

ISO/IEC 19987:2024-03 (E)

Information technology - EPC Information Services (EPCIS)

| Contents | Page |
|---|-----------|
| 1 Introduction | 1 |
| 2 Relationship to the GS1 System Architecture | 2 |
| 2.1 Overview of GS1 standards | 2 |
| 2.2 EPCIS in relation to the "Capture" and "Share" layers | 3 |
| 2.3 EPCIS in Relation to trading partners | 4 |
| 2.4 EPCIS in relation to other GS1 System Architecture components | 5 |
| 3 EPCIS specification principles | 8 |
| 4 Terminology and typographical conventions | 9 |
| 5 EPCIS specification framework | 10 |
| 5.1 Layers | 10 |
| 5.2 Extensibility | 11 |
| 5.3 Modularity | 11 |
| 6 Abstract data model layer | 13 |
| 6.1 Event data and master data | 13 |
| 6.1.1 Transmission of master data in EPCIS | 15 |
| 6.2 Standard vocabulary and user vocabulary | 15 |
| 6.3 Extension mechanisms | 17 |
| 6.4 Identifier representation | 18 |
| 6.5 Hierarchical vocabularies | 19 |
| 7 Data definition layer | 20 |
| 7.1 General rules for specifying data definition layer modules | 20 |
| 7.1.1 Content | 20 |
| 7.1.2 Notation | 21 |
| 7.1.3 Semantics | 21 |
| 7.2 Core event types module – overview | 23 |
| 7.2.1 UML Diagrams of EPCIS Event Types | 24 |
| 7.2.2 Overview of EPCIS event "dimensions" (non-normative) | 25 |
| 7.2.3 Table of vocabulary types | 28 |
| 7.3 Core event types module – building blocks | 29 |
| 7.3.1 Primitive types | 29 |
| 7.3.2 Action type | 30 |
| 7.3.3 The "What" dimension | 31 |
| 7.3.4 The "When" dimension | 32 |
| 7.3.5 The "Where" Dimension – read point and business location | 33 |
| 7.3.6 The "Why" dimension | 36 |
| 7.3.7 The "How" dimension | 40 |
| 7.3.8 Instance/Lot master data (ILMD) | 47 |
| 7.4 Core event types module – events | 48 |
| 7.4.1 EPCISEvent | 48 |

| | | |
|-----------|--|------------|
| 7.4.2 | ObjectEvent (subclass of EPCISEvent) | 52 |
| 7.4.3 | AggregationEvent (subclass of EPCISEvent)..... | 56 |
| 7.4.4 | TransactionEvent (subclass of EPCISEvent) | 60 |
| 7.4.5 | TransformationEvent (subclass of EPCISEvent) | 65 |
| 7.4.6 | AssociationEvent (subclass of EPCISEvent) | 68 |
| 8 | Service Layer | 74 |
| 8.1 | Core capture operations module..... | 76 |
| 8.1.1 | Authentication and authorisation..... | 76 |
| 8.1.2 | Capture service | 77 |
| 8.2 | Core Query operations module..... | 78 |
| 8.2.1 | Authentication..... | 78 |
| 8.2.2 | Authorisation and redaction..... | 79 |
| 8.2.3 | Queries for large amounts of data | 79 |
| 8.2.4 | Overly complex queries | 80 |
| 8.2.5 | Query framework (EPCIS query control interface)..... | 80 |
| 8.2.6 | Error conditions..... | 86 |
| 8.2.7 | Predefined queries for EPCIS | 88 |
| 8.2.8 | Query callback interface | 121 |
| 9 | XML bindings for data definition modules | 122 |
| 9.1 | Extensibility mechanism | 122 |
| 9.2 | Standard business document header | 125 |
| 9.3 | EPCglobal Base schema | 125 |
| 9.4 | Master data in the XML binding..... | 126 |
| 9.5 | Schema for core event types | 127 |
| 9.6 | Core event types – examples (Non-Normative) | 128 |
| 10 | JSON/JSON-LD bindings for data definition | 129 |
| 10.1 | Brief introduction to JSON and JSON-LD in the context of EPCIS | 129 |
| 10.1.1 | JavaScript Object Notation (JSON) | 130 |
| 10.1.2 | JSON for Linked Data (JSON-LD)..... | 131 |
| 10.1.3 | Features of the JSON-LD context resource..... | 132 |
| 10.1.4 | Compact URI Expressions (CURIEs)..... | 133 |
| 10.2 | Expression and validation of EPCIS data structures in JSON and JSON-LD | 134 |
| 10.2.1 | Expressing data fields expecting simple values..... | 134 |
| 10.2.2 | Validating data fields expecting simple values..... | 136 |
| 10.2.3 | Validation of fields (e.g. 'action') that expect a string value from an enumerated list..... | 138 |
| 10.2.4 | Expressing simple lists of values | 139 |
| 10.2.5 | Validating lists of values | 140 |
| 10.2.6 | Expressing lists of elements with inline attributes expressing type | 140 |
| 10.2.7 | Modelling and validating subclasses of EPCIS event | 143 |
| 10.2.8 | Comparison of how validation rules are expressed in XSD, JSON Schema and SHACL | 144 |
| 10.2.9 | Mapping core SBDH fields to the JSON/JSON-LD data format for EPCIS | 146 |
| 10.2.10 | Online validation tools for JSON Schema and SHACL | 146 |
| 10.2.11 | Libraries and toolkits providing JSON-LD support..... | 146 |
| 10.3 | Validation schema (references to normative content) | 146 |
| 10.4 | Non-normative examples in JSON and JSON-LD | 147 |
| 11 | Bindings for core capture operations module..... | 147 |
| 11.1 | Message queue binding..... | 147 |
| 11.2 | HTTP binding..... | 148 |
| 12 | REST Bindings | 149 |
| 12.1 | Code conventions | 149 |
| 12.2 | Introduction to REST | 149 |

| | | |
|-----------|---|------------|
| 12.3 | Content negotiation, service discovery and custom headers for EPCIS | 151 |
| 12.4 | Authentication and Authorization..... | 153 |
| 12.5 | Pagination | 154 |
| 12.6 | Capturing EPCIS Events..... | 154 |
| 12.6.1 | Capture Interface | 155 |
| 12.6.2 | Capture Jobs Interface | 156 |
| 12.7 | Events interface..... | 157 |
| 12.7.1 | EPCIS events collections | 157 |
| 12.7.2 | EPCIS events endpoints..... | 157 |
| 12.7.3 | Event filtering with the EPCIS query language..... | 158 |
| 12.7.4 | Top-level resources..... | 159 |
| 12.8 | Query control interface | 160 |
| 12.8.1 | Creating and using named queries | 162 |
| 12.8.2 | Deleting named queries..... | 162 |
| 12.8.3 | Subscribing to named queries..... | 162 |
| 12.8.4 | EPCIS query language..... | 167 |
| 12.8.5 | EPCIS query in the URL | 168 |
| 12.9 | Backward Compatibility of REST bindings with EPCIS 1.2..... | 169 |
| 12.10 | EPCIS Error Conditions and HTTP Status Code Mapping | 169 |
| 13 | Bindings for core query operations module..... | 172 |
| 13.1 | XML schema for core query operations module..... | 172 |
| 13.2 | SOAP/HTTP binding for the query control interface..... | 173 |
| 13.3 | AS2 Binding for the query control interface..... | 174 |
| 13.3.1 | GS1 AS2 guidelines (Non-Normative) | 175 |
| 13.4 | Bindings for query callback interface..... | 177 |
| 13.4.1 | General Considerations for all XML-based bindings | 178 |
| 13.4.2 | HTTP binding of the query callback interface..... | 178 |
| 13.4.3 | HTTPS binding of the query callback interface | 179 |
| 13.4.4 | AS2 Binding of the query callback interface | 179 |
| 14 | Conformance..... | 180 |
| 14.1 | Conformance of EPCIS XML data | 180 |
| 14.2 | Conformance of EPCIS capture interface clients..... | 180 |
| 14.3 | Conformance of EPCIS capture interface servers | 180 |
| 14.4 | Conformance of EPCIS query interface clients | 181 |
| 14.5 | Conformance of EPCIS query interface servers | 181 |
| 14.6 | Conformance of EPCIS query callback interface implementations | 181 |
| 14.7 | Conformance of JSON/JSON-LD bindings..... | 181 |
| 14.8 | Conformance of REST Interface for EPCIS 2.0 Servers..... | 182 |
| 15 | UML Diagrams for SBDH..... | 184 |
| 15.1 | UML aligned with text of SBDH specification..... | 185 |
| 15.2 | UML aligned with XSD of SBDH specification | 185 |
| 16 | List of abbreviations (non-normative) | 185 |
| 17 | References | 187 |

Index of figures

| | |
|---|------------|
| Figure 2-1 EPCIS in relation to the "Capture" and "Share" layers | 3 |
| Figure 2-2 EPCIS in relation to other GS1 System Architecture components | 5 |
| Figure 5-1 Layers of the EPCIS specification framework..... | 10 |
| Figure 6-1 Structure of event data and master data in EPCIS | 14 |
| Figure 7-1 EPCIS data definition notation | 21 |
| Figure 7-2 EPCIS UML with Ontology focus | 24 |
| Figure 7-3 EPCIS UML with Syntax focus..... | 24 |
| Figure 7-4 Example of the distinction between a read point and a business location | 35 |
| Figure 7-5 Coordinate reference systems | 46 |
| Figure 7-6 Association and Aggregation with returnable transport units (RTIs)..... | 69 |
| Figure 7-7 Association and Aggregation with containers | 70 |
| Figure 7-8 Association and Aggregation in a room | 70 |
| Figure 8-1 EPCIS Service Layer | 75 |
| Figure 10-1 RDF Triple: Subject-Property-Value | 130 |
| Figure 10-2 Supporting multiple formats for EPCIS / CBV 2.0 | 134 |
| Figure 12-1 Client first uses OPTIONS to discover which versions are supported and making GET request..... | 153 |
| Figure 12-2 Authentication and authorisation | 153 |
| Figure 12-3 Endpoint: Capture Interface workflow | 155 |
| Figure 12-4 EPCIS query as URL query parameters | 158 |
| Figure 12-5 Endpoint: Named queries workflow..... | 161 |
| Figure 12-6 Client creates a named query for EPCIS events and uses pagination to retrieve all EPCIS events | 162 |
| Figure 12-7 Scheduled query workflow | 164 |
| Figure 12-8 Event streaming query workflow..... | 165 |
| Figure 12-9 Query subscription with Webhook (HTTP Callback) | 166 |
| Figure 12-10 Query subscription with a WebSocket | 167 |
| Figure 15-1 UML aligned with text of SBDH | 185 |
| Figure 15-2 UML aligned with XSD of SBDH | 185 |