Cash Logistics

Migration from GS1 XML 2 to version 3.*

1.0, September 2018

Document describtion

Title	Cash Logistics / Migration from GS1 XML 2 to version 3.*
Date	September 2018
Version	1.0
Status	Final
Describtion	Reasons for transition from usage of standard GS1 XML 2.* to 3.3 at the logistics of cash - CashEDI

Version changes

Version	Date	Changed by	Content
1.0	September 2018	GS1 Slovenija	Initial document

Disclaimer

Contents

2. Introduction 4
3. Validation of XML documents 4
4. Differences between GS1 XML 2 and 3 standards 5
4.1. One root schema 5
4.2. Code lists 5
4.3. Electronic signature 6
4.4. Other 6
5. Specific application of Version 2* 6
5.1. Packaging hierarchy 6
5.2. Alternative messages 6
5.3. Envelope around the standard schema 7
5.4. Local adaptation of the structure 7
6. New elements 7
6.1. New messages 7
6.2. New identifiers 7
6.3. Packaging hierarchy 7
7. Main differences 8
8. Reasons for the transition 8
9. Transition 9
10. Links 9

2. Introduction

The cash logistics project - CashEDI started in 2008 in cooperation with the German Central Bank, the Deutsche Bundesbank. It has been used for more than 10 years and is primarily based on the electronic data exchange standard GS1 XML, Version 2.5.

The system spread relatively quickly and has reached other countries, including Slovenia in 2010. The system was initially designed as a principle of data exchange between the central bank and commercial banks, but not also with the end customers.

To some extent, the situation in Slovenia is specific because also the Ministry of Interior – the Police and the Inspectorate – looked for a traceability standard in cash transit operations. This was because there was no appropriate legislation requiring the traceability of cash shipments or the control of cash couriers. As a result, a regulation was prepared, namely the rules that define the work method of cash couriers and the accompanying security services. The standard that is not explicitly named in the Rules is a part of these regulations; however, GS1 Standard is the only one to meet these requirements.

The second requirement that is also specific for Slovenia was that one of the larger commercial banks expressed a wish to extend its system to include its customers and to incorporate the cooperation with cash couriers – CIT companies.

Consequently, the specifications of 2008/2010 had to be refined. Some of the findings are presented below in addition to the reasons why it is prudent to shift to the versions of the standard 3.3 and prepare new recommendations.

3. Validation of XML documents

The XML format enables the tree – hierarchical structure of the record, which is the ideal manner to write down complex data structures.

To ensure the same application of such tree data structure, the XML schemas (XSD documents) are used and they clearly specify what content to be entered into the XML reference document.

At the beginning, the XML document has a reference path to the schema that was used to design it. The XSD schema and the XML document are connected through this reference, which enables that each user, each programme and each system reading this XML can check whether XML complies with its schema.

There are two levels of the control of data recording appropriateness in the XML format: **formation** and **validation**.

Formation is only the verification whether all data elements have been started and completed correctly. Formation does not control the appropriateness of data types – whether a number is really a number and not a text, whether a date is really a date and whether all mandatory elements have really been entered, and whether the sequence is correct, and whether the right codes have been used, etc.

The second level of control – validation is used for that purpose. In order to be able to use validation, the XML document must be in accordance with the scheme not only structurally but also in terms of data types.

The XML schema is a regulation that specifies all possible and allowed formats of an XML document. The schema defines all data elements, all data, all data types (numbers, dates, codes, etc.) and their sequence.

Validation is therefore a procedure to compare the definition in the scheme with the document. If there is anything wrong with the XML document, the validation procedure identifies it as an error.

Validation is crucial to ensure the accuracy of composed XML documents and to provide the standard between various integrators and solution providers at the same time.

That is precisely why it is important for all XML documents to follow their reference schema, to be formed appropriately and most importantly, that they can be validated by any user of the document. This means that the schema on the basis of which a document is prepared must be public.

When the XML document can not be validated, it no longer meets the standard or the specifications.

4. Differences between GS1 XML 2 and 3 standards

Version GS1 XML 3.0 resulted in significant progress made in terms of the content and technology. The technological differences[Ref 3]are described on the GS1 headquarters' website. Some of the major ones are mentioned below.

4.1. One root schema

Version 3 has only one main schema and only in rare cases it relates to any of the subordinated schemas.

In terms of the integration and maintenance it is much easier to integrate and maintain one schema than a number of subordinated schemas. The problem associated with the use of a number of subordinated schemas of Version 2 is that it is not absolutely clear which of the subordinated schemas is the main one – the root one.

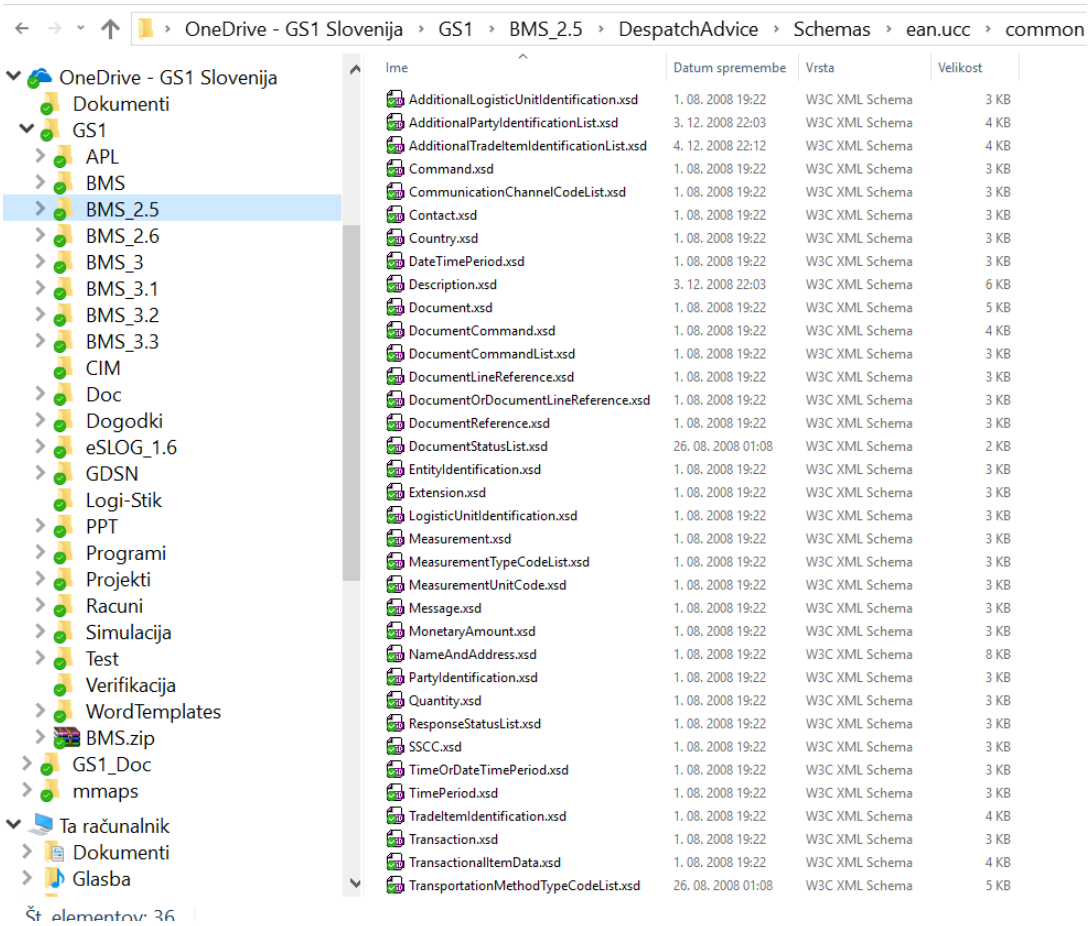

Figure 4—1: Some of subordinated schemes with Despatch Advice Version 2.5

4.2. Code lists

Code lists were a part of the schema definition in Version 2 and it is the code lists that are most frequently subject to changes in the course of the use of the standard. As a result, the problem related to updating of versions is frequent or the schemas and software are often changed. A new code means a new version of schemas, a new version of software and potentially new instructions

and work process. This can be avoided by improvising or manual addition of new codes into the old schemas, but this is not the method of work.

The code lists are excluded from Version 3 and a special tool has been designed – Global Data Dictionary[Ref 4] that enables the insight into the most recent situation of the code lists regarding all encoded data elements. Consequently, schemas are independent of any changes of the code lists.

4.3. Electronic signature

The Version 2 schemas (except the electronic invoice) do not support the use of electronic signature that is often mandatory when transmitting the data on cash logistics. This is why the integrators modified the original GS1 schema, and made an envelope that includes the electronic signature.

This modification caused a structural change of the schema and the problem of validation because such remaking is very awkward due to the complexity of Version 2 schemas, and the documents based on such a schema become non valid.

The integration of such a schema is a specific problem since the control of the appropriateness of the content can only be performed manually – formal schema validation is almost impossible.

The integration of electronic signature into version 3 is simple although it is not formally specified because a special data structure – extension – is integrated for such extensions.

4.4. Other

The use of *namespace*s is specified, and the application of the SBDH element (*Standards Business Document Header*) is mandatory in Version 3, which facilitates the routing of messages. The application of attributes in Version 3 is more precisely defined.

This all results in much more conclusive data model, which facilitates XML file generation and reading.

5. Specific application of Version 2*

Some business processes are simply not covered by Version 2. The messages were elementary, and the practice and modifications did not refine data structures through GS1 GSMP, some data elements were missing, etc. This is why various improvisations and even modifications of the standard schema during its use were necessary.

Specific application is a conventional principle of the message composition, the use of own codes and data structures outside the definition of the standard. Such application is a last resort when the standard fails to cover the business needs and there is no time to adapt it to new business needs.

5.1. Packaging hierarchy

The integration of Version 2 in the field of logistics includes an agreement concerning the artificial – virtual transport unit that contains the identification numbers of transport units in a shipment. Such an agreement was necessary so that the entire shipment was identified simply because in those days there was no standard shipment number (GSIN) and this was some kind of workaround solution.

5.2. Alternative messages

When the transport units are prepared by the sender, the latter must inform the courier to collect them and deliver them to appropriate locations. In this case, Despatch Advice message is used in current practice, but it is now reduced so that it no longer contains the details intended for the recipient of the shipment. The principle related to the application of GS1 standards is that a dedicated message is used for the right process and not a message adapted from other processes.

5.3. Envelope around the standard schema

For various reasons, but mainly due to the need to integrate electronic signature, the practice is to provide an envelope around the formal GS1 schema with additional elements. This again results in the problem of validating such XML documents.

5.4. Local adaptation of the structure

Business needs dictate data structures in electronic messages which can mean that standard messages become completely useless. The advantage and the problem of the XML format is that it is easy to adjust, but local adjustments can lead away from the standard. Non-standard manner of use can cause problems in the applications of other business partners and undermine the reputation of the GS1 organization.

This manner is no different from the use of the so-called flat-file system since all systemic advantages of the validation of XML messages are lost.

6. New elements

6.1. New messages

Version 3 introduced several new messages which include two that are relevant for cash logistics.

- **Transport Instruction** is a message generated by the client ordering the transport and sent to the courier. With this message, the client informs the courier to come and collect certain transport units.
- **Transport Instruction Response** is a message whereby the client ordering the transport and the recipient of the shipment are informed by the courier of all the details of the takeover or delivery.

6.2. New identifiers

The development of general GS1 specifications in 2010 introduced two new identifiers, **GSIN** and **GINC**, which are important in logistics in general and also in cash logistics.

GSIN is applied with the Transport Instruction message to order transport with the courier, and GINC is used by a cash courier to label an individual cargo.

Formally, these identifiers cannot be used with Version 2 messages not only because the Transport Instruction and Transport Instruction Response messages did not exist prior to 2010 but also because there are no data elements in the data structure for these two identifiers.

6.3. Packaging hierarchy

Shipments are primarily multi-level, which means that several subordinated units are in the senior transport unit (for example a metal box). The hierarchy levels are theoretically unlimited – the subordinated unit may contain another multiple unit … like Russian babushkas.

The units of the hierarchy are described in accordance with the principles of GS1 concerning the description of transport units – using the appropriate tree structure. The hierarchy system in the existing recommendations for Version 2 are only two-level and even this is enabled by using the virtual transport unit that is always indicated as the first one and that contains all the physical units included.

The problem of such a solution is that it is practically limited to only two hierarchy levels and it uses the identification number (SSCC) that does not exist in physical terms, which may cause a substantive problem experienced by cash couriers. The second problem is that this is a completely conventional solution that is contrary to the prescribed structure of the standard schema.

An example of hierarchy:

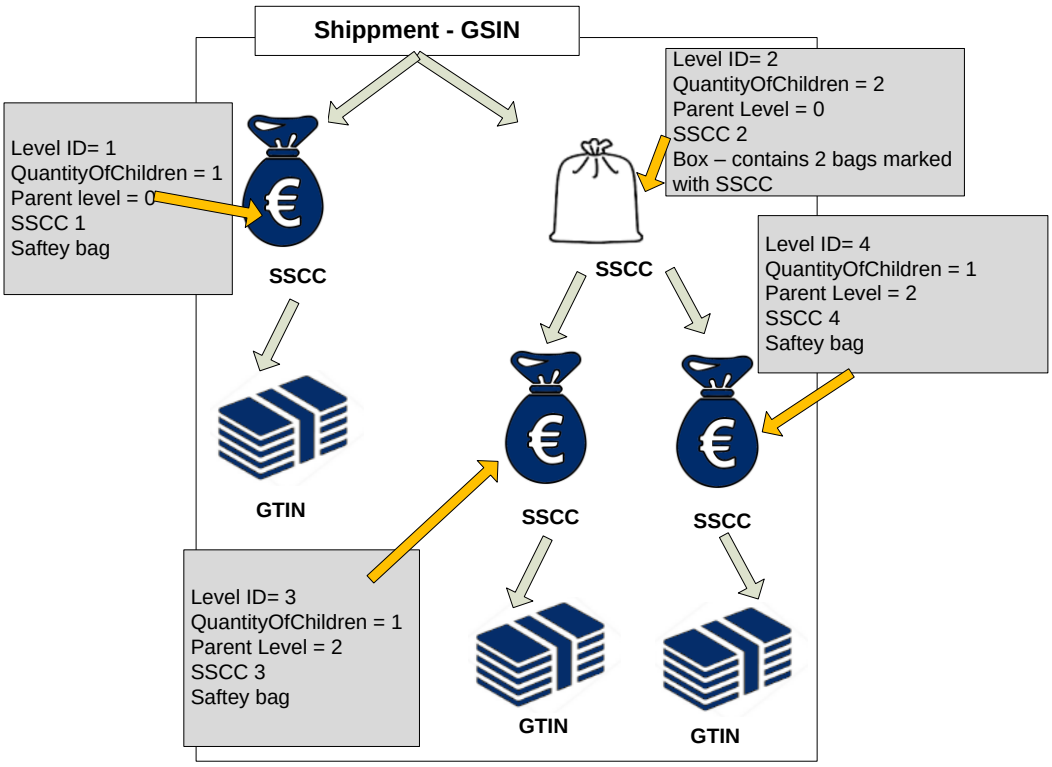

Figure 6—1: Hierarchy of a shipment in Version 3

7. Main differences

- Formal description of the packaging hierarchy in a shipment and the suspension of the application of the synthetic first transport unit as used in specifications related to Version 2.
- Application of two new messages (Transport Instruction and Transport Instruction Response).
- Use of GSIN and GINC identifiers.
- Use of the GS1 formal scheme without any specific envelopes or additional data elements that are not included in the formal scheme.

8. Reasons for the transition

- GS1 has not been supporting version 2* since 2010. The assistance provided by the GS1 organizations to the users of the old version is therefore limited. The schemas for the old version are still available [Ref 2] but are no longer maintained. The use of the old version is therefore very similar to the use of an old vehicle whose maintenance gets more demanding and of course more expensive.
- All additional extensions/adjustments of the older version are made on one's own and consequently undermine the reputation of GS1 since the integration at business partners is incompliant with the GS1 standard and the XML technology principles.
- The messages of the standard are intended for certain business processes. However, the appropriate message must be used for the appropriate business process. Version 2 did not include the Transport Instruction message and in practice, the shortened Dispatch Advice is used instead. Technically, this is in place, but the applicability is limited.

- In Version 3, the electronic signature can be simply used in the existing structure whereas in Version 2 this is not possible without the scheme or scheme hierarchy adaptation.
- Both versions can co-exist, which means that the users of the old version do not need to be convinced to opt for the transition until they decide on their own or there is another reason to do that.

9. Transition

Obviously, the transition between versions of information systems is complex and requires more resources. In addition to all process changes and the information system adaptations, the education of all partners involved is the major issue.

Fortunately, the transition from Version 2 to 3 in the CashEDI system only involved relatively small process and information changes.

What is to be provided

- Software adjustment. This means that parsing of documents following the new version must be insured in one's own information system. And since the two systems are fully data consistent, this step is the simplest of all.
- The provision of co-existence of both versions.
- The application of new messages Transport Instruction and in Transport Instruction Response. The integration of new messages into a business process is agreed between business partners. With the transition to version 3, the new Transport Instruction message replaces a modified Despatch Advice message and this is why the partners must be made familiar with the new message use. In terms of data – the messages are very similar so that from the technological point of view such integration poses no problem.
- Use of new identifiers, GSIN and GINC. All partners that form the Transport Instruction message need to use the GSIN identifier. And couriers use GINC, but this is not relevant for other participants – except for potential other couriers.
- Acceptance of the Transport Instruction Response message. The logistics service provider or the courier (CIT Company) can integrate this message in its system. In this case also partners need to be willing to accept it. The advantage of this message is that a vehicle and the crew coming to the location can be described. This may be very important for safety reasons.
- A change in the format of the packaging hierarchy
- Distinction of partners based on the version they use. It takes a long time for all partners to shift to the new version. This results in a period of the co-existence of the systems and this requires special preparations.

10. Links

Referenca	Dokument	Povezava
Ref 1	Latest GS1 XML schemas	http://www.gs1.org/edi-xml
Ref 2	Schemas for version 2.*	https://www.gs1.org/family-page/archive/family-page/archive/standards/gs1-xml/archive
Ref 3	Differences between 3 in 2	https://www.gs1.org/edi-xml/technical-user-guide/Main_differences
Ref 4	Global Data Dictionary	http://apps.gs1.org/gdd/SitePages/Home.aspx
Ref 5	Documentation for Cash EDI in Slovenia	https://www.gs1si.org/GS1-v-praksi/Banke/CashEDI-Standardi-GS1/CashEDI-dokumentacija
Ref 6	GS1 XML schemas 3.3	https://www.gs1.org/standards/gs1-xml/3-3

Referenca	Dokument	Povezava
Ref 7	GINC specifications	https://www.gs1.org/standards/id-keys/ginc
Ref 8	GSIN specifications	https://www.gs1.org/standards/id-keys/gsin