GS1 EPCglobal Transport and Logistics Industry User Group

Implementation Guide – TLS Pilots

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CONTENTS

1. Introduction and Objectives

1.1. What is TLS about

In 2004, the Transportation and Logistics Business Action Group (TLS BAG) was formed within the EPCglobal community with the mission of working towards the successful deployment of RFID utilizing the EPCglobal Network in supply chain applications, such that the use of specific standards (data sets, RFID technology/frequencies, exchange interfaces, etc.) are transparent to trading partners. In the whole supply chain, Transportation and Logistics Services (TLS) play a crucial role for cargo movement and related information exchange between the upstream and downstream supply chain.

1.2. Objective and goal

In the past three years, TLS had conducted 3 different global pilot projects with the use of GS1 EPC/RFID technology and GS1 EPCglobal standards. The group aimed to evaluate how EPC/RFID technology could enable the current Transportation and Logistics operation practice in order to provide and increase sufficient visibility to benefit the global supply chain operations utilizing existing hardware and software systems as well as the RFID standards developed within the EPCglobal community.

This implementation guideline is targeted to TLS industry players including shippers, consignees, terminal and warehouse operators, standards organizations, solution providers and other research institutes. The guideline will provide a step by step outline of what is required to implement RFID/EPC for Transportation and Logistics in the EPCglobal Network .The guideline will also point out some practical information and issues that are worth noting for an implementation.

1.3. Scope of the guideline

This guideline will review the transportation and logistics related processes from the point of cargo leaving the production factory until it reaches the destination warehouse. The scope of this paper will be limited to the findings, suggestions and practices based on the previous three phases of the TLS global pilot projects. It includes the operations process at origin and destination warehouse, yard, departure and arriving terminal, Import / Export clearance process as well as land transportation. Operation processes or issues within the production plant or factory and retail store are excluded. The GS1/EPCglobal Transport and Logistics Service Industry Action Group - Implementation Guide – Detailed Version is contained in a separate

document.http://community.gs1.org/apps/org/workgroup/gs1ietransportandlogisticsug/members/upload.php

2. Market needs

2.1. Key challenges and enablers in the Transport and Logistics industry

Key Challenges   EPC/RFID Enables

Supply Chain Efficiency

- Inventory Visibility / Out of Stocks
- Error Reduction   Competitive Advantage
- Theft / Diversion
- Factor utilization and productivity

Asset Visibility / Prevention of Loss / Theft

- Logistics Units (containers, pallets, …)
- Tools and Equipment   Asset Management
- Property / Yard Management

"Safe and Secure" Initiatives

- Anti-Counterfeit
- Health & Safety   Compliance
- Homeland Security (US)
- Food Supply

2.2. Hidden Problems

If you can't see what's wrong in your operation, you can't fix a problem that you don't know you have! The key to "seeing" your problems and opportunities for improvement is to have 'visibility' into what has happened in your operation and your supply chain.

| Process Improvements | Optimised Inventory | Asset Management | Vendor Performance |
| Pipeline Velocity | | Trend Analysis | Customer Service |

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What, When, Where, Why & How

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Identify + Capture + Exchange

Figure **Error! Reference source not found.**-2: Importance of visibility for business analysis

3. Visibility

3.1. Cargo Layers

Understanding various cargo layers is essential for the tracking and tracing of cargo using RFID technology. A shipper or consignee will pay more attention to the item level (Layer 0), package level (layer 1) and case level (Layer 2).

However, logistics players, like warehouse operators, will be more focused on pallet level (layer 3) throughout their warehouse operations especially for the unloading and container stuffing processes. Ocean or air cargo port terminal operators, will focus on the container / ULD (Unit Load Device) level (layer 4) in their port terminal cargo handling.

Figure 3.1: Example of Cargo layers – Reference ISO 14816, 17363, 17364,17365,17366,17367

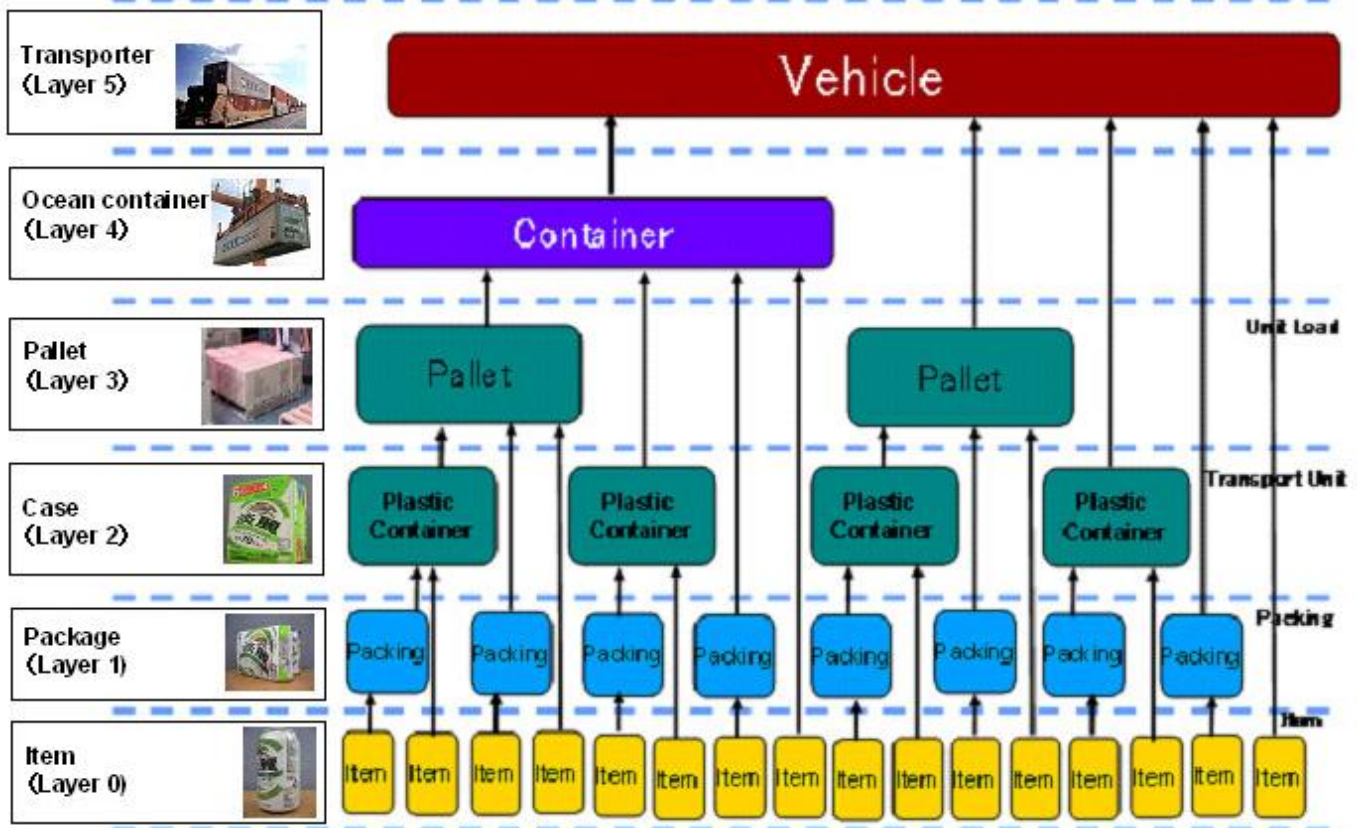In order to create cargo visibility in general, it is essential to define the visibility level since different logistics players may have different interests and focus. In the phase 3 global pilot, the business use case was to improve cargo visibility on container, pallet and carton level among terminal, warehouse operators. The tagging level was defined at cargo layer 2, 3, 4 representing carton level, pallet level and container level and they were tagged for cargo track and trace.

3.2. Key Concepts/Key Principles

The main objective of implementing RFID/EPC in Transportation and Logistics is to provide visibility to all participants in the supply chain. External and internal visibility is needed to achieve full supply chain visibility. Internal visibility can be achieved by the organization itself but external visibility, between trading partners, requires a common language and some previous agreement on how to track and trace, be it in terms of what to track and trace, how to identify it, what data to exchange and/or the technology to use. This is where GS1 standards play a role. Please see http://www.gs1.org/productssolutions for further information.
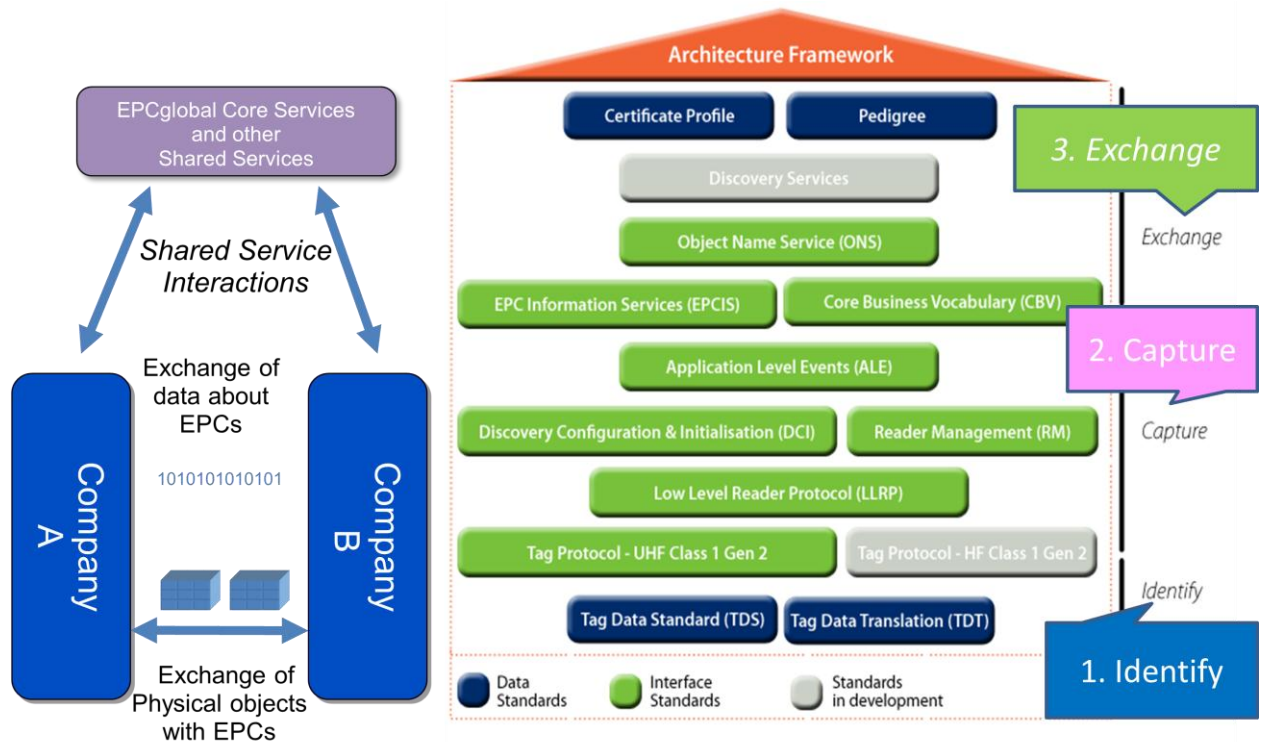
Figure 3.2: Visibility and the EPCglobal Architectural Framework

4. Implementation Procedures

4.1. Visibility Implementation – Project Management Methodology

Implementation of open, global and proven standards enable effective and efficient visibility systems.

The GS1 System is applicable to the full range of GS1 members of any size and to all levels of organizational complexity and system sophistication, although the depth and breadth of operational implementation will vary for each organization in line with their visibility priorities.

4.1.1. Preparation Stage

Visibility is multi-disciplinary. Many departments will be involved in the development and implementation of a Visibility system. A fundamental decision to take at the beginning of this process is to define internal and external roles and responsibilities, the scope of the visibility process across the supply chain, timelines, the partners involved, the main use cases (e.g. where is my product, inventory management, etc.) and the level of required visibility (e.g. at pallet, case, conveyance level).

TASKS	RESULTS
• Define Responsibilities • Fix Deadlines • Determine Scope	Project Manager Organization Steering Committee 1st Draft of Scope Determine Scope

4.1.2. Planning Stage

Start by describing the physical flow of items through your supply chain. This can be done by walking through each step of the supply chain to identify the physical locations, inputs, internal processes and outputs, that an object goes through. Next, identify the type of products that are exchanged between your partners and describe the logical hierarchies and the way in which each of these objects will be identified (GTIN, SSCC, etc). Make sure you add flow of information about items to this diagram. The results are a project plan, gap analysis and functional specifications (including supply chain links, operating and data exchange processes, relevant documents, key departments, critical control point definitions and assignment of roles).

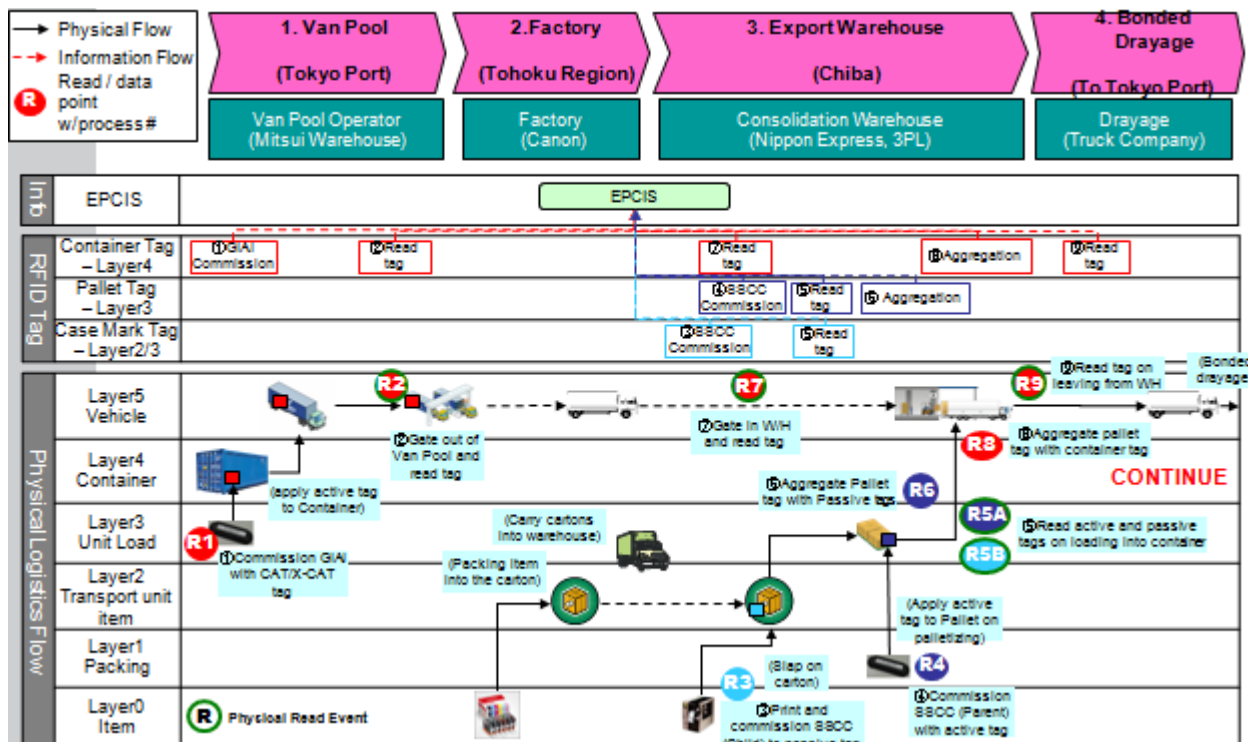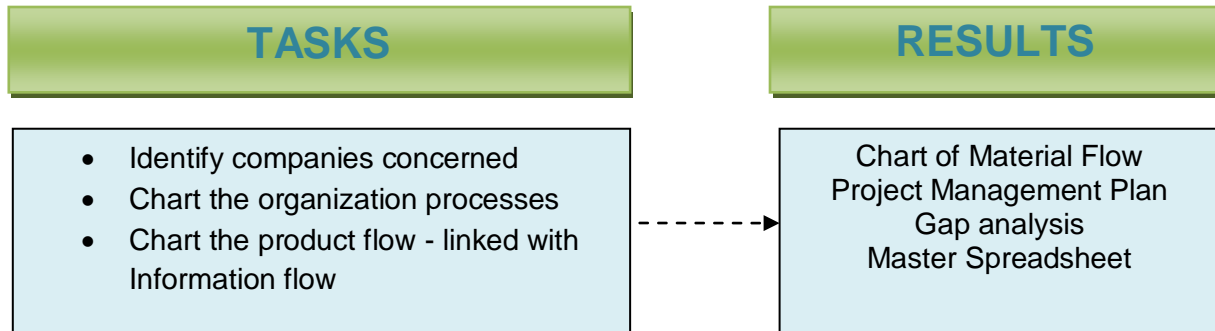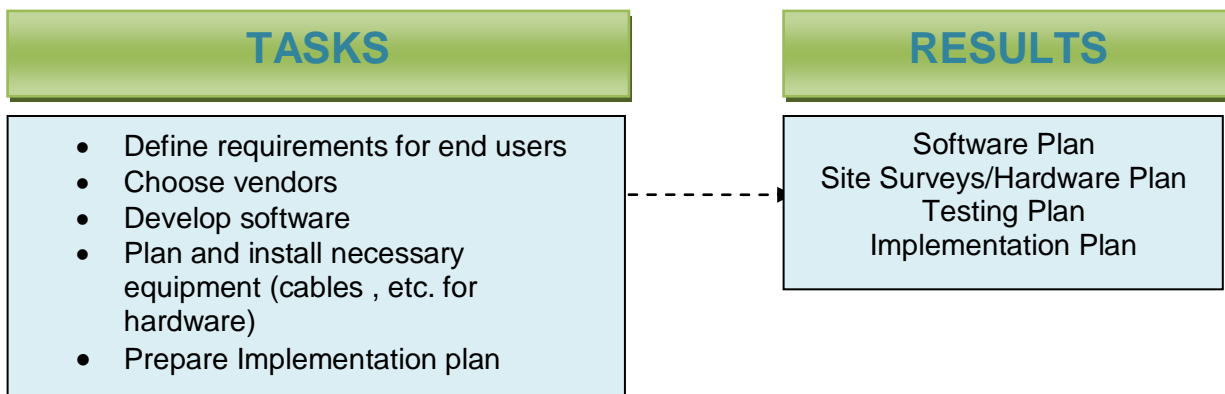| TASKS	RESULTS
• Identify companies concerned • Chart the organization processes • Chart the product flow - linked with Information flow	Chart of Material Flow Project Management Plan Gap analysis Master Spreadsheet

Figure 4.1.2-1: Format for Material and Information Flow used in TLS Phase III Pilot

Logical Read Point / Data Point (IAW with Physical Flow Document)			R1(XCAT) – Attach XCAT tag to empty container and read XCAT tag	LE1	R2(XCAT) – Empty container leaves Mitsui Soko Van Pool and XCAT tag is read	R3 – Print Passive carton tags	R3A – Slap passive tags on carton and read caton tags	R4 – Slap tags on pallet and read pallet tags
EPCIS Event Data	Where	EventTimeZoneO	+09:00	+09:00	+09:00	+09:00	+09:00	+09:00
		ReadPoint (id)	urn:epc:id:sgln:491 2345.00001.299,43 2.ExitGate01		urn:epc:id:sgln:491 2345.00001.299,43 2.ExitGate01	urn:epc:id:sgln:491 2345.00002.210,42 9.PrintingRoom01La belPrinter01	urn:epc:id:sgln:491 2345.00002.210,42 1.StagingSpace01	urn:epc:id:sgln:491 2345.00002.210,42 1.StagingSpace01
		ReadPoint (master data) GLN	Mitsui Soko Van Pool 4912345000019		Mitsui Soko Van Pool 4912345000019	Nippon Express warehouse 4912345000026	Nippon Express warehouse 4912345000026	Nippon Express warehouse 4912345000026
		SSLT	299 – Empty Container Yard		299 – Empty Container Yard	210 – Shipping Area	210 – Shipping Area	210 – Shipping Area
		SSLTA	432 – Exit Gate		432 – Exit Gate	429 – Printing Room	421 – Staging	421 – Staging
		SSLE	ExitGate01		ExitGate01	PrintingRoom01Lab elPrinter01	StagingSpace01	StagingSpace01
		BizLocation (id)	urn:epc:id:sgln:491 2345.00001.299,43 2.ExitGate01		N/A	urn:epc:id:sgln:491 2345.00002.210,42 9.PrintingRoom01	urn:epc:id:sgln:491 2345.00002.210,42 1.StagingSpace01	urn:epc:id:sgln:491 2345.00002.210,42 1.StagingSpace01
		BizLocation (master data) GLN	Mitsui Soko Van Pool 4912345000019		N/A	Nippon Express warehouse 4912345000026	Nippon Express warehouse 4912345000026	Nippon Express warehouse 4912345000026
		SSLT	299 – Empty Container Yard		N/A	210 – Shipping Area	210 – Shipping Area	210 – Shipping Area
		SSLTA	432 – Exit Gate		N/A	429 – Printing Room	421 – Staging	421 – Staging
		SSLE	ExitGate01		N/A	PrintingRoom01	StagingSpace01	StagingSpace01
	Why	BizStep	urn:epcglobal:cbv:b izstep:commissionin g	urn:epcglobal:tlspilot:bi zstep:transactionassoci ation	urn:epcglobal:cbv:b izstep:departing	urn:epcglobal:cbv:b izstep:encoding	urn:epcglobal:cbv:b izstep:commissionin g	urn:epcglobal:cbv:b izstep:commissionin g
		Disposition	urn:epcglobal:cbv:d isp:active	n/a	urn:epcglobal:cbv:d isp:in_transit	urn:epcglobal:cbv:d isp:encoded	urn:epcglobal:cbv:d isp:active	urn:epcglobal:cbv:d isp:active
		UCR No.	GSIN	GSIN				
		Invoice Info						
		Bill Lading No.						
		ISO Container No.	Container No.					

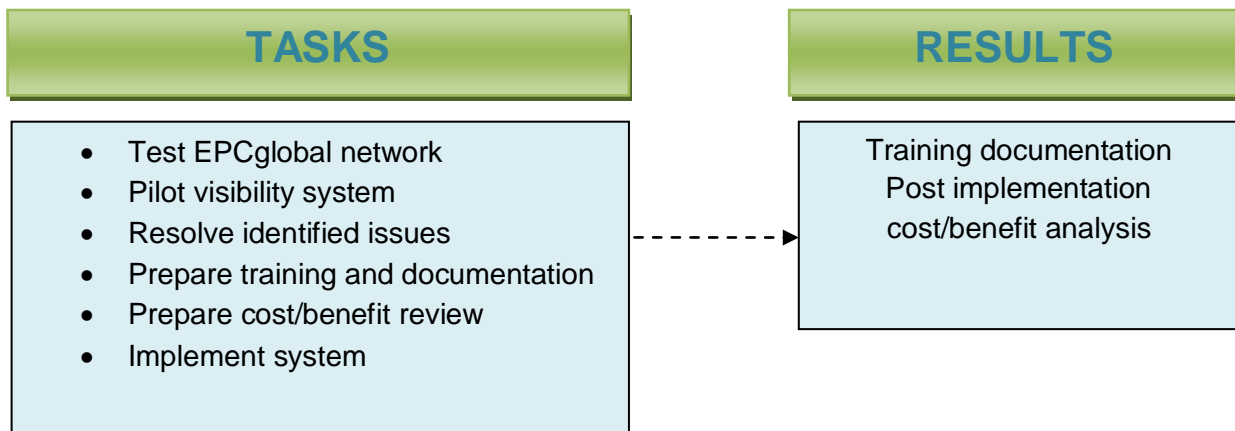Figure 4.1.2-2: Format for Master Spreadsheet used in TLS Phase III Pilot

4.1.3. Development Stage- Hardware and Software

In order to create a visibility system using the different components of the EPCglobal network, decisions need to be made in order to choose technology and solution providers for each of the components of the system. i.e. readers and tags, middleware, EPCIS capturing application, EPCIS repository, and EPCIS accessing applications. For detailed information about the planning and installation of hardware please refer to http://www.epcglobalinc.org/what/cookbook/chapter4/ For pilot and implementation planning tools see http://www.epcglobalinc.org/what/cookbook/chapter2/ Para. 2.6.

TASKS

- Define requirements for end users
- Choose vendors
- Develop software
- Plan and install necessary equipment (cables , etc. for hardware)
- Prepare Implementation plan

RESULTS

Software Plan
Site Surveys/Hardware Plan
Testing Plan
Implementation Plan

4.1.4. Implementation/Operation Step

It is beneficial to first pilot the visibility system to ensure that everything is working as expected. All hardware needs to be installed and all the components of the network should be tested. It is recommended that the visibility system be piloted for at least three months in order to identify and resolve any problems. It is also important to train and develop documentation and training manuals. As this is a major undertaking documentation of the costs of the project and overall benefits of the system. All documentation will be beneficial to assist in future implementations with other trading partners.

TASKS	RESULTS
• Test EPCglobal network • Pilot visibility system • Resolve identified issues • Prepare training and documentation • Prepare cost/benefit review • Implement system	Training documentation Post implementation cost/benefit analysis

5. The Components of Implementing a Visibility System

5.1. Identify

GS1 manages a global system that allows companies all around the world to globally and uniquely identify their physical things like trade items (products & services), assets, logistic units, shipments, and physical locations and logical things like a corporation or a service relationship between provider and recipient. When this powerful identification system is combined with GS1 BarCodes, EPC tags, eCom business messages, and the Global Data Synchronization Network (GDSN), the connection is made between these physical or logical things and the information the supply chain needs about them. With the connection made, one world of global commerce comes into view.
In the supply chain, partners in that supply chain may wish to identify items for more than one purpose. For this reason there may be more than one GS1 identification keys used to identify items. Please see http://www.gs1.org/barcodes/technical/id_keys and http://www.epcglobalinc.org/standards/tds/ for more information.
The Serial Shipping Container Code (SSCC) is used to identify individual logistic unit. A logistic unit can be any combination of units put together in a case or on a pallet or truck where the specific unit load needs to be managed through the supply chain. The SSCC enables this unit to be tracked individually which brings benefits for order and delivery tracking and automated goods-receiving. As the SSCC provides a unique number for the delivery it can be utilized as a look-up number to provide not only detailed information regarding the contents of the load but also as part of an Advanced Shipping Notice (ASN) or Despatch Advice process.

Typically this means that just one scan at a goods-in bay of the SSCC on a logistic unit can be linked to a pre-received electronic ASN/Despatch Advice of the contents of the logistic unit to facilitate speedy goods-in and put away processes. Alternatively when tracking a unit in transit the SSCC provides all the information required for accurate identification.

An SSCC is different to a traded unit in that it is used when an item or unit load need to be identified specifically when moving from one place to another. It is possible to have a single item identified with both an SSCC and a GTIN (an example would be a pallet of bottled water that needs to be tracked in the supply chain but is also bought and sold). The SSCC can be captured when a specific logistic unit is dispatched, arrives at the destination or at any other intermediary point in the supply chain.

Identifiers by cargo layer:

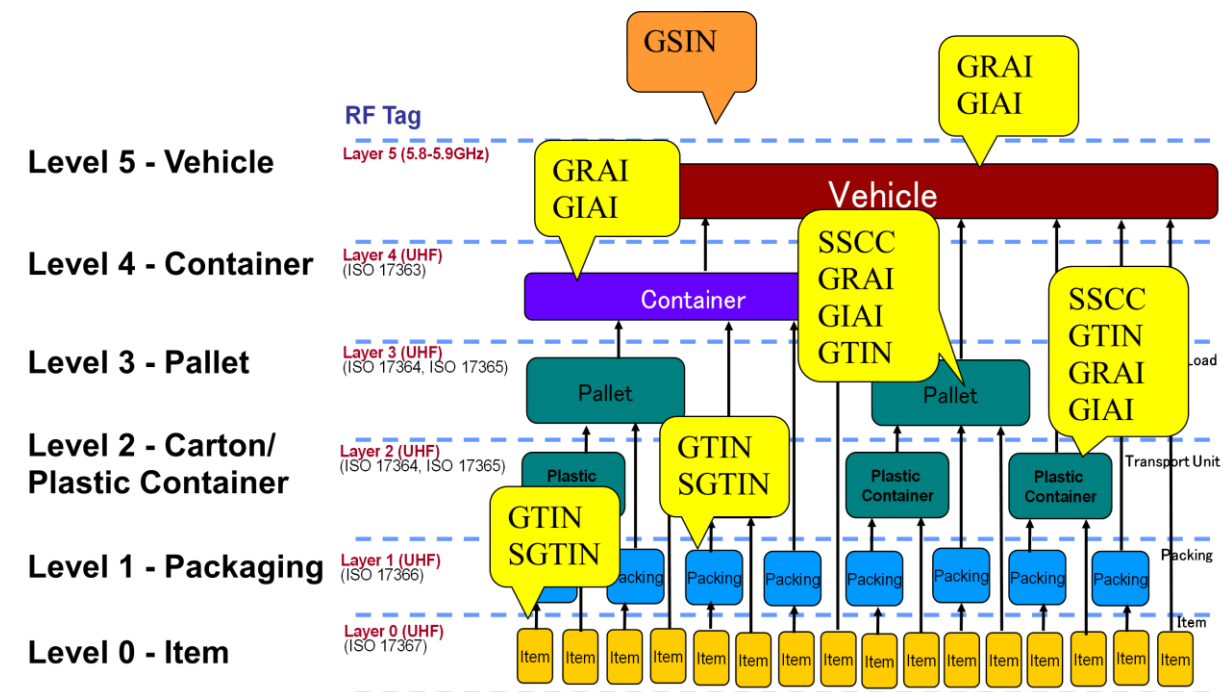| Cargo Layer	Asset/Trade Item Identifier	Shipment Identifier
Item:	SGTIN	SSCC
Carton:	SGTIN	SSCC
Pallet:	GRAI	SSCC
Conveyance:	GIAI 202	
Shipment:		GSIN

Figure 5.1.: Identification by Cargo Layer

5.2. Capture

5.2.1. Readers/Tags

Different readers and tags will be used for different layers of the visibility system: In most cases passive UHF Gen 2 tags will be used. If active tags or HF tags are used then different readers need to be installed for different tags.

5.2.2. Middleware

Electronic Product Code/Radio Frequency Identification (EPC/RFID) middleware refers to a wide range of functionality. Its primary functions are:

- Integrate a number of RFID readers with business applications.
- Handle a large number of EPC tag reads by consolidating the EPC tag data using filtering.

It is equally important that RFID middleware addresses the operational aspects and non-functional requirements. A more detailed description of middleware can be found in:
http://www.epcglobalinc.org/standards/ale

5.2.3. EPCIS Capturing Application

An EPCIS capturing application is any program that understands the business context in which the EPCIS information capture takes place. It conforms to the capturing interface as defined in the EPCIS standard. What this means is that an EPCIS capturing application is able to provide a higher-level business context to the RFID data that is captured. The capturing application gets information from a RFID middleware system implementing the ALE specification.(See figure 5.3.2). http://www.epcglobalinc.org/standards/ale

5.2.4. EPCIS Repository

EPCIS-enabled repository stores events generated by one or more EPCIS capturing applications and makes them available for later query.

Electronic Product Code Information Services (EPCIS) can accommodate read events captured from both a barcode and/or an RFID tag. However in this guideline we will only be addressing events resulting from an RFID read.. EPCIS provides a standard for capturing and sharing events that occur to an object in the physical world. It provides a means to express physical events. By contrast, other standards, such as Electronic Data Interchange (EDI) or GS1 eCom standards provide a means to communicate business transactions that take place between trading partners, such as a purchase order, or an Advances Ship Notice/ Despatch Advice. EPCIS complements these standards as opposed to replacing them. Business transactions very often can be described as one party telling another party that something happened. For example, an ASN says 'I shipped you these items'. By contrast, an EPCIS event provides physical evidence that something occurred. . EPCIS provides a way to share high volume, detailed information about material movement and status among trading partners. EPCIS does not address purchasing, forecasts, bidding, billing, etc. that are typically exchanged via EDI in a business transaction between two parties.

5.2.5. Accessing Application

The EPCIS accessing application is any application that needs to access an EPCIS. It implements the querying interface as defined in the EPCIS standard. Generally, this is an application responsible for carrying out some business process, such as an inventory collection, order management, or visibility system.
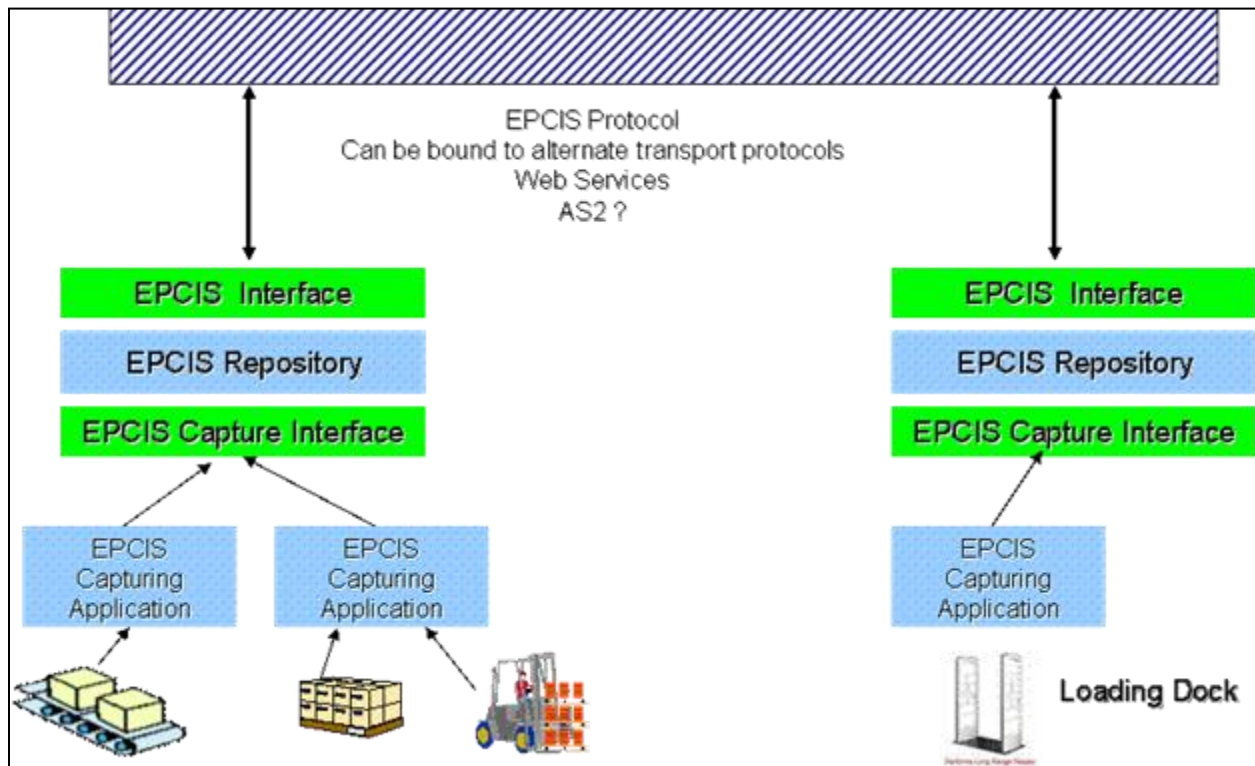

Figure 5.3.2: Applications used in a visibility system

6. Implementation by processes/operations

6.1. Commissioning the tags

Tag commissioning is the process of associating an EPC with a particular object (product, shipment, asset or container). A tag may have been encoded and applied in this step, or may have been previously encoded.

Cartons/Items:

Tag issuance, cargo tagging and commissioning is the first key fundamental steps for cargo track and trace using EPC/RFID technology. Tag issuance is referring to the printing (labels) and encoding of tags. Tagging is referring to the process of slapping a RFID tag on to the cargo units. Cargo units can be a carton box, pallet unit or container etc which requires track and trace visibility.

Pallets:

If pallets already have an EPC/RFID tag the tag should be read when the cartons are loaded on the pallet and the cartons aggregated to the pallets.
If the pallets do not have an EPC/RFID tag the tag will need to be applied to the pallet and the tag commissioned.
The tags usually are passive tags but there may be a requirement for active tags.

Conveyances:

If tags are not already on the conveyance a tag will need to be applied. Either passive tags(CAT) or an active tag(XCAT) could be used. In the case of passive tags more than one tag should be applied. Please refer to GS1 EPCglobal Conveyance Asset Tag (CAT) Environmental Testing Technical Implementation Guide to determine the recommended placement for the CAT tags.
http://www.epcglobalinc.org/standards/implementation_guidelines/CAT_Tech_Implementation_Guide_v2-_including_AG_recommendations_-_April_2010.pdf

6.2. Reading tags

Container Pool Depot -It is recommended that readers at the Container Pool Depot be positioned at the Gate. Note that depending on the technology (active and/or passive) readers will need to be installed for each type of reader.

Warehouse/Shipper –

Cartons/Items:
- Tag commissioning

Pallets:
- Tag commissioning.
- Cartons are loaded on the pallet
- Dock door when the goods are being loaded to the conveyance

Conveyance:
- Empty conveyance arrives at gate in
- Empty conveyance arrives at dock door
- Loaded conveyance at gate out

Carriers- Ocean, Rail, Air, Sea
- Loading to Carrier

- Unloading from Carrier

Departure and Arrival Terminal

- Gate in/Gate out

6.3. Capturing and Recording Information

Container Pool Depot

As the creation of the GSIN (Global Shipment Identification Number) data is not a physical read event, a logical read event will need to be created in the capturing application. This would be triggered by the tagging and commissioning event of the conveyance. If the tag has already been commissioned then this event would need to be created when the GSIN no. is received.
As there will be more than one conveyance tag (possibly 3 passive tags and one active tag) it will be important to decide which read event(s) will be passed to EPCIS. If the conveyance is being tracked it could be confusing if there is more than one GIAI.

Warehouse/Shipper –

- It is important that only one aggregation event per pallet and one aggregation event per conveyance be sent to EPCIS
- In section 4.1 we discussed the importance of choosing which GIAI (conveyance tag) would be used for tracking purposes. This will need to be decided in order to create the aggregation event correctly. It's recommended that the "tag location code" in the GIAI be used for this purpose.
- In order to distinguish between a pallet SSCC and carton SSCC there needs to be an identifier in the SSCC numbering. In the example above after the "01" a "2" was used to identify a pallet SSCC. : urn:epc:id:sscc:4912345. 0120000298 Note: This is an interim solution that was used during the pilot. A standard currently does not exist for this process.
- From the indicator in the SSCC the capturing application can then create the necessary Child and Parent SSCCs in the Aggregation Event. The Extension Field <tls:aggregationLevel> is shown in the example and will need to be created by the Capturing application. This will allow accessing applications to distinguish between the Pallet and Carton SSCC's.
- If more than one EPCIS is used it is important that BizTransaction ID's are associated to the shipment unit in each EPCIS, otherwise you will be unable to track the shipment with the identifier e.g. GSIN associated to container in Logistics EPCIS and Pallet in the Warehouse EPCIS .

Carriers- Ocean, Rail, Air, Sea

The Invoice details and bill of lading may not be available until after the carrier departs. In this case a Logical Event will need to be created.

6.4. Import/Export Process

During the Phase III pilot when the conveyance(s) was assigned to the shipment the GSIN was created using the assigned UCR. A detailed explanation of this process is contained in the GS1/EPCglobal Transport and Logistics Service Industry Action Group - Implementation Guide – Detailed Version
http://community.gs1.org/apps/org/workgroup/gs1ietransportandlogisticsug/document.php?document_id=37611

Container Pool Depot
- The GSIN is shared with the shipping company on booking. Then the GSIN is associated with the containers that are assigned to the shipment.

Warehouse/Shipper
- The GSIN is assigned when the shipper determines an export plan according to the delivery order from the consignee.
- The GSIN is shared with the shipping company on booking. Then the GSIN is associated with the containers that are assigned to the shipment.
- The GSIN is sent to the consignee in the Advance Shipping Notice/Despatch Advice by the shipping company. (Then, the GSIN is shared with the terminal operator at the destination along with the manifest notice by the shipping company.)
- The GSIN could replace the booking number when a shipper makes a booking with a shipping company.
- The GSIN could be used for a confirmation notice of delivery order from the shipper to the consignee.
- The shipper could provide the GSIN to the forwarder including the 3PL when it finalizes an export plan.

- The GSIN could be used for an export/import declaration/management number when the shipper/consignee declares an export/import to the customs administration.
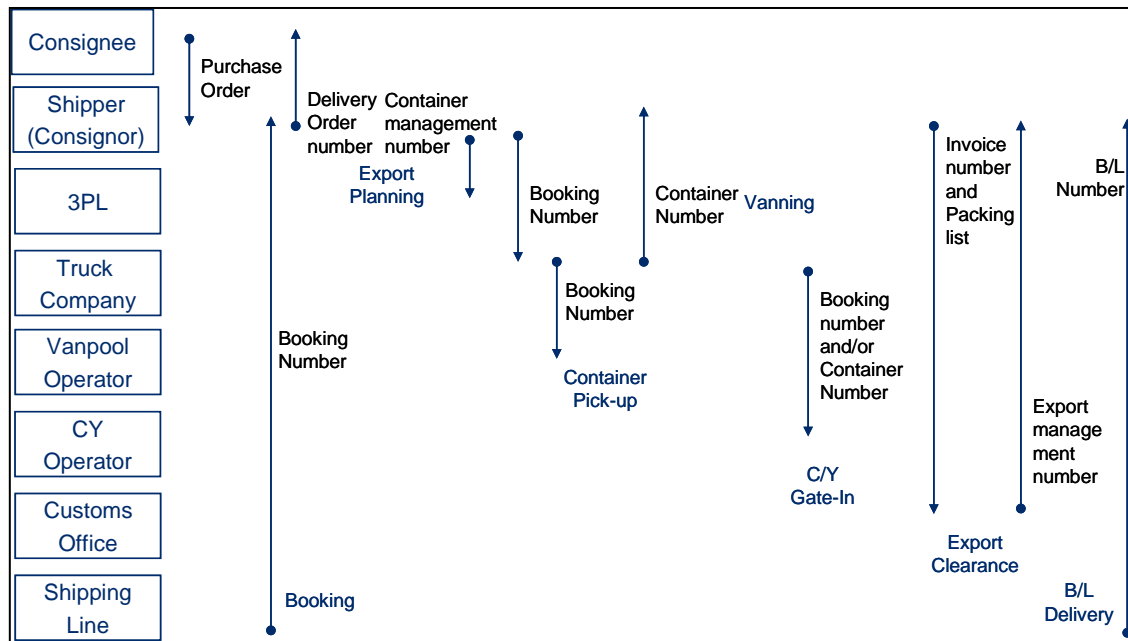
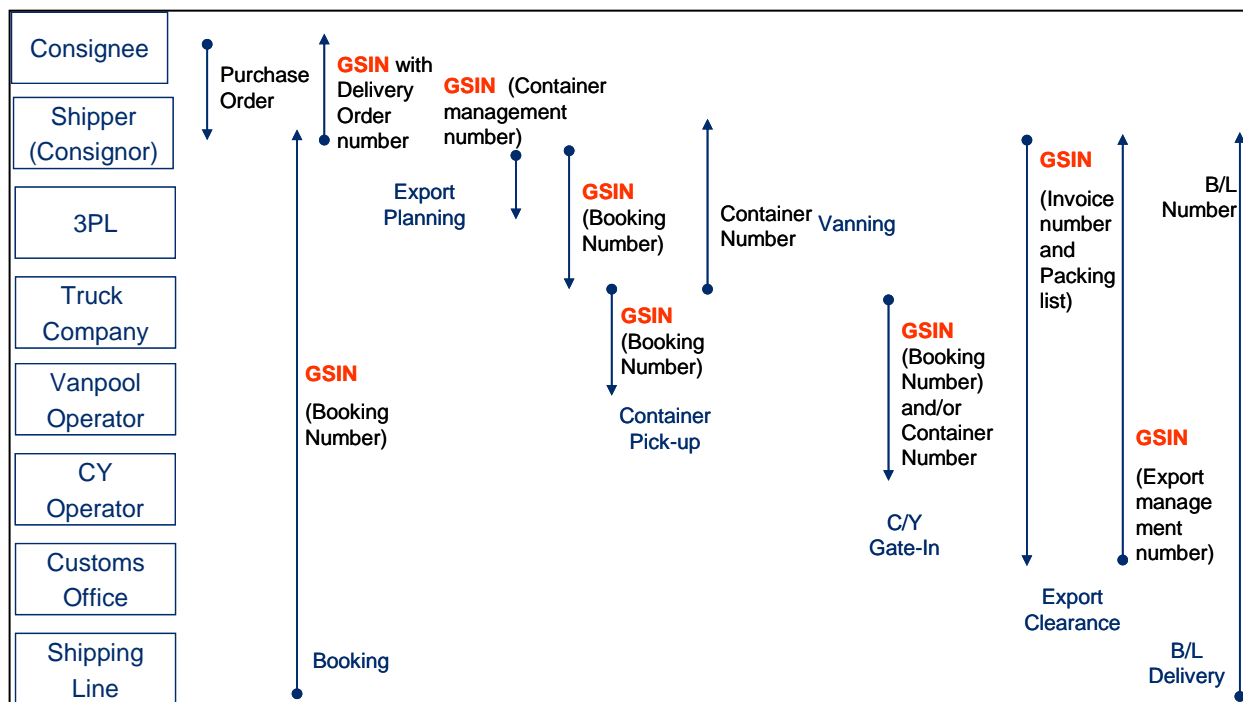Figure **Error! Reference source not found.**-1.   General Export Process with Key ID

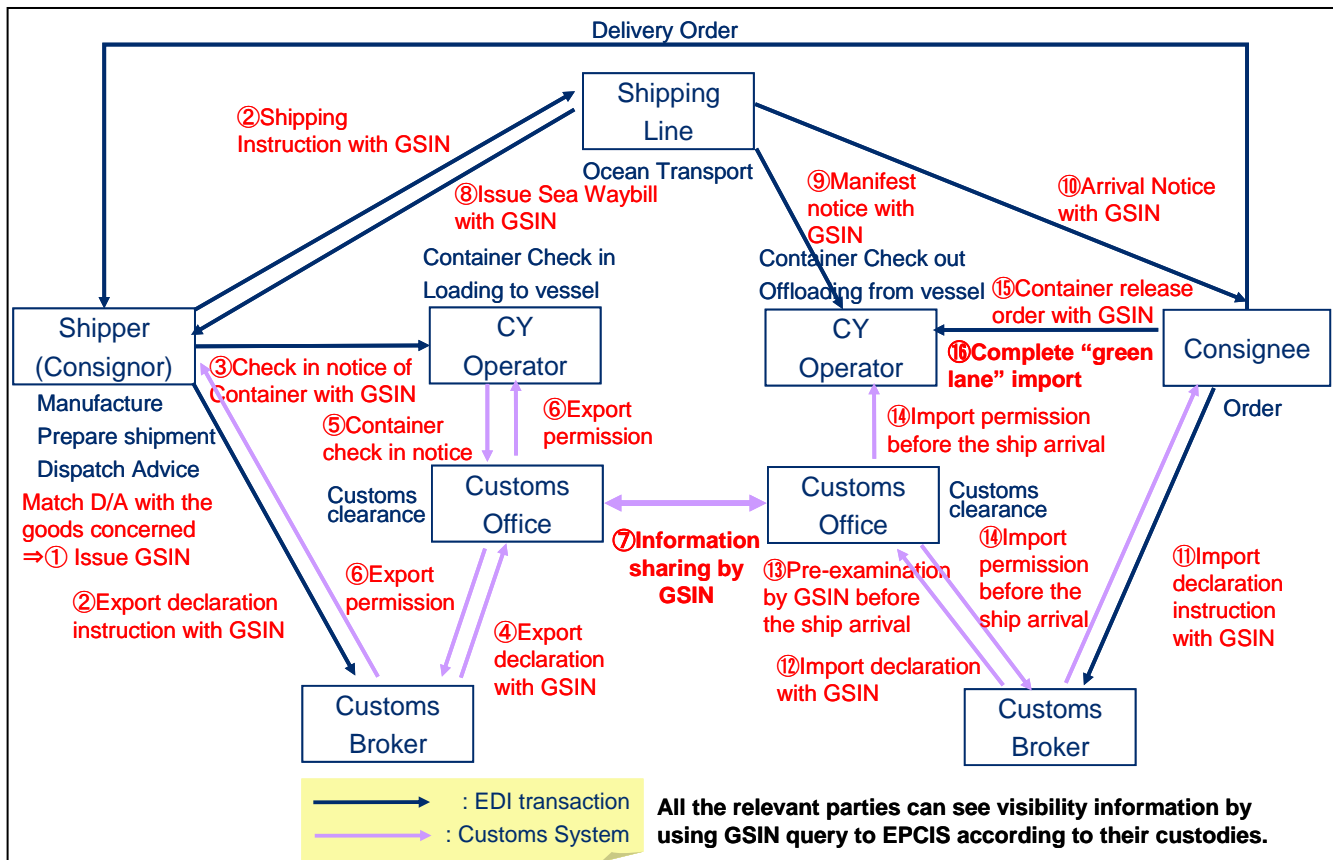Figure 6.4-2 Hypothesis of Export Process Using GSIN

Figure **Error! Reference source not found.**-3. Hypothesis of GSIN Distribution Process

Carriers- Ocean, Rail, Air, Sea

- The GSIN is shared with the shipping company on booking. Then the GSIN is associated with containers that are assigned to the shipment
- The GSIN could replace the booking number when a shipper makes a booking with a shipping company.

Departure and Arrival Terminals

- The GSIN is sent to the consignee in the Advance Shipping Notice/Despatch Advice by the shipping company. (Then, the GSIN is shared with the terminal operator at the destination along with the manifest notice by the shipping company.)

7. Assessment of Implementation

After the implementation is complete:

- Prepare a Post Implementation Cost/Benefit Analysis – often benefits are realized in areas that were not expected

- Analyze where additional benefits might be achieved and whether it would be beneficial to implement changes ie. Integration to existing systems

8. Appendix

8.1. TLS Pilots

A detailed explanation of the TLS Pilots is contained in the "GS1/EPCglobal Transport and Logistics Service Industry Action Group -Implementation Guide – Detailed Version http://community.gs1.org/apps/org/workgroup/gs1ietransportandlogisticsug/document.php?document_id=37611

8.1.1. Data events

Tag commissioning:- **Container**
Event Type: Object
   Action: Add
What:urn:epc:giai:4912345.0101401MISU9346040
Where: urn:epc:id:sgln:4912345.00001.299,432.ExitGate01
Why:
     Biz Step: urn:epcglobal:cbv:bizstep:commissioning
     Disposition: urn:epcglobal:cbv:disp:active
Extension: Custodian

GSIN:
Event Type: Transaction
   Action: Add
   What: urn:epcglobal:tlspilot:bti:ucr:gsin:4912345.123456789
Why:
   BizStep: urn:epcglobal:other:bizstep:transactionassociation

Container Leaves Van Pool:
Event Type: Object
   Action: Observe
   Why:
   BizStep: urn:epcglobal:cbv:bizstep:departing
       Disposition: urn:epcglobal:cbv:disp:in_transit

Print passive carton tags:
Event Type: Object
   Action: Observe
   Why:

BizStep: urn:epcglobal:cbv:bizstep:encoding
        Disposition: urn:epcglobal:cbv:disp:encoded

Tag commissioning: **Carton/Item and Pallet**
Event Type: Object
   Action: Add
What: urn:epc:id:sscc:4912345. 0100002117 (carton/item)
What: urn:epc:id:sscc:4912345. 0120000298 (pallet)
Where: urn:epc:id:sgln:4912345.00002.210,421.StagingSpace01
Why:
     Biz Step: urn:epcglobal:cbv:bizstep:commissioning
     Disposition: urn:epcglobal:cbv:disp:active
Extension: Custodian

Aggregation of cartons and association of Delivery Order and GSIN to pallet:
EPC- Parent – Pallet (SSCC); Children – Carton(SSCC)
Event Type: Aggregation
   Action: Add
   What:
urn:epcglobal:tlspilot:bti:do:4912345000040.IKDA364-03
urn:epcglobal:tlspilot:bti:ucr:gsin:4912345.123456789
Where: urn:epc:id:sgln:4912345.00002.210,421.StagingSpace01
Why:
   BizStep: urn:epcglobal:cbv:bizstep:packing
   Disposition: urn:epcglobal:cbv:disp:in_progress
Extension Field: <tls:aggregationLevel>urn:epcglobal:tls:aggregation:case-to-pallet</tls:aggregationLevel>

Gate In Read at Warehouse:
Event Type: Object
   Action: Observe
   Why:
   BizStep: urn:epcglobal:cbv:bizstep:arriving
       Disposition: urn:epcglobal:cbv:disp:in_progress

Container Dock Door Read at Warehouse:
Event Type: Object
   Action: Observe
   Why:
   BizStep: urn:epcglobal:cbv:bizstep:arriving
       Disposition: urn:epcglobal:cbv:disp:in_progress

Pallet tags read at Dock at Warehouse:
Event Type: Object

Action: Observe
Why:
BizStep: urn:epcglobal:cbv:bizstep:loading
     Disposition: urn:epcglobal:cbv:disp:in_progress

Aggregation of pallets and association of Delivery Order and GSIN to conveyance
EPC- Parent – Conveyance(GIAI); Children – Pallet(SSCC)
Event Type: Aggregation
  Action: Add
  What:
urn:epcglobal:tlspilot:bti:do:4912345000040.IKDA364-03
urn:epcglobal:tlspilot:bti:ucr:gsin:4912345.123456789
Where: urn:epc:id:sgln:4912345.00002.210,421.StagingSpace01
Why:
  BizStep: urn:epcglobal:cbv:bizstep:packing
  Disposition: urn:epcglobal:cbv:disp:in_progress
Extension Field: <tls:aggregationLevel>urn:epcglobal:tls:aggregation:pallet-to-container
</tls:aggregationLevel>

Gate Out read at Warehouse:
Event Type: Object
  Action: Observe
  Why:
  BizStep: urn:epcglobal:cbv:bizstep: departing
     Disposition: urn:epcglobal:cbv:disp: in_transit

Gate In Read at Port:
Event Type: Object
  Action: Observe
  Why:
  BizStep: urn:epcglobal:cbv:bizstep: arriving
     Disposition: urn:epcglobal:cbv:disp: in_progress

Loading conveyance on vessel::
Event Type: Object
  Action: Observe
What:urn:epc:giai:4912345.0101401MISU9346040
Where:
Read Point: urn:epc:id:sgln:4912345.00003.213,435.QuayCrane01
BizLocation: urn:epc:id:sgln:4912345.00005.214(Vessel)
Why:
   Biz Step: urn:epcglobal:cbv:bizstep:loading
   Disposition: urn:epcglobal:cbv:disp:in_transit
Extension:

Custodian
CustodianshipHandedOverTo

Invoice
EPC's: Conveyance EPCs (GIAI)
(All conveyance GIAIs associated with invoice#)
Event Type: Transaction
   Action: Add
   What:
urn:epcglobal:tlspilot:bti:ucr:gsin:4912345.123456789
   urn.epcglobal:other:bti:inv:4912345000040.CQ-08/06891
Why:
   BizStep: urn:epcglobal:other:bizstep:transactionassociation

BOL (Bill of Lading)
EPC's: Conveyance EPCs (GIAI)
(All conveyance GIAIs associated with bill of lading#)
Event Type: Transaction
   Action: Add
   What:
urn:epcglobal:tlspilot:bti:ucr:gsin:4912345.123456789
   type::urn:epcglobal:other:bti:bol:4912345000064.MISCTYO000038538
Why:
   BizStep: urn:epcglobal:other:bizstep:transactionassociation

Unloading conveyance from vessel::
Event Type: Object
   Action: Observe
Why:
     Biz Step: urn:epcglobal:cbv:bizstep: arriving
     Disposition: urn:epcglobal:cbv:disp:in_progress

Gate Out read at port::
Event Type: Object
   Action: Observe
Why:
     Biz Step: urn:epcglobal:cbv:bizstep: departing
     Disposition: urn:epcglobal:cbv:disp:in_transit

Dock Door read at Warehouse::
Event Type: Object
   Action: Observe
Why:
     Biz Step: urn:epcglobal:cbv:bizstep: arriving

Disposition: urn:epcglobal:cbv:disp:in_progress

Disassociate D/O, UCR, and Invoice from container::

Event Type: Transaction

   Action: Delete

Why:

     Biz Step: urn:epcglobal:other:bizstep:transactionassociation

Pallets unloaded from conveyance::

Event Type: Object

   Action: Observe

Why:

     Biz Step: urn:epcglobal:cbv:bizstep: accepting

     Disposition: urn:epcglobal:cbv:disp:in_progress

Pallets disaggregated from conveyance::

Event Type: Aggregation

   Action: Delete

Why:

     Biz Step: urn:epcglobal:cbv:bizstep: accepting

     Disposition: urn:epcglobal:cbv:disp:in_progress

Disassociation of D/O from cartons::

Event Type: Transaction

   Action: Delete

Why:

     Biz Step: urn:epcglobal:other:bizstep:transactionassociation

Carton tags read at dock door::

Event Type: Object

   Action: Observe

Why:

     Biz Step: urn:epcglobal:cbv:bizstep: accepting

     Disposition: urn:epcglobal:cbv:disp:in_progress

Gate Out read of empty conveyance at Warehouse:

Event Type: Object

   Action: Observe

   Why:

     BizStep: urn:epcglobal:cbv:bizstep: departing

     Disposition: urn:epcglobal:cbv:disp: in_transit

Gate In read at Van Pool:

Event Type: Object

Action: Observe

Why:

BizStep: urn:epcglobal:cbv:bizstep: arriving

Disposition: urn:epcglobal:cbv:disp: in_transit

Disassociation of BOL from conveyance::

Event Type: Transaction

Action: Delete

Why:

Biz Step: urn:epcglobal:other:bizstep:transactionassociation

8.1.2. EPCIS Repository

In the Phase III TLS Pilot two EPCIS's were used. In an implementation any number of EPCIS"s could be used based on the user's requirements. Either an ASP model based EPCIS network or individually hosted EPCIS could be used. In the Phase III pilot the EPCIS's were set up by function. Read events for logistics events were stored in one EPCIS and read events for the warehouse events were stored in the 2nd EPCIS.
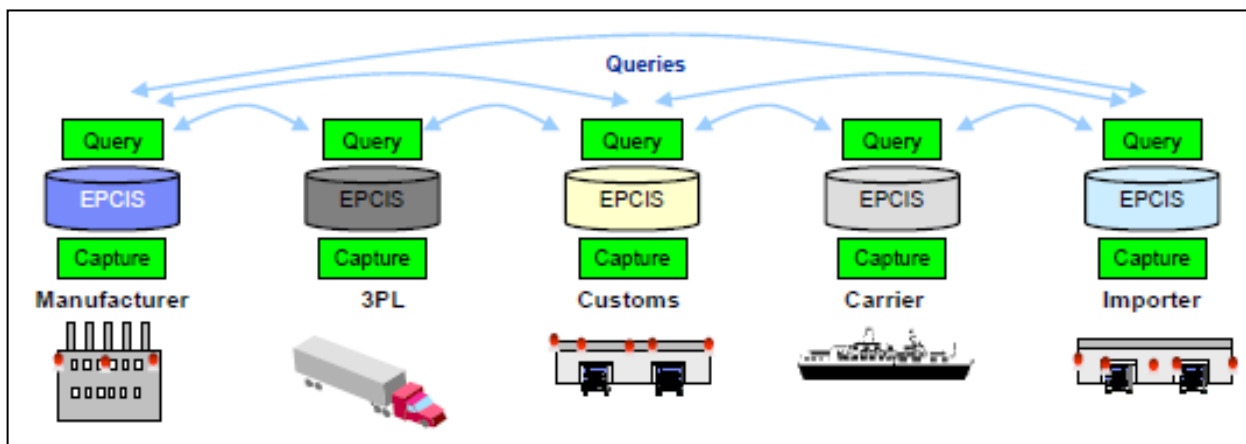

Figure **Error! Reference source not found.**-1. Linkage Among multiple EPCIS for Global Supply Chain Visibility

8.1.3. Accessing applications

In the Phase III TLS pilot, we created accessing applications for Consigners/Consignees and Logistics Service Providers including maritime carriers and terminal operation. The accessing applications provided the function of

1. Tracking commercial material through GS1 ID Keys and commercial identifiers .i.e Bill of Lading (BOL), Delivery Order (DO), Invoice Number, and unique consignment reference (UCR).
2. Sending alarm notice for any delayed shipment.
3. Confirming shipment plan.
4. Displaying cargo inventory information in real time basis including in-transit period.
5. Displaying historical events for tracing

Container Pool Depot –

Queried data by: GIAI (conveyance) & GSIN
Data Access: Conveyance Level

Warehouse/Shipper –
Queried data by: DO , Invoice, GSIN
Data Access: All Levels

Carriers- Ocean, Rail, Air, Sea
Queried data by: GIAI (conveyance), BOL & GSIN
Data Access: Conveyance Level

Departure and Arrival Terminals
Queried data by: GIAI (conveyance), BOL & GSIN
Data Access: Conveyance Level

Customs
Queried data by: GSIN
Data Access: All Levels

Terminal Operator
Queried data by: BOL;GIAI (conveyance), GSIN
Data Access: Conveyance Level

8.2. Data events

Please refer to the data events used in the TLS pilots section above for examples of recommended data events. Please refer to the EPCIS standard for explanations of the data elements http://www.epcglobalinc.org/standards/epcis/epcis_1_0_1-standard-20070921.pdf

8.3. UCR (Unique Consignment Reference)

In 2004, WCO issued the Recommendation on the UCR. The premise of the Unique Consignment Reference (UCR) is built around the concept of a reference number, essentially for Customs use, that has sufficient flexibility to cope with the most common scenarios that occur in International Trade. The basis of the UCR is to make maximal use of existing Supplier, Customer and Transport references.

The UCR should be:

- Applied to all international goods movements for which Customs control is required;
- Used only as an access key for audit, consignment tracking and information, reconciliation purposes;
- Unique at both national and international level;
- Applied at consignment level;

- Issued as early as possible in the international transaction.

The UCR concept recognizes the need to take account of trade exigencies and have minimal impact on them. The basis of the UCR is to set regulatory requirements for the use of existing Supplier/Customer references preferably on the basis of the international standards such as ISO 15459 or another existing proprietary numbering system that would contain a mechanism ensuring uniqueness of the UCR over a sufficient period of time.

To date, there is no full implementation of the UCR by any Customs administration. Over the last few years, there have been pilot projects aimed at demonstrating the UCR as a tool to improve supply chain management and security.