

## French C-ITS Deployment Coordination committee

# Common technical specifications for use cases – J: Multimodal Cargo Transport Optimization

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## Information on the document

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## Publication history

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Black highlighted texts are issues with standards.

Yellow highlighted texts are topics that need to be finalized.

The following legend is used on master document tables (next sub-chapters) and on profiles in each UC documents :

Standard / Field : if status is mandatory in standard : **bold**, If optional : *italic*.

Profile / Status :

- If mandatory : ✓
- If optional in standard :
  - Used (U) when always used
  - Not used (X) when never used.
  - Sometimes (S) when it depends.

Profile / Content : important settings or information are in ***bold italic pink underline***.

# Quality rules

## Reference to the version administration

Version number to be composed of 3 digits > vR.XY

- **R** corresponds to the release number : it is upgraded each time SC Studies validates the diffusion of a new release,

- **X** is the major version number: it is upgraded each time SC Studies validates the deliverable,

- **Y** is the minor version number: it is upgraded each time a contributor changes anything.

Once the deliverable is approved, its version number is upgraded from vR.XY to vR.(X+1)0

Once the deliverable is release, its version number is upgraded from vR.XY to v(R+1).00

As illustration :

0.03 > Work in progress version

0.10 > Del. Approved by SC Studies but not released

2.00 > Del. approved & released (in release 2)

2.05 > Del. Updated - in progress version

## Requirements identification & traceability

In this document, the following verbal forms are used to indicate requirements: **Shall / Shall not**

Recommendations shall be indicated by the verbal forms: **Should / Should not**

Permissions shall be indicated by the verbal forms: **May / May not**

Possibility and capability shall be indicated by the verbal forms: **Can / Cannot**

Inevitability used to describe behavior of systems beyond of the scope of this del. shall be indicated by: **Will / Will not**

Facts shall be indicated by the verbal forms: **Is / Is not**

In the table here below:

2.4.X.XX > is the number given to the deliverable (e.g. 2.4.4.8)

YYYY > for digit are given to identifying which component/entity the requirement is addressing (e.g. LTCA for long terme certificate authority)

ZZZ > is the numeration of the requirement

# Acronyms & abbreviations

CAM	Cooperative Awareness Message
C-ITS	Cooperative Intelligent Transport Systems
C-ITS-S	Central ITS Station (national ITS station)
DENM	Decentralized Environmental Notification Message (réf. ETSI standard for C-ITS messages)
GPS	Global Positioning System
ITS-G5	ITS-G5 is a European standard for ad-hoc short-range communication of vehicles among each other (V2V) and with Road ITS Stations (V2I). ITS-G5 refers to the approved amendment of the IEEE 802.11 (standard IEEE 802.11p). This technology (possibly others) uses the 5.9 GHz frequency band to support safety- and non-safety ITS applications. In this document ITS-G5 stands for IEEE802.11p/ETSI ITS-G5.
IVI	Infrastructure to Vehicle Information (réf. ETSI standard for C-ITS messages)
MAPData	Geometric information for the intersection (réf. ETSI standard for C-ITS messages)
R-ITS-S	Roadside ITS Station (RSU or ITS-S R in the French Terminology)
SPAT	Signal Phase and Timing (réf. ETSI standard for C-ITS messages)
TCC	Traffic Control Centre (the place where road management measure are decided)
TMS	Traffic Management System (the usual system in which the road operator sets its road measures and events)
TOS	Traffic Operating System
POS	Parking Operating System
CCS	Cargo Community System
V-ITS-S	Vehicle ITS Station (any vehicles)
Vro-ITS-S	Road operator vehicle ITS Station
Vu-ITS-S	User vehicle ITS Station (in that case, road operator vehicle are excluded when they are not in user mode)
ETA	Estimated Time of Arrival

N/A	<i>Not Applicable</i>
TBC	<i>To Be Checked, with MS or associated partner</i>
WIP	<i>Work in progress : when mentioned next to the version number, it means the document is an in-between version</i>

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- Services : the main services used in InterCor
- Connectors : allow information to be exchanged with external systems
- Smartphone management : management of exchanges with smartphones

### 1.1.1 HMI

There are two types of HMIs:

- HMIs accessible using login / password authentication which allows access to all the services offered by the Noscifel platform.
- intelligentDashboard which is accessible using a token that offers features like access to multimodal ETA.

### 1.1.2 Services

The services are related to the different use cases developed in the framework of InterCor:

- Multimodal ETA for cargo optimisation
- Dock reservation
- Assigning a slot for multimodal terminal access management
- Information on the site's access conditions

### 1.1.3 Connectors

Here are the main connectors used in InterCor:

- C-ITS : for exchanges with the NeoGLS Central ITS-S
- AEOLIX : for exchanges with the AEOLIX platform and mainly the ETA calculation service
- Ci5 / AP+ : for exchanges with CCS Ci5 / AP+ and mainly the checking of the status of the slots

## 2. J1 : Multimodal ETA for cargo optimization

The National Central ITS-S centralises information about ETA trucks and barges having as destinations a terminal in France. These can be provided by MCTO Transporters other than the one proposed by NeoGLS.

This information is then broadcast to the different terminals (MCTO Terminal) who have subscribed on the National Central ITS-S.

### 2.1 Activity diagram

#### 2.1.1 Basic truck driver scenario

*Illustration 2: Diagram Basic truck driver scenario*

**Select destination** : The driver selects in a list the final destination (port or terminal)

**Start the trip** : The driver starts his trip

**Send truck position and destinations** : The smartphone sends the destination and the GPS position of the truck at regular intervals to the MCTO Transporter.

**Ask ETA for truck** : The MCTO Transporter sends the position of the truck and his destination to the ETA calculator.

**Calculate ETA** : The ETA calculator calculates the ETA using the GPS position and the destination. It sends this information to the MCTO Transporter.

**Send truck ETA** : The MCTO Transporter sends the truck ETA at regular intervals to the French National Central ITSS. The message used is ETAINformation message (see § 2.2.1 Message ETA).

**Broadcast truck ETA** : the French National Central ITSS broadcasts truck ETA to the MCTO Terminal and Foreign National Central ITSS. The message used is ETAINformation message (see § 2.2.1 Message ETA).

**Visualise truck ETA** : The Terminal operator can visualise information about the truck ETA on the HMI of MCTO Terminal .

## 2.1.2 Barge scenario

### Illustration 3: Diagram Barge scenario

**Generate recurrent trips** : The MCTO Transporter generates the recurrent trips for the current day. It sends this list to the smartphone.

**Select a trip** : The smartphone displays the list of trips and the driver selects one

**Start the trip** : The driver starts his trip

**Send trip** : The smartphone sends the trip to the MCTO Transporter.

**Send barge position** : The smartphone sends the GPS position of the barge at regular intervals to the MCTO Transporter.

**Calculate ETA** : The MCTO Transporter calculates the ETA using the GPS position and the chosen trip.

**Send barge ETA** : the MCTO Transporter sends to the French National Central ITSS. The message used is ETAINformation message (see § 2.2.1 Message ETA). It also sends this information to the driver's smartphone.

**Broadcast barge ETA** : the French National Central ITSS broadcasts barge ETA to the MCTO Terminal and Foreign National Central ITSS. The message used is ETAINformation message (see § 2.2.1 Message ETA).

**Visualise barge ETA** : The Terminal operator can visualise information about ETA of the barge on the HMI of the MCTO Terminal. The truck driver can visualise information about ETA of the barge on the smartphone.

## 2.2 Messages description

Messages exchanged with external systems are described in the following paragraphs.

### 2.2.1 Message ETA

This message is sent by the MCTO Transporter to the French National Central ITSS. There is a message by truck.

**Following messages and tables of description is out of standard.**

Below, the ASN description of the message.

```
-- ETAINformation description
-- ASN.1 Start Definition

ETAINformation-PDU-Descriptions DEFINITIONS AUTOMATIC TAGS ::= BEGIN

IMPORTS

ItsPduHeader, TimestampIts, Latitude, Longitude
FROM ITS-Container {itu-t (0) identified-organization (4) etsi (0) itsDomain (5) wg1 (1) ts (102894) cdd (2) version (1)}

FROM EfcDsrcApplication {iso(1) standard(0) 14906 application(0) version5(5)};

-- ETAINformationPdu
ETAINformationPdu ::= SEQUENCE {
    header    ItsPduHeader,
    generationTimeStamp TimestampIts,
    data      ETAINformationMessage
}

ETAINformationMessage ::= SEQUENCE {
    transporterName UTF8String SIZE (1..31),
```

```

carriageld UTF8String (SIZE (1..25)), -- Id of the transport unit. Ex : plate number for truck
updatedETA TimestampPlts, -- Update time of ETA
initialETA TimestampPlts OPTIONAL, -- Initial estimated time of arrival
companyName UTF8String (SIZE (1..25)) OPTIONAL, -- Carrier company name
typeTransport TransportType,
slotReference UTF8String OPTIONAL, -- Logistic references
equipmentId UTF8String SIZE (1..31) OPTIONAL, -- Identifiant of container
unlocodeDestination UTF8String (SIZE (5)), -- Unlocode of the destination port (see
https://en.wikipedia.org/wiki/UN/LOCODE)
location Location OPTIONAL
}

TransportType ::= INTEGER {
    unavailable(0),
    truck(1),
    vessel(2),
    train(3),
    barge(4)
}(0..4)

Location ::= SEQUENCE {
    latitude Latitude,
    longitude Longitude
}

END

-- ASN.1 End

```

Below, the message description table.

Profile MCTO				
Field	Status (ETSI)	Status For the UC	Comments	Value set
<b>ETaInformationPdu</b>				
<b>header</b>	✓	✓	ItsPduHeader	
<b>generationTimeStamp</b>		✓	TimestampPlts	
<b>data</b>		✓	SEQUENCE OF ETaInformationMessage	
<b>ItsPduHeader</b>				
<b>protocolVersion</b>	✓	✓	Version of the ITS message and/or communication protocol = INTEGER{ currentVersion(1) } (0..255)	is 1
<b>messageID</b>	✓	✓	Type of the ITS message=INTEGER{ denm(1),cam(2), poi(3), spat(4), map(5), ivi(6), ev-rsr(7) } (0..255)	is 14
<b>stationID</b>	✓	✓	stationID = INTEGER(0..4294967295) <b>Id of the Central ITS-S of MCTO Transporter</b>	
<b>ETaInformationMessage</b>				
<b>transporterName</b>		✓	UTF8String SIZE (1..31) <b>Name of Transporter</b>	
<b>carriageld</b>		✓	UTF8String (SIZE (1..25)) <b>Id of the transport unit. Ex : plate number for truck</b> <b>Unique identifier of the message (compare this field on reception to create/update the message).</b>	Plate number of the truck
<b>updatedETA</b>		✓	TimestampPlts <b>Update time of ETA</b>	
<b>initialETA</b>		S	TimestampPlts OPTIONAL <b>Initial estimated time of arrival</b>	
<b>companyName</b>		S	UTF8String (SIZE (1..25)) OPTIONAL <b>Carrier company name</b>	

		Profile MCTO		
Field	Status (ETSI)	Status For the UC	Comments	Value set
<b>typeTransport</b>		✓	TransportType. = INTEGER { unavailable(0), truck(1), vessel(2), train(3), barge(4) }(0..4)	
<b>slotReference</b>		S	UTF8String OPTIONAL <b>List of logistic references</b>	
<b>equipmentId</b>		S	UTF8String (SIZE (1..31)) OPTIONAL <b>Identifiant of container</b>	
<b>unlocodeDestination</b>		✓	UTF8String (SIZE (5)) <b>Unlocode of the destination port (see <a href="https://en.wikipedia.org/wiki/UN/LOCODE">https://en.wikipedia.org/wiki/UN/LOCODE</a>)</b>	
<b>Location &gt;</b>	✓	S	OPTIONAL	
<b>&gt;latitude</b>	✓	S	latitude position of the truck	
<b>&gt;longitude</b>	✓	S	longitude position of the truck	

*Table 1: Truck ETA Message description*

## 3. J2 : Dock reservation

### 3.1 Activity diagram

*Illustration 4: Diagram Dock reservation*

**Send available docks and timeslots** : the MCTO Terminal defines information on available loading docks and timeslots and sends this information to the French National Central ITSS. This message contains the list of docks and timeslots for the next 7 days.

**Broadcast available docks and timeslots** : the French National Central ITSS broadcasts it to the MCTO Transporter. The MCTO Transporter is subscribed to this message.

**Visualise available docks and timeslots** : the transport planners visualise available docks and timeslots to make a planning for (a fleet of) trucks.

**Reserve a dock and a timeslot** : the transport planners request reservations for an available dock and timeslot.

**Timeslot not available** : the MCTO Transporter receives that the slot is already reserved. Transport planners makes a new request.

**Update available docks and timeslots** : the MCTO Terminal does the reservation and updates the available docks and timeslots.

**Send reserved dock and timeslot** : the MCTO Transporter sends the reserved dock and timeslot to the smartphone.

**Display reserved dock and timeslot** : the smartphone displays the reserved dock and timeslot to the driver.

**Visualise reserved dock and timeslot** : the driver can visualise the reserved dock and timeslot on the smartphone. The Terminal operator can visualise the reserved dock and timeslot on MCTO Terminal.

## 3.2 Messages description

The messages exchanged with the French National Central ITSS use messages inspired from ITS standards.

Messages exchanged are described in the following paragraphs.

### 3.2.1 Message Available docks and timeslots

This message is sent by the MCTO Terminal to French National Central ITSS and it is broadcast by the French National Central ITSS to the MCTO Transporter.

This message contains the list of available docks and timeslots for the next 7 days.

**Following message and table of description is out of standard**, but inspired by ETSI TS 101 556-1 V1.1.1 "Electric Vehicle Charging Spot Notification Specification". This standard is pointed by ETSI 102 894-2 V1.2.1 "common data dictionary", chapter A.114 on DF\_ItsPduHeader, for integers associated to messageID : "poi(3): Point of Interest message as specified in ETSI TS 101 556-1".

For more detail about this message, see "2.4.1.2\_H Master document", chapter about POI.

Below, the ASN description of the message.

```
-----
-- DockTimeslot Data Section
-- This part is an extension of the asn of TS 101 556 in reference to the standard.
-- This part is used when POIType will be "12".
-----

DockTimeslotPdu ::= SEQUENCE {
    header    ItsPduHeader,
    data      DockTimeslotMessage
}

DockTimeslotMessage ::= SEQUENCE {
    poiHeader    ItsPOIHeader,
    provider      Provider,
    terminalName  UTF8String (SIZE (1..31)), -- Name of Terminal
    webServiceUrl UTF8String, -- WebService URL to do the dock and timeslot reservation. Format http(s)://xxx.yy.com
    docks         SEQUENCE (SIZE (1..31)) OF DockTimeslotInformation
}

DockTimeslotInformation ::= SEQUENCE {
    dockId          INTEGER (1..16383), -- Internal Id of dock in the terminal
    dockName        UTF8String (SIZE (1..31)), -- dock name
    availableDayTimeslots SEQUENCE (SIZE (0..7)) OF DayTimeslotInformation -- List of days of available timeslots
}

DayTimeslotInformation ::= SEQUENCE {
    dayTimeStamp    Timestamp, -- Available day
    availableTimeslots SEQUENCE (SIZE (0..23)) OF OpeningPeriod -- List of available timeslots of the day
}

END
    availableDayTimeslots SEQUENCE (SIZE (0..7)) OF DayTimeslotInformation -- List of days of available timeslots
}

DayTimeslotInformation ::= SEQUENCE {
    dayTimeStamp    Timestamp, -- Available day
    availableTimeslots SEQUENCE (SIZE (0..23)) OF OpeningPeriod -- List of available timeslots of the day
}

```

Below, the message description table.

standard ETSI TS 101 556-1	modified	Profile MCTO		
Field	Status (ETSI)	Status For the UC	Comments	Value set
<b>DockTimeslotPdu</b>				
<b>header</b>	✓	✓	ItsPduHeader	
<b>data</b>		✓	SEQUENCE OF DockTimeslotMessage	
<b>ItsPduHeader</b>				
<b>protocolVersion</b>	✓	✓	Version of the ITS message and/or communication protocol = INTEGER{ currentVersion(1) } (0..255)	is 1
<b>messageID</b>	✓	✓	Type of the ITS message=INTEGER{ denm(1),cam(2), poi(3), spat(4), map(5), ivi(6), ev-rsr(7) } (0..255)	is 3
<b>stationID</b>	✓	✓	stationID = INTEGER(0..4294967295) <b>Id of the Central ITS-S of MCTO Terminal</b>	
<b>DockTimeslotMessage</b>				
<b>poiHeader</b>		✓	ItsPOIHeader with poiType = 12 (see "2.4.1.2_H Master document", chapter about POI)	
<b>provider</b>		✓	SEQUENCE of CountryCode and IssuerIdentification CountryCode::= BIT STRING(SIZE(10)) IssuerIdentifier::= INTEGER(0 .. 16383)  IssuerIdentifier : one by terminal operator. The value is between 14000 and 14499. the identifier is assigned by the organization managing the list of providers. <b>IssuerIdentifier is the unique identifier of the message (compare this field on reception to create/update the message).</b>	
<b>terminalName</b>		✓	UTF8String SIZE (1..31) <b>Name of Terminal</b>	
<b>webServiceUrl</b>		✓	UTF8String <b>WebService URL to do the dock and timeslot reservation. Format http(s)://xxx.yy.com</b>	
<b>docks</b>		✓	SEQUENCE (SIZE (1..31)) OF DockTimeslotInformation	
<b>DockTimeslotInformation</b>				
<b>dockId</b>		✓	INTEGER (1..16383) <b>Internal Id of dock in the terminal</b>	
<b>dockName</b>		✓	UTF8String SIZE (1..31) <b>dock name</b>	
<b>availableDayTimeslots</b>		✓	SEQUENCE (SIZE (0..7)) OF DayTimeslotInformation <b>List of days of available timeslots</b>	
<b>DayTimeslotInformation</b>				
<b>dayTimeStamp</b>		✓	Timestamps <b>Available day</b>	
<b>availableTimeslots</b>		✓	SEQUENCE (SIZE (0..23)) OF OpeningPeriod (see "2.4.1.2_H Master document", chapter about POI) <b>List of available timeslots for a day</b>	

Table 2: Available docks and timeslots Message description

## 4. J3 : Assigning a slot for multimodal terminal access management

### 4.1 Activity diagram

*Illustration 5: Diagram Assigning a slot for multimodal terminal access management*

**Send slot reference validity status** : the MCTO Terminal sends the validity status of each active slot reference in the terminal to the French National Central ITSS.

**Broadcast slot reference validity status** : the French National Central ITSS broadcasts it to the MCTO Transporter. The MCTO Transporter is subscribed to this message.

**Process slot reference validity status** : the MCTO Transporter processes the information received and stores it.

**Select a destination** : the driver selects in a list the final destination (port or terminal)

**Enter a slot reference** : the driver enters a slot reference for which he wants to check the status

**Send slot reference and destination** : the smartphone sends the destination of the truck and the slot reference to the MCTO Transporter.

**Check validity of slot reference for the destination** : the MCTO Transporter checks the status of the slot reference.

**Provide validity status** : the MCTO Transporter processes the information

**Send validity status** : the MCTO Transporter sends validity status to the smartphone of the driver and to MCTO Terminal

**Display slot reference validity status** : the smartphone displays the validity status to the truck driver.

**Visualise slot reference validity status** : the Terminal operator can visualise information about validity status of slot reference on the HMI of MCTO Terminal. The truck driver can visualise information about validity status on the smartphone.

### 4.2 Messages description

The messages exchanged with the French National Central ITSS use messages inspired from ITS standards.

Messages exchanged are described in the following paragraphs.

## 4.2.1 Message Slot reference validity status

This message is sent by the Terminal Operating System / CCS to the French National Central ITSS and it is broadcast by the French National Central ITSS to the MCTO Transporter. There is one message per slot reference.

**Following message and table of description is out of standard**, but inspired by ETSI TS 101 556-1 V1.1.1 "Electric Vehicle Charging Spot Notification Specification". This standard is pointed by ETSI 102 894-2 V1.2.1 "common data dictionary", chapter A.114 on DF\_ItsPduHeader, for integers associated to messageID : "poi(3): Point of Interest message as specified in ETSI TS 101 556-1".

For more detail about this message, see "2.4.1.2\_H Master document", chapter about POI.

Below, the ASN description of the message.

```

-----
-- SlotReferenceStatus Data Section
-- This part is an extension of the asn of TS 101 556 in reference to the standard.
-- This part is used when POIType will be "11".
-----

SlotReferenceStatusPdu ::= SEQUENCE {
    header    ItsPduHeader,
    data      SlotReferenceStatusMessage
}

SlotReferenceStatusMessage ::= SEQUENCE {
    poiHeader    ItsPOIHeader,
    port          UTF8String (SIZE (5)), -- Locode Geographical place where the slot is validated
    operator      UTF8String (SIZE (1..31)), -- Operator code: Ex : APPLUSDKE
    terminal       UTF8String (SIZE (1..50)), -- SIRET of terminal for which the status are given
    slotReference UTF8String (SIZE (1..50)), -- Booking reference for pick-up and or Cargo reference for delivery
    equipmentId   UTF8String (SIZE (1..31)) OPTIONAL, -- Container number
    operationType INTEGER(0..399), -- Trade and Transport status codes Revision 6, UNECE CEFAC Trade Facilitation
    Recommendation No. 24
    expirationDate Timestamps -- Date of expiry of the status
}

```

Below, the message description table.

standard ETSI TS 101 556-1	modified	Profile MCTO		
Field	Status (ETSI)	Status For the UC	Comments	Value set
<b>SlotReferenceStatusPdu</b>				
header	✓	✓	ItsPduHeader	
data		✓	SEQUENCE OF SlotReferenceStatusMessage	
<b>ItsPduHeader</b>				
protocolVersion	✓	✓	Version of the ITS message and/or communication protocol = INTEGER{ currentVersion(1) } (0..255)	is 1
messageID	✓	✓	Type of the ITS message=INTEGER{ denm(1),cam(2), poi(3), spat(4), map(5), ivi(6), ev-rsr(7) } (0..255)	is 3
stationID	✓	✓	stationID = INTEGER(0..4294967295) <b>Id of the Central ITS-S o fMCTO Terminal</b>	
<b>SlotReferenceStatusMessage</b>				
poiHeader		✓	ItsPOIHeader with poiType = 11 (see "2.4.1.2_H Master document", chapter about POI)	

standard ETSI TS 101 556-1	modified	Profile MCTO		
Field	Status (ETSI)	Status For the UC	Comments	Value set
port		✓	UTF8String SIZE (5) <b>Locode Geographical place where the slot is validated</b>	
operator		✓	UTF8String SIZE (1..31) <b>Operator code: Ex : APPLUSDKE</b>	
terminal		✓	UTF8String SIZE (1..50), <b>SIRET of terminal for which the status are given</b>	
slotReference		✓	UTF8String SIZE (1..50) <b>Booking reference for pick-up and or Cargo reference for delivery Unique identifier of the message (compare this field on reception to create/update the message).</b>	
equipmentId		\$	UTF8String SIZE (1..31) OPTIONAL <b>Container number</b>	
operationType		✓	INTEGER(0..399) Trade and Transport status codes Revision 6 UNECE CEFAC Trade Facilitation Recommendation No. 24	
expirationDate		✓	Timestamp <b>Date of expiry of the status</b>	

Table 3: Slot reference validity status Message description

## 5. J4 : Information on the site's access conditions

### 5.1 Activity diagram

*Illustration 6: Diagram Information on the site's access conditions*

**Provide traffic conditions** : The French National Central ITSS provides information about traffic conditions (ex : road events).

**Provide Parking information** : The French National Central ITSS provides information about parkings (current disponibility, opening days and hours)

**Send data** : the MCTO Transporter receive DENM Message or POI message, processes them and sends the information to the smartphone

**Display data** : the smartphone displays information about traffic conditions or parking

**Visualise data** : The truck driver can visualise this information on the smartphone.

### 5.2 Messages description

Messages exchanged with external systems are described in the following paragraphs.

#### 5.2.1 DENM Message

This message is broadcast by the French National Central ITSS to the MCTO Transporter.

## 5.2.2 POI Message

This message is broadcast by the French National Central ITSS to the MCTO Transporter.

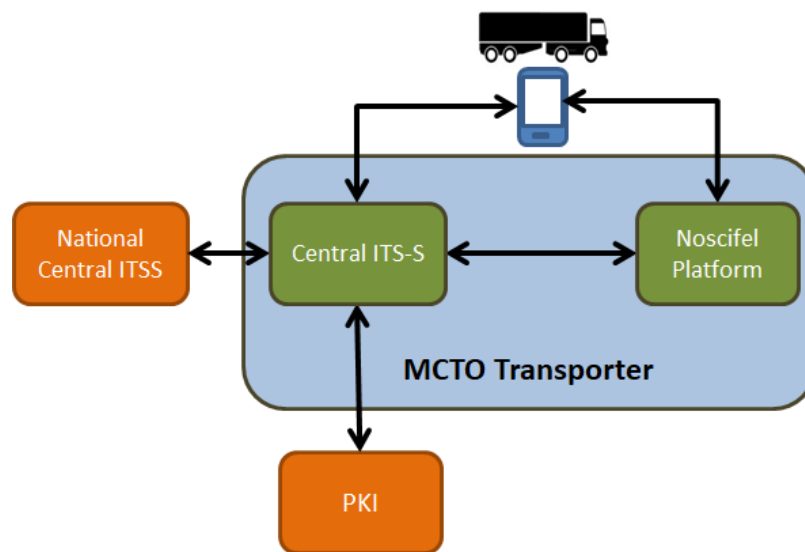
For the specifications of this message, see document “2.4.1.2\_H Common technical specifications for use cases : F1 - Information on parking lots, location, availability and services (I2V)”.

## 6. Exchanges between French National Central ITSS and MCTO Transporter

The **MCTO Transporter** platform is based on the Noscifel platform and the NeoGLS Central ITS-S.

The exchanges between the French National Central ITSS and the MCTO Transporter are managed by the NeoGLS Central ITS-S.

The NeoGLS Central ITS-S will have the role of a “relay platform”.



*Illustration 7: Link French National Central ITSS and MCTO Transporter*

The MCTO Transporter exchanges messages with the French National Central ITSS :

- DENM
- CAM
- POI (SlotReferenceStatus and DockTimeslot)
- ETA

For security concerns, the MCTO Transporter exchanges with PKI servers to manage certificates, CRL and TSL. The MCTO Transporter is enrolled in the ITS trust domain as all other ITS-S. It performs verification of messages and signs outgoing ITS messages.

It may communicate with PKI servers to request pseudonym certificates to be used to sign generated ITS messages or use pre-installed certificates.

The exchanges with the French National Central ITSS use an exchange information service. Details about this service are out of scope; refer to [3] for further information.

The MCTO Transporter implements an interface called IF2 (including AMQP protocol) according to specifications described in [3] and 2.4.1\_H, to communications with the French National Central ITSS.

The parameters of connections are described in the deliverable 2.4.4.11\_H and 2.4.1\_H.

### Description of the functions

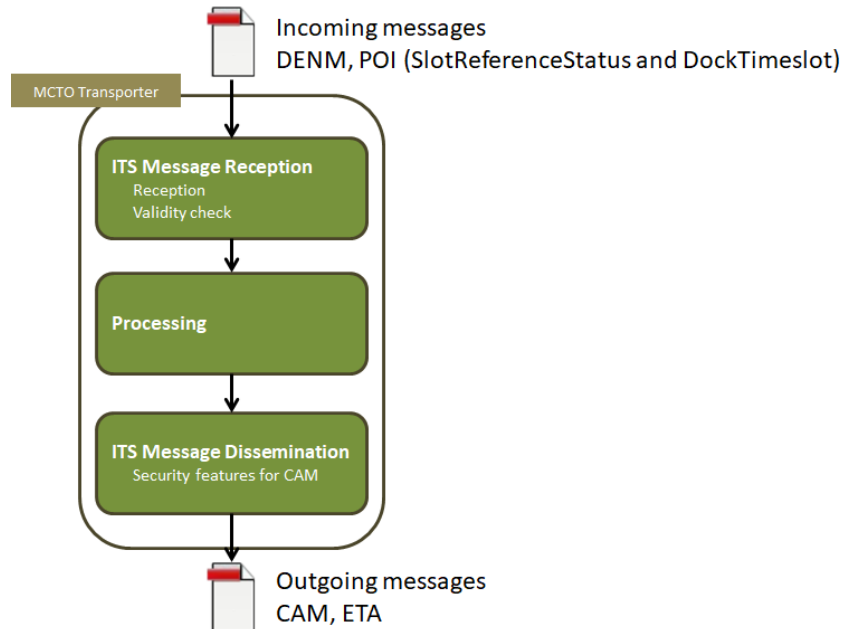
The French National Central ITSS broadcasts to the MCTO Transporter :

- DENM messages to provide information about traffic conditions (ex : road events),
- POI messages to provide :
  - ◆ the available loading docks and timeslots on Terminals (DockTimeslot messages)

- ◆ the validity status of each active slot reference in Terminals (SlotReferenceStatus messages).

The MCTO Transporter broadcasts to the French National Central ITSS :

- CAM messages to provide truck positions. This information is used by the French National Central ITSS for statistical purposes. The smartphone sends its position to the MCTO Transporter that broadcasts it to the French National Central ITSS with a CAM message.
- ETA messages to provide truck ETA about trucks coming to a terminal.



*Illustration 8: Description of the functions*

## 6.1 Prerequisites

The MCTO Transporter must be subscribed to the French National Central ITSS to receive messages. The tiles of subscriptions will be defined later.

## 6.2 ITS Message reception

The reception module is composed of reception and validity check.

### Reception

The reception of messages is defined in the deliverable 2.4.1\_H: Functional and technical hybrid architecture – Common specifications

The MCTO Transporter receives DENM and POI messages from French National Central ITSS.

The protocol used to receive data is defined in the deliverable 2.4.1\_H.

The MCTO Transporter considers a message as valid if the uplink message format defined in 2.4.1\_H is respected.

The MCTO Transporter de-encapsulates messages POI and DENM from Geonet/BTP.

### Validity check

Upon message reception, the MCTO Transporter checks the validity of the message. This helps identifying relevant and valid messages that will be processed by the MCTO Transporter and other messages that will be ignored and dropped.

According to the identification format, the verification of the message structure is given in ASN1 for DENM and POI messages.

The MCTO Transporter checks :

- at the application layer that the POI and DENM messages are readable. If the message format is not identified, the message is dropped.
- the validity (e.g. signature, certificate validity) of the POI and DENM messages. This is described in deliverable 2.4.4.11\_H.
- the structure of the POI and DENM messages via ASN1
- all mandatory fields defined in this deliverable and deliverables 2.4.1.2\_H and 2.4.1\_H for each DENM and POI message and drop incomplete messages

## 6.3 ITS Message Dissemination

The MCTO Transporter sends ETA and CAM messages to the French National Central ITSS.

The MCTO Transporter signs ETA and CAM messages with appropriate certificate as described in the deliverable 2.4.4.11\_H.

ETA and CAM messages are signed in Geonet Layer following the ETSI TS 103 097 v1.2.1.

Signed ETA and CAM messages are transmitted to the French National Central ITSS using :

- AMQP protocol .
- TLS with a X509 certificate to protect transport of signed messages.

## 7. References

### ITS and IETF (RFC) standards:

Deliverable 2.4.1\_Bis List of standards.

### Other references:

- [1] COCSIC deliverable 2.4.1\_H
- [2] SCOOP deliverable 2.4.1 v2.0
- [3] InterCor Project deliverable called InterCor\_2.1b\_IF2\_specs-v1.0 final
- [4] website to display the zoom level: <http://www.maptiler.org/google-maps-coordinates-tile-bounds-projection/>
- [5] COCSIC deliverable 2.4.4.11\_H of the series of security deliverables 2.4.4x\_H.
- [6] COCSIC deliverable 2142\_H Common technical specifications for use cases