WR #	GSCN Name	Ratification Date
21-318	Encoding Geocoordinates to support ship-to/deliver-to	Apr 2022

Associated Work Request (WR) Number:

Background:

Large numbers of locations in the world do not have (useful/usable) addresses, but all locations in the world have unique and unambiguous geocoordinates. Industries such as freight transport, construction, agriculture, telecommunications and healthcare need to be able to identify locations that do not have an address. To support location information, encoding geocoordinates as a data element for ship-to and deliver-to is an important characteristic to support delivery and delivery processes. Note that the <mark>highlighted sections</mark> indicate a proposed new section.

Disclaimer:

Symbol size is determined by the amount of data and the number of rows and columns required encoding the data for the X-dimensions selected (see figures section *5.6.3.2*).

Consult *GS1 symbol specification table 7*, section *5.12.3.7*, for minimum and maximum X-dimensions and other sizing requirements.

<u>Durable labelling and marking:</u>

For long distance scanning see section *5.12.3.13*, *GS1 symbol specification table 13*.

For short distance scanning see section *5.12.3.9*, *GS1 symbol specification table 9* (assets) or section *5.12.3.4*, *GS1 symbol specification table 4* (trade items).

Symbol placement

General principles on placement of barcodes are described in section *6*.

The majority of uses for these symbols will be on very small items with curved surfaces such as vials, ampoules and very small bottles. For guidance in locating these symbols on curved surfaces, refer to section *6.2*.

Unique application processing requirements for direct part marking

See section *7* and section *5.12.4.3*.

2.6.15 Encoding transport process information

Introduction

The global Transport & Logistics industry is experiencing exponential growth in freight volumes and becoming ever more open and competitive to support the growing needs. The increasing number of service providers (especially in Last Mile) and new entrants coming in from outside the traditional T&L environment causes challenges within the supply chain where parties involved in a supply chain at times don't even know each other, let alone have integrated systems. The fragmented nature of the industry, connectivity limitations (e.g., internet access) and the need for redundancy (e.g., absence of advance information exchange) drives the need for greater interoperability and the ability to capture transport process information via barcode(s). Information such as ship-to / deliver-to address and other delivery information is encoded directly on the logistic label to support first/last mile and sortation processes.

Note (informative): For further guidance and supporting standards see the *GS1 Encoding Transport Process Information Implementation Guideline.*

Application description

This application describes the creation of transport unit labels when using 2D barcodes to include necessary transport data on GS1 transport labels. The SSCC is the mandatory identifier required on all transport labels in a GS1-128 barcode and this application defines how it should be used together with optional attributes in 2D barcodes to support transport and logistic processes.

GS1 Key

Required

- SSCC

The GS1 Application Identifier for the SSCC is AI (00), see section *3.2*.

Rules

All SSCC rules described in section *4.4*.

Attributes

Required

Not applicable

Optional

To provide optional transport process information, see figure below for a listing of GS1 Application Identifiers. For all the GS1 Application Identifiers that may be used with an SSCC in support of encoding transport process information and their format, see section *3.2*.

Figure 2.6.15-1. Application Identifiers used to support the transport process

AI	Data Content	Permits Non-Latin Characters
420	Ship-to / Deliver-to postal code with a single postal authority	
4300	Ship-to / Deliver-to company name	X
4301	Ship-to / Deliver-to contact	X
4302	Ship-to / Deliver-to address line 1	X
4303	Ship-to / Deliver-to address line 2	X
4304	Ship-to / Deliver-to suburb	X
4305	Ship-to / Deliver-to locality	X
4306	Ship-to / Deliver-to region	X
4307	Ship-to / Deliver-to country code	
4308	Ship-to / Deliver-to telephone number	
4309	Ship-to / Deliver-to GEO location	
4310	Return-to company name	X
4311	Return-to contact	X
4312	Return-to address line 1	X
4313	Return-to address line 2	X
4314	Return-to suburb	X
4315	Return-to locality	X
4316	Return-to region	X
4317	Return-to country code	
4318	Return-to postal code	
4319	Return-to telephone number	
4320	Service code description	X
4321	Dangerous goods flag	
4322	Authority to leave	
4323	Signature required flag	
4324	Not before delivery date time	
4325	Not after delivery date time	
4326	Release date	

To encode non-Latin characters within the alphanumeric value, use percent-encoding as defined within *RFC 3986*. A space character should be encoded as a single plus symbol, +.

Rules

All transport process information rules see section *7*.

For general human readable interpretation rules see section *4.15*.

AI	Data Content	Format [1]	FNC1 required [4]	Data title
422	*Country of origin of a trade item: AI (422)*	N3+N3	(FNC1)	ORIGIN
423	*Country of initial processing: AI (423)*	N3+N3+N..12	(FNC1)	COUNTRY - INITIAL PROCESS.
424	*Country of processing: AI (424)*	N3+N3	(FNC1)	COUNTRY - PROCESS.
425	*Country of disassembly: AI (425)*	N3+N3+N..12	(FNC1)	COUNTRY - DISASSEMBLY
426	*Country covering full process chain: AI (426)*	N3+N3	(FNC1)	COUNTRY – FULL PROCESS
427	*Country subdivision of origin code for a trade item: AI (427)*	N3+X..3	(FNC1)	ORIGIN SUBDIVISION
4300	*Ship-to / Deliver-to Company name: AI (4300)*	N4+X..35	(FNC1)	SHIP TO COMP
4301	*Ship-to / Deliver-to contact name: AI (4301)*	N4+X..35	(FNC1)	SHIP TO NAME
4302	*Ship-to / Deliver-to address line 1: AI (4302)*	N4+X..70	(FNC1)	SHIP TO ADD1
4303	*Ship-to / Deliver-to address line 2: AI (4303)*	N4+X..70	(FNC1)	SHIP TO ADD2
4304	*Ship-to / Deliver-to suburb: AI (4304)*	N4+X..70	(FNC1)	SHIP TO SUB
4305	*Ship-to / Deliver-to locality: AI (4305)*	N4+X..70	(FNC1)	SHIP TO LOC
4306	*Ship-to / Deliver-to region: AI (4306)*	N4+X..70	(FNC1)	SHIP TO REG
4307	*Ship-to / Deliver-to country code: AI (4307)*	N4+X2	(FNC1)	SHIP TO COUNTRY
4308	*Ship-to / Deliver-to telephone number: AI (4308)*	N4+X..30	(FNC1)	SHIP TO PHONE
4309	*Ship-to / Deliver-to GEO location: AI (4309)*	N4+N20	(FNC1)	SHIP TO GEO
4310	*Return-to company name: AI (4310)*	N4+X..35	(FNC1)	RTN TO COMP
4311	*Return-to contact name: AI (4311)*	N4+X..35	(FNC1)	RTN TO NAME
4312	*Return-to address line 1: AI (4312)*	N4+X..70	(FNC1)	RTN TO ADD1
4313	*Return-to address line 2: AI (4313)*	N4+X..70	(FNC1)	RTN TO ADD2
4314	*Return-to suburb: AI (4314)*	N4+X..70	(FNC1)	RTN TO SUB
4315	*Return-to locality: AI (4315)*	N4+X..70	(FNC1)	RTN TO LOC
4316	*Return-to region: AI (4316)*	N4+X..70	(FNC1)	RTN TO REG
4317	*Return-to country code: AI (4317)*	N4+X2	(FNC1)	RTN TO COUNTRY
4318	*Return-to postal code: AI (4318)*	N4+X..20	(FNC1)	RTN TO POST
4319	*Return-to telephone number: AI (4319)*	N4+X..30	(FNC1)	RTN TO PHONE
4320	*Service code description: AI (4320)*	N4+X..35	(FNC1)	SRV DESCRIPTION
4321	*Dangerous goods flag: AI (4321)*	N4+N1	(FNC1)	DANGEROUS GOODS
4322	*Authority to leave flag: AI (4322)*	N4+N1	(FNC1)	AUTH LEAVE
4323	*Signature required flag: AI (4323)*	N4+N1	(FNC1)	SIG REQUIRED
4324	*Not before delivery date/time: AI (4324)*	N4+N10	(FNC1)	NBEF DEL DT
4325	*Not after delivery date/time: AI (4325)*	N4+N10	(FNC1)	NAFT DEL DT
4326	*Release date: AI (4326)*	N4+N6	(FNC1)	REL DATE
7001	*NATO Stock Number (NSN): AI (7001)*	N4+N13	(FNC1)	NSN
7002	*UN/ECE meat carcasses and cuts classification: AI (7002)*	N4+X..30	(FNC1)	MEAT CUT
7003	*Expiration date and time: AI (7003)*	N4+N10	(FNC1)	EXPIRY TIME
7004	*Active potency: AI (7004)*	N4+N..4	(FNC1)	ACTIVE POTENCY
7005	*Catch area: AI (7005)*	N4+X..12	(FNC1)	CATCH AREA
7006	*First freeze date: AI (7006)*	N4+N6	(FNC1)	FIRST FREEZE DATE
7007	*Harvest date: AI (7007)*	N4+N6[+N6]..12	(FNC1)	HARVEST DATE
7008	*Species for fishery purposes: AI (7008)*	N4+X..3	(FNC1)	AQUATIC SPECIES

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- Hour and Minutes: the number of the hour and minutes based on a local 24-hour time (e.g., 6:30 p.m. = 1830). If it is not necessary to specify a time, these fields must be filled with nines.

Note: When it is not necessary to specify the day (the day field is filled with two zeroes), the resultant data string SHALL be interpreted as the last day of the noted month including any adjustment for leap years (e.g., "130200" is "2013 February 28", "160200" is "2016 February 29", etc.).

Note: This element string can only specify dates ranging from 49 years in the past to 50 years in the future. Determination of the correct century is explained in section *7.12*.

The data transmitted from the barcode reader means that the element string denoting a not after delivery data/time has been captured. As this element string is an attribute to a logistic unit it must be processed together with the SSCC of the unit to which it relates (see section *4.14* Data relationships). When indicating this element string in the non-HRI text section of a barcode label, the following data title SHOULD be used: **NAFT DEL DT**.

3.7.46 Release date: AI (4326)

The GS1 Application Identifier (4326) indicates that the data fields contain the release for the logistic unit. This date indicates that the logistic unit can be released for delivery after the indicated date.

Figure 3.7.46-1 Format of the element string

GS1 Application Identifier	Release date		
	YY	**MM**	**DD**
4 3 2 6	$N_1 N_2$	$N_3 N_4$	$N_5 N_6$

The structure is:

- Year: the tens and units of the year (e.g., 2007 = 07), which is mandatory

- Month: the number of the month (e.g., January = 01), which is mandatory

- Day: the number of the day of the relevant month (e.g., second day = 02), which is mandatory

The data transmitted from the barcode reader means that the element string denoting a release date has been captured. As this element string is an attribute to a logistic unit it must be processed together with the SSCC of the unit to which it relates (see section *4.14* Data relationships). When indicating this element string in the non-HRI text section of a barcode label, the following data title SHOULD be used: **REL DATE**.

3.7.47 Ship-to / Deliver-to GEO location: AI (4309)

The Application Identifier (4309) indicates that the GS1 Application Identifier data field contains a numeric string that can be converted to geocoordinates for the ship-to/deliver-to location.

The geocoordinate conversion algorithms are explained in section *7.13* and *7.14*. The conversions, which must be carried out in the application software, can provide a latitude and longitude from a twenty-digit string associated with the ship-to/deliver-to location, see section *7.14*. The process for converting a latitude and longitude into a twenty-digit string is shown in section *7.13*.

Figure 3.7.47-1. Format of the element string

GS1 Application Identifier	Ship-to / Deliver-to GEO location	
	<- digits for latitude conversion->	< -- digits for longitude conversion-->
4309	$N_1 N_2 N_3 N_4 N_5 N_6 N_7 N_8 N_9 N_{10}$	$N_{11} N_{12} N_{13} N_{14} N_{15} N_{16} N_{17} N_{18} N_{19} N_{20}$

The data transmitted from the barcode reader means that the element string associated with the ship-to/deliver-to GEO location has been captured. As this element string is an attribute of a logistic unit, it must be processed together with the SSCC of the logistic unit to which it relates (see section *4.14.2* Mandator association of element strings).

When indicating this element string in the non-HRI text section of a barcode label, the following data title SHOULD be used: **SHIP TO GEO**

If element string		Then mandatory associated element string	Rule
AI	Designation	AI	
392n	Applicable amount payable - single monetary unit	01 AND (30 XOR 31nn XOR 32nn XOR 35nn XOR 36nn *)	The applicable amount payable (single monetary area) SHALL occur in combination with the GTIN and either: ▪ variable count of items; or ▪ a trade measure. Note: The GTIN must relate to a variable measure trade item.
393n	Applicable amount payable – with ISO currency code	01 AND (30 XOR 31nn XOR 32nn XOR 35nn XOR 36nn *)	The applicable amount payable (with ISO currency code) SHALL occur in combination with the GTIN and either: ▪ variable count of items; or ▪ a trade measure. Note: The GTIN must relate to a variable measure trade item.
394n	Percentage of a coupon	255	The percentage of a coupon SHALL occur in combination with the Global Coupon Number.
395n	Amount payable per unit of measure single monetary area (variable measure trade item)	01 AND (30 XOR 31nn XOR 32nn XOR 35nn XOR 36nn *)	The applicable amount payable per unit of measure (single monetary area) SHALL occur in combination with the GTIN and either: ▪ variable count of items; or ▪ a trade measure. Note: The GTIN must relate to a variable measure trade item.
403	Routing code	00	The routing code SHALL occur in combination with an SSCC.
415	GLN of the invoicing party	8020	The GLN of the invoicing party SHALL occur in combination with the payment slip reference number.
422	Country of origin	01 XOR 02 XOR 8006 XOR 8026 ***	The country of origin SHALL occur in combination with: ▪ a GTIN; or ▪ a GTIN of contained trade items; or ▪ an ITIP ▪ an ITIP of contained trade item pieces
423	Country of initial processing	01 XOR 02	The country of initial processing SHALL occur in combination with: ▪ a GTIN; or ▪ a GTIN of contained trade items.
424	Country of processing	01 XOR 02	The country of processing SHALL occur in combination with: ▪ a GTIN; or ▪ a GTIN of contained trade items.
425	Country of disassembly	01 XOR 02	The country of disassembly SHALL occur in combination with: ▪ a GTIN; or ▪ a GTIN of contained trade items.
426	Country of full processing	01 XOR 02	The country of full processing SHALL occur in combination with: ▪ a GTIN; or ▪ a GTIN of contained trade items.
427	Country subdivision of origin	(01 XOR 02) AND 422	The country subdivision of origin SHALL occur in combination with the country of origin and: ▪ a GTIN; or ▪ a GTIN of contained trade items.
430N	Ship-to / Deliver-to address GS1 Application Identifiers	00	Ship-to / Deliver-to address GS1 Application Identifiers SHALL occur in combination with an SSCC
4303	Ship-to / Deliver-to address line 2	4302 and 00	Ship-to / Deliver-to address line 2 SHALL occur in combination with line 1 of a ship-to address and an SSCC
4309	Ship-to / Deliver-to GEO location	00	Ship-to / Deliver-to GEO location SHALL occur in combination with an SSCC

7.13   Conversion of latitude and longitude to twenty-digit string

A latitude and longitude (both expressed in decimal degrees using the *WGS84* coordinate reference system) can be converted into two 10-digit fields, X and Y, (X,Y) as follows:

X = 10,000,000 * (WGS84 latitude + 90)

Y = 10,000,000 *((WGS84 longitude + 360) mod 360)

X and Y SHALL be integer values.

✓   **Note**: The WGS84 latitude and longitude SHOULD be expressed with no more than 7 decimal places.

If the calculation of either X or Y results in fewer than 10 digits then the value must be left-padded with '0' to reach a total of 10 digits per value.

For GS1 AIs encoding geocoordinates, X and Y are concatenated into a single string of twenty digits.

For example, Machu Picchu Antarctica Base's latitude (-62.0914152°) and longitude (-58.4702029°) would be converted to 0279085848 and 3015297971, resulting in a final data element of 02790858483015297971.

7.14 Conversion of twenty-digit string to latitude and longitude

A twenty digit geocode contains two ten-digit fields, X and Y, that can be converted to latitude and longitude values in the *WGS84* coordinate reference system (expressed in decimal degrees) using the following calculations:

- X, the first 10 digits can be converted to WGS84 latitude using the following calculation:
  - WGS84 latitude = $((X/10,000,000) - 90)°$
- Y, the second group of 10 digits can be converted to WGS84 longitude using the following calculation:
  - WGS84 longitude = $((((Y/10,000,000)+180) \bmod 360) - 180)°$