
**Information technology — EPC
Information services — Specification**

*Technologies de l'information — Services d'information sur les codes
de produit électronique — Spécification*

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GS1 Standard

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2 Abstract

3 This document is a GS1 Standard that defines Version 1.1 of EPC Information Services (EPCIS).
4 The goal of EPCIS is to enable disparate applications to create and share visibility event data,
5 both within and across enterprises. Ultimately, this sharing is aimed at enabling users to gain a
6 shared view of physical or digital objects within a relevant business context.

7 Status of this document

8 This section describes the status of this document at the time of its publication. Other
9 documents may supersede this document. The latest status of this document series is
10 maintained at GS1. See www.gs1.org/gsmf for more information.

11 This version of the GS1 EPCIS 1.1 Standard is the ratified version and has completed all GSMP
12 steps.

13 Comments on this document should be sent to gsmf@gs1.org.

14 Differences from EPCIS 1.0.1

15 EPCIS 1.1 is fully backward compatible with EPCIS 1.0.1.

16 EPCIS 1.1 includes these new or enhanced features:

- 17 • Support for class-level identification is added to `ObjectEvent`, `AggregationEvent`,
18 and `TransformationEvent` through the addition of quantity lists.
- 19 • A new event type, `TransformationEvent`, provides for the description of events in
20 which inputs are consumed and outputs are produced.
- 21 • The “why” dimension of all event types are enhanced so that information about the sources
22 and destinations of business transfers may be included.
- 23 • The “why” dimension of certain event types are enhanced so that item/lot master data may be
24 included.
- 25 • The `SimpleEventQuery` is enhanced to encompass the above changes to event types.
- 26 • The introductory material is revised to align with the GS1 System Architecture.
- 27 • The XML extension mechanism is explained more fully.
- 28 • The `QuantityEvent` is deprecated, as its functionality is fully subsumed by
29 `ObjectEvent` with the addition of quantity lists.

30



31

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110 Introduction

111 This document is a GS1 Standard that defines Version 1.1 of EPC Information Services (EPCIS).
112 The goal of EPCIS is to enable disparate applications to create and share visibility event data,
113 both within and across enterprises. Ultimately, this sharing is aimed at enabling users to gain a
114 shared view of physical or digital objects within a relevant business context.

115 “Objects” in the context of EPCIS typically refers to physical objects that are identified either at
116 a class or instance level and which are handled in physical handling steps of an overall business
117 process involving one or more organizations. Examples of such physical objects include trade
118 items (products), logistic units, returnable assets, fixed assets, physical documents, etc. “Objects”
119 may also refer to digital objects, also identified at either a class or instance level, which
120 participate in comparable business process steps. Examples of such digital objects include digital
121 trade items (music downloads, electronic books, etc.), digital documents (electronic coupons,
122 etc), and so forth. Throughout this document the word “object” is used to denote a physical or
123 digital object, identified at a class or instance level, that is the subject of a business process step.
124 EPCIS data consist of “visibility events,” each of which is the record of the completion of a
125 specific business process step acting upon one or more objects.

126 The EPCIS standard was originally conceived as part of a broader effort to enhance collaboration
127 between trading partners by sharing of detailed information about physical or digital objects. The
128 name EPCIS reflects the origins of this effort in the development of the Electronic Product Code
129 (EPC). It should be noted, however, that EPCIS does not require the use of Electronic Product
130 Codes, nor of Radio-Frequency Identification (RFID) data carriers, and as of EPCIS 1.1 does not
131 even require instance-level identification (for which the Electronic Product Code was originally
132 designed). The EPCIS standard applies to all situations in which visibility event data is to be
133 captured and shared, and the presence of “EPC” within the name is of historical significance
134 only.

135 EPCIS provides open, standardised interfaces that allow for seamless integration of well-defined
136 services in inter-company environments as well as within companies. Standard interfaces are
137 defined in the EPCIS standard to enable visibility event data to be captured and queried using a
138 defined set of service operations and associated data standards, all combined with appropriate
139 security mechanisms that satisfy the needs of user companies. In many or most cases, this will
140 involve the use of one or more persistent databases of visibility event data, though elements of
141 the Services approach could be used for direct application-to-application sharing without
142 persistent databases.

143 With or without persistent databases, the EPCIS specification specifies only a standard data
144 sharing interface between applications that capture visibility event data and those that need
145 access to it. *It does not specify how the service operations or databases themselves should be*
146 *implemented.* This includes not defining how the EPCIS services should acquire and/or compute
147 the data they need, except to the extent the data is captured using the standard EPCIS capture
148 operations. The interfaces are needed for interoperability, while the implementations allow for
149 competition among those providing the technology and implementing the standard.

150 EPCIS is intended to be used in conjunction with the GS1 Core Business Vocabulary (CBV)
151 standard [CBV1.1]. The CBV standard provides definitions of data values that may be used to
152 populate the data structures defined in the EPCIS standard. The use of the standardized
153 vocabulary provided by the CBV standard is critical to interoperability and critical to provide for

154 querying of data by reducing the variation in how different businesses express common intent.
155 Therefore, applications should use the CBV standard to the greatest extent possible in
156 constructing EPCIS data.

157 2 Relationship to the GS1 System Architecture

158 This section is largely quoted from [EPCAF] and [GS1Arch], and shows the relationship of
159 EPCIS to other GS1 Standards.

160 2.1 Overview of GS1 Standards

161 GS1 Standards support the information needs of end users interacting with each other in supply
162 chains, specifically the information required to support the business processes through which
163 supply chain participants interact. The subjects of such information are the real-world entities
164 that are part of those business processes. Real-world entities include things traded between
165 companies, such as products, parts, raw materials, packaging, and so on. Other real-world
166 entities of relevance to trading partners include the equipment and material needed to carry out
167 the business processes surrounding trade such as containers, transport, machinery; entities
168 corresponding to physical locations in which the business processes are carried out; legal entities
169 such as companies, divisions; service relationships; business transactions and documents; and
170 others. Real-world entities may exist in the tangible world, or may be digital or conceptual.
171 Examples of physical objects include a consumer electronics product, a transport container, and a
172 manufacturing site (location entity). Examples of digital objects include an electronic music
173 download, an eBook, and an electronic coupon. Examples of conceptual entities include a trade
174 item class, a product category, and a legal entity.

175 GS1 Standards may be divided into the following groups according to their role in supporting
176 information needs related to real-world entities in supply chain business processes:

- 177 • Standards which provide the means to **Identify** real-world entities so that they may be the
178 subject of electronic information that is stored and/or communicated by end users. GS1
179 identification standards include standards that define unique identification codes (called GS1
180 Identification Keys).
- 181 • Standards which provide the means to automatically **Capture** data that is carried directly on
182 physical objects, bridging the world of physical things and the world of electronic
183 information. GS1 data capture standards include definitions of bar code and radio-frequency
184 identification (RFID) data carriers which allow identifiers to be affixed directly to a physical
185 object, and standards that specify consistent interfaces to readers, printers, and other
186 hardware and software components that connect the data carriers to business applications.
- 187 • Standards which provide the means to **Share** information, both between trading partners and
188 internally, providing the foundation for electronic business transactions, electronic visibility
189 of the physical or digital world, and other information applications. GS1 standards for
190 information sharing include this EPCIS Standard which is a standard for visibility event data.
191 Other standards in the “Share” group are standards for master data and for business
192 transaction data, as well as discovery standards that help locate where relevant data resides
193 across a supply chain and trust standards that help establish the conditions for sharing data
194 with adequate security.



195 The EPCIS Standard fits into the “Share” group, providing the data standard for visibility event
196 data and the interface standards for capturing such information from data capture infrastructure
197 (which employs standards from the “Capture” group) and for sharing such information with
198 business applications and with trading partners.

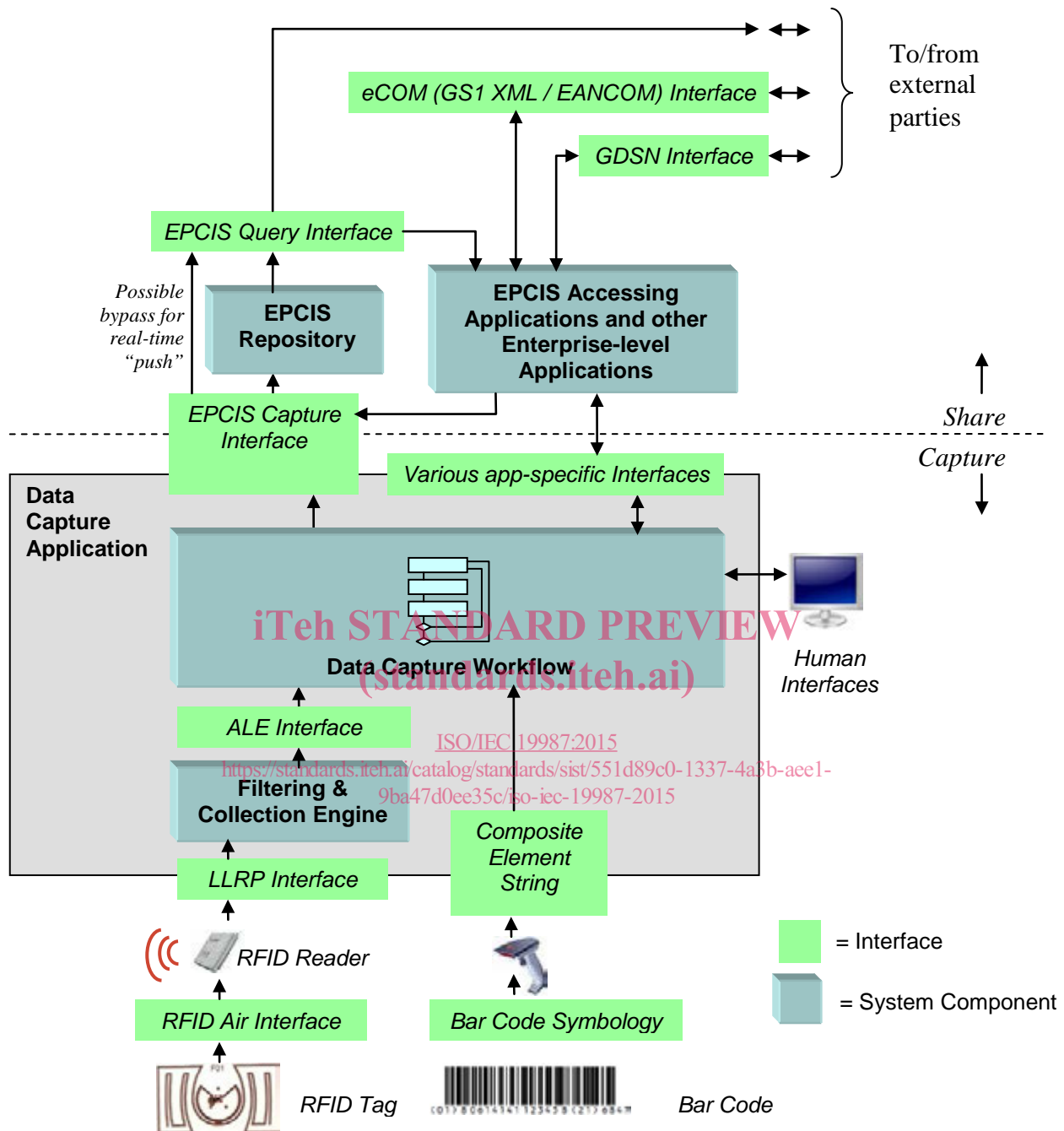
199 **2.2 EPCIS in Relation to the “Capture” and “Share” Layers**

200 The following diagram shows the relationship between EPCIS and other GS1 Standards in the
201 “Capture” and “Share” groups. (The “Identify” group of standards pervades the data at all levels
202 of this architecture, and so is not explicitly shown.)

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203

204 As depicted in the diagram above, the EPCIS Capture Interface exists as a bridge between the
 205 “Capture” and “Share” standards. The EPCIS Query Interface provides visibility event data both
 206 to internal applications and for sharing with trading partners.

207 At the centre of a data capture application is the data capture workflow that supervises the
 208 business process step within which data capture takes place. This is typically custom logic that is
 209 specific to the application. Beneath the data capture workflow in the diagram is the data path
 210 between the workflow and GS1 data carriers: bar codes and RFID. The green bars in the diagram
 211 denote GS1 Standards that may be used as interfaces to the data carriers. At the top of the

212 diagram are the interfaces between the data capture workflow and larger-scale enterprise
213 applications. Many of these interfaces are application- or enterprise-specific, though using GS1
214 data as building blocks; however, the EPCIS interface is a GS1 Standard. Note that the interfaces
215 at the top of the diagram, including EPCIS, are independent of the data carrier used at the bottom
216 of the diagram.

217 The purpose of the interfaces and the reason for a multi-layer data capture architecture is to
218 provide isolation between different levels of abstraction. Viewed from the perspective of an
219 enterprise application (i.e., from the uppermost blue box in the figure), the entire data capture
220 application shields the enterprise application from the details of exactly how data capture takes
221 place. Through the application-level interfaces (uppermost green bars), an enterprise application
222 interacts with the data capture workflow through data that is data carrier independent and in
223 which all of the interaction between data capture components has been consolidated into that
224 data. At a lower level, the data capture workflow is cognizant of whether it is interacting with bar
225 code scanners, RFID interrogators, human input, etc, but the transfer interfaces (green bars in the
226 middle) shield the data capture workflow from low-level hardware details of exactly how the
227 data carriers work. The lowest level interfaces (green bars on the bottom) embody those internal
228 data carrier details.

229 EPCIS and the “Share” layer in general differ from elements in the Capture layer in three key
230 respects:

- 231 1. EPCIS deals explicitly with historical data (in addition to current data). The Capture layer, in
232 contrast, is oriented exclusively towards real-time processing of captured data.
- 233 2. EPCIS often deals not just with raw data captured from data carriers such as bar codes and
234 RFID tags, but also in contexts that imbue those observations with meaning relative to the
235 physical or digital world and to specific steps in operational or analytical business processes.
236 The Capture layers are more purely observational in nature. An EPCIS event, while
237 containing much of the same “Identify” data as a Filtering & Collection event or a bar code
238 scan, is at a semantically higher level because it incorporates an understanding of the
239 business context in which the identifier data were obtained. Moreover, there is no
240 requirement that an EPCIS event be directly related to a specific physical data carrier
241 observation. For example, an EPCIS event may indicate that a perishable trade item has just
242 crossed its expiration date; such an event may be generated purely by software.
- 243 3. EPCIS operates within enterprise IT environments at a level that is much more diverse and
244 multi-purpose than exists at the Capture layer, where typically systems are self-contained and
245 exist to serve a single business purpose. In part, and most importantly, this is due to the
246 desire to share EPCIS data between enterprises which are likely to have different solutions
247 deployed to perform similar tasks. In part, it is also due to the persistent nature of EPCIS
248 data. And lastly, it is due to EPCIS being at the highest level of the overall architecture, and
249 hence the natural point of entry into other enterprise systems, which vary widely from one
250 enterprise to the next (or even within parts of the same enterprise).

251 2.3 EPCIS in Relation to Trading Partners

252 GS1 Standards in the “Share” layer pertain to three categories of data that are shared between
253 end users:

Data	Description	GS1 Standards
Master Data	Data, shared by one trading partner to many trading partners, that provide descriptive attributes of real-world entities identified by GS1 Identification Keys, including trade items, parties, and physical locations.	GDSN
Transaction Data	Trade transactions triggering or confirming the execution of a function within a business process as defined by an explicit business agreement (e.g., a supply contract) or an implicit one (e.g., customs processing), from the start of the business process (e.g., ordering the product) to the end of it (e.g., final settlement), also making use of GS1 Identification Keys.	GS1 eCOM XML EANCOM
Visibility Event Data	Details about physical or digital activity in the supply chain of products and other assets, identified by keys, detailing where these objects are in time, and why; not just within one organization's four walls, but across organizations.	EPCIS

254

255 Transaction Data and Visibility Event Data have the characteristic that new documents of those
 256 types are continually created as more business is transacted in a supply chain in steady state,
 257 even if no new real-world entities are being created. Master Data, in contrast, is more static: the
 258 Master Data for a given entity changes very slowly (if at all), and the quantity of Master Data
 259 only increases as new entities are created, not merely because existing entities participate in
 260 business processes. For example, as a given trade item instance moves through the supply chain,
 261 new transaction data and visibility event data are generated as that instance undergoes business
 262 transactions (such as purchase and sale) and physical handling processes (packing, picking,
 263 stocking, etc). But new Master Data is only created when a new trade item or location is added to
 264 the supply chain.

265 The following figure illustrates the flow of data between trading partners, emphasizing the parts
 266 of the EPCIS standard involved in the flow of visibility event data.