



GS1 and PEPPOL Adoption

GS1 Keys supporting the core enablers

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Introduction

This document forms part of the GS1 and PEPPOL adoption guidance for trusts. It is intended to provide implementing managers with intermediate level knowledge of the essential GS1 standards that support the core enablers and primary use cases set out in *GS1 and PEPPOL adoption: Getting Ready*. Further technical expert level detail can be downloaded from the GS1 UK website.

There are a number of GS1 'keys' that need to be adopted by both trusts and their suppliers to ensure GS1 and PEPPOL adoption is consistent with the standards. The GS1 keys covered in this document are:

- 1) GLN global location number - identifies a *place*
- 2) GTIN global trade item number - identifies a *product*
- 3) GSRN global service relationship number - identifies a *person*

These keys enable unique barcodes to be created that provide access to electronic datasets, providing trusts and suppliers with the ability to retrieve data attributes associated with a barcode by simply scanning the barcode. The three keys support the three core enablers and the three primary use cases set out in *Getting Ready*:

Core enablers	Primary use cases
Global location numbering	Inventory management
Catalogue management	Purchase-to-Pay
Patient identification	Product recall

There are further GS1 keys that are not described in this document, as these are not needed to support the primary use cases detailed in *Getting Ready*. A further information pack will be published providing detail of the additional GS1 keys that are required to support the further use cases set out in *Getting Ready*.

Each of the GS1 keys is a globally unique identification number that is made up of three basic segments:

- GS1 Company Prefix
- Reference number
- Check Digit

Each NHS trust has a Company Prefix already provided as part of an enterprise agreement between the Health and Social Care Information Centre and GS1 UK. Trusts can contact the GS1 UK Help Desk to ascertain their Company Prefix. Each trust should have only one GS1 Company Prefix, applicable at the legal entity level.

The GS1 Company Prefix is a globally unique number of between 4 and 12 digits that is assigned to an organisation by GS1 as part of a membership agreement. The Company Prefix is part of the data structure for all GS1 keys (eg GLN, GTIN, GSRN, etc), and provides the foundation for generating all GS1 Identification Numbers.

The Reference number is assigned by the organisation itself, not by GS1. Trusts will assign GLNs and GSRNs to relevant places and people, whereas GTINs are assigned by the brand owner of the product or service that is being coded.

The Check Digit is a calculated one-digit number used to calculate data integrity. An online check digit calculator is available along with the check digit calculation at http://www.gs1.org/barcodes/support/check_digit_calculator

Guidance for trusts for the implementation of the GTIN key will be produced when further use cases are created that require trusts to allocate GTINs. For the core enablers and primary use cases, trusts will not need to allocate GTINs.

Global Location Number

What is a GLN?

A GLN is a globally unique GS1 identification number that is used to identify any unique location in the supply chain and within the trust. The GLN is also a core enabler and supports all the use cases currently identified for the adoption of GS1 and PEPOL standards. GLNs can be used to uniquely identify different types of entity:

- *a legal entity* (eg a health service provider)
- *a functional entity* (eg a hospital pharmacy)
- *a physical entity* (eg a hospital ward)

The GLN acts as a key to access pre-defined information, or attributes, held in a database about the location. The attributes defined for each GLN (eg name, address, class of trade) help users to ensure that each GLN is specific to one, very precise location within the world.

In terms of data structure, GLNs are thirteen-digit numbers comprised of three basic segments:

- GS1 Company Prefix;
- Location Reference: A number assigned by the trust to which the GS1 Company Prefix has been prepended to uniquely identify a location or the organisation itself;
- Check Digit: A calculated one-digit number used to ensure data integrity.

How are GLNs used?

GLNs are used to identify the various locations and functional entities in an organisation. A GLN can be encoded into a data carrier (such as a barcode or a Radio Frequency Identification (RFID) tag). This enables healthcare providers to mark the various locations and functional entities throughout their facilities with GLN barcodes for accurate identification (eg trust, hospital; site; floor, ward).

Marking locations within a hospital with barcoded GLNs enables activities undertaken in a location to be quickly and accurately recorded by scanning the GLN barcode into an IT system providing both speed and accuracy. With their reliable location identification, GLNs can enhance patient care, for example by facilitating the rapid recall of faulty products as detailed in the Product Recall use case.

The GLN not only identifies a specific location, but also provides the link to the information pertaining to it (ie, a registry holding the GLN attributes). This enables supply chain partners to simply reference a GLN in supply chain communications, as opposed to manually entering all of the necessary location information. Using a GLN to reference location information promotes efficiency, precision and accuracy in communicating and sharing location information.

Many Estates teams in NHS trusts already have a database of hospital locations to which a field for the GLN can be added. Trusts should consider Estates teams taking the lead on managing and maintaining an internal database of GS1 GLN location identifiers and the physical installation of the associated GLN barcode labels at the entry point to a physical location.

How are GLNs allocated?

Once trusts have their GS1 Company Prefix, they can create, manage and store multiple GLNs online using the GS1 UK Numberbank, which can be found on the GS1 UK website. Use of the Numberbank ensures that GLNs are formed correctly including the necessary check digit. A bulk upload and download facility is available making it straightforward to integrate GLNs into IT systems within the trust. More information on GLN allocation rules can be found at: <http://www.gs1.org/1/glnrules>.

A label containing the GLN in both human readable format and in a GS1 barcode and/or RFID tag can be attached to each location. This will enable applications to use the barcode or RFID tag data directly within their systems. For example, delivery services or other outsourced services will be able to use the location barcode to confirm the correct delivery location and then to record where the delivery was actually made.

NHS GLN Registry

The Department of Health will establish a central GLN Registry to provide a comprehensive list of both trust and supplier GLNs and their attributes, serving as an electronic catalogue of standardised location information. Using the Registry, subscribers will be able to access updated and accurate location information about manufacturers, distributors, and hospitals. It is anticipated that the Registry will be available during 2016. This should not delay the implementation of GLNs, as the GS1 Numberbank can be used for the creation and managing of GLNs.

Best practice for GLN allocation

Each trust should only use one Company Prefix when allocating GLNs across its organisation. There should only be one GLN for a given physical location, therefore there will never be two or more GLNs used to identify a physical location. Each location should be physically labelled with a corresponding GS1barcode.

Benefits of using GLNs

Patient safety	Right location – using GLNs within healthcare facilities promotes reliable identification of precise locations enabling staff to ensure that the right product is delivered to the right location
	Product recall – using GLNs facilitates product recall processes by precisely identifying specific locations where recalled items were received, stored and/or used
Supply chain efficiency	Information quality - using GLNs within trust systems and business processes improves information quality by ensuring that location information is identical among supply chain partners
	Productivity - using GLNs frees up staff time by eliminating the need to maintain multiple proprietary location identification numbers

Global Trade Item Number

What is a GTIN?

A GTIN is a globally unique GS1 identification number that is used to identify any trade item in the supply chain. A trade item is any item (goods or services), including individual items as well as their different configurations in different levels of packaging. The GTIN acts as a key to access pre-defined information and attributes held in a database about the item. The GTIN supports all the primary use cases for GS1 and PEPPOL adoption.

GTINs are used to identify items that are traded between organisations so, for the NHS, the use of GTINs will primarily apply to goods and services purchased from external suppliers. Suppliers are required by the NHS eProcurement strategy to allocate GTINs to all their products and to label those products with a GS1 compliant barcode. The timeline for supplier compliance will be published following consultation with trade associations and selected suppliers.

Where trusts sell goods and services to other NHS organisations they can allocate GTINs to those traded items. Trusts can also apply GTINs to goods and services that are produced and consumed internally within the organisation. Guidance for trusts for the implementation of the GTIN key will be produced when further use cases are created that require trusts to allocate GTINs.

The information below about GTINs is provided to enable trusts to have an understanding of the requirements that are placed on suppliers in the creation and application of GTINs. Trusts can refer suppliers to the GS1 service desk for advice and guidance on the creation and application of GTINs to products and services.

Although GTINs have an administrative structure to ensure that they are unique, they should be treated as non-significant numbers. This means that they should be recorded and processed in their entirety; no part of the number relates to any classification or conveys any information.

In terms of data structure, GTINs are most commonly thirteen-digit numbers (GTIN-13) comprised of three basic segments:

- GS1 Company Prefix
- Item Reference: A number assigned by the organisation to which the GS1 Company Prefix has been prepended to uniquely identify an item;
- Check Digit: A calculated one-digit number used to ensure data integrity.

It is also acceptable to have a fourteen-digit (GTIN-14) code where the first character is an indicator applied by the organisation to denote a packaging level. The indicators have no meaning and do not have to be applied in a sequential order.

How are GTINs used?

The GTIN provides a common language for all entities and trading partners worldwide to uniquely identify and communicate information about an item. GTINs can be used to unambiguously identify trade items online, for example in catalogues, in electronic messages such as purchase orders and invoices, and embedded in web pages to optimise use by search.

Suppliers to the NHS are required to allocate GTINs to their products and enter the associated data attributes into a GS1 datapool. In line with the NHS eProcurement strategy, trusts will draw data, for items they wish to purchase, from the relevant GS1 datapool by accessing the NHS Product Information Management (PIM) system. The PIM will be procured by the Department of Health and will become available for use in 2016. The PIM will be integrated to the trust catalogue management system, which in turn will support the trust inventory management system. This approach will ensure that all trusts use a single version of the master data associated with a product in all their transactions, increasing accuracy in transactions with suppliers.

The GTIN can be encoded in a barcode or RFID tag. By scanning the barcode or RFID tag, it is possible to efficiently and accurately process products and related information. This can be used when receiving goods into a hospital store and when administering medication in a hospital for example. As well as the widely used linear barcodes found in shops, some products may carry a square GS1 DataMatrix

barcode, also called a two-dimensional (2D) barcode. Trusts must use camera-based scanners to scan 2D barcodes; these scanners can also read linear barcodes.

How are GTINs allocated?

A GTIN is used to identify any item that may be priced, ordered or invoiced at any point in any supply chain, for which there is a need to retrieve pre-defined information for the lowest level of packaging, as well as higher packaging levels.

A separate unique GTIN is required whenever any of the pre-defined characteristics of an item are different in any way that is relevant to the trading process. For example, where two medicines have identical ingredients and brand names, they would require separate GTINs if one product can be sold anywhere, while the other requires a Pharmacist to distribute (because of the intended usage).

If any significant change is made that distinguishes a new trade item from an old trade item, a new GTIN should be assigned. More information on GTIN allocation rules can be found at: <http://www.gs1.org/1/gtinrules>

GS1 Global Data Synchronisation Network

The GS1 Global Data Synchronisation Network (GDSN) connects trading partners to the GS1 Global Registry® via a network of interoperable GS1certified datapools. It enables sharing of GTINs and associated data attributes between trading partners.

There are currently 34 GS1 datapools around the world and, to comply with the NHS Terms and Conditions for the Supply of Goods and the Provisions of Services, all suppliers to the NHS must load GTINs and data attributes into a GS1 datapool.

GDSN provides interoperability between all of the GS1 datapools, so suppliers can use any of the datapools to store their data, which can then be accessed by the Product Information Management system that is being established by the Department of Health for NHS trusts to use to pull supplier product and price data into their local catalogue solution.

Best practice for GTIN allocation

There should be only one GTIN for each product or service. The allocation of a GTIN should take place once and, for medical devices, medicines and other clinical products, the GTIN must never be reallocated or re-used on any other product or service. For more information about the allocation of GTINs to healthcare products and services see:

http://www.gs1.org/docs/gsmf/healthcare/GS1_Healthcare_GTIN_Allocation_Rules.pdf

For more information about the allocation of GTINs on non-clinical products and services see <http://www.gs1.org/1/gtinrules/>

Benefits of using GTINs

Patient safety	The GTIN provides accurate identification of products, supporting efforts to ensure that the right product is used for patient care
	The GTIN facilitates the product recall process, enabling product data to be stored in the patient record
Supply chain efficiency	The GTIN combined with a barcode frees staff time by eliminating the manual checking of product codes throughout the journey from manufacturer to end-user
	The GTIN ensures that product information is identical among supply chain partners, eliminating identification errors
	The GTIN supports inventory management processes by enabling reductions in requisition, order and payment processing costs through the automation of data capture and exchange

Catalogue management

Catalogue management is concerned with the management of information about products that the trust purchases. The GLN and the GTIN are the GS1 keys which support catalogue management. All products in the catalogue should have a GTIN for each packaging level such as box, carton and case. This GTIN will be assigned by the manufacturer regardless of the supplier involved. All manufacturers and suppliers should be identified by a GLN.

Catalogue Management should:

- enable the flow of accurate product data from manufacturer
- link product data to inventory management and purchase-to-pay systems

The information includes price, product data and description and product images. Catalogue management systems make it easy for users to select the products they require and to generate unambiguous standardised purchase orders. Catalogue management can pose problems for trusts for the following reasons:

- trust systems have to integrate many catalogues from different manufacturers and distributors and these may contain the same products but with different product codes and with different prices
- there is not any clear identification for manufacturers and distributors leading to many duplicate entries for the same companies
- products may not be categorised or classified leading to trusts having to classify products themselves
- the different catalogues include different data elements, with different names and with different data structures making comparison difficult
- trusts may be unable to update catalogues quickly enough when prices and other data changes
- the unit of measure or ordering unit for a product may not be clear
- it may be difficult to exclude unwanted products from the catalogue

The use of GS1 keys to identify products and suppliers in conjunction with the proposed NHS Product Information Management (PIM) system will minimise these problems.

Suppliers are required to place standardised master product data into a GS1 certified datapool. The GS1 Global Data Synchronisation Network (GDSN) links these datapools and an NHS PIM will be established to enable trusts to draw supplier master data from the datapools into their local catalogue solution. This process will ensure that accurate and consistent product information is used consistently across the NHS and its supporting supply chains. It will also ensure that product data comes from the manufacturer and is compliant with GS1 data standards.

Potential benefits

Catalogues using GS1 standards can lead to a number of benefits including, but not limited to:

- Purchases are made at the best and current price
- Saving of staff time involved in managing catalogues
- Saving of staff time in managing orders and checking invoices for payment
- Providing accurate purchase information by product, by product class or category, by manufacturer or by distributor
- Reduction in ordering errors and associated stock-outs or losses due to over ordering
- Reduced wastage when phasing out products

At present more than 50% of a trust's invoices are likely to require manual intervention at a typical cost of £8.50 per invoice.

Global Service Relation Number

What is a GSRN?

A Global Service Relation Number (GSRN) is a globally unique GS1 identification number that can be used by trusts to identify patients, staff (including agency) and visitors (eg supplier representatives). For the purpose of the core enabler for Patient Identification, use of the GSRN key is limited to patients. However, the Product Recall use case can optionally include the identification of the caregiver associated with the use of a specific product when treating a specific patient.

For patients, the GSRN should be encoded in a 2D DataMatrix barcode on the patient wristband, where a wristband is issued. The GSRN only identifies the patient in the context of the particular service relationship, limiting privacy concerns.

The GSRN is made up of three elements:

- **GS1 Company Prefix:** for patient identification, in accordance with ISB 1077, all trusts must use the prefix for the Health & Social Care Information Centre (5050898) rather than the trust's own prefix; for members of staff, all trusts must use their own prefix;
- **Service Reference:** for patient identification, in accordance with ISB 1077, all trusts must use the NHS number assigned to a person; for members of staff, trusts must assign a number to uniquely identify the person;
- **Check Digit:** A calculated one-digit number used to ensure data integrity.

How are GSRNs used?

The purpose of the GSRN is to provide a point of identification that can be used to retrieve information held in a database associated with that particular service relationship. The GSRN may be produced as a barcode, encoded in an RFID tag, or printed on a document, wristband or identity badge as a method of identification or to enable information retrieval.

For members of staff, an individual may have multiple GSRNs from different service providers, eg if an agency worker is registered with multiple staffing agencies. It is the service provider that allocates the GSRN which means there isn't any danger of any of the individual's other service relationships being linked. The GSRN itself does not have any meaning and so the service relationship can be located in a secure database and its associated information accessed only by the service provider.

How are GSRNs allocated?

For patients, a GSRN must be allocated in accordance with ISB 1077.

For members of staff, how a GSRN is allocated is up to the individual hospital to determine. However, the GSRN must be unique for each individual and must remain unique for a period in excess of the lifetime of the records relevant to the service relationship. It is recommended that GSRNs are allocated sequentially and do not contain any "classifying" elements, ie this is merely a number that doesn't have any specific meaning encoded.

Best practice for GSRN allocation

The use of the GSRN for patients is fully documented in ISB 1077

<http://www.isb.nhs.uk/documents/isb-1077>.

Benefits of using GSRNs

Patient safety	The GSRN is a simple coding system used to facilitate service relationships and identifies the relationship between patient and hospital
	The GSRN captured in a patient wristband enables the hospital to scan it to ensure the right patient is being treated and whenever the patient receives a service from the hospital, the patient's record can be updated
Supply chain efficiency	The GSRN can be used throughout without the need for trading partners to assign proprietary numbers to ensure uniqueness
	The GSRN facilitates enhanced management information on the use of staffing agencies in a hospital

Patient identification

The GSRN is the GS1 key that support the patient identification core enabler.

Patient misidentification constitutes one of the most serious risks to patient safety in hospitals or clinics. Today identification of the patient by the caregiver is still in general checked manually. This human interaction is inevitably prone to error and may result in patient harm when carrying out vital activities such as surgery, medication administration, blood transfusions, or other medical procedures. Such errors can also have a significant economic impact. It is the primary responsibility of caregivers to check the identity of patients and match the correct patients with the correct care before that care is administered.

The ISB 1077 standard requires trusts to adopt GS1 barcoding standards for use on patient identity wristbands, enabling accurate identification of the patient, with barcode scanning facilitating the upload of clinical data into the electronic patient record. The GS1 standards enable electronic records to be created that capture details of the patient, caregiver, care location, and equipment and consumables utilised during an episode of care, facilitating clinical audit and product recall.

Automatic Identification and Data Capture (AIDC) systems read the barcode on the patient's wristband allowing automatic capturing of the patient's unique identification through the GSRN. This in turn provides immediate access to patient information from the hospital's information system and enables the sharing of relevant patient information.

It is estimated that about 10% of inpatient episodes result in errors of some kind, of which half are preventable. As a result, a number of standards, notices and guidelines have been issued to the NHS including ISB 1077 to support safer patient identification. Specifically, standardising the design of patient identity bands, the data on them and how it should be displayed.

Potential benefits

The use of barcode scanning and associated computing technologies at the point of care can lead to a number of benefits including, but not limited to:

- improved patient safety through clear identification leading to increased accuracy of care given;
- reduction in time spent correcting and managing adverse patient incidents;
- financial saving in minimising adverse patient incidents and associated corrective costs;
- reduction in potential liability costs associated with adverse patient incidents;
- reduction in the number of manual processes leading to increased accuracy and reduced resources used within point of care;
- improved quality of patient experience through greater accuracy of care given.

As described earlier, it is also possible to link the caregiver, to the treatment they have administered, to the patient. This can be achieved by using GSRNs to uniquely identify caregivers, as well as the patient. This would enable tracking back to which caregiver was involved in the treatment and what activity they undertook.

Further information

Further information is available on the Department of Health Centre for Procurement Excellence (CPE) portal to registered members. Each trust has a GS1 lead with access and typically the Head of Procurement in each trust also has access. Access can be provided to other trust staff on request.