TBG 5
Team Finance

UN/CEFACT

UN/CEFACT United Nations Centre for Trade Facilitation and Electronic Business

TBG International Trade & Business Processes Group

Team 5 Finance Domain

Maintenance Task Force

Cardinalities

in UN/EDIFACT messages of the Finance Domain

Methods and techniques for message enhancement

Recommendation of UN/CEFACT TBG Team 5 Finance Domain

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2   Summary

Some industries have the need to make large counts of transactions. Typical examples are pensions payments and insurance premiums.

The currently implemented UN/EDIFACT multiple transaction messages of the finance domain are limited to 9.999 transactions per batch. This limitation has regularly no impact, as only few clients of financial institutions get close to this count. On the other hand the few clients reaching this limit get in trouble for at least following reasons:

- The limitation require an additional batching criteria within the software preparing the transfers
- For each business relation with a financial institution a different workaround might be necessary

For ease of both parties, financial institutions and industries, this document offers a straightforward solution to overcome the current limitation.

3   Background

3.1   Current situation

Current implementations of UN/EDIFACT multiple transaction messages of the finance domain are using the message types of the UN/EDIFACT Directory 96A in a Syntax level 3 environment for communications between financial institutions and their clients.

3.1.1   Single transaction count

The used message types for orders and debits are PAYMUL and DIRDEB. Both message types have limited the maximum count of single transaction per batch to 9.999 instances. The limitation is arbitrary in sense of the available possible maximum count. The trigger segment of each single transaction hosts a counter limited to 6 alpha numeric characters. This is likewise the same for other message types.

3.1.2   Segment count

Every UN/EDIFACT message ends with trailer segment (segment tag UNT). This trailer segment is a service segment defined in ISO 9735. The UNT segment hosts a counter counting the segments used in the message. The counter for Syntax level 1 to 3 is limited to 6 numeric digits.

3.1.3   Extension need

At least for two reasons an extension is requested for current implementations:
- Segment counter can be easily exceeded with current definitions of repetitions of batches, single transactions per batch and possible amount of remittance information
- Repetition of single transactions per batch is not sufficient for some industries

3.2   Estimations

3.2.1   Single transaction count

Looking at two examples, pension payments and insurance debits, typical batching criteria were encountered. While pension payments are often batched by administrative units (districts, city quarters …), insurance debits are often sorted by product (life insurance, car insurance, …). Another often used batching criteria – also used in other businesses – is the last names first letter.

Observations made in existing implementations shows, that single transaction count of those industries often exceeds the 9.999 limit and already occasionally reaches more than 300.000 single transactions in one batch.

3.2.2   Average segment count

Some theoretic considerations will lead to an estimated count of some 10 segments per single transactions. This includes the trigger segment, amount, account, references and remittance information.

Observations made in existing implementations shows, that 10 segments per single transactions is indeed a realistic average segment count.

3.2.3   Practical Extensions

Single transaction count could be extended to 999.999 repetitions. This is a pure numeric extended use of the counter in the trigger segment. It overrules the Directory 96A.

Segment count could be extended to 10 numeric digits. This is a pure numeric extended use of the counter in the message trailer segment. It overrules the ISO 9735 of current implementations. Syntax level 4 provides 10 numeric digits.

3.3   Potential risks

Enlarging the possible count of repetitions of single transactions in a batch affects also the segment counter in the service segment UNT. Any solution must take care of this effect. Risks might arise due to data types used in applications and/or gateways.

As the count of single transactions per batch was restricted to 9.999 instances per batch, a programmer might have used a Short counter. An enlargement to 999.999 single transactions per batch will need an Integer counter.

As the count of segments was restricted to 999.999 segments per message, a programmer might have used a Integer counter. An enlargement to 9.999.999.999 segments per message will need a Long counter.

3.4   Alternatives

If overruling of Directory and / or Syntax level is not acceptable, there is only one possible and valid solution.

This solution will require to

- switch to Syntax level 4 environment (as Syntax level 4 provides 10 numeric digits for message segment counter) and
- using message types of later Directories (as provided repetitions are 99.999 starting with Directory 98A and 999.999 starting with Directory 02A)

at least for those customers needing the extension. A general switch to either Syntax level 4 and later Directory will affect all communication partners just for the few really needing it.

4   Solution

After having checked acceptance possibility and data types of applications and/or gateways

- enlarge single transactions per batch counter to 999.999
- enlarge segments per message counter to 9.999.999.999

If data type of segment counter was designed as Integer and not as Long, an interim restriction to 2.147.483.647 segments per message might help. Assuming 10 segments per single transaction this offers already some 200.000.000 transactions per message. A message like this must contain at least 200 batches.

4.1   Compatibility

Extension of either single transactions per batch counter and segments per message counter do have no affect on current exchanged messages, as those messages fit into current restrictions and do not interfere with this extension.

Existing implementations already working with this solution work seamlessly together with older implementations. Also other message types where extended using the same principle.

5   Glossary

5.1   Terms and expressions

Cardinality	Number of instances in a set. Here: minimum and maximum repetition of information sets
Directory	Definitions from: UN/EDIFACT Directories
Message type	Specific message taken from a stated UN/EDIFACT Directory
Batch	Set of single transactions aggregated to a booking entry on an financial account
Single transaction	Information set containing data about and for one beneficiary
Segment	Set of data as defined in a UN/EDIFACT Directory
Syntax level 3	Definitions from: ISO 9735 - Amendment 1992
Syntax level 4	Definitions from: ISO 9735 -1 : 1998
Signed / unsigned count	Depending on programming language data types do / do not respect signed numbers

5.2   Associated documents and sources

ISO 9735 - Amendment 1992	Electronic data interchange for administration, commerce and transport (EDIFACT) – Application level syntax rules	http://www.iso.ch/cate/cat.html
ISO 9735 -1 : 1998	Electronic data interchange for administration, commerce and transport (EDIFACT) – Application level syntax rules	http://www.iso.ch/cate/cat.html
UNTDID	UNITED NATIONS TRADE DATA INTERCHANGE DIRECTORY	http://www.unece.org/trade/untdid
UN/EDIFACT Directories	See UNTDID	http://www.unece.org/trade/untdid
TBG 5 Service Segments	Service Segments for the use in all UN/EDIFACT messages of the Finance Domain	http://www.unece.org/trade/untdid http://www.tbg5-finance.org

5.3   Data types

Type	size	count signed	count unsigned
Short	2 byte	$32.767 (=2^{15}-1)$	$65.535 (=2^{16}-1)$
Integer	4 byte	$2.147.483.647 (=2^{31}-1)$	$4.294.967.295 (=2^{32}-1)$
Long	8 byte	$9.223.372.036.854.775.807 (=2^{63}-1)$	$18.446.744.073.709.551.615 (=2^{64}-1)$

5.4   Theoretic extensions

Other counting systems as the decimal system can be used for count of repetitions of single transactions. In this case the used counting system could be indicated in one of the subsequent elements of the counter. Following examples for illustration: the decimal system can count $999.999 (=10^6-1)$ repetitions, the hexadecimal counting system can count $16.777.215 (=16^6-1)$ repetitions, a system using all available characters could reach up to $50.096.498.540.543 (=192^6-1)$ repetitions.

5.5   Principle restrictions

The maximum file size of modern desktop operating systems depend on the file system of the connected hard disk. It is 4 Gigabyte $(=2^{32})$ for a FAT 32 system and 2 Terabyte $(=2^{41})$ for a NTFS system (For NTFS there is no real restriction, but 2 Terabyte is the largest possible hard disk partition. In theory the maximum file size is 16 Exabyte $(=2^{64})$). Mainframe file systems reaches 512 Terabyte $(=2^{49})$ to 4 Petabyte $(=2^{52})$ maximum file sizes.