

# The EPCglobal Network™ and The Global Data Synchronization Network (GDSN)

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**EPCglobal** ™

**The EPCglobal Network™ and  
The Global Data Synchronization Network (GDSN):  
Understanding the Information & the Information Networks**

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# 1 Introduction

Companies require detailed information about their products and supply chain, and the ability to share that information with their trading partners in order to facilitate commercial transactions and the movement of goods and services. In order to serve various needs for information, two distinct information networks have been developed: the Global Data Synchronization Network (GDSN) and the EPCglobal Network™. The GDSN ensures the quality of STATIC INFORMATION about commercial entities and product/service groups among partners for collaborative trading. The EPCglobal Network provides access to DYNAMIC INFORMATION about the movement of individual items as they pass through the supply chain. The EPCglobal Network and the GDSN each provide significant benefits in their own right. Moreover, for companies striving to achieve a fully collaborative business model, the combination of the EPCglobal Network and the GDSN can provide a comprehensive, integrated approach to electronic collaboration and, as a result, can be complementary in the effort to optimize global trading relationships.

## 2 Purpose of this Document

With significant effort currently underway to understand and implement each network, this paper seeks to clarify the function and benefits of the EPCglobal Network and the GDSN, and to distinguish the information, operation and capabilities of each.

## 3 Distinguishing the Categories of Information

As business, technology and information needs continue to evolve, so do the standards and methods for communicating information, as evidenced by the evolution of information services like the EPCglobal Network and the GDSN. In order to understand this evolution, it is necessary to distinguish between two categories of information: STATIC INFORMATION and DYNAMIC INFORMATION.

### 3.1 Static Information

In the world of global commerce, STATIC INFORMATION can be defined as high level, core data about commercial entities and product/service groups. For example, STATIC INFORMATION about *commercial entities* includes location information about a warehouse, store, distribution center, sales office, etc. STATIC INFORMATION about *product/service groups* includes trading unit, selling unit, item dimensions, etc.

<b>COMMERCIAL ENTITIES</b>	<ul style="list-style-type: none"><li>▪ Party role (e.g., store; warehouse; etc.)</li><li>▪ Address</li><li>▪ Telephone number</li></ul>
<b>PRODUCT/SERVICE GROUPS</b>	<ul style="list-style-type: none"><li>▪ Target market</li><li>▪ Product classification</li><li>▪ Product description</li></ul>

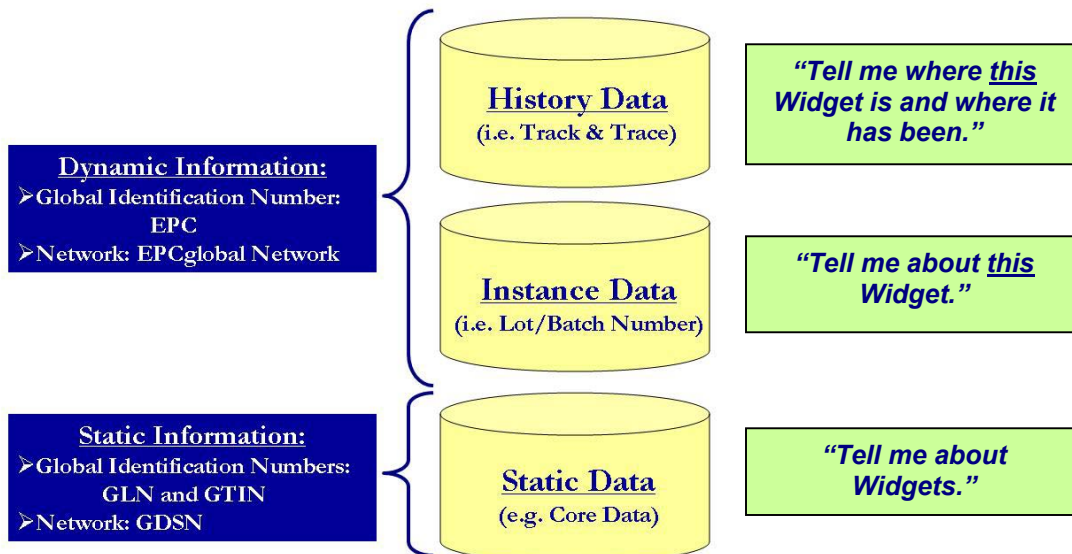
### 3.2 Dynamic Information

DYNAMIC INFORMATION can be defined as heterogeneous data that is specific to and variable for individual items, whether the item is a pallet, case, book, or vial. DYNAMIC INFORMATION conveys data specific to an individual instance of an object. There are two types of DYNAMIC INFORMATION: *Instance Data* and *History Data*.

<b>INSTANCE DATA</b>	<ul style="list-style-type: none"> <li>▪ Data regarding specific information on an individual item</li> <li>▪ Serial Number</li> <li>▪ Examples include date of manufacture, date of expiration, etc.</li> </ul>
<b>HISTORY DATA</b>	<ul style="list-style-type: none"> <li>▪ Data regarding the movement of an individual item throughout the product life cycle</li> <li>▪ <i>Events &amp; States</i> data</li> <li>▪ Examples include arrival times, departure times, destinations, current temperature, etc.</li> </ul>

### 3.3 Information Services

Thus, STATIC INFORMATION conveys core data of a certain object class (i.e., information applicable to all widgets), while DYNAMIC INFORMATION conveys data specific to an individual instance of an object (i.e. information about this particular widget). The GDSN and the EPCglobal Network have been developed in response to the various needs for each type of information. The GDSN ensures the quality of STATIC INFORMATION about parties and product groups. In contrast, the EPCglobal Network enables the collection and communication of DYNAMIC INFORMATION about the movement of individual items.



## **4 The Global Data Synchronization Network (GDSN)**

Companies share STATIC INFORMATION, like product attributes and company locations, with their trading partners in order to facilitate commercial transactions. In the event that a product attribute changes or a new product is introduced, that new information needs to be communicated across the supply chain to all affected parties to ensure that all partners are trading with the same information. This is also the case if a party changes the location of its headquarters where invoices are to be sent, or opens a new store to which deliveries must be made. Communicating changes in STATIC INFORMATION to all affected parties can be a daunting task in complex supply chains with hundreds of partners. The GDSN responds to these information needs by ensuring consistent, quality STATIC INFORMATION among trading partners utilizing EAN.UCC System standards, global identification numbers and business messaging standards.

### **4.1 Global Identification Numbers: GTIN & GLN**

The Global Location Number (GLN) and the Global Trade Item Number® (GTIN®) are the global identification numbers in the GDSN. The GLN is the EAN.UCC System identifier for legal entities, trading partners and locations (e.g., stores, manufacturing centers, warehouses, sales offices, etc.). The GTIN is the EAN.UCC System identifier for trade items, including both products and services. Each company assigns and maintains their own GTINs and GLNs, based on their *Company Prefix* and EAN.UCC System standards. The GLN and the GTIN are utilized by many vertical sectors to uniquely identify themselves and their product lines. The assignment of GLNs and GTINs enables the communication of STATIC INFORMATION about the associated legal entities, trading partners, locations and product lines within the GDSN.

### **4.2 Operation of the GDSN**

Utilizing EAN.UCC System standards-based information and messaging, the GDSN delivers a single entry point for trading partners to synchronize STATIC INFORMATION using interoperable data pools and the GS1 Global Registry™. The data pools are the warehouses for GLN and GTIN STATIC INFORMATION. Companies register their product information with a data pool and authorize a list of trading partners to receive their information. Thereafter, when information changes, the company makes the changes to their product information in their data pool. GDSN data pools then provide data synchronization by checking all STATIC INFORMATION for compliance to EAN.UCC System standards and synchronizing it between supply and demand side partners to ensure that all trading partners are using identical, updated, EAN.UCC System standards-compliant data. Finally, the GS1 Global Registry serves as the central directory for locating product and party data (i.e., GTINs and GLNs) from the various data pools in the GDSN. As such, it provides for basic global searches for GTIN and GLN information, and facilitates the movement of STATIC INFORMATION among trading partners within the network by identifying the data pool in which the information can be found.

## **5 The EPCglobal Network**

Access to DYNAMIC INFORMATION provides real time visibility for items and a complete history of product movement. The ability to access product movement information in real time about any item optimizes track and trace capabilities and enables greater

automation of tracking procedures. This enhanced capability has found uses in many industries, from baggage handling, to monitoring prescription drug administration. In addition, access to DYNAMIC INFORMATION is an invaluable resource to public safety officials in product recall and public health situations, and can be used to enhance customs and port security as well. Prior to the development of the EPCglobal Network, there were no globally recognized standards or methods for collecting and communicating DYNAMIC INFORMATION. However, the EPCglobal Network will fill that vacuum with a network of DYNAMIC INFORMATION based on Radio Frequency Identification (RFID) and Internet technologies.

## **5.1 Global Identification Number: EPC**

The Electronic Product Code™ (EPC) is the standardized item identifier in the EPCglobal Network. The EPCglobal Network provides a flexible framework for the EPC data structure that supports multiple numbering schemes (e.g., EAN.UCC; VIN; CAGE; DODAAC; etc.). This flexible framework facilitates the use of the EPCglobal Network by all vertical sectors because it permits each sector to integrate its own standards-based numbering system into its EPCs. For example, the EAN.UCC community will build their EPCs around the EAN.UCC System numbering system, and other industries will build their EPCs around their own standards-based numbering systems. The assignment of unique EPCs to individual items enables the collection and communication of DYNAMIC INFORMATION throughout the EPCglobal Network.

## **5.2 Operation of the EPCglobal Network**

The EPCglobal Network is the method for using RFID technology in the global supply chain by using inexpensive RFID tags and readers to pass EPCs, and then leveraging the Internet to access large amounts of associated information that can be shared among authorized users. To capture data, EPC tags carrying unique EPCs are affixed to containers, pallets, cases and/or individual units. Then, strategically placed EPC readers at gateways throughout the supply chain will read each tag as it passes and communicate the EPC and the time, date and location of the read to the network. EPC Middleware will control and integrate the EPC tags, readers and local infrastructure at the individual site.

Once the information is captured as described above, the EPCglobal Network then utilizes Internet technology to create a network for sharing that information among authorized trading partners in the global supply chain. Similar to Internet technology, the Object Naming Service (ONS) within the Discovery Services serves as White Pages that convert the EPC to a URL, which is then used to point local computers to where information associated with that EPC can be found. From there, actual access to data in the EPCglobal Network is managed at the local level by the EPC Information Services (EPC IS) where the company itself designates which trading partners have access to its information. The result will be a network of information that provides a history of individual product movement in real time.

**\*NOTE: Most EPC tags will pass only the EPC number to the reader. However, the potential value of more complicated tags with additional functionality justifies their increased cost in certain industries. For example, the food industry may want to add temperature tracking by adding a temperature sensor on tags. If a temperature sensor was added, the current temperature could also be passed to the reader when the tag was read.**

## 6 Comparing the Two Networks

Although the GDSN and the EPCglobal Network respond to different information needs, there are some synergies and comparisons, specifically in terms of the global identification numbers and the resolution of those global identification numbers with their associated information.

### 6.1 GTIN and EPC

The GTIN is the standards-based identifier for product groups for the EAN.UCC community, as well as the global identification number for obtaining static product information in the GDSN. The EPC data structure enables each sector to utilize its own standards-based numbering system in its EPCs. In the EAN.UCC community, the GTIN is the standards based number integrated into the EPC.

### 6.2 Synergy of the Networks

Currently, the two networks do not maintain any overlapping information. The EPCglobal Network does not provide GTIN information, and the GDSN does not provide information about individual instances of a product. However, because the GTIN has been integrated into the EPC, the global identification numbers for those two networks have been coordinated within the EPCglobal Network. The integration of the GTIN in the EPC provides an information link from the EPCglobal Network to the GDSN. As a result, the EPC not only provides the global identification number for accessing DYNAMIC INFORMATION about an individual item in the EPCglobal Network, but also the global identification number for EAN.UCC System users to access STATIC INFORMATION about that item's product group in the GDSN.

### 6.3 Components of Each Network

The EPCglobal Network and the GDSN both utilize a mechanism to associate a global identification number with the related information, as well as a mechanism to manage access to information within the network. In the EPCglobal Network, users query the ONS within Discovery Services with the EPC and the ONS returns the locations where information associated with that EPC can be found. From there, actual access to data in the EPCglobal Network is managed at the local level by the EPC IS where each company designates who has access to its DYNAMIC INFORMATION. In the GDSN, users query the GS1 Global Registry with the GLN and/or GTIN and the GS1 Global Registry then specifies the data pool in which information for that GTIN or GLN can be found. From there, access to the information is managed by the data pool where the data owner authorizes who has access to its STATIC INFORMATION.

GDSN	EPCglobal Network
<b>GS1 Global Registry</b> Automated directory service that identifies the data pool in which GTIN and/or GLN information can be found.	<b>ONS within Discovery Services</b> Automated networking service that converts the EPC to a URL, which is then used to point local computers to where information associated with that EPC can be accessed by authorized users.

<b>Data Pool</b>	<b>EPC IS</b>
Warehouse for product attribute information accessible to those authorized to send and receive the information.	Information services necessary for the communication and dissemination of EPC data, which leverages security technology including authentication, authorization and access control.

## 7 Contrasting the Two Networks

Despite these comparisons, there are key differences between the EPCglobal Network and the GDSN. Not only do the two networks each provide a distinct class of valuable information as discussed above, but they also have very different goals and operating environments.

### 7.1 Goals & Information

The EPCglobal Network is a method for collecting and sharing information about the physical movement of individual items. The goal of the EPCglobal Network is to provide access to DYNAMIC INFORMATION for collaborative logistics. In contrast, the GDSN is a method for sharing STATIC INFORMATION with trading partners in order to facilitate commercial transactions. The goal of the GDSN is to ensure the quality of STATIC INFORMATION among partners for collaborative trading.

	<b>GDSN</b>	<b>EPCglobal Network</b>
<b>Business Use</b>	Collaborative e-commerce <ul style="list-style-type: none"> <li>▪ Trade it!</li> </ul>	Collaborative logistics <ul style="list-style-type: none"> <li>▪ Move it!</li> </ul>
<b>Mission</b>	Ensure information quality between trading partners.	Track physical movement of items.
<b>Primary Functions</b>	Data synchronization and EAN.UCC System compliance validation. <ul style="list-style-type: none"> <li>▪ Foundation for collaborative transaction management (B2B electronic commerce).</li> </ul>	Record events and states changes. <ul style="list-style-type: none"> <li>▪ Automatic identification and data capture, plus standardized information exchanged over the Internet.</li> </ul>
<b>Type of Information</b>	Static Information <ul style="list-style-type: none"> <li>▪ Object class and party information</li> <li>▪ GTIN and GLN</li> </ul>	Dynamic Information <ul style="list-style-type: none"> <li>▪ Instance specific information</li> <li>▪ Unique identification of individual items using serialized EPCs</li> </ul>
<b>Data Stability</b>	Stable - relatively infrequent changes	Changing – frequent updates

## 7.2 Operating Environments

The mission and function of the EPCglobal Network is quite different from the mission and function of the GDSN. As a result, they have very different operating environments. The EPCglobal Network provides access to a high volume of frequently changing DYNAMIC INFORMATION. Each time an EPC tagged item passes through an EPC reader, the date, time, and location of the read is sent to the EPCglobal Network. Because EPCs are assigned to individual items, and because each item will pass through numerous EPC readers during its product life cycle, the operating environment of the EPCglobal Network is engineered for access to information moving through the supply chain. In contrast, the GDSN provides access to quality STATIC INFORMATION that is widely disseminated. Moreover, GLNs and GTINs provide core data about commercial entities and product/service groups. Thus, the GDSN is engineered to ensure the quality of relatively stable information.

## 8 Conclusion

The EPCglobal Network and the GDSN each provide significant benefits in their own right: the EPCglobal Network provides access to DYNAMIC INFORMATION about the movement of individual items as they pass through the supply chain while the GDSN ensures the quality of STATIC INFORMATION about commercial entities and product/service groups among partners for collaborative trading. For some of these collaborative models, data synchronization is a valuable counterpart to the EPCglobal Network, especially for companies striving to achieve a fully collaborative business model. For those business models, the combination of the EPCglobal Network and the GDSN can provide a comprehensive, integrated approach to electronic collaboration. As a result, they can be complements in the effort to optimize global trading relationships in complex supply chains.

Data synchronization, however, is not a pre-requisite to the implementation of the EPCglobal Network. Even at this early juncture in the development of the EPCglobal Network, many valuable use cases have been identified that span industries. For example, prescription administration and control and baggage handling do not require data synchronization to achieve benefits from the EPCglobal Network. Therefore, although data synchronization is not a pre-requisite to the implementation of the EPCglobal Network, each company must evaluate their own goals and information needs to determine if data synchronization can optimize their experience using the EPCglobal Network.

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