EXHIBIT D

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The Global Language of Business

GDSN 3.1 Trade Item Implementation Guide

Supplements the formal GS1 Global Data Synchronisation Network (GDSN) standards with advice on their implementation and operation

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Related Documents

The following documents provide additional background and relevant information:

1. ***GDSN Trade Item for Data Alignment BMS***: Standards document for GDSN Trade Item for Data Alignment. It contains business rules, GDD attributes, and class diagrams – *https://www.gs1.org/access-gdsn-standards*
2. ***Catalogue Item Synchronisation BMS***: Standards document for GDSN Catalogue Item Synchronisation. It contains detailed use-cases of the GDSN message choreography - *https://www.gs1.org/access-gdsn-standards*
3. ***GS1 XML Release Technical User Guide***: The technical guidelines to the structure and design of the GS1 XML - *https://www.gs1.org/edi-xml/latest*
4. ***GDSN XML Operations Manual***: The user operations manual for the GDSN - *https://www.gs1.org/access-gdsn-standards*
5. ***GS1 Global Data Dictionary (GDD)***: A repository of core component and business definitions and their equivalent representations in targeted standards – *http://apps.gs1.org/gdd/SitePages/Home.aspx*
6. ***GDSN Validation Rules:*** Distributed Global Validation Rules required to support the Global Data Synchronisation process – *https://www.gs1.org/access-gdsn-standards*
7. ***GS1 General Specifications:*** The core standards document of the GS1 system describing how GS1 barcodes and identification keys should be used. – *https://www.gs1.org/genspecs*
8. ***GTIN Management Standard:*** Provides the global supply chain solution for the identification of any item that is traded (priced, ordered, invoiced) - *https://www.gs1.org/1/gtinrules*

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1 Introduction

This document supplements the formal GS1 Global Data Synchronisation Network (GDSN) standards with advice on their implementation and operation. This document is in no way normative or definitive and is not a standard. It includes implementation guides for a variety of the more complicated issues encountered when implementing the standards outlined by this document. It seeks to increase consistency and ease of implementation by explaining the standards and providing real-world examples.

1.1 Who Will Use this Document?

Business users who are implementing or operating GDSN may use this document to supplement the formal GDSN standards with additional guidance.

This document is aimed primarily at business users who need to understand the data content or process standards. Technical users involved with implementation may also find topics of interest.

1.2 Scope of this Document

The scope is the data and processes for the synchronisation of Trade Items within the GDSN.

For this issue of the document the scope is limited to a few high priority topics which have been identified by GS1 as sources of confusion. It is intended that future versions will expand the scope to cover additional topics that require detailed explanation and examples related to GDSN Trade Item synchronisation.

Until this document is complete, if information is sought about a procedure or attribute not yet covered, users should see formal GDSN Standards as published in the *GDSN Trade Item for Data Alignment Business Message Standard (BMS)*

For additional training or advice please contact your solution provider, data pool, or GS1 member organisation.

2 Overview

2.1 What is GDSN?

The Global Data Synchronisation Network (GDSN) is an internet-based, interconnected network of interoperable data pools and a global registry that enable companies around the globe to exchange standardised and synchronised supply chain data with their trading partners. It assures that data exchanged between trading partners is accurate and compliant with universally supported standards.

GDSN is built around the GS1 Global Registry, GDSN-Certified Data Pools, the GS1 Data Quality Framework, and GS1 Global Product Classification, which when combined provide a powerful environment for secure and continuous synchronisation of accurate data. Trade items are identified using the GS1 identification key called Global Trade Item Numbers (GTIN). Partners and locations are identified by the GS1 identification key called Global Location Numbers (GLN). A combination of GTIN, GLN and Target Markets (the geographical area where the catalogue item is intended to be sold) allows information to be shared in the Network.

GDSN allows trading partners to share the latest information in their systems. Any changes made to one company's database can be automatically and immediately provided to all of the other companies who subscribe to the data through GDSN. When a supplier and a customer know they are looking at the same accurate and up-to-date data, it is smoother, quicker and less expensive for them to do business together. The GDSN provides a single point of truth for product information.

How GDSN Works

There are six simple steps that allow trading partners to synchronise item, location and price data with each other:

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1. **Load Data:** The seller registers product and company information in its data pool.
2. **Register Data**: A small subset of this data is sent to the GS1 Global Registry.
3. **Request Subscription**: The buyer, through its own data pool, subscribes to receive a seller's information.
4. **Publish Data:** The seller's data pool publishes the requested information to the buyer's data pool.
5. **Confirm & Inform:** The buyer may send a confirmation to the seller via each company's data pool, which informs the supplier of the action taken by the retailer using the information.
6. **Updates:** The seller continues to publish updates to the Item throughout the lifecycle of the product. The buyer should then update their systems to keep the Item data in sync.

Additional Information

- For more information on GDSN standards and implementation please see *GDSN website*.
  - *How GDSN Works*
  - *GDSN-Certified Data Pools*
  - *GS1 Data Quality Framework*
  - *GS1 Global Product Classification (GPC)*
- For more information on GS1 identification keys, GTIN, GLN and please see *GS1 Id keys*.

2.2 Design Principle

The Data Sync Trade Item model was built keeping in mind the design of the GDSN data synchronisation process developed for implementation by GS1.

The key principle that is carried over from that work is the assumption that when a trade item's information is transmitted from an information provider to a data pool, and data pool to data pool (in network data synchronisation) that the entire product hierarchy is transmitted.

For example, in the grocery industry that product hierarchy will normally include retail point-of-sale, case, and pallet, and may also include other levels. Included in this product hierarchy, it is understood that each link connecting the various levels is also considered to be a part of the message.

2.3 Explanation of CIN "Core" Attributes vs. CIN Extensions

The GDSN Catalogue Item Notification (CIN) contains a set of attributes which are grouped in different modules, also known as attribute classes and attribute subclasses. A list of modules has been defined for each context based on the characteristics of the product and/or industry sector. For example, the Nutritional Information Module is relevant for food products which would be published with the context "Food, Beverage, Tobacco, & Pet Food"; the Apparel Information Module is relevant for clothing and footwear products which would be published with the context "Clothing and Personal Accessories".

The attributes within each module are either mandatory, optional, or dependant. All modules should be handled in the item sync message in alphabetical order. Some modules will contain as a subclass the Attribute/Value Pair (AVP) functionality as well. Furthermore, several extension points will be provided for additional data sets if needed. In addition to the content related modules, the CIN will contain the core attributes which are mandatory and must be used with all contexts.

Note: If the data source chooses to send one or more modules which are not in the list of modules defined for the context, the data pools will pass the additional modules through to the data recipient. However, the data source should bear in mind that the data recipient may not be expecting the additional modules for that context and may or may not be able to process them.

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ANNEX A. Food & Beverage

This section describes how the fields in the Food & Beverage (F&B) Extension should be populated. The Food & Beverage is intended to be used by trading partners in both the Food Service as well as the Food Retail sector.

A.1 Pre-Requisite

The F&B extension is based on the presumption that manufacturers / brand owners have assigned GTINs to the lowest level in the trade item hierarchy. Please be aware that even if the lowest level trade item is not marked with a barcode symbol it can still have a GTIN assigned to it. It is common practice within the Foodservice industry that the lowest level trade item (consumer unit) is not marked or assigned a GTIN. Determining the 'lowest level' of a product hierarchy is not always easy. The GTIN Management Standard say that any product that is priced or ordered or invoiced at any point in any supply chain is called a trade item and should have a GTIN assigned. For example, even if a manufacturer sells only cases of 6 catering tins of beans (and not the individual tins), if a distributor may break the case down and sell on individual tins to Foodservice operators then both the case and the tin would require GTINS (even if the Operator is not scanning barcode symbols).

Within the Foodservice Industry it is common practise, that the lowest level of a product hierarchy may still be higher than the unit which is consumed (eaten, drunk) by the end consumer. For example, a manufacturer sells a case/carton containing 4 lasagnas to a Foodservice Operator. The individual lasagnas are not marked or assigned a GTIN. Therefore, in this example all attributes will be provided at the case/carton level.

Elements marked as 'Future Core' have been approved and will be incorporated in the core item BMS in a future release in the following manner:

- **productionFacility** will be added as association to the **ManufacturerOfTradeItem** class.
- **customerSupportCentre** will be added as association to **TradingPartnerNeutralTradeItemInformation**
- **TradeItemExternalInformation** will be added as association to **TradingPartnerNeutralTradeItemInformation**

The most up to date list of valid code values is incorporated in the latest version of the F&B extension.

National authorities regulate the detailed information about the content and characteristics of food. Examples of information classes affected by such regulations are Health Claims, Ingredients, and Nutrients. The party providing food product information is expected to know and comply with the statutory regulations of the target market for which the item information is intended

A.2 When Would I Use This?

Companies that typical use the extension are (but not limited to):

- Manufacture of Food Products and Beverages
- Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles
- Retail trade, Except of Motor Vehicles and Motorcycles, Repair of Personal and Household goods
- Hotels and Restaurants

The information exchanged describes the:

- Food components ('ingredients") itself
- Food components that might cause an allergic reaction
- Nutrients
- Diets in which the product fits
- Microbiological characteristics
- Physiochemical characteristics

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- Issues related to preparing the product.
- Serving size and other serving related issues
- Yield of the product after preparation
- Techniques applied to preserve the product
- The applicable marketing information
- The applicable nutritional and health claims
- The link to additional information

A.3 How to use the Food & Beverage Extension

The following section describes the Food & Beverage attributes and extensions. Naming conventions follow the standards described in *Section 2*.

A.3.1 Production Variant Effective Date and Production Variant Description

Attribute names are as follows:

- Production Variant Effective Date – productionVariantEffectiveDate
- Production Variant Description – productionVariantDescription

These attributes are used to exchange information on one or more production variants that differ in information but share the same allocated GTIN. This is typically the case with different package series that for the main part are identical but have slight changes in ingredient content and/or preparation instruction. Please note that the *GTIN Management Standard* give guidance on when a new GTIN should be allocated.

A.3.2 Food & Beverage Ingredient Class and Ingredient Statement

Extension names are as follows:

- Food & Beverage Ingredient Class – FoodAndBeverageIngredient
- Ingredient Statement – ingredientStatement

The Food & Beverage Extension facilitates the exchange of a structured list of individual ingredient as well as an ingredient statement in one text field. The latter is incorporated to facilitate all those trading partners that currently are not able to break down the list of ingredients per ingredient. The breakdown of the ingredient list per ingredient however is mandatory in case there is a need to enable:

- structured searches
- specification of information per ingredient (for instance the content percentage and /or country of origin)

A.3.3 Food & Beverage Allergen Class and Allergen Statement

Extension names are as follows:

- Food & Beverage Allergen Class – FoodAndBeverageAllergen
- Allergen Statement – allergenStatement

The Food & Beverage Extension facilitates the exchange of a structured list of individual allergens as well as an allergen statement in one text field. The latter is incorporated to exchange the allergy statement in exactly the same wording as displayed on the product label or other applicable regulations dictate

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A.3.4 Nutrient Type Code and Unit of Measure

The field Nutrient Type Code (Food and Beverage Nutrient class) refers to the nutrient's tag name (http://www.fao.org/home/en/). As part of this data a quantity and measurement value is also required. Definitive unit supplied along with the tag name supersedes traditional GDS UOM pick list. From a consistency and systems point of view it would probably be easier to use the tag name so that all users apply the same unit of measure for the nutrient specified (important for smaller users where systems may not have flexibility).

A.4 Food & Beverage Module Examples

Class in core item model
Class in common library
Root class in core item model
Class in module
Attribute

Example 1: List of Individual Ingredients and Ingredient Statement

TradeItemDocument	
CatalogueItemNotification	
- creationDateTime	2011-03-11T11:00:00.000-05:00
- documentStatusCode	ORIGINAL
CatalogueItemNotificationIdentification	
- entityIdentification	20051101
ContentOwner	
- gln	8712345678913
CatalogueItem	
TradeItem	
- gtin	00074562000525
- isTradeItemABaseUnit	true
- isTradeItemAConsumerUnit	true
- isTradeItemADespatchUnit	false
- isTradeItemAnInvoiceUnit	false
- isTradeItemAnOrderableUnit	true
- tradeItemUnitDescriptorCode	BASE_UNIT_OR_EACH
InformationProviderOfTradeItem	
- gln	6612345678944
- partyName	Food Service Distributor
GdsnTradeItemClassification	
- gpcCategoryCode	10000028
TargetMarket	
- targetMarketCountryCode	124
TradeItemInformation	
Extension	
FoodAndBeverageIngredientModule	

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TradeItemDocument	
AdditiveInformation	
- additiveName	Sodium Nitrate
- levelOfContainmentCode	CONTAINS
FoodAndBeverageIngredient	
- ingredientSequence	1
- ingredientName (+ languageCode)	EN, Water
FoodAndBeverageIngredient	
- ingredientSequence	2
- ingredientName (+ languageCode)	EN, Tomato paste
FoodAndBeverageIngredient	
- ingredientSequence	3
- ingredientName (+ languageCode)	EN, Tomatoes (citric acid, calcium chloride)
FoodAndBeverageIngredient	
- ingredientSequence	4
- ingredientName (+ languageCode)	EN, Carrots
FoodAndBeverageIngredient	
- ingredientSequence	5
- ingredientName (+ languageCode)	EN, Red kidney beans
FoodAndBeverageIngredient	
- ingredientSequence	6
- ingredientName (+ languageCode)	EN, Celery
FoodAndBeverageIngredient	
- ingredientSequence	7
- ingredientName (+ languageCode)	EN, Rehydrated potatoes (sodium phosphate)
FoodAndBeverageIngredient	
- ingredientSequence	8
- ingredientName (+ languageCode)	EN, Italian green beans
FoodAndBeverageIngredient	
- ingredientSequence	9
- ingredientName (+ languageCode)	EN, Penne pasta (enriched wheat flour, egg white)
FoodAndBeverageIngredient	
- ingredientSequence	10
- ingredientName (+ languageCode)	EN, Zucchini
FoodAndBeverageIngredient	
- ingredientSequence	11
- ingredientName (+ languageCode)	EN, Peas
FoodAndBeverageIngredient	
- ingredientSequence	12
- ingredientName (+ languageCode)	EN, Spinach
FoodAndBeverageIngredient	

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TradeItemDocument	
- ingredientSequence	13
- ingredientName (+ languageCode)	EN, Salt
FoodAndBeverageIngredient	
- ingredientSequence	14
- ingredientName (+ languageCode)	EN, Modified corn starch
FoodAndBeverageIngredient	
- ingredientSequence	15
- ingredientName (+ languageCode)	EN, Parmesan cheese
FoodAndBeverageIngredient	
- ingredientSequence	16
- ingredientName (+ languageCode)	EN, Spice
FoodAndBeverageIngredient	
- ingredientSequence	17
- ingredientName (+ languageCode)	EN, Canola oil
FoodAndBeverageIngredient	
- ingredientSequence	18
- ingredientName (+ languageCode)	EN, Enriched wheat flour
FoodAndBeverageIngredient	
- ingredientSequence	19
- ingredientName (+ languageCode)	EN, Garlic powder
FoodAndBeverageIngredient	
- ingredientSequence	20
- ingredientName (+ languageCode)	EN, Disodium guanylate
FoodAndBeverageIngredient	
- ingredientSequence	21
- ingredientName (+ languageCode)	EN, Disodium inosinate
FoodAndBeverageIngredient	
- ingredientSequence	22
- ingredientName (+ languageCode)	EN, Parsley
DietInformationModule	
DietInformation	
- dietTypeDescription	Suitable for Gluten Free Diets
- dietTypeCode	FREE_FROM_GLUTEN
FoodAndBeveragePreparationServingModule	
- manufacturerPreparationTypeCode	UNPREPARED
PreparationServing	
- preparationTypeCode	BOIL
- convenienceLevelPercent	100
- preparationConsumptionPrecautions	Do Not Freeze

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TradeItemDocument	
- servingSuggestion	As a soup, or ingredient in many of your favourite recipes. Add simple garnishes to create signature soups
ServingQuantityInformation	
- numberOfServingsPerPackage	6
- numberOfServingsPerPackageMeasurementPrecisionCode	APPROXIMATELY
NutritionalInformationModule	
- nutritionalClaim	High in Calcium
NutritientHeader	
- preparationStateCode	AS_DRAINED
- nutrientBasisQuantity	100 GRM
NutrientDetail	
- dailyValueIntakePercent	20
- measurementPrecisionCode	APPROXIMATELY
- nutrientTypeCode	FIB-
- quantityContained	GRM, 4.5
- dailyValueIntakePercent	10
- measurementPrecisionCode	APPROXIMATELY
- nutrientTypeCode	ENERC
- quantityContained	E14, 96
NutrientDetail	
- dailyValueIntakePercent	10
- measurementPrecisionCode	APPROXIMATELY
- nutrientTypeCode	FAT
- quantityContained	GRM, 0.3

Example 2: Allergen Statement

TradeItemDocument	
CatalogueItemNotification	
- creationDateTime	2011-03-11T11:00:00.000-05:00
- documentStatusCode	ORIGINAL
CatalogueItemNotificationIdentification	
- entityIdentification	20051101
ContentOwner	
- gln	8712345678913
CatalogueItem	
TradeItem	
- gtin	00074562000525
- isTradeItemABaseUnit	true
- isTradeItemAConsumerUnit	true
- isTradeItemADespatchUnit	false
- isTradeItemAnInvoiceUnit	false

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TradeItemDocument	
- isTradeItemAnOrderableUnit	true
- tradeItemUnitDescriptorCode	BASE_UNIT_OR_EACH
InformationProviderOfTradeItem	
- gln	6612345678944
- partyName	Food Service Distributor
GdsnTradeItemClassification	
- gpcCategoryCode	10000028
TargetMarket	
- targetMarketCountryCode	124
TradeItemInformation	
Extension	
FoodAndBeverageIngredientModule	
TradeItemDescriptionModule	
TradeItemDescriptionInformation	
- functionalName	Soup
- productRange	Healthy Options
- tradeItemDescription (+ languageCode)	EN, Camp's Frozen Soup Homestyle Minestrone
- descriptionShort (+ languageCode)	EN, Soup
- additionalTradeItemDescription (+ languageCode)	EN, An Italian tradition full of diced carrots, kidney beans, peas and penne pasta
- variantDescription (+ languageCode)	EN, Homestyle Minestrone
BrandNameInformation	
- brandName	Camp's Frozen
PackagingMarkingModule	
- hasBatchNumber	false
- isNetContentDeclarationIndicated	true
- isPackagingMarkedReturnable	false
- isPriceOnPack	false
- packagingMarkedLabelAccreditationCode	UNIQUELY_FINNISH
FoodAndBeveragePreparationServingModule	
- manufacturerPreparationTypeCode	UNPREPARED
PreparationServing	
- preparationTypeCode	BAKE
- preparationConsumptionPrecautions	EN, Once cooked, the finished dish can be frozen in a suitable container.
- servingSuggestion	EN, EN, To Oven cook Preheat oven to 180'c (Gas Mark 4). Pan-Fry 450g boneless chicken until golden. Place chicken in a casserole dish, stir in the sauce and cover. Cook in the oven for 1 hour (or until chicken is fully cooked) If you prefer chicken pieces, use 900g and allow 10 minutes extra cooking time.
PreparationServing	
- preparationTypeCode	FRY

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TradeItemDocument	
- preparationConsumptionPrecautions	EN,Once cooked, the finished dish can be frozen in a suitable container.
- servingSuggestion	EN, Pan-fry the chicken until golden. Stir in the sauce, cover and simmer for 20 minutes until the chicken is fully cooked.
ServingQuantityInformation	
- numberOfServingsPerPackage	4
FoodAndBeverageIngredientModule	
AdditiveInformation	
- additiveName	Sodium Nitrate
- levelOfContainmentCode	CONTAINS
FoodAndBeverageIngredient	
- ingredientSequence	1
- ingredientName (+ languageCode)	EN, Water
FoodAndBeverageIngredient	
- ingredientSequence	2
- ingredientName (+ languageCode)	EN, SUGAR
FoodAndBeverageIngredient	
- ingredientSequence	3
- ingredientName (+ languageCode)	EN, ONION
FoodAndBeverageIngredient	
- ingredientSequence	4
- ingredientName (+ languageCode)	EN, TOMATO PUREE
FoodAndBeverageIngredient	
- ingredientSequence	5
- ingredientName (+ languageCode)	EN, SPIRIT VINEGAR
FoodAndBeverageIngredient	
- ingredientSequence	6
- ingredientName (+ languageCode)	EN, TOMATO
FoodAndBeverageIngredient	
- ingredientSequence	7
- ingredientName (+ languageCode)	EN, GREEN PEPPERS
FoodAndBeverageIngredient	
- ingredientSequence	8
- ingredientName (+ languageCode)	EN, Italian green beans
FoodAndBeverageIngredient	
- ingredientSequence	9
- ingredientName (+ languageCode)	EN, CELERY
NutritionalInformationModule	

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TradeItemDocument	
- nutritionalClaim	High in Calcium
NutritientHeader	
- preparationStateCode	UNPREPARED
- nutrientBasisQuantity	131.25 GRM
NutrientDetail	
- dailyValueIntakePercent	20
- measurementPrecisionCode	APPROXIMATELY
- nutrientTypeCode	FIB-
- quantityContained	GRM, 4.5
- dailyValueIntakePercent	10
- measurementPrecisionCode	APPROXIMATELY
- nutrientTypeCode	ENERC
- quantityContained	E14, 96
NutrientDetail	
- measurementPrecisionCode	APPROXIMATELY
- nutrientTypeCode	CHOAVL
- quantityContained	GRM, 20.8
NutrientDetail	
- measurementPrecisionCode	APPROXIMATELY
- nutrientTypeCode	SUGAR
- quantityContained	GRM,18.7
NutrientDetail	
- measurementPrecisionCode	APPROXIMATELY
- nutrientTypeCode	FAT
- quantityContained	GRM,0.1
NutrientDetail	
- measurementPrecisionCode	APPROXIMATELY
- nutrientTypeCode	FASAT
- quantityContained	MGM,0.001
NutrientDetail	
- measurementPrecisionCode	APPROXIMATELY
- nutrientTypeCode	FIB
- quantityContained	GRM,0.5
NutrientDetail	
- measurementPrecisionCode	APPROXIMATELY
- nutrientTypeCode	NA
- quantityContained	GRM,0.19
AllergenInformationModule	
AllergenRelatedInformation	
- allergenSpecificationAgency	European Union
- allergenSpecificationName	2003/89/EC

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TradeItemDocument	
- allergen	
- allergenTypeCode	AP
- levelOfContainmentCode	MAY_CONTAIN
DietInformationModule	
DietInformation	
DietTypeInformation	
- dietTypeCode	VEGETARIAN
DietCertification	
- certificationAgency	UNI UK FOODS

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