



## French C-ITS Deployment Coordination committee

# Common technical specifications for use case: H6 - HGV overtaking ban (I2V)

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### 2.4.1.2\_M\_H6

#### Activity 2: Studies

#### Sub Activity 2.4 > Specifications

Version 4.30, approved

Publication Date: 05/08/2022



Co-financed by the Connecting Europe  
Facility of the European Union

## Information on the document

Document: Common technical specifications for use case - H6 HGV OvertakingBan (I2V)

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## Publication history

Date	Version	Author(s)	Updates & changes	Diffusion
14/11/2019	4.00	A. AUDIGÉ	<ul style="list-style-type: none"> <li>Consolidated version for release 4</li> </ul>	Release 4
<del>09/01/2020</del>	<del>4.01</del>	<del>A. AUDIGÉ</del>	<ul style="list-style-type: none"> <li><del>Spec post migration =&gt; <b>main changes</b></del></li> </ul>	
23/02/2020	4.10	A. AUDIGÉ	<ul style="list-style-type: none"> <li><u>Spec post migration, V validated by COCSIC 2020-02</u> <del>(no changes in the document since V4.01)</del></li> </ul>	COCSIC
<del>11/09/2020</del>	<del>4.11</del>	<del>A. AUDIGÉ</del>	<ul style="list-style-type: none"> <li><del>Correction of the message associated to the figure to comply with the master_I2V post-migration (positionConfidenceEllipse, applicableLanes)</del></li> </ul>	<del>COCSIC Studies</del>
13/10/2020	4.20	A. AUDIGÉ	<ul style="list-style-type: none"> <li><u>Correction of the message associated to the figure to comply with the master_I2V post-migration (positionConfidenceEllipse, applicableLanes)</u></li> <li><u>Validated by COCSIC 2020-09</u> <del>(no changes in the document since V4.11)</del></li> </ul>	COCSIC
<u>13/06/2022</u>	<u>4.21</u>	<u>J.DIEZ</u>	<ul style="list-style-type: none"> <li><u>New Master taken into account for IVI messages (inclusion of road configuration container and minor changes).</u></li> <li><u>Clarification of the process of the message &amp; inclusion of requirement tables.</u></li> <li><u>References to DENM messages removed.</u></li> <li><u>Reference and applicable documents added.</u></li> </ul>	<u>Small group of experts</u>
<u>21/06/2022</u>	<u>4.22</u>	<u>J.DIEZ</u>	<ul style="list-style-type: none"> <li><u>Small modifications from previous versions</u></li> </ul>	<u>COCSIC Studies</u>
<u>19/07/2022 to 05/08/2022</u>	<u>4.30</u>	<u>J.DIEZ</u>	<ul style="list-style-type: none"> <li><u>Remarks from COCSIC taken into account</u></li> </ul>	<u>COCSIC</u>

Black highlighted text are problem with standards.

The following legend is used on the document tables:

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

Profile / Status:-

- If mandatory:- **V**
- 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 red 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

<del>CAM</del>	<del>Cooperative Awareness Message</del>
C-ITS	Cooperative Intelligent Transport Systems
<del>C-ITS-S</del>	<del>Central ITS Station (national ITS station)</del>
<del>DENM</del>	<del>Decentralized Environmental Notification Message (réf. ETSI standard for C-ITS messages)</del>
<del>GPS</del>	<del>Global Positioning System</del>
HGV	Heavy goods vehicle
<u>HMI</u>	<u>Human-Machine Interface</u>
<u>I2V</u>	<u>Infrastructure To Vehicle</u>
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.
<del>IVIM</del>	<del>Infrastructure to Vehicle Information (réf. ETSI standard for C-ITS messages) Message</del>
<del>MAPData</del>	<del>Geometric information for the intersection (réf. ETSI standard for C-ITS messages)</del>
<del>PF</del>	<del>Local PF of the road operator for C-ITS communication e.g local SCOOP PF Platform</del>
<u>PFro</u>	<u>Road Operator Platform</u>
R-ITS-S	Roadside ITS Station (RSU or ITS-S R in the French Terminology)
<del>SPAT</del>	<del>Signal Phase and Timing (réf. ETSI standard for C-ITS messages)</del>
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
<del>Vro-ITS-S</del>	<del>Road operator vehicle ITS Station</del>
<del>Vu-ITS-S</del>	<del>User vehicle ITS Station (in that case, road operator vehicle are excluded when they are not in user mode)</del>
<i>N/A</i>	<i>Not Applicable</i>
<i>TBC</i>	<i>To Be Checked, with MS or associated partner</i>
<i>WIP</i>	<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. Documents

## 1.1 Reference documents

Id.	Reference	Version	Title / Content
<b>[DR1]</b>	2.4.1_M Common specifications	0.30	Functional and technical hybrid architecture – Common specification

## 1.2 Applicable documents

Id.	Reference	Version	Title / Content
<b>[DA1]</b>	2.4.1.2_M_Master_I2V	4.90	Master technical specifications for I2V use cases

## 2. 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**



*Figure 1: Example by 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)
#Represents the example of the figure 1 of the document
#Linked with a figure 2412H-H6
#Commented by A. AUDIGE & J.DIEZ (DIR A & DGITM)(DIR A)

header {
  protocolVersion=24, #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=0,
          semiMinorConfidence=0,
          semiMajorOrientation=0
        },
        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 the road at the referencePosition, here wgs84East
            headingConfidence=127 #unavailable
          }
          zone segment : {
            line deltaPositions : {
              {
                deltaLatitude=-6637,
                deltaLongitude=9289
              },
              {
                deltaLatitude=-5379,
                deltaLongitude=10567
              },
              ... # number of points needs to be defined according to DA1 §2.3. line
            }
          }
        },
        {
          zoneId=2, #description of a zone. Here, zone in which the IVI applies (similar to DENM/eventHistory)
          zoneHeading {
            headingValue=900, #Heading of the road at the referencePosition, here wgs84East
            headingConfidence=127 #unavailable
          }
          zone segment : {
            line deltaPositions : {
              {
                deltaLatitude=7591,
                deltaLongitude=-7420
              },
              {
                deltaLatitude=8278,
                deltaLongitude=-5379
              },
              ... # number of points needs to be defined according to DA1 §2.3. line
            }
          }
        }
      }
    }
  }
}
```

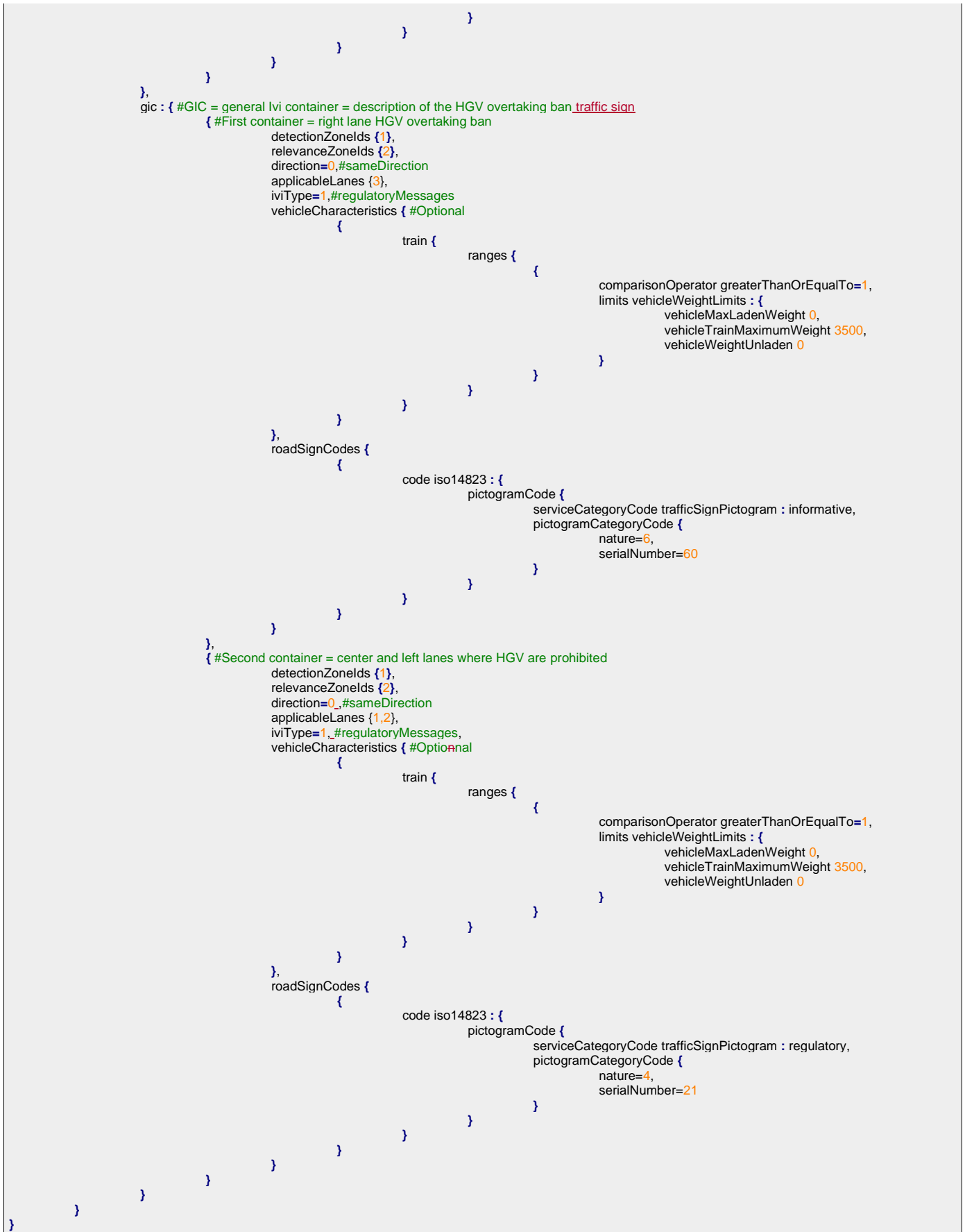
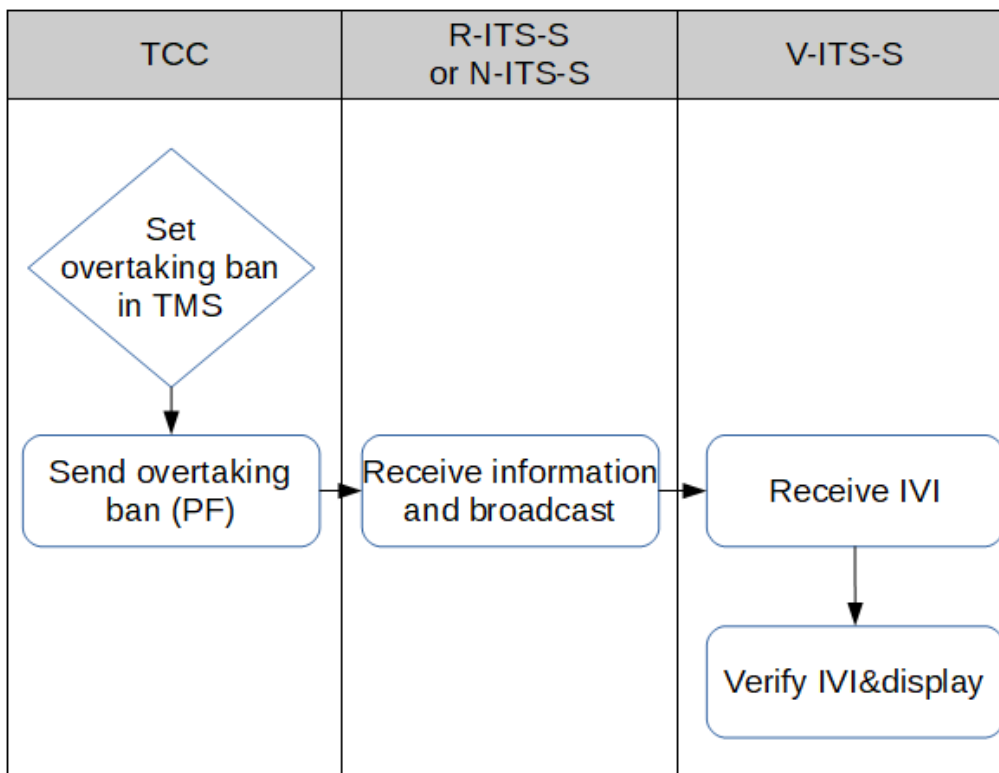


Figure 2: IVI message associated with example from figure 1

### 3. 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:

<b>ID</b>	<b>2.4.1.2_M_H6-SendOvertakingBanFromTCC (1)</b>
<b>Component(s)</b>	<b>TMS</b>
<b>Requirement</b>	As the PFro will admit only Datex II format in entrance, road operators <b>shall</b> develop an appropriate interface between their existing tool and the PFro, if needed.
<b>Acceptance</b>	
<b>Additional information</b>	

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~~ 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 (**R-ITS-S** or **Nfr-ITS-S**):

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

<b>ID</b>	<b>2.4.1.2 M_H6-ReceiveAndBroadcast (1)</b>
<b>Component(s)</b>	R-ITS-S or Nfr-ITS-S
<b>Requirement</b>	Canal CCH should be used (see DR1 for more details).
<b>Acceptance</b>	
<b>Additional information</b>	GeoNetwork dissemination and forwarding are described in DA1.

~~Channel 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 are described in 2.4.1.2\_M\_Master-DV.~~

#### Receive IVI (vehicle)->:

<b>ID</b>	<b>2.4.1.2 M_H6-ReceiveIVI (1)</b>
<b>Component(s)</b>	V-ITS-S
<b>Requirement</b>	<p>Architecture options are not treated in this document (see DR1).</p> <p>Whatever route taken by the message, duplicates of the same IVI messages shall be recognizable thanks to the couple of elements, which should be identical for all duplicates (as presented below in profile):</p> <ul style="list-style-type: none"> <li>- <u>serviceProviderId+ivIdentificationNumber</u></li> <li>- <u>timestamp</u></li> </ul> <p>Those elements are the key to identify an IVI from another.</p>
<b>Acceptance</b>	CA1: serviceProviderId+ivIdentificationNumber and timestamp do not differ when the same IVIM is following G5 and cellular paths.
<b>Additional information</b>	That allows the vehicle to treat one message or the other, but not both of them as they contain the exact same information.

~~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 timeStamps (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~~ Message is displayed on HMI from referencePosition or before it (pre-awareness is possible), depending on the choice of the receiver. The information is displayed all the ~~relevanceZones~~ relevance zones long. To classify and prioritize the information between several VMS messages, the receiving vehicle **may** use the data element IvType (see below for further details), that provides the message category.

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

1. The vehicle checks serviceProviderID+ivIdentificationNumber and timestamp to verify if ~~event the information is already known~~, if it is new ~~event~~ or if it is an update.
2. The vehicle checks validFrom and validTo to determine if information is currently applicable ~~active~~.
3. The vehicle checks referencePosition to determine if the overtaking ban is near of far ~~of from~~ its position ~~and calculate its time-to-event~~.
4. The vehicle checks the zones described in the message to determine whether it is concerned by the information. It can do this analysis by different means (using detectionZones, relevanceZone or zoneHeading for example) depending on the OEM's implementation.

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 absence of Text container and the presence of applicableLanes in the general IVI container. It proves the IVI provides information by lanes~~ 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) lane s where HGV are banned.** (see annex 1 of 2.4.1.2\_M Master (2V))






7.



































	informative				
				6	60
	regulatory				
				4	21

8.6.

- 9.7. HMI displays the message from referencePosition point or before (pre-awareness) and displays it all relevanceZone(s) 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.

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

<b>ID</b>	<b>2.4.1.2 M_H6 – IVIProfile (1)</b>
<b>Component(s)</b>	R-ITS-S, Nfr-ITS-S
<b>Requirement</b>	The IVIM transmitted by the R-ITS-S or N-ITS-S <b>shall</b> respect what's expected in the following table (IVIM profile for H6).
<b>Acceptance</b>	Referring to the "Status for the UC" column in the table-: CA1: All mandatory  DE and used  DE shall be present in the message emitted, with the defined values. CA2: All optional  DE can be present in the message emitted. See expected values in the table when defined. CA3: All not used  DE shall be absent in the message emitted.
<b>Additional information</b>	At reception, V-ITS-S receiving a message with not used  DE shall not discard the message.

IVI Master_I2V status/IVI transverse state		Profile_H6 (DSL)		
Field	Status (Master) Status from transverse	Status For the UC	Comments	Value set
Header				
protocolVersion			See Master_I2V document / IVI	(is 2)
messageID			See Master_I2V document / IVI	(is 6)
stationID			See Master_I2V document / IVI	
Management container				
serviceProviderId			See Master_I2V document / IVI	by PF
ivIdentification Number			See Master_I2V document / IVI	by PF
timestamp			See Master_I2V document / IVI	by PF
validFrom			See Master_I2V document / IVI	From TMS
validTo			See Master_I2V document / IVI	From TMS or by PF
connectedIviStructures				
iviStatus			See Master_I2V document / IVI	by PF
connectedDenms				
Geographic Location Container				
referencePosition			Position of the start of the overtaking ban zone. Transverse position is in the middle of the carriageway.	by PF
referencePosition Time				
referencePosition Heading				
referencePositionSpeed				
parts			See 5 next lines	
>zoneId			First zone(s) Ids <b>may</b> be used to define the "detection zone(s)", approach of the overtaking ban zone (similar to traces in DENM). Then, next zone Ids <b>may</b> 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 continues.</b> At least one detection zone and one relevance zone <b>shall</b> be provided. Minimum is 2 zone-Id for HGV overtaking-ban UC (e.g. one trace / detection-zone and one eventHistory / relevance-zone)	by PF
>laneNumber				
>zoneExtension				

IVI Master I2V status IVI transverse state		Profile <u>H6</u> (DSL)		
Field	Status (Master) Status from transverse se}	Status For the UC	Comments	Value set
>zoneHeading	U	U	Heading direction of the carriageway concerned by the HGV overtaking ban at the point of referencePosition. If the confidence is unknown, the confidence is set to unavailable (127)	by PF
>zone	U	U	See Master_I2V document / IVI	by PF
<i>General IVI Application Container</i>				
detectionZoneIds	U	U	See Master_I2V document / IVI	
its-rrid	X			
revelanceZoneIds	U	U	See Master_I2V document / IVI	by TMS or PF
direction	U	U	See Master_I2V document / IVI	Is 0
driverAwareness ZoneIds	X			
minimumAwareness Time	X			
applicableLanes	S	U	The HGV overtaking ban shall be lane specific to deliver the best message to users about the status of each lane.	by PF
iviType	V	V	Regulatory messages (1) is used.	is 1
iviPurpose	X			
laneStatus	X			
vehicleCharacteristics	S	S	To be provided for describing the type of vehicles the traffic ban applies. But optional, the UC can work without the vehicleCharacteristics (what is essential is the provided road sign).  Note that if a coach has often a weight over 7,5t the road sign B8/regulatory-4-21 does not apply to it (it applies to trucks).	by PF
driverCharacteristics	X			
layoutId	X			
preStoredLayoutId	X			
roadSignCodes	V	V	For the right lane(s), it is set to informative, nature 6, serial 60. For the other lane(s), it is set to regulatory, nature 4, serial 21.	by PF
extraText	S	S	Shall not be used without "/". Should not be used with "/". (not needed)	by PF
<i>Road Configuration Container</i>				
relevanceZoneIds	V	V	Each Rcc part is used for all zones in an IVIM that have the same characteristics. All those zones are listed here.	by PF
roadType	V	V	See Master_I2V document / IVI.	by PF
laneConfiguration	V	V	See next 6 lines	
>laneNumber	V	V	See Master_I2V document / IVI.	by PF
>direction	V	V	See Master_I2V document / IVI.	Is 0
>validity	S		Not needed for this UC	
>laneType	V	V	See Master_I2V document / IVI.	by PF
>laneStatus	V	V	See Master_I2V document / IVI.	by PF
>laneWidth	S	S	See Master_I2V document / IVI.	by PF
<i>Road Configuration Container</i>				
Text Container				
Layout Container				