



The Global Language of Business

How to apply GS1 keys in UBL messages Guideline

guidance on how to apply a master data approach with GS1 identification keys when using UBL (Universal Business Language)

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1 Background and context

Governmental regulation is affecting and influencing global trade.

Serving the goals of efficiency and cost reduction, many governments have issued mandates related to Business2Government electronic communication.

As an example, many countries nowadays require Invoicing to be carried out electronically in a certain format. Regarding these formats, a trend can be observed that in the past 10 years, the XML syntax Universal Business Language (UBL)¹ has been selected by a number of governmental agencies. The standards organisation that developed and maintains this syntax is OASIS².

Companies and organisations applying the GS1 system in their Business2Business relations and trading and communicating with Governments are facing challenges, as they cannot seamlessly apply the GS1 practices in all their trading partner relationships.

In order to reduce the gap between these Business2Business and Business2Government communications, GS1 is providing this guideline to explain how to apply a master data approach with GS1 identification keys when using UBL. It will empower users of GS1 standards accustomed to the master data approach to apply that concept while communicating in UBL.

This guideline can equally be useful for UBL acquainted users, enabling them to apply the master data concept introduced and promoted by GS1, to profit from its benefits.

GS1 has concluded a collaboration agreement with OASIS (<http://www.gs1.org/articles/1898/gs1-collaboration-oasis-ubl>) and the present guide is intended to cement this collaboration by providing help to the industry in explaining how to bring the GS1 and OASIS sphere closer to each other.

¹ <https://www.oasis-open.org/standards#ublv2.1>

² <https://www.oasis-open.org/>

2 Reading instructions

The guideline explains the GS1 approach to master data and the related usage of the GS1 keys.

If you are acquainted with GS1 identification, please refer directly to [Chapter 6](#) that explains in detail how GS1 keys should be used in UBL.

3 Introduction

Through its engagement in commerce for more than 40 years, GS1 and its users have developed and implemented a concept where master data is treated and operated in a unique way comprising the application of GS1 keys.³

Master Data is the core information about the "who" and "what" in a trading relationship. The "who" can include the name, address and identification codes of the buyer and seller plus details of shipping, delivery and billing locations. The "what" is product information such as product name, description, size and barcode number.⁴ Master data can be identified by GS1 identification keys.

Transactional Data is the information exchanged between two organisations about the products and services they are selling, ordering, delivering, receiving, invoicing and paying for.⁵

Elements considered to be master data can be omitted from transactional messages provided they are aligned prior to the first exchange of transactional messages. This is known as the concept of alignment of master data.

This guideline facilitates a master data approach via GS1 identification keys when using UBL in electronic business transactions.

4 The building blocks of a master data approach

If parties decide to use a master data approach in their mutual electronic business communication, there are three basic principles that apply, which are:

- Use of GS1 identification keys
- Alignment of master data
- Transactional messages exempted from master data

4.1 Use of GS1 identification keys

GS1 identification keys provide the link between an item and information about it. They are used to uniquely distinguish all products, logistics units, locations, assets and relationships across the supply chain from manufacturer to consumer.

A GS1 identification key is always created from a GS1 Company Prefix (GCP) licenced by a GS1 Organisation.

The most commonly used GS1 identification keys across the global supply chain are

- GTIN – Global Trade Item Number
- GLN – Global Location Number
- SSCC – Serial Shipping Container Code

GS1 offers eleven identification keys in total⁶.

³ [GS1 System Architecture](#), Chapter 6.1.1,

⁴ <https://www.gs1ie.org/Standards/Share/Master-Data/>

⁵ <https://www.gs1ie.org/Standards/Share/Transactional-Data/>

⁶ <http://www.gs1.org/id-keys>

GS1 identifies parties and locations via the Global Location Number⁷, products and services via the Global Trade Item Number⁸, and logistic units⁹ via the Serial Shipping Container Code.

Furthermore, a combined shipment of logistic units can be identified via the Global Shipment Identification Number (GSIN), and logistic units transported together in an ocean container by the Global Identification Number for Consignment (GINC).

This guide primarily focuses on the usage of GTIN and GLN in a master data context. In the implementation section the master data examples are complemented by implementation examples stemming from the Transport and Logistics domain and covering the usage of SSCC, GSIN, and GINC in UBL.

GS1 identification keys must be aligned by the trading parties as a reference to master data.

4.2 Alignment of master data

The process of master data alignment comprises an agreement on the master data to be aligned.

Prior to detailing the different ways of aligning master data, here is a definition of master data.

4.2.1 Definition of master data

Master data is data held by an organisation that describes the entities that are both independent and fundamental for that organisation, and that it needs to reference in order to perform its transactions." (ISO, 2012)

Master data is information that changes infrequently and is typically used in many transactions before being changed or updated. It describes entities, which are most commonly products, parties and locations.

Two basic types of master data are recognised – party and location and product information:

- Party and location master data describes e.g. physical locations, legal and functional entities including the name and address, bank details and account number, sales department, and company profile¹⁰
- Product master data is a set of data describing properties of each traded item. It can be, for example the product's name, dimensions, content, commodity classification or the item packaging type and measurements.

4.2.2 Alignment

The method of the exchange of master data should be pre-agreed between the trading parties and the method they choose to update the master data should also be described upfront. Once the master data has been exchanged, the parties can be considered to be aligned.

Generally, three different approaches of aligning master data can be identified. Parties can choose one of them for alignment of all their master data or a combination of different approaches for different types of data:

- Bilateral exchange of unstructured or semi-structured master data.
Usually, the data transfer to the recipient's information system takes place manually by paper or spreadsheet.
Update of the data must be handled manually by both the data provider and recipient;
- Bilateral exchange of structured or semi-structured master data based on electronic data interchange including electronic messages or webforms.
The process of the data exchange and its handling is (semi-)automated.
Update of the data must be handled by the data provider individually for every data recipient (peer2peer);

⁷ <http://www.gs1.org/gln>

⁸ <http://www.gs1.org/gtin>

⁹ <http://www.gs1.org/serial-shipping-container-code-sscc>

¹⁰ http://www.gs1.org/sites/default/files/docs/barcodes/GS1_General_Specifications.pdf

- Multi-lateral exchange using an agreed master data repository as a single point of entry for structured data for all data providers and representing a single source of data for all data recipients.
Update of the data is handled by the data provider once and automatically delivered to all subscribed recipients.
That approach is known as the GS1 Global Data Synchronisation Network (GDSN¹¹).
In March 2016, there were approximately 20 million trade item GTINs and 38.000 trading partner GLNs¹² referenced in the GDSN.

Regardless of the chosen approach, the process can be divided in two phases:

- Agreeing on the set of master data to be shared;
- Initial and ongoing alignment of master data each time information is added, changed or removed.

Business transactions accompanied by transaction business documents can only take place after master data has been aligned.

4.3 Transactional messages exempted from master data

Transactional data is related to particular instances of transactions and it is usually different for each. Such data cannot be pre-aligned and it has to be included in each of the transactional data exchanges.

Prior to explaining the principle that transactional messages do not containing master data, transactional data shall be defined.

4.3.1 Definition of transactional data

According to ISO 8000, transactional data is "*data that represents a business transaction*" and a business transaction is the "*completion of a business action or a course of action.*" (ISO, 2012)

Typical examples of transactional data are ordered quantity, invoiced amount or delivery details and dates.

4.3.2 Exchange of transactional messages

Integrity and timeliness of master data is critical to the flow of goods, services and information throughout the supply chain. Since master data is not subject to frequent changes, GS1 recommends to not include master data in transactional data exchange.

As a consequence, transactional messages only contain transactional data and GS1 identification keys referencing the master data previously exchanged during the master data alignment process.

It might be that for legal purposes some of the master data must also be included in transactional messages. Business practices generally used in a particular industry sector have to be taken into account as well.

Therefore, some user communities use very thin transactional messages with no or very little master data included while others can use quite verbose messages with a substantial amount of master data included.

5 Benefits of the master data approach

The master data approach can be considered as a best practice in electronic business communication. This approach allows redundant data to be removed from transactional messages, ensures efficient processing and brings considerable cost savings, by integrating the electronic transfer of data with the physical flow of goods.

¹¹ <http://www.gs1.org/gdsn>

¹² http://www.gs1.org/sites/default/files/docs/gdsn/stats/gdsn_adoption.pdf

Applying a master data approach is associated with significant benefits. Omitting master data from transactional messages facilitates higher level of automation, eliminates data redundancy and improves data quality by creating one source of validated data. Many leading businesses use this approach for electronic data interchange particularly by retailers, suppliers and in healthcare.

Using the master data approach has significant impact on reliability and efficiency of transactional data exchange and related processes. There are three main benefits.

5.1 Quality of data

The master data approach has a significant positive influence on data quality. Data quality dimensions that are affected in particular are:

- **Consistency:** all data is consistent, elimination of different representation of any two identical states of the real world
- **Duplication:** master data is centralised within organisation or even within the whole supply chain if a common master data repository is used

Using well-designed identification keys allows easy validation of such keys leading to **improved accuracy**. Identification keys can be rendered in data carriers (e.g., barcodes, 2D codes, EPC/RFID tags, etc.) and used on labels identifying objects, typically, items. It provides reference to an object's master data that can be automatically and reliably captured. Machine-readability of such a reference is crucial for the effectiveness of every supply chain.

5.2 Higher level of automation

The master data approach facilitates the use of structured data and leads to thinner transactional documents and the reduction of free text. Consequently, it allows high automation of processes related to business document exchange.

Increased automation reduces costs and improves accuracy and overall efficiency.

5.3 Simplification of data distribution

Master data is communicated only once and redundancy of such data in transactional communication is prevented.

There are several case studies proving benefits and illustrating positive financial effects of a master data approach when a common data repository is used to align master data because it is considered to be the most efficient way to achieve alignment. Nevertheless, some of those benefits can be at least partly achieved by using a bilateral master data approach. Areas of improvement are typically in administration, store operations and reduced transportation costs. (GMA, 2006)

Removal of redundant data from transactional messages also ensures lower volume of data exchanged which is driving down the costs of electronic data interchange for users charged on "volume of data exchanged" basis.

6 GS1 guiding principles

Master data exchanged via document instances (messages) must be of high quality in order to maintain consistency of data stored in information systems across the supply chain.

It must be possible to unambiguously identify products, parties, and locations that are stated in document instances (messages) in order to prevent any errors in goods or services delivery and related processes.

Document instances (messages) exchanged between trading partners should contain only a necessary minimum of data in order to keep such messages simple and lower the volume of data exchanged.

Legal requirements must be respected.

7 Implementation guidance

7.1 Before you start the master data Approach

There are some specific pre-requisites for using the master data approach in electronic communication:

- Parties agree on which master data will not be included in transactional messages and which identification keys will be recognised before any transactional communication. Parties must know what master data can be omitted and how to reference to it.
- Parties agree on the means of aligning selected master data and align it before any transactional communication, so identification keys used in transactional messages do not refer to empty data fields.
- Parties communicate any update of their master data to all business partners using the master data approach for mutual electronic data interchange in an agreed way so identification keys in transactional messages refer to up-to-date master data.
- When a party receives a transactional message, its internal information system should be able to pair up the identification keys used in transactional message with the relevant master data records stored in this system.

The separation between master data and transactional data must be seen in a wider perspective than merely an issue of data transfer. The ability to pair up the transactional messages and the relevant master data records must be maintained during the archiving period of the transaction. In order to reduce any future issues of data matching, many organisations consider it best practice to archive the amalgamation of the transaction message and related master data.

7.2 Context related to UBL and the implementation of GS1 keys

The latest version of UBL is V 2.1¹³. This version is an ISO Standard ISO/IEC 19845:2015¹⁴.

This guide focuses on the usage of GTIN, GLN, SSCC, GSIN, and GINC in UBL.

The examples stated below explain how a typical party, item, and logistic unit, shipment, and consignment will be expressed via a party, item, logistic, shipment, and consignment unit identifier in UBL.

The GLN can also be used in a routing scenario as a routing key. There are different ways to manage the routing of messages, for example in a SBDH specified by GS1 and UN/CEFACT or in a BDE specified by OASIS. The approach will be driven by the context and there is no unique approach to the routing. This guide is not covering routing scenarios.

7.3 Identifiers in UBL

All identifier elements in UBL are using the same underlying data type and structure. The GS1 key is stated as the XML element text value and the information about the type of key is described using XML attributes. Not all available attributes are necessary.

The table below lists each attribute and its recommended use for GS1 keys.










































- ▼                                         

Table 7-1 Each attribute and its recommended use for GS1 keys

| Element/Attribute | Use in UBL Scheme | Use of GS1 Keys | Example | Remark |
|--------------------|-------------------|-----------------|---------------|--|
| Content of element | Mandatory | Mandatory | 7315567125084 | |
| @schemeID | Optional | Mandatory | GLN | Identifies the scheme on which the identifier is based such as GLN, GTIN, SSCC, etc. |
| @schemeName | Optional | Not used | | Clear text name of the scheme. |
| @schemeAgencyID | Optional | Optional | 9 | Identifier for the issuing agency of the ID scheme using UN/CEFACT code list 3055. |
| @schemeAgencyName | Optional | Not used | | Clear text name of the agency |
| @schemeVersionID | Optional | Not used | | Version of the scheme |
| @schemeDataURI | Optional | Not used | | A URI for the location of where scheme data can be found |
| @schemeURI | Option | Not used | | A URI for the location of where scheme can be found |

7.4 Implementation examples

7.4.1 Master data: How to identify a party with a party identifier in UBL (GLN)

```
<cac:Party>
  <cac:PartyIdentification>
    <cbc:ID schemeID="GLN" schemeAgencyID="9">7315567125084</cbc:ID>
  </cac:PartyIdentification>
</cac:Party>
```

7.4.2 Master data: How to identify an item with an item identifier in UBL (GTIN)

```
<cac:Item>
  <cac:StandardItemIdentification>
    <cbc:ID schemeID="GTIN" schemeAgencyID="9">07311104114566</cbc:ID>
  </cac:StandardItemIdentification>
</cac:Item>
```

7.4.3 Logistics data: How to identify a logistic unit with a logistics identifier in UBL (SSCC)

```
<cac:TransportHandlingUnit>
  <cbc:ID schemeID="SSCC" schemeAgencyID="9">173111000000000013</cbc:ID>
</cac:TransportHandlingUnit>
```

7.4.4 Logistics data: How to identify a shipment with a shipment identifier in UBL (GSIN)

```
<cac:Shipment>  
  <cbc:ID schemeID="GSIN" schemeAgencyID="9">57098761234567890</cbc:ID>  
</cac:Shipment>
```

7.4.5 Logistics data: How to identify a consignment with consignment number in UBL (GINC)

```
<cac:Consignment>  
  <cbc:ID schemeID="GINC" schemeAgencyID="9">570987698767654567898767876765</cbc:ID>  
</cac:Consignment>
```

7.5 Implementation of the master data approach in CEN BII

Add as implementation example the fact that we have introduced the master data concept in CEN BII (put some words around that) and provide link.

7.6 Application of GS1 identification keys in openPEPPOL

Explain briefly how we have introduced GS1 identifiers in openPEPPOL.

8 Contact GS1

A GS1 identification key is always created from a GS1 Company Prefix (GCP) licenced by a GS1 Member Organisation. Please contact your local GS1 Member Organisation for more information <http://www.gs1.org/contact>.

9 About GS1 and OASIS

9.1 GS1

GS1 is a neutral, not-for-profit, global organisation that develops and maintains the most widely used supply chain standards system in the world. GS1 standards improve the efficiency, safety, and visibility of supply chains across multiple sectors.

With local Member Organisations in over 110 countries, GS1 engages with communities of trading partners, industry organisations, governments, and technology providers to understand and respond to their business needs through the adoption and implementation of global standards.

GS1 is driven by over a million user companies, which execute more than six billion transactions daily in 150 countries using GS1 standards. More information at www.gs1.org.

9.2 OASIS

OASIS is a non-profit consortium that drives the development, convergence and adoption of open standards for the global information society.

OASIS promotes industry consensus and produces worldwide standards for security, Internet of Things, cloud computing, energy, content technologies, emergency management, and other areas. OASIS open standards offer the potential to lower cost, stimulate innovation, grow global markets, and protect the right of free choice of technology.



OASIS members broadly represent the marketplace of public and private sector technology leaders, users and influencers. The consortium has more than 5,000 participants representing over 600 organisations and individual members in more than 65 countries. More information at <https://www.oasis-open.org/org>.