WHO FRAMEWORK CONVENTION ON TOBACCO CONTROL

Conference of the Parties

Intergovernmental Negotiating Body on a Protocol on Illicit Trade in Tobacco Products

Fourth session
Geneva, Switzerland, 14–21 March 2010

FCTC/COP/INB-IT/4/INF.DOC./1
22 February 2010

Provisional agenda item 3

Analysis of the available technology for unique markings in view of the global track-and-trace regime proposed in the negotiating text for a protocol to eliminate illicit trade in tobacco products

Note by the Convention Secretariat

BACKGROUND

1. At its third session (28 June – 5 July 2009, Geneva), the Intergovernmental Negotiating Body on a Protocol on Illicit Trade in Tobacco Products decided[1] to establish two drafting groups, each of which would work on several articles of the negotiating text for a protocol to eliminate illicit trade in tobacco products. The Intergovernmental Negotiating Body requested the drafting groups to propose text for the articles assigned to them, in order to facilitate further negotiation at its fourth session.[2]

2. In regard to Article 7 (Tracking and tracing), Drafting Group 1 requested the Convention Secretariat to prepare a report on the available technology for unique markings, in view of the proposed global track-and-trace regime in the negotiating text. The Drafting Group requested that the report be prepared in time to be submitted to the fourth session of the Intergovernmental Negotiating Body.

[1] Decision FCTC/COP/INB-IT/3(1).

[2] See documents FCTC/COP/INB-IT/4/3 and FCTC/COP/INB-IT/4/4.

3. In particular, the Drafting Group requested the Convention Secretariat to answer the following three questions.

(i) Is the technology available, or is it likely to become available (and if so, when), for affixing unique, non-removable, secure, identifiable markings on unit packets of cigarettes?

(ii) How would such markings contribute to information-sharing among Parties through the global information-sharing focal point of the proposed track-and-trace regime?

(iii) Do existing national and regional track-and-trace/control systems for tobacco products require modification, and if so to what extent, in order for them to be compatible with such a global track-and-trace regime?

4. This report provides answers to these questions on the basis of a review of:

(a) practices related to unique markings used in track-and-trace/control systems for tobacco products by several Parties, as recommended by the Drafting Group; and

(b) currently available marking solutions that are not used in tobacco control, but which are potentially applicable to it.

5. The Convention Secretariat organized the report with the support of an external consultant. The results of two previous studies concerning the proposed track-and-trace regime in tobacco products convened by the Secretariat at the request of the Intergovernmental Negotiating Body were also taken into account.[1]

GENERAL REQUIREMENTS

6. In order to meet the objectives of a protocol on combating illicit trade in tobacco products, marking technologies used on such products need to fulfil the requirements indicated in the areas listed below.

- **Human-readability.** Markings must use characters that are comprehensible by people from a range of linguistic backgrounds. To ensure the human-readability of markings the product code must be printed, even when 1D DataBar, 2D DataMatrix or Radio Frequency Identification (RFID) tags are being used.[2]

- **Uniqueness.** Every individual tobacco product must have a globally unique identification.

- **Security.** It should be impossible for external stakeholders to decrypt the complete marking without accessing a national, regional or global track-and-trace system.

[1] Documents FCTC/COP/INB-IT/3/INF.DOC./5 and FCTC/COP/INB-IT/3/INF.DOC./8.

[2] See Annex 1 (Overview of common marking technologies) for an explanation of these terms.

- **Integration**. All saleable units subject to tax by the authorities require a unique, serialized identity that can be exchanged by electronic means along the entire supply chain, starting from the point of manufacture.

- **Compliance.** National or regional regulatory requirements must be respected.

- **Size.** To be printable at pack level, markings must respect the size limitations of the products being marked.

- **Ease of production.** Markings need to be easily and quickly produced in order to meet the requirements of today's fast-moving international supply chains.

- **Cost–effectiveness.** As the Parties negotiating the draft protocol are aiming for a standard solution, applicable globally, the resource limitations of developing countries need to be respected. In addition, costs to Parties should not hinder the implementation of a global track-and-trace solution.

7. These requirements have not been weighted, as weighting factors need to be applied according to circumstances. For global supply chains involving developing country Parties, requirements such as costs and the need for human readability may, for example, have a stronger impact on the success of a track-and-trace system than other criteria.[1]

INDUSTRY MARKING SOLUTIONS: EXAMPLES FROM NON-TOBACCO SECTORS

8. Other industries often face similar supply-chain problems to those that would be faced in establishing a global track-and-trace regime for tobacco products. Marking solutions to these problems aim to:

- improve supply-chain visibility through item-level serialization;

- ensure consumer safety and compliance with regulatory mandates established by governments;

- reduce vulnerability to counterfeiting and diversion;

- drive return on investment through more effective anti-counterfeiting and more efficient recall management;

- integrate events with business applications and processes;

- protect brand value;

- reduce costs in the supply chain.

[1] More detailed information can be found in Annex 1 (Overview of common marking technologies) and Annex 2 (Assessment of marking technologies against key requirements).

9. Industries often put substantial effort into harmonizing and aligning the various available marking solutions. Although proprietary solutions are frequently used, industries are in general shifting towards globally recognized standards, such as GS1[1] (see Table 1).

Table 1. Comparison of unique industry marking solutions

	Industry				
	Pharma-ceutical	**Consumer products**	**Logistics/ postal service**	**Airline**	**Firearms**
Criteria					
Marking systems used	2D DataMatrix second generation (Gen-2) electronic product code (EPC)[2] RFID	1D DataBar 2D DataMatrix Gen-2 EPC RFID	1D DataBar 2D DataMatrix Proprietary marking	1D DataBar 2D DataMatrix	Proprietary markings
Human-readable?	Yes – serial number is always printed in plain text	Yes – serial number is always printed in plain text	Yes – serial number is always printed in plain text	Yes – serial number is always printed in plain text	Yes
Machine readable?	Yes	Yes	Yes	Yes	No
Unique identification?	Yes – serialized number	Yes – serialized number	Yes – serialized number	Yes – serialized number	Yes
Use of standard codes	GS1 codes: Serialized Global Trading Identification Number (SGTIN)[3] etc.	GS1 codes: SGTIN, SSCC, etc.	GS1 codes: SSCC Proprietary coding schemes	IATA proprietary coding	National proprietary coding systems

[1] GS1 is a global organization which designs and implements global standards with regard to supply and demand chains globally and across sectors.

[2] An EPC is a unique number used to identify a product at item level. It is electronically recorded in an RFID tag.

[3] More detailed information can be found in Annex 3 (Overview of data elements in SGTIN).

MARKING SOLUTIONS IN THE TOBACCO SECTOR: EXPERIENCES IN BRAZIL, THE EUROPEAN UNION AND TURKEY

10. The Drafting Group recommended that marking solutions used in Brazil, the European Union and Turkey be reviewed.

Brazil

11. All cigarette packs sold in Brazil are marked with a standard European Article Number (EAN-8) bar code and a tax stamp, which is printed by the Brazilian authorities. An invisible and secure 2D DataMatrix code is embedded in the tax stamp carrying a unique serial number for each cigarette pack to be sold in Brazil.

12. Cross-border illicit trade is not addressed by the Brazilian system, but the unique markings applied on the tax stamps at pack level help the Brazilian authorities to distinguish between licit and illicit products that are smuggled into their territory.

European Union[1]

13. Japan Tobacco International does not print or label packs with unique serial numbers. It marks cigarette packs with a standard EAN bar code and a secure, human-readable embossed code that is unique to each production shift. It is currently tracking product information only to the first purchaser of the supply chain. Parent–child relationships (aggregation)[2] are only created between carton and master case plus master case and pallet.

14. Philip Morris International prints/labels packs with unique serial numbers (no bar code technology) for dedicated markets such as Germany or Portugal using the company's *Codentify* system. It tracks product information to the first purchaser of the supply chain in 124 markets. For markets in which counterfeiting is a major problem it also tracks information down to the second and/or third purchaser. Parent–Child relationships (aggregation)[2] are only created between carton and master case plus master case and pallet.

Turkey

15. All cigarette packs sold in Turkey are marked with a tax stamp, printed by the authorized company SICPA. A non-visible 2D DataMatrix is embedded in the tax stamp carrying a unique serial number for each cigarette pack to be sold in the country.

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[1] Marking solutions being implemented by Japan Tobacco International and Philip Morris International as part of the agreements of these companies with the European Commission were reviewed for this section. These agreements are: the Cooperation Agreement between JT International S.A., JT International Holding BV and The European Community and the Participating Member States (14 December 2007); and the Anti-Contraband and Anti-Counterfeit Agreement and General Release (9 July 2004) among Philipp Morris International Inc., Philipp Morris Products Inc., Philipp Morris Duty Free Inc., and Philipp Morris World Trade SARL, the European Community, represented by the European Commission, and each Member State which signed the Agreement.

[2] See under "Aggregation", below.

16. The Turkish tax stamps are only used for the domestic Turkish market and can only be read using SICPA scanners.

OTHER RELEVANT PRACTICES

17. Practices potentially relevant to the objectives of this study were also reviewed as part of the previous study convened in Kenya, Bangladesh and Djibouti in relation to requirements for a track-and-trace regime in low-resource environments.[1]

18. The Kenya Revenue Authority is piloting the electronic tracking of sensitive cargos to avoid the diversion and dumping of transit goods in the local market, by following them along the supply chain. This electronic tracking system uses RFID complemented by GSM/GPRS technologies (enabling the sending and receiving of data through digital cellular communication). The Kenya Revenue Authority is also working closely with the Regional Intelligence Liaison Office of the World Customs Organization's Global Network in Nairobi to report seizure of illicit goods to the Customs Enforcement Network.

19. There are no track-and-trace systems in Bangladesh and Djibouti. However, the National Board of Revenue of Bangladesh uses three information-gathering systems for tax purposes. The Automated System for Customs Data (ASYCUDA) was developed by the United Nations Conference on Trade and Development. The Tax Identification System is managed and installed at the headquarters of the National Board of Revenue; and the Value-Added Tax Management System is a standalone application which holds all information obtained in relation to the revenue generated by the tax system. Since 2007, in Djibouti, customs officials have been implementing an electronic system named the Sea Automatic System to allow shipping companies to declare their cargo manifests prior to the receipt of merchandise in Djibouti port.

KEY ELEMENTS OF MARKING SYSTEMS

20. Defining a global track-and-trace regime for tobacco products requires a focus on several key elements of marking systems:

- unique identification numbers;
- marking technologies;
- aggregation;
- data to be captured;
- supply-chain events; and
- data transfer.

[1] Assessment of potential requirements at national level for an international tracking and tracing system for tobacco products, Note by the Convention Secretariat, FCTC/COP/INB-IT/3/INF.DOC./8, 26 June 2009.

21. The use of internationally recognized coding standards in such a track-and-trace regime has a number of benefits, as these standards:

- are a prerequisite for collaboration along the supply chain;
- improve security and communication;
- help reduce transaction costs and errors; and
- reduce the risk of system incompatibility.

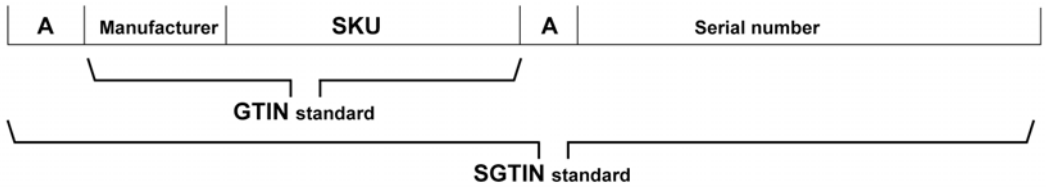
Unique identification number

22. The numbering system should meet certain requirements. It should be:

- built on international standards;
- human-readable;
- extensible; and
- unique, i.e. the number is not predictable and a number is never used twice.

23. The Serialized Global Trading Identification Number (SGITN) standard is a solution already in use (see Figure 1). More detailed information can be found in Annex 3 (Overview of data elements in SGTIN).

Figure 1. Serialized Global Trading Identification Number standard



Marking technologies

24. The choice of standard marking technology to be used depends on the capabilities of the manufacturers concerned. Manufacturers with low technical equipment capability or low production capacity may use printed serialization numbers only. For manufacturers with low production capacity per stock-keeping unit (SKU)[1] a serial number of 8 digits may be sufficient to ensure uniqueness of individual saleable units. Manufacturers with basic technical equipment may prefer using 1D DataBar codes in combination with a human-readable printed serialization number. The serial number should have between 12 and 20 digits. Manufacturers with state-of-the-art technical equipment may be able to

[1] The SKU is a unique identifier for each distinct product and service.

use 2D DataMatrix or RFID tags in combination with a human-readable printed serialization number. A manufacturer can also add EPC Gen-2 RFID tags to its products as long as the product is also using a 2D DataMatrix in combination with a human-readable printed serialization number. This would allow manufacturers to use RFID if they see a business reason to do so, but would allow downstream trading partners (such as wholesalers, retailers and importers) to scan the products without investing in RFID readers. The serial number should have between 12 and 20 digits. More detailed information can be found in Annex 4 (Identification number).

Aggregation

25. Aggregation events are used to establish parent–child relationships between different packaging units and serialization standards to support the track-and-trace possibilities along the supply chain. More information can be found in Annex 5 (Aggregation events).

26. The main reason for using aggregation events is to create traceability events for objects without scanning each of them individually. This is especially useful for objects which are stored inside other objects. Without aggregation events, each trading partner would be required to open each pallet, case, and carton and scan each individual case, carton, and pack. Furthermore, the recording of aggregation events helps anti-counterfeiting efforts because it makes it almost impossible for a counterfeiter to reconstruct the aggregation events.

27. Manufacturers need to build aggregation events and record the parent–child relationships in the system. Any changes in the aggregation events along the supply chain (such as removing a case from a pallet, creating mixed-pallets, destroying items, taking quality samples) need to be recorded. The ability to manage aggregation events along the supply chain is a key requirement for an effective track-and-trace regime; if this requirement cannot be fulfilled throughout the supply chain, compliance will not be possible.

Data to be captured

28. Several parameters could be captured to obtain unique markings solutions under already existing international standards.

- **"Country of manufacture"** could be added to the product code by using the Application Identifier[1] (422) "Country of origin of a trade item". It should be noted that most manufacturers already request unique manufacturer numbers for each of their international business units (indicating the country of origin) from GS1. In addition, to ensure efficient identification of the correct country database without having a country code in the marking, "Object Naming Services" and "EPC Discovery Services" may be used.

- **"Product description"** is embedded in the SKU in the second part of the code. The SKU or item reference can be assigned by the manufacturer or a global institution such as GS1.

[1] Application Identifiers are a part of standard codes, and indicate the type of information that is being encoded.

- **"Date of manufacture"** can be encoded using the Application Identifier (11) "Date of manufacture (yymmdd)". The industry does not use this information as a standard in the unique identifier.

- **"Intended market of retail"** can be encoded using the Application Identifier (421) "Ship to ...". The industry does not use this information as a standard in the unique identifier.

- **"Manufacturing facility"**, **"Machine used to manufacture tobacco products", "Production shifts of manufacture":** standard Application Identifiers do not exist to encode this information in a unique identifier.

29. If further information on a packaging unit is needed in addition to that provided in the standard structure of the code, it should be printed on the package after the unique identifier. The unique identifier could continue to be an EPC with the other data elements included in printed labels, embedded into 2D bar codes, or added to the user memory of RFID tags after the unique identifier. This would substantially speed up reading/scanning throughout the supply chain and would entail the least disruption to distribution and retail traceability systems that include both tobacco and non-tobacco products. Shipping and receiving information would be recorded along the supply chain.

Supply-chain events

30. A major requirement of a track-and-trace regime is to make sure that products are always received and validated between any shipper and receiver along the supply chain.

31. An item passes through a number of events when it is shipped internationally from the point of origin to the final delivery point. Events in the shipping of the item are recorded and fed into local computer systems. The information gathered is known as the "tracking details" for that item. These data are made available to other trading partners.

32. One vital requirement for all partners in the supply chain is to record shipping and receiving events, thereby ensuring anti-counterfeiting and anti-diversion through shipping verification. More detailed information can be found in Annex 6 (Supply-chain event steps for shipping and receiving).

Data transfer

33. There are three layers for data exchange.

(i) **Supply chain.** Manufacturer and downstream supply-chain partners record the relevant data in their systems. Manufacturers and trading partners need to have a corporate query engine or other systems in place so that requested data can be made available to national and international authorities.

(ii) **National authority.** According to national requirements, national authorities collect data provided along the supply chain in national databases. As an alternative to maintaining a national database, a national query engine which requests information as needed may be considered. For smaller countries the national database could also be outsourced to a third-party service provider or this service could be provided by a regional or international authority.

(iii) **International data exchange authority.** One possibility is a central query engine, which forms an interface with national databases/query engines to search for the required information.

At this stage there is no need to maintain a central database at the international level, but it may be an advantage in the future to capture the most frequently requested non-confidential data in a central repository to improve system performance as an answer to increasing data traffic.

34. If the option to outsource the query engine to a third-party service provider is taken, the internationally recognized EPCIS standard may be considered as a protocol for transferring queries and data. EPCIS is a global standard for sharing information between trading partners, helping to improve efficiency, security and visibility in the global supply chain, by facilitating internal data capture as well as external sharing of information about movement and status of goods in the supply chain. Supply-chain partners can exchange information by "talking the same language". EPCIS enables the exchange of information on the "what, where, when and why" of events occurring in any supply chain. This is important business information, such as the time, location, disposition and business step of each event that occurs during the life of an item in the supply chain. More information on information exchange can be found in Annex 7 (Information exchange).

KEY REQUIREMENTS FOR NATIONAL/REGIONAL TRACK-AND-TRACE/ CONTROL SYSTEMS FOR TOBACCO PRODUCTS

35. As this report has shown, the implementation of an effective national and international track-and-trace regime for tobacco products requires the following elements:

- serialization of all tobacco products to the level of the smallest saleable unit;
- common numbering standards for serialization;
- human-readable printing/labelling of serialization numbers on all traded units;
- establishment of parent–child relationships between different packaging units (aggregation);
- recording of any changes in the parent–child relationship along the supply chain;
- recording of any shipping and receiving events along the supply chain;
- recording of relevant data by supply-chain partners;
- establishment of query interfaces between the databases of the supply-chain partners and national/international authorities;
- a standard as a protocol for transferring queries and data, such as EPCIS.

CONCLUSIONS

36. On the basis of the preceding review, answers can be given to the three questions asked by the Drafting Group (see "Background", above).

(i) Is the technology available, or is it likely to become available (and if so, when), for affixing unique, non-removable, secure, identifiable markings on unit packets of cigarettes?

- The technology for unique marking systems such as 1D DataBar, 2D DataMatrix and RFID tags is available and already used in several other industries.

- 2D DataMatrix and RFID markings are more difficult to duplicate than 1D DataBar markings. Capturing aggregation events adds another layer of security as it allows the tracking of illicit trade by revealing inconsistent parent–child relationships through queries.

(ii) How would such markings contribute to information-sharing among Parties through the global information-sharing focal point of the proposed track-and-trace regime?

- The unique identifier on each packaging unit acts as the key information for Parties authorized to query additional information concerning the product.

- An authorized Party would be granted a user account enabling it to access the global information-sharing point. This account would be used by authorized users to log into a web application and thereby access a simple web query interface. This interface would feature a single search field into which the user would type the unique identifier found on a packaging unit in order to launch a global search across all connected databases (national databases and others). The global information-sharing focal point would simultaneously send multiple search queries for this unique identifier to all connected databases through secure Internet communication channels. The global information-sharing focal point would then display to the user all the information associated with this unique identifier received from connected databases. If no information were to be received, it would mean that either the product was not genuine or that the information associated with the product had never been entered into any database. The latter case could arise if, for example, the information originated from a country which was not a Party to the protocol. The relevant details would therefore not have been imported into the database of a Party to the protocol.

(iii) Do existing national and regional track-and-trace/control systems for tobacco products require modifications or adaptation, and if so, to what extent, in order for them to be compatible with such a global track-and-trace regime?

- To be compatible with a global international track-and-trace regime of the kind proposed in the negotiating text, existing national/regional track-and-trace systems for tobacco products would need to move from national/regional proprietary coding systems to a global harmonized standard.

- For cross-border traceability to be possible, the unique identifiers need to be human-readable on packaging units, i.e. they can be read without the use of technology. If countries are using tax stamps on the packaging unit, they also need to ensure that the unique identifier is printed/labelled.

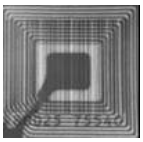
- Furthermore national/regional regimes need to ensure that actors within the supply chain record supply-chain events and allow access to national authorities based on standards for transferring queries and data, such as EPCIS.

37. The review of experiences of the three Parties demonstrates that marking solutions currently in use would require adaptation in order to be compatible with a global track-and-trace regime. The key

requirements to be met are presented in Annex 8 (Analysis of parameters for possible adaptation of markings solutions in Brazil, the European Union and Turkey, in line with the requirements of an international track-and-trace regime for tobacco products).

ANNEX 1

OVERVIEW OF COMMON MARKING TECHNOLOGIES

Markings technology	**Description**
Printed serialization number **(21)274877906943**	Unique, human-readable identifier printed on or attached as a label to the corresponding packaging unit. Printing the serialization number is a mandatory requirement, to ensure human-readability, but may be combined with any other marking technology.
1D DataBar 	A 1D DataBar is a machine-readable representation of data storing information in the widths of and spacing between printed parallel lines. The global standard for 1D DataBars is the GS1 DataBar which enables GTIN identification for small hard-to-mark products, and can carry additional information, such as serialization and lot numbers.
2D DataMatrix 	A 2D DataMatrix bar code may be printed as a square or rectangular symbol made up of individual dots and squares. The global standard for such bar codes is the GS1 DataMatrix which enables GTIN identification for small hard-to-mark products, and can carry additional information, such as serialization and lot numbers.
RFID tag 	An RFID tag is a microchip attached to an antenna that is packaged in such a way that it can be attached to an object. The tag picks up and sends signals from and to a reader. The tag contains a unique serial number, but may also contain additional information. RFID tags can be active, passive or semi-passive. EPC is an industry-driven standard promoted by the EPC global organization and supporting the use of RFID in a number of industries.

ANNEX 2

ASSESSMENT OF MARKING TECHNOLOGIES AGAINST KEY REQUIREMENTS

Requirement	**Printed serial number**	**1D DataBar**	**2D DataMatrix**	**RFID Tag**
Human-readable	●	○	○	○
Machine-readable	○	●	●	●
Secure (assumption: only non-confidential information stored in marking)	○	○	◉	◉
Small size	○	○	●	●
High-speed tagging	●	●	●	◉
Low unit costs	●	●	●	○
Low supply chain investment	●	◉	○	○
Maturity level	●	●	◉	○
Level of automation (e.g. ability to be read at distance)	○	◉	◉	●

● = Strong occurrence ◉ = Medium occurrence ○ = Low occurrence ○ = Non-occurrence

ANNEX 3

OVERVIEW OF DATA ELEMENTS IN SGTIN

Table 1

Element	Description	Where to request the numbers?
Application Identifier	Defines the meaning and the format of the data that follow e.g. (01) → GTIN; (21) Serial number	▪ Determined by number creator based on GS1 standard
Manufacturer	Number of manufacturer name or brand name	▪ Number will only be assigned by GS1 ▪ The manufacturer number must be requested from GS1
SKU	Number of stock keeping unit (also described as item reference or product number)	▪ It is desirable to request the SKU number from GS1
Serial number	Unique, randomized, non-predictable number	▪ Manufacturer defines number ▪ Smaller manufacturers which are not equipped to create serial number can request numbers from a 3rd party service (optional) ▪ GS1 recommends serial numbers of between 12 and 20 digits

Table 1 provides an overview of data elements in SGTIN. The serial number must be randomized and the algorithm for the randomization must not be predictable. It is the responsibility of the manufacturer to define the algorithm for randomization, but national authorities need to set up the legal prerequisites. There will be a lower level of security if serial numbers are not randomized, and the danger of counterfeit serial numbers will increase.

In order to check if a manufacturer applies randomization, national authorities should frequently audit the processes being used by the manufacturer. The unique, randomized, non-predictable serial number must contain enough digits to ensure that billions of tobacco products can be serialized. Therefore a serial number length of between 12 and 20 digits is recommended. Table 2 shows how many unique serial numbers can be created if a length of 8, 12 or 20 digits is chosen.

Table 2

Length of serial number	Quantity of unique serial numbers	SKU production volume per year	Time required to consume quantity of unique serial numbers
8 digits	100 million	10 million	10 years
12 digits	1000 billion	25 billion	40 years
20 digits	1E+20	250 billion	400 million years

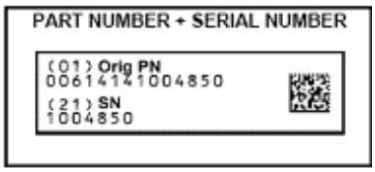
As Table 2 shows, a manufacturer using a 12-digit serial number and producing 25 billion units of a SKU per year will have to reassign a previously used serial number after a period of 40 years. To mark logistic units it is desirable to use a standard which is widespread in the logistics/shipping industry, such as the SSCC standard.

ANNEX 4

IDENTIFICATION NUMBER

The identification number may be split into rows to use the available space on packaging units as efficiently as possible.

Sample 2D DataMatrix



Sample 1D DataBar

GTIN: 02123486507164
SERIAL: 274688906665

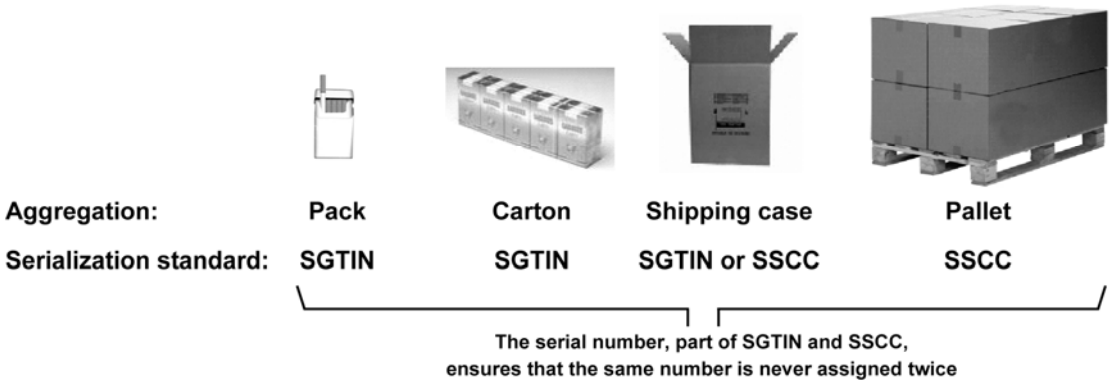
Affixing the SGTIN number in human-readable form on the national stamp is often not possible because of the size of the stamp. Integrating the SGTIN number in a 2D DataMatrix national stamp is one possible solution; but in this case the challenge would be to ensure that the national authority and the manufacturer are able to manage the creation and distribution of the serial number. Another point to be considered is that those packaging units foreseen for export do not require national stamps from the exporting country, while those which are imported need to be labelled with the stamps of the importing country.

The serial number, 1D DataBar or 2D DataMatrix can be printed directly onto packaging units or can be printed on labels. Even if a country is using its own national stamp it is necessary to have the SGTIN number in human-readable form on the packaging unit for international track-and-trace solutions, and the stamp must therefore be positioned so that it does not hide the human-readable SGTIN number and the bar code.

The technology for the proposed unique marking systems such as 1D DataBar, 2D DataMatrix and RFID tags is available and already used by the consumer-products industry. While 2D DataMatrix and RFID are less liable to be copied than 1D DataBar, security is only ensured through queries regarding the parent–child relationships of packages (aggregation).

ANNEX 5

AGGREGATION EVENTS



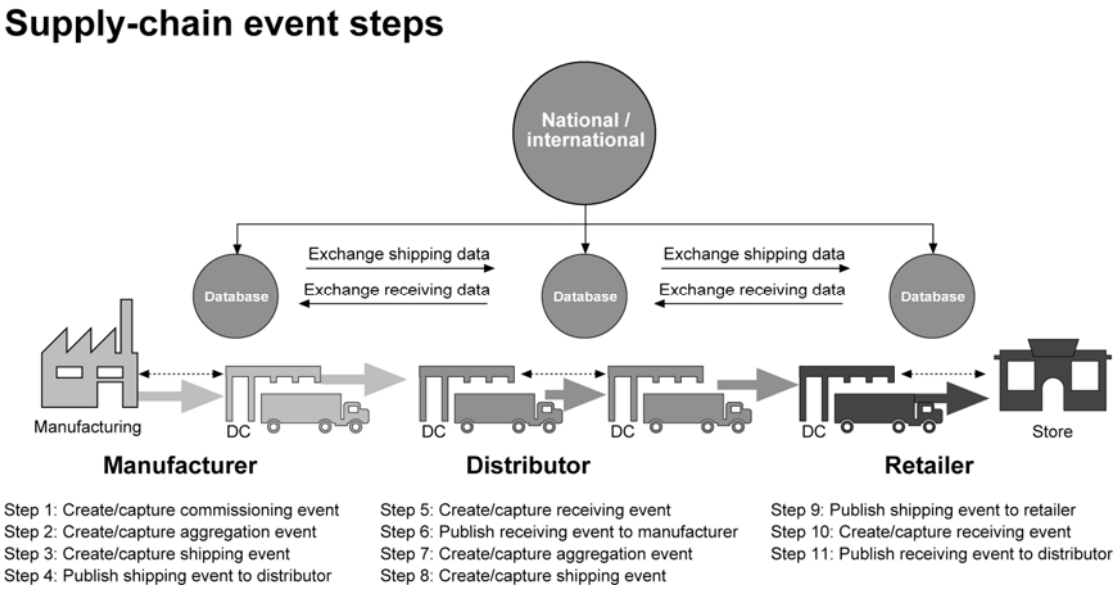
ANNEX 6

SUPPLY-CHAIN EVENT STEPS FOR SHIPPING AND RECEIVING

An item passes through a number of events when it is shipped internationally, from the point of origin to the final delivery point. Events in the shipping of the item are recorded and fed into local computer systems, and are known as the "tracking details" for that item (see diagram below). The tracking data are made available to other trading partners. A key requirement for all supply chain partners is to record the shipping and receiving events. Shipping verification helps anti-counterfeiting and anti-diversion efforts.

Managing supply-chain events properly:

- enables the shipper to verify that an item is received at the intended location within the expected time period;
- enables the receiver to gain visibility of pending shipments through advance notification;
- allows standard-based data sharing through secure subscription queries;
- significantly increases real-time visibility within the supply chain and helps to identify potential risks;
- can help the tax authority to trigger financial payments.

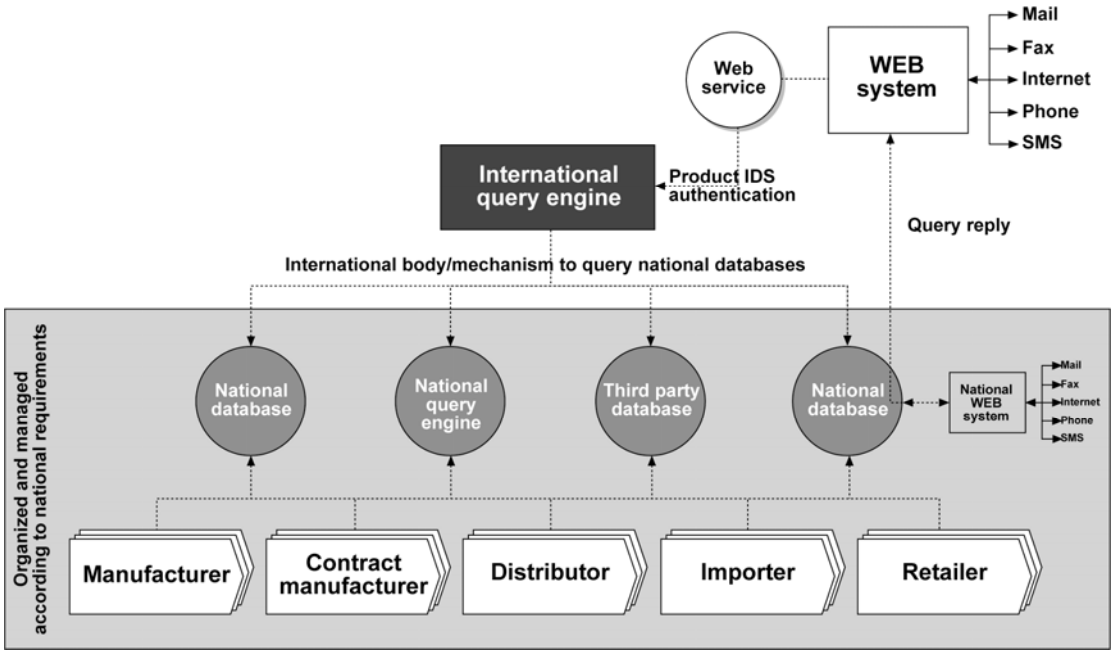


ANNEX 7

INFORMATION EXCHANGE

Processing of query requests could take place through an information exchange such as the one shown in the diagram below. If such an architecture were in place, requests for information would be made via a national web system (if such a system were available). If the query could be answered using the national database there would be no need to involve the international query engine. However, if the national database were not able to provide the necessary information, the query would be forwarded to the international query engine which would then query other national databases. The original requester would then receive a response from the national database.

Information exchange architecture



ANNEX 8

ANALYSIS OF PARAMETERS FOR POSSIBLE ADAPTATION OF MARKINGS SOLUTIONS IN BRAZIL, THE EUROPEAN UNION AND TURKEY, IN LINE WITH THE REQUIREMENTS OF AN INTERNATIONAL TRACK-AND-TRACE REGIME FOR TOBACCO PRODUCTS

Brazil

The system used currently in Brazil is a sophisticated solution for the domestic market. However, in order to meet the requirements of an international track-and-trace regime for tobacco products, the following issues characterizing the current system would need to be dealt with:

- international serialization standards are not used;
- international data exchange standards are not used;
- events are not tracked along the supply chain; and
- aggregation does not take place (only cigarette packs are marked).

The European Union

(i) The system used by Japan Tobacco International

In order to meet the requirements of an international track-and-trace regime for tobacco products, the following issues characterizing the current system would need to be dealt with:

- tracking only takes place up to the first purchaser along the supply chain;
- packs are not marked with unique serial numbers; and
- aggregation does not take place down to the smallest saleable packaging unit.

According to Japan Tobacco International, the smallest unit sold to retailers in most parts of the world is a carton and packs would therefore be traced rather than tracked and would not require the same level of standardization.

(ii) The system used by Philip Morris International

In order to meet the requirements of an international track-and-trace regime for tobacco products, the following issues characterizing the current system would need to be dealt with:

- tracking does not always take place up to the second or third purchaser of the supply chain;
- aggregation is not taking place down to the smallest saleable packaging unit; and
- although the tracking of cigarette packs is already taking place in pilot markets, Philip Morris International still focuses primarily on master case tracking.

Turkey

The system used currently in Turkey is a sophisticated solution for the domestic market. However, in order to meet the requirements of an international track-and-trace regime for tobacco products, the following issues characterizing the current system would need to be dealt with:

- international serialization standards are not used;
- international data exchange standards are not used;
- events are not tracked along the supply chain; and
- aggregation does not take place (only cigarette packs are marked).

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