while offering the buying community a solution that uses the same standards the balance of their business has used for over two decades. With this new solution, the fresh food sector will now be in harmony with the packaged goods segment and will allow the fresh food sectors the ability to begin participating in various supply-chain technologies.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

## 8.1 Business Requirements

The exercise used when creating a solution was based upon input received from each fresh food sector as to what information is currently mandatory versus optional, and needed at the item level versus the case level. Find below a summary of those findings.

Business Requirements	Dairy	Deli	Bakery	Produce	Meat/Poultry	Seafood
Manufacturer ID – Case	Blue	Blue	Blue	Blue	Blue	Blue
Case Identification	Blue	Blue	Blue	Blue	Blue	Blue
Manufacturer ID – Item	Blue	Blue	Blue	Blue	Blue	Blue
Item Identification	Blue	Blue	Blue	Blue	Blue	Blue
Item Weight / Count	Blue	Blue	Blue	(bulk)	Blue	Blue
Extended Price for bulk food	Blue	Blue	Blue	Blue	Blue	Blue
Lot/Batch number at item level	Blue	Blue	Blue	Blue	Blue	Blue
Production date	Blue	Blue	Blue	Blue	Blue	Blue
Expiration date	*	*	*	Blue	Blue	Blue
Department Identification	Blue	Blue	Blue	Blue	Blue	Blue
Allergens	Blue	*	*	Blue	Blue	Blue
Growing Method	Blue	Blue	Blue	(bulk)	Blue	Blue
Species	Blue	Blue	Blue	Blue	Blue	Blue
Country of Origin	imported cheese, meat, etc.		Blue	Blue	Blue	Blue
Storage Method	Blue	Blue	Blue	Blue	Blue	Blue

Blue = mandatory, tan = optional

\* Expiration Date and Allergens have become mandatory for many dairy/deli/bakery trading partners

As a result of the findings shown in the Business Requirements table, it was fairly easy to determine what business requirements were common across all fresh

food segments. We also determined the difference between what was required to be encoded in the barcode versus what was required to be printed on the package at point-of-sale. Country of Origin, for example, is required to be visually seen by the consumer, but not required at point-of-sale. As such, we would not want to include this information inside a barcode that already has limitations on space. It would, however, need to be visually shown on signage near the product or on the product itself, according to regulatory guidelines.

## 8.2 Business Challenges

Each fresh food sector was also asked to provide input on the challenges its industry has regarding product identification. A summary of those findings follows.

Business Challenges	Dairy	Deli	Bakery	Produce	Meat	Poultry	Seafood
Inability to hold optional fields	X	X	X	X	X	X	X
Cannot track to manufacturer	X	X	X	X	X		X
Cannot identify manufacturer	X	X	X	X	X		X
Cannot conduct category management (analysis)	X	X	X	X	X		
Cannot track shrink	X	X	X	X	X		
Cannot track ingredient ownership	X	X	X				
Cannot track lot numbers	X	X	X	X			
Current PLU numbering system not robust enough to categorize all products	X	X	X	X	X	X	X
Developing an industry-wide solution to create greater granularity of PLU codes	X	X	X	X	X	X	
Creation of a strong business case to affect change	X	X	X	X	X	X	
Minimal available space on bulk item for current technologies				X			

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

The above findings revealed similar challenges across all fresh food sectors, with the biggest challenge being a lack of space to hold information, as well as the inability to accurately track product by supplier.

**8.3 The Recommended Identification Standard**

As discussed at the beginning of this document, the GTIN (and its accompanying GS1 standards) is the standard endorsed by the fresh foods trade associations. With the GTIN, the industry can be assured that the buying community can track product by supplier (a problem that every fresh food sector had). In addition, the industry can be assured that the supplier number is unique anywhere in the world, one of the many advantages for employing the use of a global standard. Finally, the GTIN gives companies the flexibility they need to identify their own products. The fresh food sectors have been constrained with the PLU number ranges given to each commodity over a decade ago. With the use of the GTIN, and with the technology recommended herein, a solution can be devised that is not bound by these constraints.

**8.4 The Recommended Technology at the Item Level**

With the exception of produce, all fresh food sectors are using the random-weight U.P.C. for items processed at store level as well as some standard fixed-weight U.P.C.s packed by the supplier. Figure 8.4 shows a clear recognition that the fresh food sectors had requirements at the item level that could not fit into either a U.P.C. number or inside of a random-weight U.P.C. The solution became evident once we looked at what pieces of information were common across all



fresh food segments: the GS1 Data Bar (RSS). The GS1 Data Bar (RSS) is a family of new barcodes used on space-constrained products requiring more information than what is provided via a U.P.C. As the GS1 Data Bar (RSS) is a “linear” barcode, it can be read by most point-of-sale linear scanners that read U.P.C.s. As GS1 Data Bar (RSS) is a finite family of barcodes (each holding a different amount of data). The more information you need to encode in one of these barcodes, the larger the GS1 Data Bar (RSS) barcode. As the majority of product from the fresh food segments are sold in some form of package, they do not have the space constraint as most produce items that are sold fresh (e.g., apples, avocados, etc.). As such, the recommendation is for the produce industry to use the GS1 Data Bar (RSS), which contains 14 digits and the balance of the fresh food sectors to use the GS1 Data Bar (RSS) Expanded Stacked (which contains up to 74 characters). Both GS1 Data Bar (RSS) barcodes use the GTIN standard, and subsequent information contained in the GS1 Data Bar (RSS) Expanded Stacked, follow GS1 standard protocols.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

**Example: Information encoded in an GS1 Data Bar (RSS) Expanded Stacked barcode**

AI (01) 90075620608052 = GTIN  
 AI (3922) 000261 = Price  
 AI (3202) 000164 = Weight  
 AI (15) 121206 = Sell by Date

*(Note that this maximum is for labels with only numeric characters, not alpha.)*



An evaluation of business requirements by fresh food sector determined the following:

**Figure 8.4 AT THE ITEM LEVEL**

Mandatory	At the Item Level	* # of Characters
GTIN #	X	16
Price	X	10
Weight	X	10
Lot/Batch #	X	** 14
Expiration Date <sup>1</sup>	X	8

\* The “# of Characters” in Figure 8.4 includes the number of characters available for that piece of information AS WELL AS the “Application Identifier” (see Section 6.3) that represents that piece of information.

\*\*The one variable-length AI (Lot/Batch #) needs to be encoded at the end of the label, or else an extra character will be needed to delimit the end of its data.

\*\*Although the standards allow more room for the Lot or Batch Number, in order to carry this number from the case onto the item for traceability purposes and fit remaining pieces of information, we had to limit the Lot or Batch number to 12 digits plus its 2-digit Application Identifier (total of 14 digits), which still should allow companies enough room to indicate this information.

<sup>1</sup> “Expiration Date” can also mean “Sell-By Date” or any other equivalent date.

**8.5 The Recommended Standard at the Case Level**

Regardless of what technology is used at the case level (e.g. barcodes or RFID), the recommended product identification standard below can be accommodated by both. The standard focuses more on the information that should be contained inside the barcode or associated with the RFID tag.

**Figure 8.5 AT THE CASE LEVEL**

Mandatory	At the Case Level	* # of Characters
GTIN #	X	16
Weight	X	10
Lot or Batch #	X	** 14
Expiration Date <sup>1</sup>	X	8

\* The “# of Characters” in Figure 8.5 includes the length of the Application Identifiers that represent each requirement in the 1<sup>st</sup> column.

\*\*The one variable-length AI (Lot/Batch #) needs to be encoded at the end of the label, or else an extra

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

character will be needed to delimit the end of its data.

\*\* Although the standards allow for more room for the Lot or Batch Number, in order to fit the remaining pieces of information, we had to limit the Lot or Batch Number to 12 digits plus its 2-digit Application Identifier (total of 14 digits), which still should allow companies enough room to indicate this information.

<sup>1</sup> “Expiration Date” can also mean “Sell-By Date” or any other equivalent date.

## 9 Benefits

The following section describes the benefits that could be derived by the incorporation of the GTIN at case and item level as proposed in Section 8. Although there are some unique benefits to each fresh food sector, the majority of benefits listed below would be universally applicable to all. However, some might apply to more than one of the fresh food sectors addressed in this document and would also have varying levels of benefit.

- **Effective tracking and trace back (traceability)** – All products that are scanned at Point-of-Sale (POS) systems will be tracked to the supplier. This is only possible if companies obtain and use their U.P.C. Company Prefix as part of the GTIN structure. In the event of a recall, this is essential. Having the GTIN on the case will also help to quickly locate and isolate implicated product that is still in the case and not already on a retail floor.
- **Increased information** – As products could be scanned and tracked to the supplier, so could other important information to help effectively manage a product category, such as product movement to the consumer, weight, shrink, promotional effectiveness, expiration dates, etc.

- **Effective category management** – Managing categories by individual supplier versus by commodity or category will allow companies to assess overall category performance, and assess the effectiveness of an individual product within a category. Having product movement data by supplier will: help identify how much of that particular product moved to the consumer versus being thrown out due to waste; how much of that product sat on the shelf versus being sold at POS; the effectiveness of promotions for that item or category; and seasonality for that item or category, etc.
- **Reduction in shrink** – When a product is thrown away, a quick scan of the GS1 Data Bar (RSS) barcode will tell you the product ID and identify the supplier of the product. You can track shrink by supplier and take necessary actions to fix problems.
- **Promotional effectiveness** – As POS purchases will now tie an item to a specific supplier, both the buying and selling community can determine if the promotions on that item sold more product to the consumer.
- **Fresher product** – for those products that have an expiration date inside the GS1 Data Bar (RSS) barcode, stock clerks will know by a simple scan of the barcode the remaining shelf life of that product. In addition, if something gets by the stock clerks and is sold to a consumer, processes could be put into place to either mark down and/or replace expired product. In addition, having this information tied to a specific GTIN number on the case will help monitor and improve stock rotation, both manually and automatically, when using the appropriate technologies that recognize these standards.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

- **Faster throughput at register** – GS1 Data Bar (RSS) pilot tests being done by key retailers have determined that having the GS1 Data Bar (RSS) barcode on products that currently do not carry barcodes will increase the speed of throughput at checkout (e.g., loose produce items).



## 10 GTIN Assignment Strategies

The following sections provide a strategy, by fresh food sector, on how GTINs can be created for case configurations and for items. Please refer to the appropriate trade association for more details.

### 10.1 Produce GTIN Assignment Strategy

The PMA recommends that produce companies assign GTIN numbers at the case level (go to the PMA Website for details (see Section 4.2). The examples are simplistic to allow for clarity and understanding. If you follow the basic concept of this strategy, it should address the majority of your products. Please note, however, that as with most strategies, it does not address every situation or exception that arises. As is the case today, you have to plan for exceptions and this strategy offers a method to deal with these as well. The ultimate goal of this strategy is to minimize exceptions, thus minimizing the work to handle the exceptions.

#### Assumptions for Example A

- A GTIN number is 14 digits long (see example below)
- The first digit is the indicator digit, which in this case will be a "0"
- The second digit in this GTIN is a "0" which is used for filler
- The supplier has a 6-digit U.P.C. Company Prefix = 123456
- Because of this supplier having a 6-digit U.P.C. Company Prefix, the supplier has 5 digits left over to assign an Item Reference Number for that product
- The last digit is a single "check digit"

#### Example A:

	Comp		Item		Check					
	<u>Prefix</u>		<u>Ref #</u>		<u>Digit</u>					
0	+	0	+	123456	+	55555	+	3	=	14 digits
										[00123456555553] = 14 digits

#### Buyer Database

In the current process, buyers typically order loose/bulk produce from a more macro view than how the

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

supplier actually stores information for that product. For example, most buyers would order Fuji Apples using the following attributes of the product:

**Example B:**

PLU Code	Commodity	Variety	Size	Pack Type
4129	Apple	Fuji	Small	Volume Fill

**Supplier Database**

Following the same example, the supplier might include several additional attributes when storing item information that the buyer would not care to have distinguished. We will call these additional attributes “secondary attributes,” as they are not considered “important” from the standpoint of the buyer when identifying an item. In this example, “LABEL” is a secondary attribute that would still remain in the supplier’s database, but would not be used to define the GTIN case code given to the buyer. Those attributes used to define the primary GTIN case codes are called “core attributes.”

**Note:** In this example, a PLU sticker would still be applied to all of the items INSIDE the case. As 80-count, 90-count, and 100-count are all considered “Small,” they would, therefore, have the same PLU sticker applied to the items inside all three case configurations. As the case configurations are different (i.e., 80 apples in one case, 90 apples in one case, and 100 apples in one case), their corresponding GTIN case codes would be different:

**Example C:**

For 80 count, GTIN = 0 0 123456 00001 4  
 For 90 count, GTIN = 0 0 123456 00002 7  
 For 100 count, GTIN = 0 0 123456 00003 2

GTIN Case Code	CORE ATTRIBUTES					SECONDARY ATTRIBUTES	
	Origin	Com	Var	Size	Pack	Grade	Label
00123456000014	Wa	Apple	Fuji	080	12/3lb	xfancy	Sierra
00123456000014	Wa	Apple	Fuji	080	12/3lb	xfancy	Lucky
00123456000014	Wa	Apple	Fuji	080	12/3lb	xfancy	Primo
00123456000014	Wa	Apple	Fuji	080	12/3lb	xfancy	Gold
00123456000014	Wa	Apple	Fuji	080	12/3lb	fancy	Sierra
00123456000014	Wa	Apple	Fuji	080	12/3lb	fancy	Lucky
00123456000014	Wa	Apple	Fuji	080	12/3lb	fancy	Primo
00123456000014	Wa	Apple	Fuji	080	12/3lb	fancy	Gold
00123456000027	Wa	Apple	Fuji	090	12/3lb	xfancy	Sierra
00123456000027	Wa	Apple	Fuji	090	12/3lb	xfancy	Lucky
00123456000027	Wa	Apple	Fuji	090	12/3lb	xfancy	Primo
00123456000027	Wa	Apple	Fuji	090	12/3lb	xfancy	Gold
00123456000027	Wa	Apple	Fuji	090	12/3lb	fancy	Sierra
00123456000027	Wa	Apple	Fuji	090	12/3lb	fancy	Lucky
00123456000027	Wa	Apple	Fuji	090	12/3lb	fancy	Primo
00123456000027	Wa	Apple	Fuji	090	12/3lb	fancy	Gold
00123456000032	Wa	Apple	Fuji	100	12/3lb	xfancy	Sierra
00123456000032	Wa	Apple	Fuji	100	12/3lb	xfancy	Lucky
00123456000032	Wa	Apple	Fuji	100	12/3lb	xfancy	Primo
00123456000032	Wa	Apple	Fuji	100	12/3lb	xfancy	Gold
00123456000032	Wa	Apple	Fuji	100	12/3lb	fancy	Sierra
00123456000032	Wa	Apple	Fuji	100	12/3lb	fancy	Lucky
00123456000032	Wa	Apple	Fuji	100	12/3lb	fancy	Primo
00123456000032	Wa	Apple	Fuji	100	12/3lb	fancy	Gold

In Example C, only three primary GTIN case codes need to be communicated to the buyer (provided they do not care about ‘origin,’ ‘grade,’ and ‘label’), as opposed to 24

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

GTIN case codes if they were assigned sequentially (per the traditional method of product ID assignment). These three primary GTIN case codes were created using the following “CORE” attributes: Commodity, Variety, Size, Origin, and Pack.

**NOTE 1:** The supplier could potentially have hundreds of product codes, with several attributes beyond ‘label,’ yet only three primary GTIN case codes would be required to be used by the buyer in Example C.

**NOTE 2:** With few exceptions (e.g., contract prices), if there is a different price point between two similar cases, each case should have a different GTIN.

**IDENTIFYING PRODUCTS WITH SECONDARY ATTRIBUTES**

A logical question at this point should be: If the GTIN takes care of items with similar core attributes, how do I identify those products that have the same core attributes (and thus the same primary GTIN), but different secondary attributes?

In order to minimize the number of GTINs created (and the accompanying maintenance), the GTIN methodology above was created with a way to handle items with secondary attributes without creating even more GTIN numbers that would need to be shared between buyer and seller.

Although most buyers would likely order product using the core attributes, some buyers want more specificity when ordering. For example, what if a buyer wanted to order a specific variation of GTIN 00123456000014, specifically a “Sierra” version of this GTIN? Rather than creating yet another GTIN number, we can

incorporate the use of “exception codes” that are used internally to differentiate items sharing the same primary GTIN number, yet having a different secondary attribute. This would allow the same primary GTIN to be communicated to all of buyers, while managing a “profile” of preferences internally within the supplier’s system to handle buyer-specific requests.

To illustrate, let’s look at an example:

In Example C, the secondary attribute was “LABEL” If a supplier were to assign “exception codes” to these secondary attributes, such as LABEL:

Exception Code	LABEL
001 =	Sierra
002 =	Gold
003 =	Lucky

The supplier can now attribute an **exception code** to each primary GTIN that has “Sierra” or “Gold” or “Lucky” as a LABEL.

00123456000014\_001 = Washington Fuji Apples 80 count 12/3lb **Sierra**  
 00123456000014\_002 = Washington Fuji Apples 80 count 12/3lb **Gold**  
 00123456000014\_003 = Washington Fuji Apples 80 count 12/3lb **Lucky**

A “profile” would be created for each buyer that indicates any pertinent exception codes required. This process is already in place in the produce industry and is called “the sales representative.” If an item is not available, they call the sales representative and ask them “What product should I substitute?” They would also call the sales representative to find out if a “special” pack should be shipped in lieu of the “generic” pack. “Profiling” does the same thing as the sales representative, but stores these preferences in an automated profile system.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

Once an order is received, the system can recognize each specific buyer. The system can go to that buyer’s profile to determine if there are any exception codes for that buyer or that item. The profile is typically created by the sales representative and then maintained as buyer preferences.

**Note:** You can also configure your profile to indicate permissible substitutions for this buyer as well.

\*The profile could look something like this:

Buyer: Jack’s Grocer		Buyer Number: 0001234561111	
GTIN		Exception code	
00123456000014		001	
00123456000027		002	
00123456000032		002	

Any order that comes in from Jack’s Grocer having any of the GTINs indicated in their profile will have the corresponding exception codes added to the primary GTIN when routed to the supplier’s shipping facility. The added exception code is only used internally and will, therefore, be stripped off prior to the invoice being generated. In addition, only the primary GTIN number will appear on the case to ensure that it will match the invoice.

**10.2 Dairy/Deli/Bakery GTIN Assignment Strategy**

**GTIN Assignment Strategy for Cases:**

Each product case shall be marked with a data carrier (barcode or RFID tag) containing a GTIN with the U.P.C. Company Prefix of the supplier and an Item Reference Number (determined by the supplier) that uniquely identifies the product. (The data carrier shall also

contain additional information as specified in section 8.5.) Any change to a significant attribute, quantity, or price of the enclosed item-level product requires a new GTIN Item Reference Number be assigned by the supplier.

**GTIN Assignment Strategy for Items:**

Each item intended for consumer purchase shall be marked with an GS1 Data Bar (RSS) barcode containing a GTIN, including the U.P.C. Company Prefix of the entity that last added value to the product and an Item Reference Number assigned by that entity. (The barcode shall also contain additional information as specified in section 8.4.) Any change to a significant ingredient or attribute of the product requires that a new GTIN Item Reference Number be assigned.

**Notes:** The entity that last added value could be the manufacturer/supplier (e.g., case-ready bread) or the store (e.g., rolls baked in the bakery and further “finished” by the retailer). Any value-adding entity has three fundamental requirements: it must obtain and use its own U.P.C. Company Prefix, it must have a strategy for assigning Item Reference Numbers, and it must have systems in place to link its products to the supplied components or ingredients from which they are made, thus enabling traceability.

Note that existing PLU numbers are not mentioned. A supplier may use currently-defined PLU numbers to determine its Item Reference Numbers, but purchasers’ systems cannot rely on this, as not all suppliers will use existing PLU numbers due to the length of their U.P.C. Company Prefix.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

### 10.3 Meat and Poultry GTIN Assignment Strategy

#### GTIN Assignment Strategy for Cases:

Each product case shall be marked with a data carrier (barcode or RFID tag) containing a GTIN with the U.P.C. Company Prefix of the supplier and an Item Reference Number (determined by the supplier) that uniquely identifies the products contained inside. (The data carrier shall also contain additional information as specified in Section 8.5.) Any change to a significant attribute, quantity, and/or price of the enclosed item-level product requires a new GTIN Item Reference Number be assigned by the supplier.

#### GTIN Assignment Strategy for Primals, Subprimals:

Each primal or subprimal inside a case shall be marked with an GS1 Data Bar (RSS) barcode containing the following information: the GTIN, the Lot or Batch Number, Weight, and Expiration Date. This process will allow the information to be carried from the subprimal or primal onto the individual cuts.



#### GTIN Assignment Strategy for Items:

Each item intended for consumer purchase shall be marked with an GS1 Data Bar (RSS) barcode containing a GTIN, including the U.P.C. Company Prefix of the entity that produced the product or last added value to it and an Item Reference Number assigned by that entity. (The barcode shall also contain additional information as specified in Section 8.4.) Any change in form (whether by further processing, or through the addition of an ingredient or attribute) requires that a new GTIN Item Reference Number be assigned.

For cuts of meat that are created at store level by processing primals, wholesale cuts, or subprimals from suppliers, an GS1 Data Bar (RSS) barcode (containing a GTIN including a retailer GS1-assigned U.P.C. Company Prefix and an Item Reference Number) must be printed on each item.

**Notes:** The entity that last added value could be the manufacturer/supplier (e.g., case-ready or further processed meats) or the store (e.g., cutting primals and subprimals into specific cuts or adding a marinade to specific cuts or product). Any value-adding entity has three fundamental requirements: it must obtain and use its own U.P.C. Company Prefix, it must have a strategy for assigning Item Reference Numbers, and it must have systems in place to link its products to the supplied components or ingredients from which they are made, thus enabling traceability.

Note that existing U.P.C. numbers are not mentioned. A supplier may use currently defined U.P.C. (URMIS or Poultry) numbers to determine its Item Reference Numbers, but purchasers' systems cannot rely on this, since not all suppliers will use existing U.P.C. numbers due to the length of their U.P.C. Company Prefix.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

---



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## 10.4 Seafood GTIN Assignment Strategy

### GTIN Assignment Strategy for Cases:

Each product case shall be marked with a data carrier (barcode or RFID tag) containing a GTIN with the U.P.C. Company Prefix of the supplier and an Item Reference Number (determined by the supplier) that uniquely identifies the products contained inside. (The data carrier shall also contain additional information as specified in Section 8.5). Any change to a significant attribute, quantity, and/or price of the enclosed item-level product requires a new GTIN Item Reference Number be assigned by the supplier.

### GTIN Assignment Strategy for Whole Fish, Sides, and Fillets:

Each whole fish or side inside a case shall be marked with an GS1 Data Bar (RSS) barcode containing the following information: the GTIN, the Lot or Batch Number, Weight, and Expiration Date. This process will allow the information to be carried from the whole fish or side onto the individual cuts.

### GTIN Assignment Strategy for Items:

Each item intended for consumer purchase shall be marked with an GS1 Data Bar (RSS) barcode containing a GTIN, including the U.P.C. Company Prefix of the entity that produced the product or last added value to it and an Item Reference Number assigned by that entity. (The barcode shall also contain additional information as specified in section 8.4.) Any change in form (whether by further processing or through the addition of an ingredient or attribute) requires that a new GTIN Item Reference Number be assigned.

For cuts of fish that are created at store level by processing whole fish or sides from suppliers, an GS1 Data Bar (RSS) barcode (containing a GTIN including a retailer GS1-assigned U.P.C. Company Prefix and an Item Reference Number) must be printed on each item.

**Note:** A value-adding entity has three fundamental requirements: it must obtain and use its own U.P.C. Company Prefix; it must have a strategy for assigning Item Reference Numbers; and it must have systems in place to link its products to the supplied components or ingredients from which they are made, thus enabling traceability.

## 11 Industry Action Plan

With the culmination of this document and its recommended standards and solutions, fresh food supply chain participants now have a blueprint of how their supply chain can become more efficient, become enabled to participate in supply-chain technologies, and maximize their investments in various supply-chain initiatives. A document in and of itself, however, cannot affect change. In order for all of these things to happen, the entire industry will need to push for this change.

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### 11.1 How to Measure for Success

A few key indicators that will define success, requiring work by both the buyer and seller, include:

1. The GS1 Data Bar (RSS) barcode will appear on all random-weight fresh food items.
2. The GS1 Data Bar (RSS) barcode will appear on PLU stickers used on fresh produce.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

3. The GTIN will be the primary item identifier on all bulk produce items and items currently using random-weight U.P.C. numbers.
4. The GTIN, and subsequent information, will appear on all cases of product.
5. Companies will now be able to track product, by supplier, at point-of-sale.

**11.2 Who Are the Key Stakeholders**

With the incorporation of the GTIN, many areas inside a company will be affected on both the buyer and seller side. Below is a list of key stakeholders and how they could benefit from the recommendations set forth in this document.

**The Buyer**

The buyer will be greatly impacted by these recommendations as they will now have to modify their point-of-sale systems to read new information. Whereas most buyers had their systems configured to treat commodities as groups of products, they will now have to treat each product from each supplier separately, similar to packaged goods. Some significant benefits of having information by supplier and the subsequent information provided by GS1 Data Bar (RSS) Expanded Stacked for random-weight products are:

- Track product movement to consumer by supplier
- Trace product recalls back to a specific supplier and specific lot or batch number
- Quickly isolate and narrow implicated product in a recall

- Track shrink by supplier
- Determine out-of-date product at point-of-sale
- Determine number of cuts by subprimal for meat
- Differentiate product by supplier
- Measure effectiveness of promotions

All of these applications, and much more, can now be used at retail stores. The work required to begin using this data includes ensuring current POS scanners can read the GS1 Data Bar (RSS) barcode (most scanners built after 2002

can), replacing commodity codes with GTINs in POS systems, ensuring scale printers can print an GS1 Data Bar (RSS) barcode, and incorporating new practices and processes in the back of retail stores



that process bulk and random-weight fresh food.

Under this system, retail buyers will be able to simultaneously address consumer concerns on food safety and internal concerns with the amount of information that can be tracked and/or delivered to the consumer with each product sold. Retailers will have the information to prevent the sale of bad product and to develop new ways of measuring products received from fresh food suppliers.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

**The Foodservice Distributor or Operator**

As the foodservice distributor or operator does not use point-of-sale applications, the impact and benefits they receive will be limited to case applications. As most distributors are already receiving the GTIN on cases for packaged goods products, this will not adversely impact them. However, the majority of fresh food companies do not use the GTIN on their cases currently or the subsequent information recommended in this document to accompany the GTIN. Therefore, the foodservice community will benefit greatly from receiving even more of their cases with proper, standard marking and will also benefit from the subsequent information to be included on cases. This information will help the foodservice community quickly isolate implicated product in the time of a recall.

**The Seller**

The seller will also be greatly impacted by the recommendations of this document as they will have to include new information for each product they sell. This information will now need to be included on cases of bulk product (to enable the retailer to pass critical information onto the items they have to process), as well as being included on pre-priced packaged items that are ready to be sold to the consumer when shipped. New processes and practices need to be flushed out in order to capture this information and ensure it is applied to the items (for bulk) and to the cases in all situations. Below are some benefits that the seller will now have as a result:

- Receive product movement information on product sold to the consumer
- Ensure shrink is correctly attributed
- Quickly isolate and narrow implicated product in a recall

- Track recalled product to Lot or Batch number
- Differentiate products between competitors
- Measure effectiveness of promotions
- Track product shelf-life
- Track Weight

**Industry Trade Associations**

As stated in Section 4, it is important for each fresh food industry trade association to educate and guide its members in the use and incorporation of these standards. Although this document serves as an effective blueprint for each sector, it will require a lot of work to be done by each trade association to “get the word out.” This includes education sessions at conferences, public relations events, presentations at Board meetings, identifying champions of this effort, training the trainers, and any awareness-building activities. All of these efforts are important ones and are services that each trade association should be providing their members. No longer can the fresh food industry make the claim that they cannot participate in industry standards or technology because they are different. The solutions in this paper offer answers on how to address the issues. It is now up to each trade association to evangelize the message to its members.

**GS1 US**

It is imperative that GS1 US aid trade associations in educating the fresh food industry on the intricacies of the standards and technologies recommended in this document. It is also imperative that GS1 US properly represent the findings of this initiative to the global marketplace, to ensure a competing solution will not be created.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

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### 11.3 What are the Key Enablers

In order for the recommendations of this document to be incorporated in the fresh food supply chain, there are a few enablers that must be evident, some tangible and some intangible. All of the key stakeholders mentioned in Section 11.2 must embrace these enablers for the successful incorporation of standards and the use of technologies in the fresh food industry.

1. The use of GS1 standards. The GTIN, and the format of subsequent pieces of information accompanying the GTIN, are based upon GS1 standards and protocols for encoding this information into technologies such as barcodes and RFID tags. With the use of these standards, the industry can rely on one industry-wide standard. Without it, we would have multiple proprietary solutions that will not have industry-wide use.
2. Appropriate hardware. Buyers will need to ensure their point-of-sale scanners can read GS1 Data Bar (RSS) barcodes and printers can print GS1 Data Bar (RSS) barcodes. As mentioned previously, the majority of POS scanners manufactured after 2002 can read GS1 Data Bar (RSS) barcodes. Additionally, some older scanners can be upgraded to read GS1 Data Bar (RSS) barcodes.
3. Changes in Processes and Practices. The use of the GTIN and the use of the GS1 Data Bar (RSS) for fresh foods are new for most companies. Changes will need to be made in hardware and in business AND technical processes and practices. Business processes will need to be changed in order to capture, analyze, and act upon new information and new numbers. Technical processes will need

to be altered to capture, store, share, and analyze new information and new numbers as well. In addition, these new numbers could potentially replace old numbers when ordering, invoicing, and synchronizing item details between trading partners. Training and access to subject matter experts will be critical.

4. Strong Industry Endorsement. As the recommendations of this document will require changes, some more costly than others, it will require strong senior-level support from ALL industry members. The longer the fresh food industry waits, the further we fall behind the balance of the food industry in the use of supply chain efficiencies. There are no good reasons as to why the food industry as a whole cannot operate from one set of standards and maximize the investment in the use of supply chain technologies. Some companies will move along gracefully and internalize this as a competitive advantage, while others will drag along with outdated supply chain practices that will continue to add unnecessary costs into the supply chain. The push to move the fresh food industry into a more efficient supply chain of the future will largely be determined by how long supply-chain partners want to continue in old supply-chain practices.

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### 11.4 Major Milestones

To help industry participants migrate to new industry standards and supply-chain technologies as recommended in this document, some major milestones are listed below.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

1. Sellers assign GTINs to case configurations. Use the GTIN Assignment Strategy for their sector as described in Section 10 of this document. Also, please review the ancillary guidelines issued on GS1's Website that broadly apply to GTIN assignments (<http://barcodes.gs1us.org>).
2. Sellers begin encoding GTINs and ancillary information in barcodes or RFID tags at the case level (include human-readable information in the event that it cannot be read). This will allow companies already using the GTIN at the warehouse level to incorporate cases of fresh food products into their automated systems.
3. Sellers begin using GTINs to communicate with trading partners when referring to CASES of product. This is needed to begin to change the "language" of trading partners to a number that can be used from a systems standpoint, thereby allowing business transactions to be automatically fed (or integrated) into existing systems (e.g., purchase orders, invoices, advanced ship notices, etc.). This is the very foundation needed for electronic commerce.
4. Buyers to begin reading GS1 Data Bar (RSS) at point-of-sale. This will alert the supplier community that they can begin using GS1 Data Bar (RSS) barcodes on their packaged items. By starting with packaged items, buyers can test the system to ensure everything is working in the manner designed. Once this occurs, buyers can move to printing and applying GS1 Data Bar (RSS) barcodes in lieu of a random-weight U.P.C.
5. Sellers to begin using GS1 Data Bar (RSS) barcodes and ancillary information on consumer packaged

items. Once the buying community is ready, this will allow GS1 Data Bar (RSS) barcodes to be tested with relatively minimal amount of work. It will also get the selling community to begin using the ancillary information to the GTIN as prescribed in this document.

6. Buyers to begin printing GS1 Data Bar (RSS) barcodes in the departments for random-weight products. This is the final milestone. Once this is accomplished, all things should be in place for the supply chain to begin reaping the benefits of their investments.

## 12 Appendix

### 12.1 Glossary

**Advance Ship Notice (ASN)** - The Electronic Data Interchange (EDI) transaction that provides the receiving company notice of shipping details, typically sent once the shipment departs and before it is received.

**Application Identifiers (AIs)** – Predefined numbers enclosed by parentheses used in the GS1-128 and GS1 Data Bar (RSS) barcode symbol to delineate additional information about the item.

**Auto-discriminating** – Refers to a scanning device's ability to read multiple types of barcode symbols.

**Barcodes** – A series of vertical bars and spaces that encode a number or a series of numbers.

**Bill of Lading** - A legal contract between a carrier and a shipper that provides shipment details for the movement

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

of freight.

**Check Digit** – A number found at the end of a U.P.C., GTIN, or SSCC that verifies that all of the numbers preceding the last digit are accurate. It uses a specific algorithm that can be found on GS1’s Website (www.gs1.org). NOTE: The check digit is considered to be part of the number and should therefore be stored along with the preceding digits.

**Consumer Packaged Goods (CPG)** - Consumer packaged goods are consumable goods such as food and beverages, footwear and apparel, tobacco, and cleaning products.

**Data Synchronization** – When data sent from the originator matches the data stored at the receiver.

**European Article Number (EAN)** is a barcoding standard which is a superset of the original 12-digit Universal Product Code (UPC) system developed in North America.

**Electronic Commerce (E-Commerce)** – Business processes and transactions that are conducted electronically.

**Electronic Data Interchange (EDI)** – A form of electronic commerce in which the computer-to-computer exchange of business data is in a standardized, structured format.

**Enterprise Resource Planning (ERP)** - Packaged software systems using database technology and a single interface to control all the information related to a company’s business, including customer, product, employee, and financial data.

**Global Location Number (GLN)** – A 13-digit number used to identify a location (similar to the Dunn and

Bradstreet number). Supply-side trading partner locations generally include corporate HQ, regional offices, warehouses, plants, and distribution centers, demand-side (retail) trading partner locations generally include corporate HQ, divisional offices, stores, and distribution centers. The GLN consists of two parts: a GS1 Company Prefix and a location number assigned by the owner of the GLN.

**Global Trade Identification Number (GTIN)** – An umbrella term used to describe the family of GS1 data structures for trade items (products and services) identification. The family of data structures include: GTIN-8, GTIN-12, GTIN-13, and GTIN-14. Products at every level of product configuration (consumer selling unit, case level, inner pack level, pallet shipper, etc.) require a unique GTIN. The Electronic Product Code (EPC) also encodes a GTIN. GTIN is a new term, not a standards change. The GTIN in this document refers to the GTIN-14 and has four components: (1) an Indicator, (2) a GS1 or U.P.C. Company Prefix, (3) a unique Item Reference Number and (4) a Check Digit.

**GS1-128** – A linear barcode symbol used on either: (1) a case to encode the GTIN and related Application Identifiers or (2) a pallet to encode the SSCC and related Application Identifiers. Holds 47 characters of information.

**GS1 Data Bar (RSS)** – A family of barcode symbols that were designed to hold more information than a U.P.C. barcode and in a much smaller place.

**Indicator** – The first digit of the GTIN 14 used to indicate the type of container being identified. If the indicator is a ‘9’, the contents of the container is random weight or variable count. If the indicator is 1-8, the Item Reference

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

Number is the same as the Item Reference Number found on the consumer unit inside the container. If the indicator is '0', the Item Reference Number is different than the Item Reference Number found on the consumer unit inside the container.

**Interleaved Two-of-Five (ITF)** – A linear barcode symbol used at the case level to encode a 14-digit GTIN number.

**Item Reference Number** – A number issued by the owner of the GS1 or U.P.C. Company Prefix to distinguish it from other products. Used by itself, the product code has no value to anyone other than the owner of that number.

**Linear Barcodes** – One dimensional barcodes that are read left to right or right to left.

**Point-of-Sale (POS)** - Refers to a retail checkout where barcode symbols are normally scanned.

**Radio Frequency Identification (RFID)** – A method of identifying unique items using radio waves. The big advantage over barcode technology is that a barcode reader must see the barcode in order to read it. Radio waves do not require line of sight and can pass through materials such as cardboard and plastic.

**Serial Shipping Container Code (SSCC)** – An 18-digit number used to uniquely identify a pallet.

**U.P.C. Company Prefix** – A globally unique number assigned to a company by GS1 US. The length of the U.P.C. Company Prefix can vary anywhere from 6 to 9 digits, depending on the number of products sold.

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## 12.2 Other References

The following references may be useful to the reader.

- “GTIN: A Case for Streamlining the Supply Chain” – Produce pilot examining the processes and challenges of implementing the GTIN at the case level, available at [www.pma.com](http://www.pma.com)
- Link to the Produce Marketing Association’s e-store: <http://ebiz.pma.com/m/Default.aspx?tabid=135&action=T&args=TECH>
- Link to “Build My GTIN for the U.P.C. barcode” [http://barcodes.gs1us.org/dnn\\_bcec/Default.aspx?tabid=98](http://barcodes.gs1us.org/dnn_bcec/Default.aspx?tabid=98)
- Link to “RSS for Fresh Foods Overview”: [http://barcodes.gs1us.org/dnn\\_bcec/Solutions/FreshFoodsRSS/tabid/121/Default.aspx](http://barcodes.gs1us.org/dnn_bcec/Solutions/FreshFoodsRSS/tabid/121/Default.aspx)

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## 12.3 Application Identifiers

The following Application Identifiers (AIs) provide standard formats for data to be conveyed within the GS1 set of standards. All GS1 standard data carriers (barcodes or RFID tags) encode one or more of these AIs. Listed below are the AIs of potential use in fresh food applications. The full list of AIs is included in the GS1 General Specifications available from GS1 US.

1. Executive Summary	2
2. Introduction	3
3. The Fresh Foods Supply Chain	5
4. The Key Industry Players	6
5. The Importance of Global Standards	10
6. Standard Product Identification	12
7. Supply Chain Challenges	13
8. Supply Chain Solutions	19
9. Benefits	23
10. GTIN Assignment Strategies	24
11. Industry Action Plan	29
12. Appendix	33

AI	Full Title	Format	Data Title
00	SSCC (Serial Shipping Container Code)	n2+n18	SSCC
01	Global Trade Item Number™	n2+n14	GTIN™
02	GTIN of Trade Items Contained in a logistic unit	n2+n14	CONTENT
10	Batch or lot number	n2+an..20	BATCH/LOT
11	Production date (YYMMDD)	n2+n6	PROD DATE
12	Due date (YYMMDD)	n2+n6	DUE DATE
13	Packaging date (YYMMDD)	n2+n6	PACK DATE
15	Minimum durability date (YYMMDD)	n2+n6	BEST BEFORE or SELL BY
17	Maximum durability date (YYMMDD)	n2+n6	USE BY OR EXPIRY
21	Serial number	n2+an..20	SERIAL
30	Variable count	n2+n..8	VAR. COUNT
310(n)*	Net weight	n4+n6	NET WEIGHT (kg)
320(n)*	Net weight	n4+n6	NET WEIGHT (lb)
330(n)*	Gross weight	n4+n6	GROSS WEIGHT (kg)
340(n)*	Gross weight	n4+n6	GROSS WEIGHT (lb)
37	Count of trade items contained in a logistic unit	n2+n..8	COUNT
390	Amount payable – single monetary area	n4+n..15	AMOUNT
392	Amount payable for a Variable Measure Trade Item – single monetary unit	n4+n..15	PRICE
422	Country of origin of a trade item	n3+n3	ORIGIN
8005	Price per unit of measure	n4+n6	PRICE PER UNIT

\*(n) indicates the decimal point position.

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