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EAN.UCC standards, Galileo, GPS, GSM, GLN

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APPLICATION OF EAN.UCC STANDARDS TO THE GALILEO, GPS AND GSM ADVANCED SERVICES

The objective of this paper is to present the new idea of merging the advanced automatic identification solutions with global standards and satellite positioning systems or GSM positioning possibility. The basic concept is to maintain the GLN registry with geographic coordinates as its attributes. This information will support the ITS systems and make possibilities to develop advanced Agent based automatic information systems for all logistics solutions.

ZASTOSOWANIE STANDARDÓW EAN.UCC DLA SYSTEMÓW GALILEO, GPS I ZAAWANSOWANYCH USŁUG GSM

Celem referatu jest prezentacja nowej koncepcji łączenia zaawansowanych rozwiązań automatycznej identyfikacji z globalnymi standardami oraz możliwościami systemów satelitarnej lokalizacji lub możliwościami lokalizacyjnymi GSM. Podstawowa koncepcja to prowadzenie rejestru GLN ze współrzędnymi geograficznymi jako jej atrybutami. Informacja ta będzie wspomagała systemy ITS i umożliwiała opracowywanie zaawansowanych, opartych na koncepcji Agenta programowego, automatycznych systemów informacyjnych dla wszelkich rozwiązań logistycznych.

1. INTRODUCTION

Now, the physical location of "ship to" place specific for delivery chain is described by the names of: country, city, road, etc. These names could change and if we have not the geographic coordinates, there is the problem. EAN.UCC standards describe GLN number, which is placed on the logistics labels and in EDI messages and may change this situation.

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Fig.1. GLN2GEO system application

They may identify the delivery places and if we have the GLNs REGISTER with attributes like geographic coordinates, the ITS systems may automatically bring the information about the ideal road of delivery and display it with the digital map.

1.1. OVERALL OBJECTIVES

There is the concept of application of EAN.UCC standard GLN number to the Galileo, GPS and GSM Advanced Services. The basis idea is to construct the REGISTER of GLNs with geographic coordinates (for the specific local net or for global use). It'll be the support for information systems for intermodal transport (of accident and fire, rescue action, too).

In the real World there are sophisticated systems of delivery of goods. The European Commission, Directorate-General for Energy and Transport, is interested in new initiatives to ensure efficiency of freight transport along the supply chains. The main problem is to save and secure intermodal transport. For this reason ongoing the project called "Safe and secure intermodal transport - SIT" (www.sitglobal.org) consisting in a "Thematic Network" of Competitive and Sustainable Growth specific programme for Research and Technological Development. The clustering activity is divided by subject:

- 1. Security scenarios
- 2. Standardization, harmonization and interoperability of incident management and response
- 3. Intermodal responsibility
- 4. Data transmission and handling
- 5. Container seals
- 6. Demonstration projects and business practices

Proposal described in this paper should make the decision in area of transportation adequate to the actual opportunity of save and secure the supply chain.

2. STANDARDS AND SYSTEMS TO BE IMPLEMENTED

Global system EAN.UCC was created from EAN International Organization with Head Office at Brussels (all the World without USA and Canada) and Uniform Code Council (UCC) organization for USA and Canada (Fig.2.). This is the potential of:

- more than 1,300 EAN staff (32 at HQ)
- 5 billion transactions per day in 129 countries
- 1 million user companies
- plus the market of USA and Canada.

The main activity is to develop, promote and implement of standards for supply chain management:

- o Bar Code,
- o Automatic Data Capture (ADC),
- o Electronic Data Interchange (EDI)
- o Traceability,
- o Asset Tracking,
- o Logistics,
- o Order Management

Now we have developed the standards of identification of party and item.

EAN-UCC world map





2.1. GLOBAL LOCATION NUMBER (GLN)

The GLN (Global Location Number) provides the standard for new era of e-business. This is an identifier of legal entities, trading parties and locations. The GLN is globally unique number. It may identify:

- physical entities (e.g. warehouse gate, loading dock, delivery point; building, room within a building),
- o legal entities (e.g. buyers, sellers, freight forwarders),
- o functional entities (e.g. department or customer number within legal entity).

EAN.UCC Company Prefix	Location Reference	Check Digit
N1 N2 N3 N4 N5 N6 N7	N8 N9 N10 N11 N12	N ₁
$N_1 N_2 N_3 N_4 N_5 N_6 N_7 N_8$	N9 N10 N11 N12	N ₁
N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉	N ₁₀ N ₁₁ N ₁₂	N ₁
$N_1 N_2 N_3 N_4 N_5 N_6 N_7 N_8 N_9 N_{10}$	N ₁₁ N ₁₂	Nı
$N_1 N_2 N_3 N_4 N_5 N_6 N_7 N_8 N_9 N_{10} N_{11}$	N ₁₂	N ₁
N1 N2 N3 N4 N5 N6 N7 N8 N9 N10 N11 N12		NI

Fig.3. Structure of Global Location Number (GLN)

EAN.UCC Company Prefix	- the unique number assigned to a company by a local
	EAN.UCC Organization (e.g. EAN Poland).,
Location Reference	- the number assigned by the holder of the EAN.UCC
	Company Prefix,
Check Digit	- a calculated one-digit number to ensure data integrity,
The main idea of developing of GI	N are:

The main idea of developing of GLN, are:

- o GLNs are unique worldwide,
- o data structure with integrity checking,
- o non-significant characteristics (sector independent).

The GLN is a 13-digit number (Fig.3.) divided into 3 logical sectors of information:

- 1. An EAN.UCC Company Prefix.
- 2. A Location Reference.
- 3. A Check Digit.

When GLN is encoded in UCC/EAN-128 bar code it is explained as a machine-readable Application Identifier. It is a key factor of Automatic Identification solutions. There are some benefits of using of GLN:

- o this is one identifier for all business activities within all supply chains,
- o ensure the full functionality of the EAN.UCC System,
- o allow system-to-system interaction by enabling end-to-end automation,
- o reduce errors and the risk of system incompatibility,
- o enable the optimization of supply chain management.



Fig.4. EAN.UCC Logistics Label

2.2. EAN.UCC LOGISTICS LABEL

Consignment are moving along supply chain may be joined with logistics label putting on the package. The information printed on this label may consist of Global Location Number (GLN) of physical place of delivery. It means that ITS Systems could be informed about the destination while reading the bar code and then contact the Data Pool. It may be the information stored in memory of Radio Frequency Identification (RFID) TAG (Smart Label).

2.3. GLOBAL DATA SYNCHRONIZATION (GDS)

All applications of information systems need up to date parameters. The GLNs are several of these. The attributes linked to these GLNs (name, address, phone, fax no and the geographic coordinates of these physical places), should be accessible from any place on the globe (with relevant access rights). The EAN.UCC are developing GLOBALregistry^{T™}, serviced by UCCnet (endorsed by Global Commerce Initiative - GCI).

GLOBALregistryTM is the platform to ensure the synchronization of everyone operation on the each data pool registered to the UCCnet system. The registered Data Pool has been proceeding with data alignment process.

2.4. LOCATION SYSTEM STANDARDS

Now and in the near future we will have the opportunity to use the advanced ITS systems based on the standard Location Systems, like:

- 1. Global Positioning System (GPS) originally used by U.S. military, but now available for all users.
- 2. GLONASS
- 3. Galileo joint undertaking of European Commission and European Space Agency

3. THE GLN2GEO SYSTEM APPLICATION - HIGH LEVEL OVERVIEW

The main goal of this presentation is to explain the possibility of merging the location systems technology and the global EAN.UCC automatic identification system. The area of description is the Trade of Goods and Services. We start with EAN.UCC Global Business Model (Fig.5).



Fig.5. EAN.UCC Global Business Model

We are focused on two model process descriptions:

Align data:

This process creates a common understanding between trading partners. The exchange of basic business data such as: names, addresses and locations, will be realized by access to the Data Pool registered to the GLOBALregistryTM. The Data Pool may contain the geographic co-ordinates parameters for physical locations at the company.

Deliver:

Delivery is the process of moving the goods to the specific physical location. If we have an ITS with additional Automatic Identification technology possibility, we will operate effectively.

3.1. USE CASE DIAGRAM: DEFINITION OF LOCATIONS

This use case diagram is used to illustrate all the actors that play a role in making information about the physical location in the supply chain, accessible to the ITS applications.



Fig.6. Use case diagram - definition of location

3.2. USE CASE DESCRIPTION: DEFINITION OF LOCATIONS

Use Case Description

Definition of Location process working for each important places at all actors. The actor should make the list of places witch will be marked by EAN.UCC GLNs. Then he should find the geographic coordinates for this places (supporting by Galileo or GPS receiver). The list of GLNs with attributes: name, address, contact information and geographic coordinates will be remembered in Data Pool. The functionality of creating such catalog of GLNs with its attributes and putting it into the Data Pool may be the extension of functionality of Galileo/GPS receivers. That idea may be included to the work explained in point 4 GAL-ITS project objectives. The GAL-ITS Integrated Project (ERTICO – ITS Europe) will have the following objectives:

- 1. Create a set of ITS "reference applications", and determine their requirements for Galileo services and other components
- 2. Define a "Galileo reference environment" optimised for ITS applications, and tools for system and user terminal development
- 3. Optimise Galileo local components for ITS systems and services
- 4. Develop test and prototype Galileo receivers and terminals for ITS applications
- 5. Carry out pilot projects to validate and demonstrate the performance and features of Galileo for key ITS applications
- 6. Carry out a wide-ranging programme of awareness-building, dissemination, market development and training activities across the ITS sector.

Actors

- 1. Buyer
- 2. Manufacturer
- 3. Seller
- 4. Third Party
- 5. Operator of Location System (Galileo, GPS, GSM)
- 6. Data Pool

Preconditions

- 1. The Location System (Galileo, GPS, GSM) is operating with additional functionality of receivers (the ability to manage the list of GLNs)
- 2. Actors have rights to the Data Pool and the GLOBALregistry™
- 3. Actors have rights to maintain the list of your own GLNs.
- 4. Actors have receivers or there is the possibility to serve outsourcing of making the list of GLNs codes with attributes.

Process Start State

An actor is the member of EAN.UCC Organization and would promote your own business by joining to the Global Network of exchanging the information for ITS application. <u>Succesful End Condition</u>

The Data Pool consist of GLNs lists with its attributes.

Failed End Condition

There is no possibility to contact with the Data Pool and write the GLNs list. <u>Main Process Flow – Defenition of Location</u>

- 1. An actor is declaring the list of logistics important places.
- 2. Operator of receiver is reading the parameters (geographic coordinates) of each place and is making the list of GLNs.
- 3. Receiver is sending the list to the Data Pool.



3.3. USE CASE DIAGRAM: FREIGHT DRIVEN BROKER SYSTEM

This use case diagram is used to illustrate all the actors that play a role in the Freight Driven Broker System. The information about the physical location in the supply chain, accessible to the ITS applications from the Data Pool, is also included.(Fig.7.)

3.4. USE CASE DESCRIPTION: FREIGHT DRIVEN BROKER SYSTEM

Use Case Description

This is the description of automatic brokering system with support from Global Location and EAN.UCC Systems. The main idea is using information from Logistics Label (Fig.4. - Application Identifier (414) is reading by scanner – there are GLNs of "ship to" places) to drive transport of frights. Logistics system consists of warehouses and Logistics Centres joined with intermodal transport system. The GPS, Galileo or GSM Location Systems receivers with application of digital maps explain the ideal route but should be developed to ensure the communication to the Data Pool. In addition receiver should have the opportunity to read (to scan) GLN code from Logistics Label. Information exchanging with Data Pool is necessary for down loading the geographic coordinates of each places. This information may change from day to day. This way we have the opportunity to declare the actual place of delivery and system may calculate new route for next transport.

Actors

- 1. Buyer
- 2. Seller
- 3. Operator FDBS
- 4. Third Party
- 5. Operator (Galileo, GPS, GSM Location System)
- 6. Data Pool

Preconditions

- 1. The Location System (Galileo, GPS, GSM) is operating with additional functionality of receivers (the ability to scan the GLN's Bar Code and contact to the Data Pool)
- 2. Actors have rights to the Data Pool and the GLOBALregistry[™]
- 3. Actors have receivers or there is the possibility to serve outsourcing of route guidance.

Process Start State

The Change Request to the EAN.UCC Global Standard Management Procedure (GSMP) is approved and appropriate data are stored in Data Pool. The ITS applications accept the Logistics Label with Application Identifier (414) – GLN of logistics place at company.

Succesful End Condition

Freight was transporting with little time and small costs, accordingly to actual information from all road services (road closed, weather, accidents).

Failed End Condition

There is no possibility to contact with the Data Pool and download the parameters of GLN's.

Main Process Flow - Freight Driven Broker System

- 1. Transport booking with FDBS Operator by Buyer and/or Seller according to agreed delivery terms.
- 2. State of the Art analysis of actual assets and making the "ad hoc" supply chain (The Application of FDBS IT System)
- 3. Arrangement of agreement with participants of intermodal transport (date of delivery and route, start and stop points)
- 4. Transport of goods to the recipient (accordingly to information from Logistics Label Application Identifier (414) Fig.4.) and with support from Galileo, GPS, GSM Location Systems advanced services which deliver actual route information (the functionality should be developed for alignment with this new idea).

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