

## French C-ITS Deployment Coordination committee

# Common technical specifications for use cases – H6 - HGV overtaking ban (I2V)

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### Deliverable 2.4.1.2\_H\_H6

## Activity 2: Studies

### Sub Activity 2.4 > Specifications

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## Information on the document

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## Publication history

Date	Version	Author(s)	Updates & changes	Diffusion
14/11/19	4.00	A. AUDIGÉ	<ul style="list-style-type: none"> <li>Consolidated version for release 4</li> </ul>	Release 4

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
HGV	Heavy goods vehicle
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)
PF	Local PF of the road operator for C-ITS communication e.g local SCOOP PF.
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)
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)

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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# 1. Figure and example of IVI message for HGV overtaking ban

In order to clarify the data elements description for the HGV overtaking ban use case, we start by describing the scenario in the figure below and then the data elements associated in the table.

example illustration



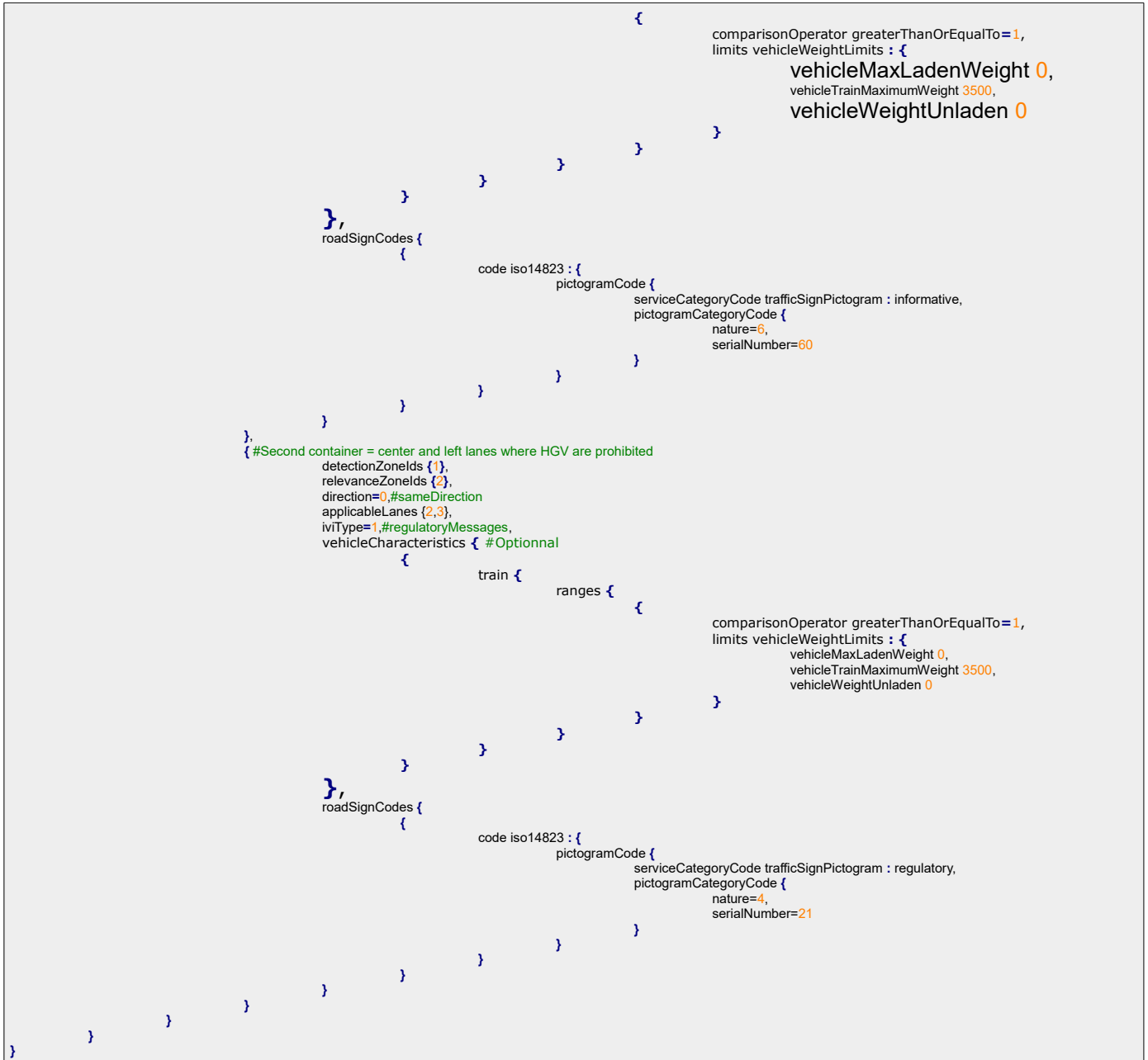
For HGV overtaking ban, road has to be cut in sections for the IVI messages. (1) is from start of the HGV overtaking ban to next entrance ramp, (2) is between two consecutives entrance ramps, (3) is from the last entrance ramp to the end of the HGV overtaking ban.

## Message associated with previous illustration (one of the 3 sections only)

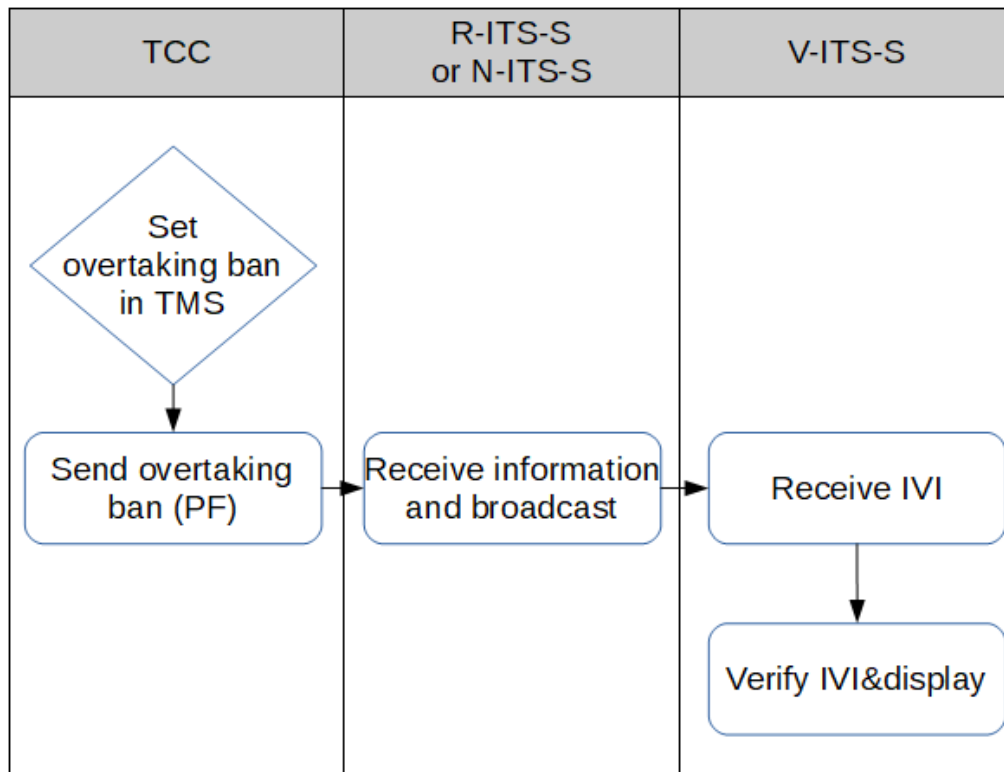
```
#Description of IVI for FR for HGV overtaking ban UC (I2V)
#Linked with a figure 2412H-H6
#Commented by A. AUDIGE (DIR A)

header {
  protocolVersion=1, #currentVersion'
  messageID=6, #IVI
  stationID=4711
},
ivi {
  mandatory {
    serviceProviderId {
      countryCode=10110 01010, #means 'FR'
      issuerIdentifier=10033 #DIRA
    },
    iviIdentificationNumber=123456789,
    timeStamp=352425600000,
    validFrom=352447200000,
    validTo=352447200010,
    iviStatus=0 #new
  },
  optional {
    glc : { #GLC = geographic location container = description of reference point and zones (2 zones in this example)
      referencePosition {
        latitude =481540527, #latitude of point "0"; start point of the measure
        longitude=164801006, #longitude of point "0" ; start point of the measure
        positionConfidenceEllipse {
          semiMajorConfidence=4095, #unavailable in the example
          semiMinorConfidence=4095, #unavailable in the example
          semiMajorOrientation=3601 #unavailable in the example
        },
        altitude {
          altitudeValue=800001, #unavailable, but can be provided if known by the system
          altitudeConfidence=unavailable(15)
        }
      },
      parts {
        {
          zoneId=1, #description of a zone. Here, approach of referencePosition (similar to DENM/trace)
          zoneHeading {
            headingValue=900, #Heading of road at the referencePosition, here wgs84East
            headingConfidence=127 #unavailable
          }
          zone segment : {
            line deltaPositions : {
              {
                deltaLatitude=-6637,
                deltaLongitude=9289
              },
              {
                deltaLatitude=-5379,
                deltaLongitude=10567
              },
              ... # number of point needs to be defined.Till 32 points possible (min 1 point)
            }
          }
        },
        {
          zoneId=2, #description of a zone. Here, zone in which the IVI applies (similar to DENM/eventHistory)
          zoneHeading {
            headingValue=900, #Heading of road at the referencePosition, here wgs84East
            headingConfidence=127 #unavailable
          }
          zone segment : {
            line deltaPositions : {
              {
                deltaLatitude=7591,
                deltaLongitude=-7420
              },
              {
                deltaLatitude=8278,
                deltaLongitude=-5379
              },
              ... # number of point needs to be defined.Till 32 points possible (min 1 point)
            }
          }
        }
      }
    },
    gic : { #GIC = general Ivi container = description of the HGV overtaking ban
      { #First container = right lane HGV overtaking ban
        detectionZoneIds {1},
        relevanceZoneIds {2},
        direction=0, #sameDirection
        applicableLanes {1},
        iviType=1, #regulatoryMessages
        vehicleCharacteristics { #Optionnal
          train {
            ranges {

```



## 2. Step by step diagram



#### Set HGV overtaking ban in pilot system :

Generally, overtaking ban is a static regulatory measure. The measure has to be set in a pilot system (TMS or other). It can also be dynamic and will be functioning the same way (same C-ITS message).

#### Send overtaking ban to R-ITS-S and Nfr-ITS-S :

The SCOOP PF adapts the Datex II coming from the TMS (or other) for the R-ITS-S and Nfr-ITS-S.

The data for IVI/detectionZone (similar to DENM/trace) and the data for IVI/relevanceZone (similar to DENM/eventHistory) are calculated as usually.

**If the linear of HGV overtaking ban includes interchange, the message should be cut in several events : one for each linear between interchange. Each linear should end at the junction of a ramp of entrance. The next linear should begin at this junction.**

#### Receive information and broadcast (RSU or national C-ITSS) :

The R-ITS-S or Nfr-ITS-S constructs an IVI with the DATEX II data given by the PF.

Chanel CCH for 100%-G5 scenario and SCH1 for hybrid scenario should be used (see 241H for more details). Geonetwork dissemination and forwarding for 100%-G5 would be the same that for SCooP1 use-cases (10km area and ten hops).




**Receive IVI (vehicle) :** through architecture. Architecture options are not treated in this document (see 241H). Anyway, whatever the route the information has followed, **IVI must have same serviceProviderId+ivIdentificationNumber and same timeStamp (as presented below in profile)**. So that vehicle treats one message or the other, but not both of them.

**Verify IVI and display IVI :** message is displayed on HMI from **referencePosition** or before it (pre-awareness). The information is displayed all the **relevanceZone** long. To classify and prioritize the information between several VMS messages, the receiving vehicle may use the data element lviType (see below for further details), that provides the message category.

The process of vehicle-receiver **can** be as followed :

1. The vehicle checks serviceProviderID+ivIdentificationNumber and timestamp to verify if event already known, new event or is an update.
2. The vehicle checks validFrom and validTo to determine if active.
3. The vehicle checks referencePosition to determine if near of far of its position and calculate its time-to-event.

4. The vehicle checks detectionZone. If vehicle is following the linear described by zone(s), it is concerned by event (which is upstream by the fact that direction DE of IVI is "0" (sameDirection)).
5. The vehicle checks the presence of applicableLanes which is true. So it's an IVI lane by lane.
6. The vehicle checks trafficSignPictogram, nature and serialNumber which are **informative, nature 6, serial 60 for the (right) lane(s) in which HGV are not banned and regulatory, nature 4, serial 21 for the (left) lanes where HGV are banned. (see annex 1 of 2.4.1.2\_H Master)**

		informative				6	60
		regulatory				4	21

7. HMI displays the message from referencePosition point or before (pre-awareness) and displays it it all relevanceZone long. If vehicleCharacteristics are given by IVI, the information should be processed by the vehicle-receiver. If conditions are not checked (involved the receiver know its own characteristics), message should not be displayed.

### 3. Information profile - Message description (in details)

IVI transverse state		Profile DSL		
Field	Status from transverse]	Status For the UC	Comments	Value set
<b>Header</b>				
protocolVersion	✓	✓	See Master document / IVI	
messageID	✓	✓	See Master document / IVI	(is 6)
stationID	✓	✓	See Master document / IVI	
<b>Management container</b>				
serviceProviderId	✓	✓	See Master document / IVI	
ivIdentification Number	✓	✓	See Master document / IVI	
timestamp	U	U	See Master document / IVI	
validFrom	U	U	See Master document / IVI	
validTo	U	U	See Master document / IVI	
connectedIviStructures	x			
iviStatus	✓	✓	See Master document / IVI	
<b>Geographic Location Container</b>				
referencePosition	✓	✓	Position of the start of the overtaking ban zone. Transverse position is in the <b>middle of the carriageway</b> .	by PF
referencePosition Time	x			
referencePosition Heading	x			
referencePositionSpeed	x			
parts	✓	✓	See 5 next lines	
>zoneId	✓	✓	First zone(s) Ids may be used to define the "detection zone(s)", approach of the overtaking ban zone (similar to traces in DENM). Then, next zone Ids may be used to define "relevance zone(s)" in which the HGV overtaking ban applies (e.g. the display zone / eventHistory). <b>By default, the relevance zone should end at next point of exchange of the road (junction of an entry ramp), where an other IVI should be generated if the overtaking ban zone continue.</b> Minimum is 2 zone Id for HGV overtaking ban UC (e.g. one trace / detection zone and one eventHistory / relevance zone)	by PF
>laneNumber	x			
>zoneExtension	x			

IVI transverse state		Profile DSL		
Field	Status from transverse]	Status For the UC	Comments	Value set
>zoneHeading	U	U	<b>Heading direction of the carriageway concerned by the HGV overtaking ban at the point of referencePosition.</b> If the confidence is unknown, the confidence is set to unavailable (127)	by PF
>zone	U	U	See Master document / IVI	
General IVI Application Container				
detectionZonelds	U	U	See Master document / IVI	
its-rrid	x			
revelanceZonelds	U	U	See Master document / IVI	
direction	U	U	See Master document / IVI	
driverAwareness Zonelds	x			
minimumAwareness Time	x			
applicableLanes	S	U	<b>The HGV overtaking ban shall be lane specific to deliver the best message to users about the status of each lane.</b>	
iviType	✓	✓	Regulatory messages (1) is used.	is 1
iviPurpose	x			
laneStatus	x			
vehicleCharacteristics	S	S	<b>To be provided for describing the type of vehicles the traffic ban applies. As done for dynamic speed limit, "ranges" with vehicleWeightLimits / vehicleTrainMaximumWeigh should be used. But optional, the UC can work without the vehicleCharacteristics (what is essential is the provided roadsign)</b> <b>Note that if a coach has often a weight over 7,5t the roadsign B8/regulatory-4-21 does not apply to it (it applies to trucks).</b>	
driverCharacteristics	x			
layoutId	x			
preStoredLayoutId	x			
roadSignCodes	✓	✓	<b>For the right lane(s), it is set to informative, nature 6, serial 60.</b> <b>For the other lane(s), it is set to regulatory, nature 4, serial 21.</b>	
extraText	S	S	<b>Shall</b> not be used without "///". <b>Should</b> not be used with "///". (not needed)	
Road Configuration Container	x			
Text Container	x			
Layout Container	x			

(\*) To describe vehicle characteristics, use of ranges and weight of train seems the simplest way to do so (by consequence, use of following lines in **bold** is recommended)

```

TractorCharacteristics::=SEQUENCE{
    equalTo SEQUENCE (SIZE (1..4,...)) OF VehicleCharacteristicsFixValues OPTIONAL,
    notEqualTo SEQUENCE (SIZE (1..4,...)) OF VehicleCharacteristicsFixValues OPTIONAL,
    ranges SEQUENCE (SIZE (1..4,...)) OF VehicleCharacteristicsRanges OPTIONAL
}
VehicleCharacteristicsFixValues::= CHOICE{
    simpleVehicleType StationType,
    euVehicleCategoryCode EuVehicleCategoryCode,
    iso3833VehicleType Iso3833VehicleType,
    euroAndCo2value EnvironmentalCharacteristics,
    engineCharacteristics EngineCharacteristics,
    loadType LoadType,
    usage VehicleRole,
    ...}
VehicleCharacteristicsRanges::= SEQUENCE{
    comparisonOperator ComparisonOperator,
    limits CHOICE{
        numberOfAxles INTEGER(0..7),

```

```

vehicleDimensions VehicleDimensions,
vehicleWeightLimits VehicleWeightLimits,
axleWeightLimits AxleWeightLimits,
passengerCapacity PassengerCapacity,
exhaustEmissionValues ExhaustEmissionValues,
dieselEmissionValues DieselEmissionValues,
soundLevel SoundLevel,
...}}
VehicleWeightLimits::= SEQUENCE {
vehicleMaxLadenWeight Int2,
vehicleTrainMaximumWeight Int2,
vehicleWeightUnladen Int2
}
ComparisonOperator::= INTEGER {
    greaterThan (0),
    greaterThanOrEqualTo (1),
    lessThan (2),
    lessThanOrEqualTo (3)
} (0..3)

```