A joint Odette/ECG/VDA Publication

Digitalisation of Finished Vehicle Logistics

Process Description

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FOREWORD

This Recommendation covers typical logistics and service processes undertaken in the distribution of finished vehicles between vehicle manufacturers and their dealerships or other end customers. It specifies standard electronic messages for automated data exchange between vehicle manufacturers (or other shippers) and providers of logistic services. These logistics services can include transport, storage, maintenance, repair and any other services that may be required during the movement of vehicles from the manufacturer to the dealership or end customer.

The invoicing process associated with distribution of finished vehicles is outside the scope of this Recommendation.

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1. INTRODUCTION

The support of state-of-the-art IT Systems for the distribution chain in the automobile-industry is essential.

Exchanges of data must be accurate, transparent and timely and the standardisation of these exchanges is required to avoid communication failure between OEMs[1] and Logistics Service Providers (LSP)[2].

The goal of this Recommendation is to provide a set of standard electronic messages which will enable OEMs and Finished Vehicle Logistics Service Providers to collaborate with each other in a more efficient way. It will also serve to avoid the proliferation of many different message types and thereby significantly reduce IT development costs for individual companies.

This Recommendation is the result of a close collaboration between OEMs and Finished Vehicle Logistics Service Providers in Europe.

The set of messages associated with this Recommendation has been developed to cover all communication processes currently defined as being required between partners (vehicle shippers and logistics service providers) in the Finished Vehicle distribution chain.

The individual message specifications take account of all data items that are currently identified as being required to be exchanged between the partners in the different communication processes in the Finished Vehicle distribution chain.

It is not expected that all partners will use all of the messages in the set nor all of the data possibilities allowed for in the individual message specifications. Partners in each specific distribution system will agree between themselves which processes will be included, and which data is required to be exchanged in those processes and will develop their own guidelines accordingly.

It is, however, essential, that these own guidelines respect the rules set out in the standard specification and that the data items exchanged are clearly understood and have the same meaning for all partners in the system.

[1] OEM could represent a vehicle manufacturer, rental company, remarketing organisations, etc.

[2] LSP: For the purpose of this Recommendation Logistics Service Provider (LSP) is used to describe companies providing any type of logistics service including transports, compound handling and technical services, etc.

2. STRUCTURE OF THE RECOMMENDATION – STAGES OF THE BUSINESS PROCESS

The Recommendation covers the following business processes:

- Transport forecast and ordering process
- Transport status reporting process
- Service ordering process
- Inventory process
- Damage reporting process
- Geo-fencing and reporting of location of vehicles on compounds

3. TRANSPORT FORECAST AND ORDERING PROCESS

Figure 1 and 2 describe the information flow in the forecast and ordering process. In a repeating process, transport demand is first forecasted and then gradually refined until finally a precise transport order can be issued.

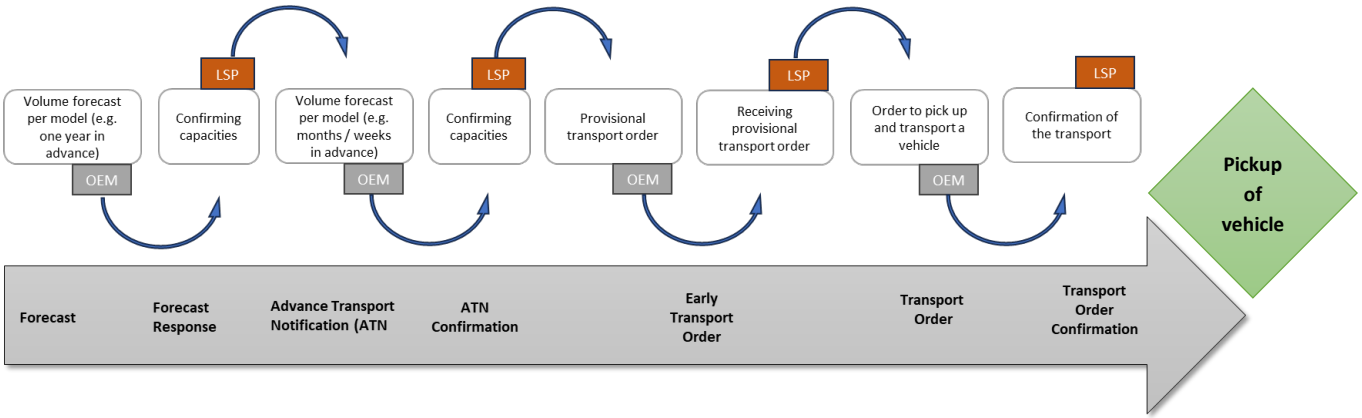

Figure 1: Transport Forecast and Ordering Process (Variant 1)

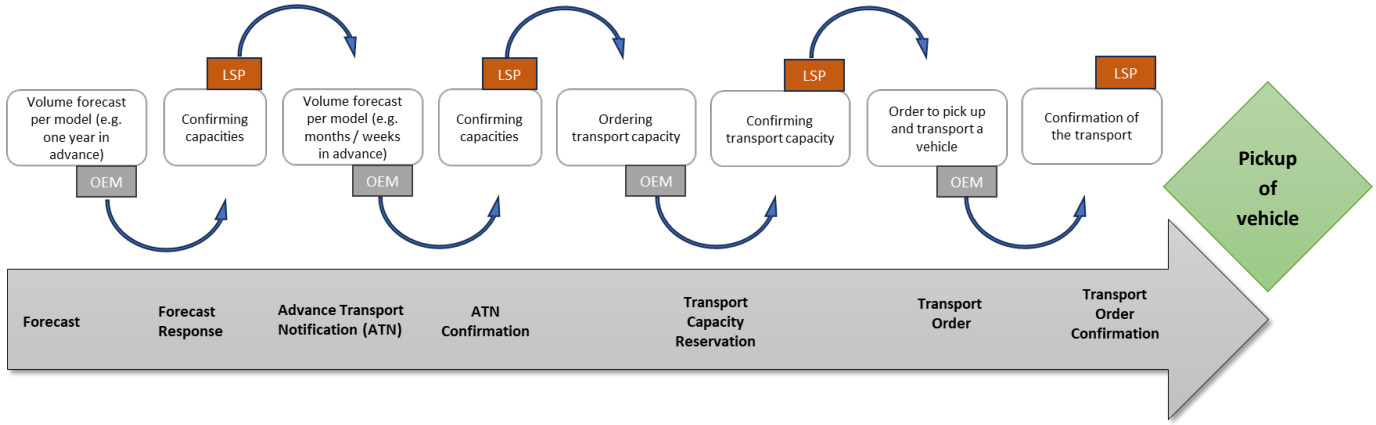

Figure 2: Forecast and Ordering Process (Variant 2)

3.1 TRANSPORT FORECAST PROCESS

Based on Sales Forecasts for different markets and a transport network to those markets, a Transport Forecast is developed by an OEM for each of their LSP partners. This forecast shows how many vehicles of each model will need to be transported at a specific time, or in a specific timeframe. Beginning with an annual forecast, figures are further refined to monthly and finally to weekly forecasts.

The forecast information will be used by the LSP for capacity planning and for the allocation of transport equipment and space on compounds. The annual forecast will be used for the budget process and the monthly and weekly forecast for real capacity planning in terms of assets and staff.

As a response to the Transport Forecast, the OEM expects a message from the LSP, confirming how many vehicles of each model will be picked up in the specified timeframe and, if possible, how many means of transport (trucks, trailers or rail wagons)will be sent to carry out the transports.

After analysing the forecast figures, the LSP will finalise their own capacity planning, checking that both assets and staff will be available. Based on this check, the LSP will confirm whether the forecast can be handled in its entirety or only partly.

EDI messages covering the process (See Annexes for EDI Guidelines and Example Messages related to this process)

- Forecast and advance transport notification based on UNSM DELFOR
  (for details, see Annexe FV01)
- Forecast and advance transport notification response based on UNSM DELFOR
  (for details, see Annexe FV02)
- XML message VehicleTransportForecast (used for forecast and response)
  (for details, see Annexe FV13)

3.2 ADVANCE TRANSPORT NOTIFICATION PROCESS

To achieve an efficient planning of resources for carriers and instigate proactive actions on capacity bottlenecks for the OEMs and LSPs, an Advance Transport Notification message is sent from the OEM to the LSP (for example, once a week) so that the LSP knows how many vehicles of each model he will be asked to pick up during the following weeks (or in an agreed timeframe).

Some OEMs also provide a summarised ATN for transport requirements related to the final destinations of the vehicles, irrespective of model.

Depending on individual agreement between OEM and LSP, the OEM can either use the ATN to instruct the LSP to send means of transport to pick up the mentioned vehicles, or just use it to give the LSP a more detailed transport forecast.

In general, vehicle data will be loaded into the transport system of the LSP but the activities of the LSP will depend on how long in advance of the actual transport the ATN has been received.

- Within the agreed frozen period: the LSP will plan the means of transport necessary for this load and will inform the OEM when the transportation will be ready for loading.
- Outside of the agreed frozen period: the LSP will plan the load, but not the specific means of transport.

If the means of transport is planned, a confirmation response will be sent and all involved parties will be informed.

Difference between Transport Forecast and Advance Transport Notification:

1. ATN is produced from a different data basis (production plan) and gives volume information per day (not just per week).
2. Forecast only shows the destination country. ATN shows the destination station – e.g. Spain, Madrid, or Spain, Girona, …

EDI messages covering the process (See Annexes for EDI Guidelines and Example Messages related to this process)

- Forecast and advance transport notification based on UNSM DELFOR (for details, see Annexe FV01)
- Forecast and advance transport notification response based on UNSM DELFOR (for details, see Annexe FV02)
- XML messages VehicleTransportForecast (for details, see Annexe FV13(a) and (b))

3.3 TRANSPORT ORDER PROCESS

Entry to the transport order process can vary depending on the OEM, the transport mode, and whether the transporter is also the compound provider. In certain cases, an OEM may send a preliminary message known as an Early Transport Order. In other cases, an OEM may send a Transport Capacity Reservation.

3.3.1 Early Transport Order

Whereas the advance transport notification (see 3.2) concerns only volumes, the early transport order contains a list of individual vehicles, either already completed or about to be produced, which may still be subject to change before the official transport order is issued. For example, see the case below where the transporter is not the compound provider.

3.3.2 Transport Capacity Reservation

In this process transport capacity is firmly ordered without yet knowing the exact load configuration. It is used as commitment and will be followed by firm VehicleTransportOrder messages for the vehicles, possibly after they are loaded.

The process can be implemented in two different ways:

1. The customer orders a number of transport means without further specification of vehicles to be transported.

2. The customer orders capacity for a given number of vehicles including at least their model names.

In the second scenario the service provider is expected to do the calculation of the space required and to return the appropriate number of means of transport in the response message.

3.3.3 Transport Order

This is the official order of the OEM for a vehicle transport.

Following the Transport Order, the OEM may receive a Transport Order Response message, confirming the pick-up and transport of the vehicle (but see different scenarios below). The transport order can be related to one or more vehicles but in all cases all the vehicles must have the same destination for the ordered transport leg.

Scenario 1: The transporter is also the compound provider

The Transport Order is usually considered as final and, as soon as the vehicle is available, the LSP will start with final transport planning. Specific trucks, rail wagons and/or vessels will be allocated to perform the transport. The LSP will plan the transport and, if contractually agreed, he will also check the connection transport.

In case of transport by truck, the transport order data may be transferred to the truck telematics device so that the driver will be able to check that the right vehicles are loaded for transport.

After finalising the transport planning the transporter may, if required, send a Transport Order Response message to the OEM containing information such as the load number, the licence plate of the truck and possibly the planned load configuration of the truck.

Scenario 2: The transporter is not the compound provider

The OEM may send an Early Transport Order to the compound provider (can be several weeks ahead).

The compound provider then usually sends a Status Report message or Inventory Report message to the relevant parties indicating the availability of the vehicles for shipment so that the OEM can issue the final Transport Order to the transporter.

After finalising the transport planning, the transporter will send a Transport Order Response message as a confirmation to the OEM, giving the details necessary to accept the truck on the loading location. The transporter may also send the load number, licence plate of the truck and possibly the planned load configuration of the truck.

The OEM in turn will inform the compound manager, often by forwarding a copy of the Transport Order Response message.

EDI messages covering the process (See Annexes for EDI Guidelines and Example Messages related to this process)

- Early Transport Order and Transport Order based on UNSM IFTMIN
  (for details, see Annexe FV03)

- Transport Order Confirmation and Planned Load Configuration- based on UNSM IFTMCS (for details, see Annexe FV04)
- XML-message VehicleTransportCapacityReservation (used for reservation and response) (for details, see Annexe FV25(a) and (b))
- XML-message VehicleTransportOrder (used for transport order and response) (for details, see Annexe FV14(a) and (b))

4. TRANSPORT STATUS AND VEHICLE STATUS PROCESS

All along the distribution chain, messages are exchanged between the OEM and LSP, to report the current status and location of a vehicle and/or the status and location of a transport means being used to transport the vehicle. These status messages also allow the LSP to provide an updated estimated time of arrival (ETA) at the next destination. The ETA can be calculated either statically, based on a known average time for a specific transport segment, or dynamically, based on current geo-position and other GPS related information such as traffic conditions, road conditions, weather conditions etc.

The increasing availability of on-board telematics means that the reporting of the status of a vehicle may be initiated by transmissions from the telematics module installed in the vehicle.

The availability of vehicle telematics data during transit may also allow the OEM to report the technical status of a vehicle to the LSP or to carry out certain operations on the vehicle at the request of the LSP. They also provide the possibility to report the status and location of a vehicle when it is moved within a compound. This latter aspect is covered in more detail in Chapter 8.

4.1 VEHICLE STATUS REQUEST AND REPORT

The vehicle status request message is most likely to be sent from an LSP to an OEM to request information about the exact position of a vehicle on the compound or to enquire about the technical status of a vehicle (e.g. condition of battery, tyre pressure etc.). Another important use of this message will be to request the OEM to carry out certain operations on vehicles during transit (e.g. lock the doors on cars in a specific area of a compound, flash the lights of a specific vehicle, etc.).

Vehicle status report messages are usually sent by the OEM as a reply to a vehicle status request message sent previously by an LSP to the OEM.

EDI Messages covering the process (See Annexes for EDI Guidelines and Example Messages related to this process)

- Vehicle Status request based on UNSM IFTSTQ
  (for details, see Annexe FV10)
- Vehicle Status Report based on UNSM IFTSTA
  (for details, see Annexe FV12)
- XML message VehicleStatusRequest
  (for details, see Annexe FV15)
- XML message VehicleStatusReport
  (for details, see Annexe FV16)

4.2 TRANSPORT STATUS REPORT

Transport status report messages are exchanged between the LSP and the OEM at various stages in the distribution process (e.g. when a vehicle or transport means is ready to be loaded, has left a compound, has arrived at a compound, is taken over by the next party in the distribution process, to give the current location during a transport, etc.). Below, an example of a multi modal transport process is described, where several different transport status report messages are exchanged to give the current status of a vehicle and/or its means of transport.

The stages, events, or points in time in the distribution process when status reports are exchanged will usually be defined in individual agreements between OEMs and LSPs. The actual status is given in the message by means of a code (see Annexe FV24).

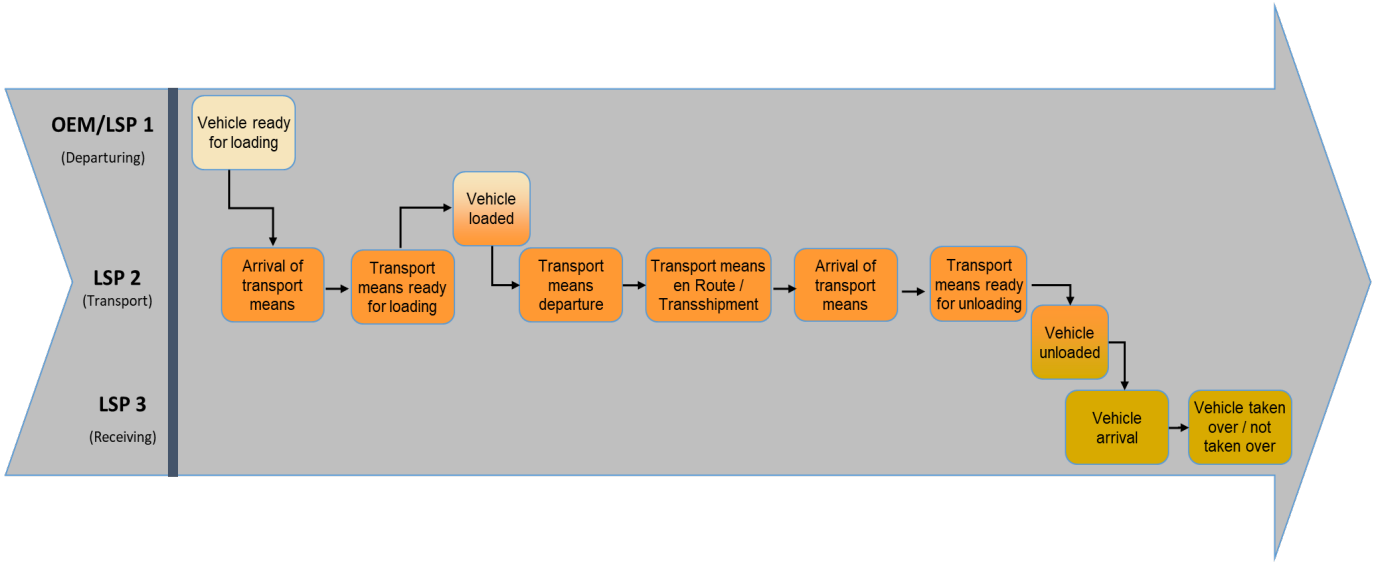

Figure 2: Transport Multi Modal Process

EDI Messages covering the process (See Annexes for EDI Guidelines and Example Messages related to this process)

- Transport Status Report based on UNSM IFTSTA
  (for details, see Annexe FV09)
- XML message VehicleTransportStatusReport
  (for details, see Annexe FV17)

5. SERVICE ORDER PROCESS

There are two possible phases in service ordering: a service order forecast and the actual service order.

5.1 SERVICE ORDER FORECAST

The service order forecast provides the LSP with an overview of the scheduled service orders for a bilaterally agreed time–period and helps the LSP to plan resources. In the service order forecast, only specific (agreed) services are included.

To fulfil the request, the LSP needs to check capacities in terms of workshop facilities, availability of staff, tools, material (and parts, if required).

5.2 SERVICE ORDER

The service order initiates the actual service activities. It can be either a regular service order, which must be executed for each vehicle of a certain batch or model, or an on-demand service order that concerns only an individually specified vehicle or group of vehicles.

With the increasing use of event triggers from a vehicle's telematics system, service orders can be sent when needed instead of being sent on a recurring/frequent basis (for example: a service order can be sent when the battery is actually low instead of asking for battery checking at fixed intervals).

After receiving the service order, the LSP must check whether he can perform the requested actions or not. The decision will be based on the requirements and capacities and perhaps on availability of necessary parts This will lead to a service order response message which can either confirm or reject the service order. A service order response may also be sent to provide information on the status of the ordered service (Started, In-Progress, Completed…)

If the service order is accepted, the LSP will certainly be required to send a service order response to the OEM to confirm that the work has been completed.

If the service order is rejected (e.g. capacity shortages), the OEM must find an alternative solution (e.g. next compound or other time slots to fulfil the necessary activities).

EDI messages covering the process (See Annexes for EDI Guidelines and Example Messages related to this process)

- Service Order based on UNSM ORDERS (used for forecast and firm order)
  (for details, see Annexe FV05)
- Service Order Response based on UNSM ORDRSP (used for responses to forecasts and firm orders) (Original, Replace, Not accepted, Cancellation, Progress Status & Completion)
  (for details, see Annexe FV06)
- XML message VehicleServiceOrder (used for forecast, order and order response)
  (for details, see Annexe FV18)

6. COMPOUND INVENTORY REQUEST AND REPORT

If, for any reason, the OEM needs the inventory of a certain compound or geo-fence zone, a request message is sent to the LSP. The LSP then sends back a response message containing the requested information.

After receiving the request for inventory, the LSP will create the response out of the compound management system to give a precise view of current stock inventory for this OEM.

Another scenario for the use of the inventory report is to notify a transport service provider at regular intervals, which vehicles are ready for pick-up or shipment.

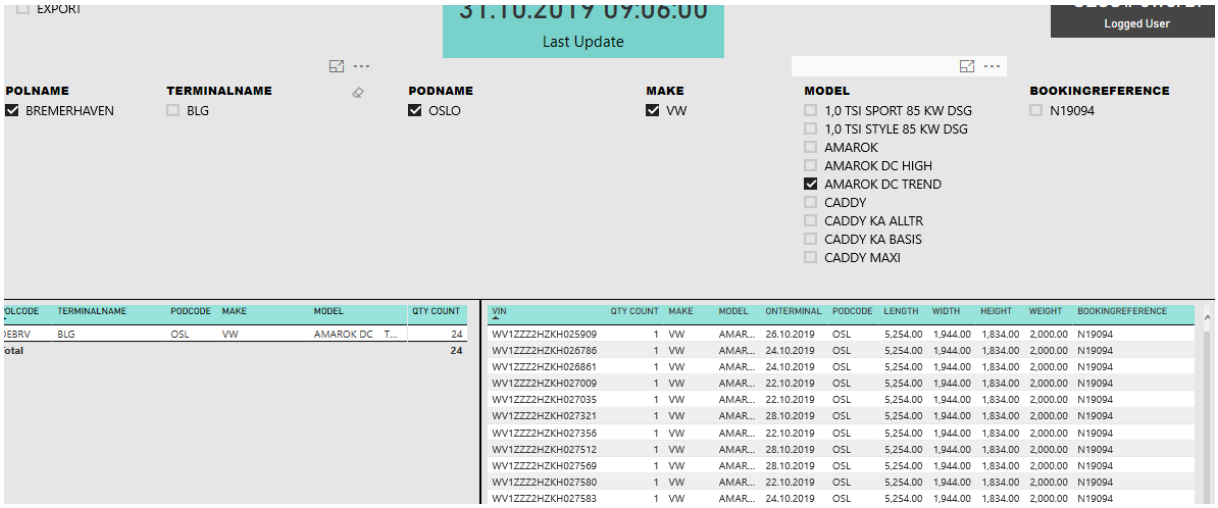

Figure 3: Sample visualisation of filtered inventory data

EDI messages covering the process (See Annexes for EDI Guidelines and Example Messages related to this process)

- Vehicle Inventory Request and Report based on UNSM INVRPT (used for request and response)
  (for details, see Annexe FV08)
- XML message VehicleInventoryReport (used for request and response)
  (for details, see Annexe FV19)

7. DAMAGE REPORT

In case of damage to a vehicle somewhere in the distribution chain, details of the damage should be communicated from the LSP to the OEM in a structured way. The damage information should include all relevant data enabling the OEM to initiate the necessary actions such as service/repair order, inform insurance companies, etc.

EDI messages covering the process (See Annexes for EDI Guidelines and Example Messages related to this process)

- Vehicle Damage Report based on UNSM PROSRV
  (for details, see Annexe FV07)
- XML message VehicleDamageReport
  (for details, see Annexe FV20)

8. GEO-FENCING AND REPORTING OF VEHICLE LOCATION IN COMPOUNDS

DESCRIPTION

OEMs and LSPs often use geo-fenced areas on their premises, where they park vehicles with the same process status. This way, by knowing the exact location of a vehicle, the process status can be automatically determined.

The geo-fencing system can have up to 3 levels:

- **Level 1:** Used to identify a whole site or step of the Outbound Logistics flow (manufacturing plant, compound or final destination…) managed by a single logistics partner (OEM, LSP, dealer or rental company …). A Level 1 zone for a logistics partner includes not only the private zones, but also all zones in which the vehicles under its responsibility are allowed to be (e.g.: Shared workshop on a port).
- **Level 2:** functional area within level one (see examples below). Standardised zone types with a common name and definition, encompassing all activities of a Level 1 step. Used in work rules definition and communication between logistics partners. Level 2 zones must be totally included in a defined Level 1 zone and must not overlap one another.
- **Level 3:** sub-area within a level 2 area named and used freely by the Level 1 manager to suit operational needs. Level 3 zones automatically inherit the same characteristics (work rules, alerts…) as the Level 2 zones they are derived from, but may be customised.

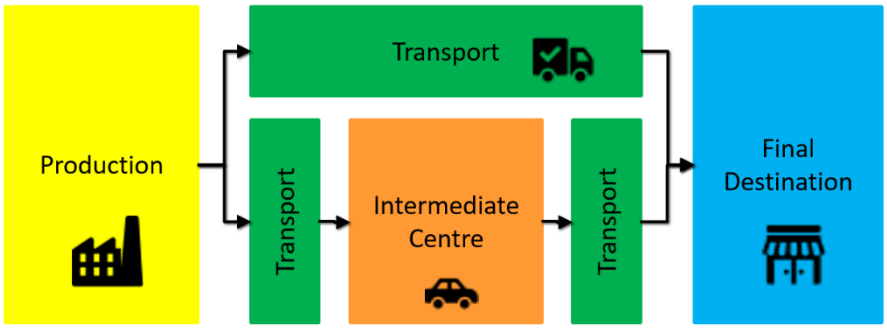

Figure 4: Level 1 geo-fenced areas

The following figures illustrate potential level 2 zones:

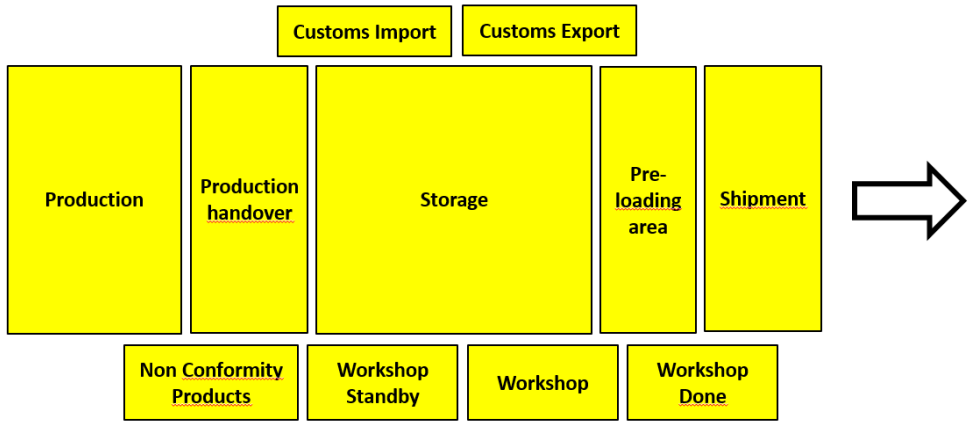

Figure 5: Potential level 2 zones in the production plant

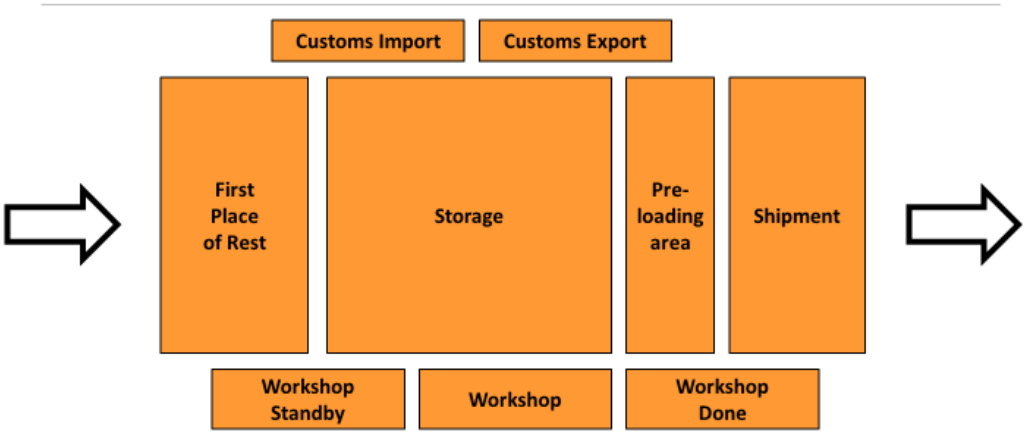

Figure 6: Potential level 2 zones in an intermediate logistics centre (compound, port, rail hub…)

Figure 7: Potential level 2 zone at final destination

Level 2 zones and definitions are standardised in this Recommendation for all types of Outbound Logistics sites in order to:

- Facilitate geo-fencing of the logistics sites: Vehicles are split into categories and zones using the definitions in the table below.
- Facilitate communication between Logistics Partners: Knowing the name of the zone where a vehicle is located gives a clear idea of its status.
- Facilitate data processing over multiple sites (e.g.: Vehicles in “Customs Import” zones of multiple sites can be processed together easily).

It is recommended that the following table should be used when designing the geo-fencing system of a vehicle compound.

Colours in the first column show which type of Level 1 zone is concerned (according to Figures 4, 5 and 6 above).

Figure 8: Table - Standardised Level 2 zones names and definitions

Level 1	Name	Definition
	Production	Vehicles still under the responsability of the prodcution (manufacturing)
	Production handover	Handover zone between production and logistics - Vehicles are put there by the production and are moved out by logistics when they are accepted by logistics
	Storage	Vehicles that are not scheduled for shipment
	Non Conformity products	Vehicles with a non conformity of production origin are put there by logistics. After refurbishment the production puts them back here to be collected by logistics
	Pre-loading area	Vehicles that are scheduled for shipment and are waiting for their transport means.
	Workshop standby	Vehicles that are waiting for their processing in the workshop
	Workshop	Vehicles for which a job of any nature is to be performed by the logistics provider's workshop
	Workshop done	Vehicles processed by the workshop waiting for the next step
	Customs Import	Imported vehicles not customs cleared yet.
	Customs Export	Exported vehicles already registered by customs.
	Shipment	Area where transport means are stationed and are being loaded. This is a "no return" zone, vehicles must be cleared for shipment at that stage.
	First Place Of Rest	Buffer zone where vehicles are unloaded from a transport means.
	Transport	Vehicles stationed in a vessel, on a truck, railcar or barge

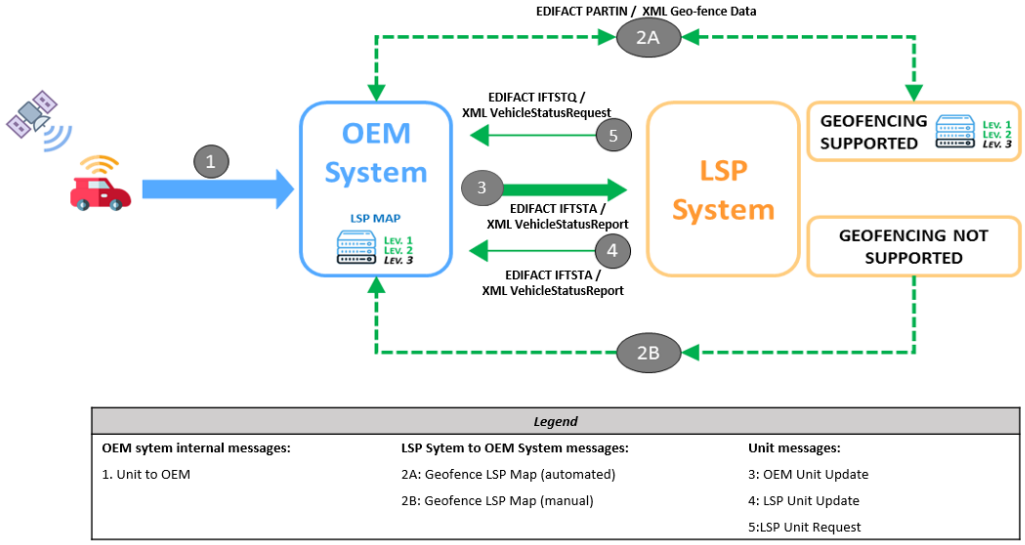

Figure 9: Information flow in geo-fencing scenarios

This chapter describes the message used in 2A, electronic geo-fence data exchange.

If an electronic exchange of geo-fence data is not supported by one of the involved partners, the exchange/update has to be done by some other means (2B).

Typical process flow:

1. Level 1 & Level 2 zone master data are stored in the IT systems of both the OEM and the LSP.
2. These zones are defined by the LSP according to their most frequent use (e.g. “Most of the time this is the FPR area”).
3. Message 3 is used by the OEM to send the vehicle geo-position coordinates and the zone as recorded in their version of the compound map.
4. If the zone given by the OEM in Message 3 is identical to the zone defined in the LSP system (e.g. FPR), no response is necessary from the LSP.
5. If the zone has changed temporarily (e.g. Part of the FPR is now used as Storage by the LSP), the LSP replies with Message 4, indicating that the vehicle is in an area that is now defined as “Storage” and the OEM system is updated to show that the vehicle is now in a “Storage” zone.
6. If a zone purpose changes permanently (e.g. a new workshop has been built), messages 2A or 2B are used to update the LSP geo-fence map in the OEM system.
7. Message 5 is used by the LSP to ask for the position of a particular vehicle (mainly necessary if the OEM does not systematically inform the LSP of the updated position when a vehicle moves within the same zone).

EDI Messages covering the process (See Annexes for EDI Guidelines and Example Messages related to this process)

- Vehicle geofence Data based on UNSM PARTIN
  (for details, see Annexe FV11)
- XML message VehicleGeofenceData
  (for details, see Annexe FV21)

9. GLOSSARY

Term	Definition
ATN	Advance Transport Notification
Compound provider	The company who manages the overall compound operations
ECG	The Association of European Vehicle Logistics
EDI	Electronic Data Interchange
EDIFACT	EDI for Administration, Commerce, and Transport
FBU	Fully Built Up
FPR	First Place of Rest
Gate in	Vehicle arrival
Gate out	Vehicle departure
Geo-fence	A virtual perimeter for a real-world geographic area
Geo-fencing	A location-based service in which an app or other software uses GPS, RFID, Wi-Fi or cellular data to trigger a pre-programmed action when a mobile device or RFID tag enters or exits a virtual boundary set up around a geographical location, known as a geo-fence.
Load	Vehicle(s) to be transported
Load Configuration	The set of information which describe the details of the load including vehicle data
LSP	Logistics Service Provider. For the purpose of this Recommendation, LSP is used to describe companies providing any type of logistics service including transports, compound handling and technical services, etc.
Means of Transport	The type of transport used according to the chosen mode of transport (e.g. vessel, barge, truck, rail wagon, aircraft etc.)
Mode of Transport	Sea, Inland waterway, road, rail, air
ODETTE	Organisation for Data Exchange by Tele-Transmission in Europe (A pan-European collaboration and services platform for the automotive supply chain)
OEM	Original Equipment Manufacturer. For the purpose of this Recommendation, OEM is used to represent a vehicle manufacturer, rental company, remarketing organisations, etc.
Transporter	The company who transports the vehicles from one point to another
Truck telematics	The technology of sending, receiving and storing information using telecommunication devices
UNSM	United Nations Standard Message
VDA	Verband der Automobilindustrie e.V. (Association of the German automotive industry)
XML	Extensible Markup Language

10. LIST OF ANNEXES

Annexe FV01	EDIFACT DELFOR Guideline for Forecast and Advance Transport Notification
Annexe FV02	EDIFACT DELFOR Guideline for Forecast and Advance Transport Notification Response
Annexe FV03	EDIFACT IFTMIN Guideline for Early Transport Order and Transport Order
Annexe FV04	EDIFACT IFTMCS Guideline for Transport Order Confirmation and Planned Load Configuration
Annexe FV05	EDIFACT ORDERS Guideline for Service Order
Annexe FV06	EDIFACT ORDRSP Guideline for Service Order Response
Annexe FV07	EDIFACT PROSRV Guideline for Vehicle Damage Report
Annexe FV08	EDIFACT INVRPT Guideline for Inventory Request and Report
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Annexe FV11	EDIFACT PARTIN Guideline for Vehicle Geofence Data
Annexe FV12	EDIFACT IFTSTA Guideline for Vehicle Status Report
Annexe FV13	XML VehicleTransportForecast Guideline (a and b)
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Annexe FV22	Structure of an XML Interchange
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