

French C-ITS Deployment Coordination committee

Common technical specifications for use cases : H2 - dynamic traffic ban to specific vehicle (I2V)

Deliverable 2.4.1.2_H_H2

Activity 2: Studies

Sub Activity 2.4 > Specifications

Version 4.00

Publication Date: 14/11/2019



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

The contents of this publication are the sole responsibility of the SCOOP@F project consortium, C-ROADS France project consortium and InterCor project consortium (French beneficiaries only) and do not necessarily reflect the opinion of the European Union.

Information on the document

Document: Common technical specifications for use cases SCooP, InterCor, C-Roads - H2 DynTrafficBan

Date of publication: 14/11/2019

Responsible, Entity: Aymeric AUDIGE, Ministry of Ecology and Inclusive Transition (MTES) – Dir Atlantique

Status: Version 4.00 – Release 4

Publication history

Date	Version	Author(s)	Updates & changes	Diffusion
14/11/19	4.00	A. AUDIGÉ	<ul style="list-style-type: none"> Consolidated version for release 4 	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 : **I**
- If optional in standard :
 - Used (**U**) when always used
 - Not used (**I**) 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)
V-ITS-S	Vehicle ITS Station (any vehicles)
Vro-ITS-S	Road operator vehicle ITS Station
Vru-ITS-S	Road 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>

Table of Contents

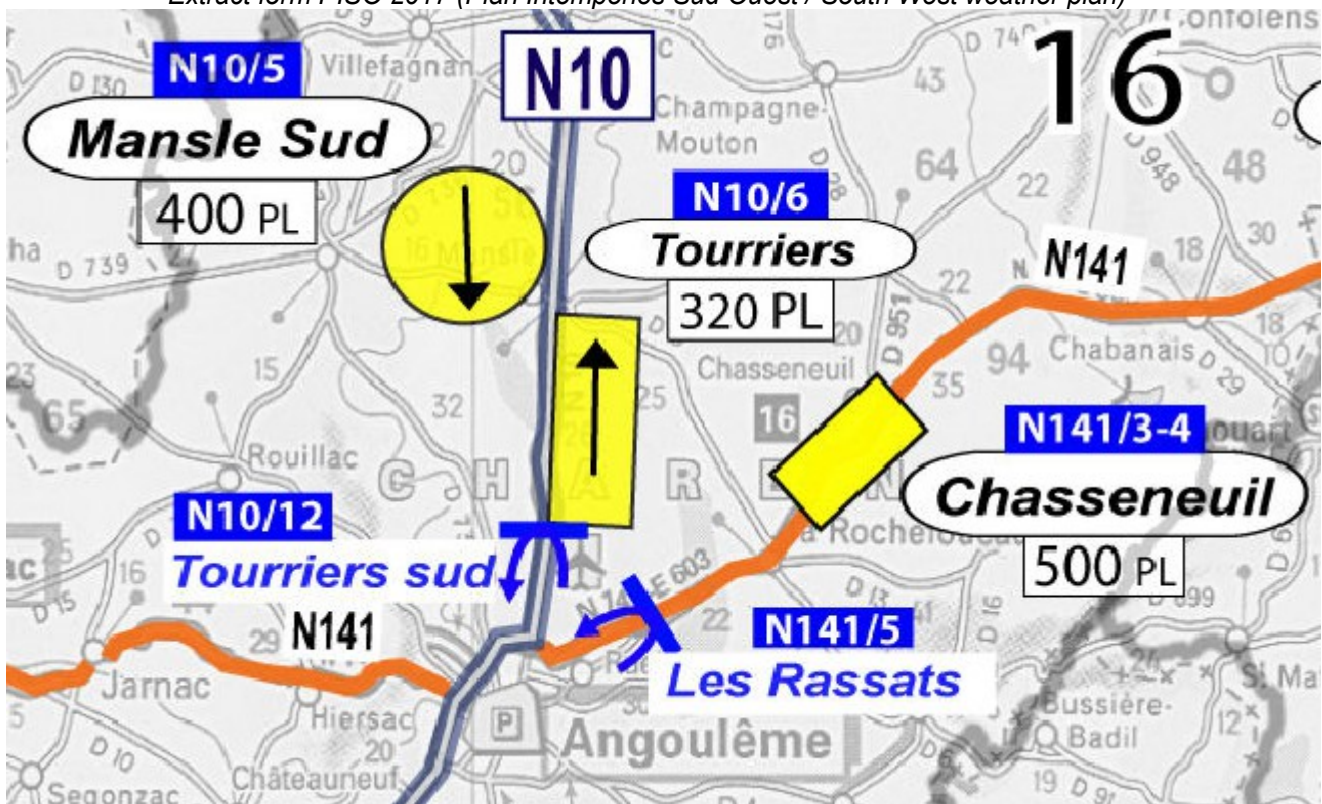
1. Figure and example of IVI message for dynamic traffic ban.....	6
2. Step by step diagram.....	9
3. Information profile - Message description (in details).....	12

1. Figure and example of IVI message for dynamic traffic ban

In order to clarify the data elements description for the Dynamic Traffic Ban (DTB) use case, we start by describing the scenario in the figure below and then the data elements associated in the table.

Example by illustration

Extract form PISO 2017 (Plan Intempéries Sud Ouest / South West weather plan)



- Circle means storage on area (parking) for trucks (weight >7,5t)
- Rectangle means storage on road for trucks (weight > 7,5t)
- Arrow gives the direction of the measure (no arrow means the measure concerns both direction of road)
- U-Turn means trucks (> 7,5t) have to go back to the other direction
- (Then, if situation exceed this status, road is generally closed (for all type of vehicles))

Message associated with figure above

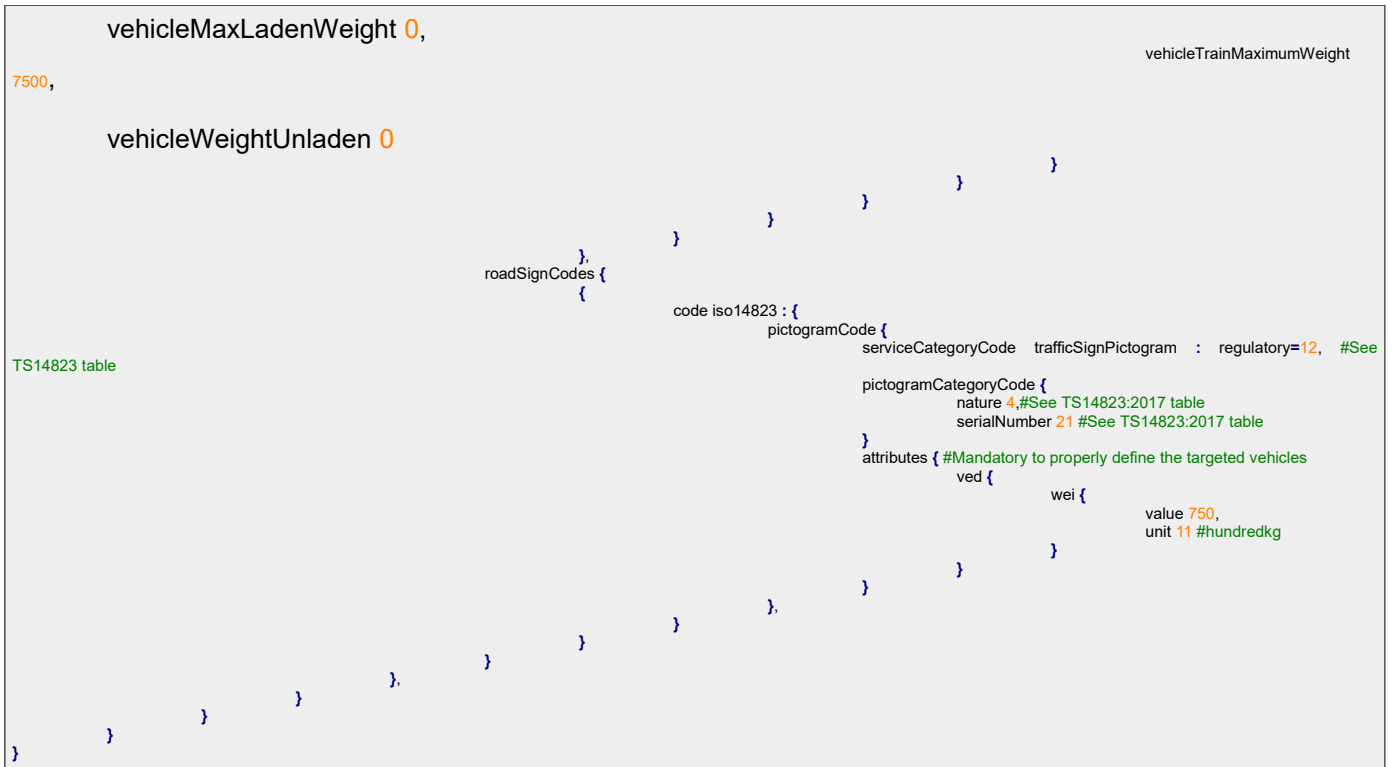
```
#Description of IVI for FR for DynTrafficBan UC (I2V)
#Linked with a figure
#Commented by A. AUDIGE (DIR A)

value1 IVI ::= {
  header {
    protocolVersion currentVersion=1,
    messageID ivi=6,
    stationID 4711
  },
  ivi {
    mandatory {
```

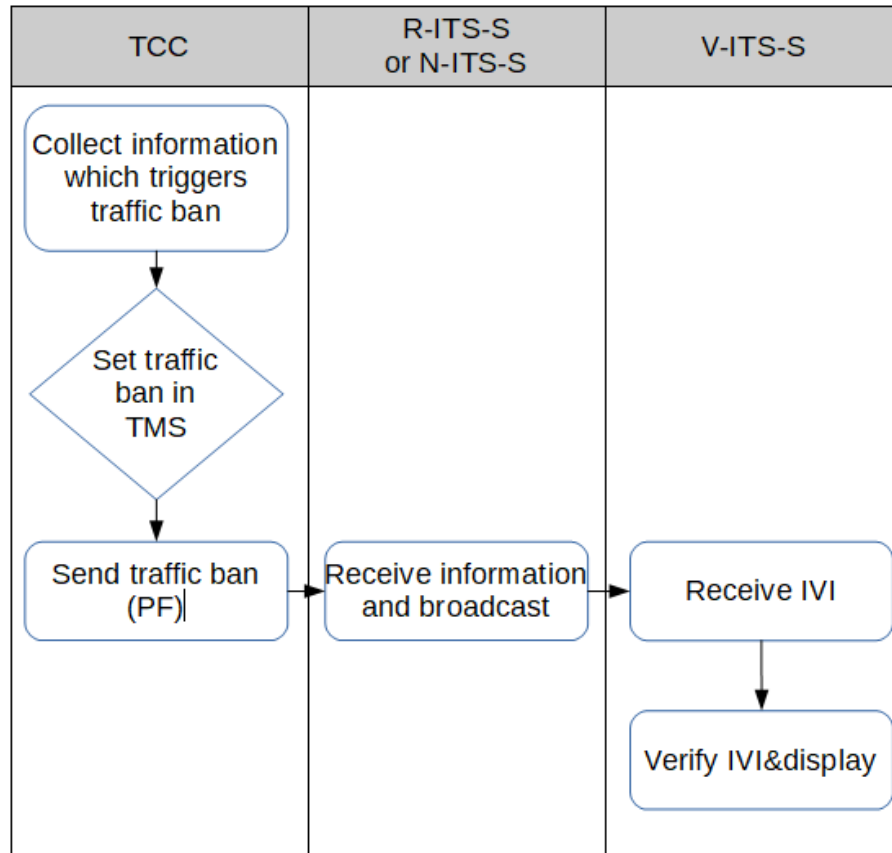
```

serviceProviderId {
    countryCode 10110 01010, #means 'FR'
    issuerIdentifier 33 #DIRA
},
iviIdentificationNumber 123456789,
timeStamp 352425600000,
validFrom 352447200000,
validTo 352447200010,
iviStatus new=0
},
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 unavailable=4095,
                semiMinorConfidence unavailable=4095,
                semiMajorOrientation unavailable=3601
            },
            altitude {
                altitudeValue unavailable=800001, #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 wgs84East(900), #Heading of road at the referencePosition
                    headingConfidence unavailable=127
                }
                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
                        }
                    }
                }
            },
            {
                zoneId 2, #description of a zone. Here, zone in which the IVI applies (similar to DENM/eventHistory)
                zoneHeading {
                    headingValue wgs84East(900), #Heading of road at the referencePosition
                    headingConfidence unavailable=127
                }
                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
                        }
                    }
                }
            }
        }
    },
    gic : { #GIC = general Ivi container = description of the VMS
        { #First container = speed limit for trucks (which is under the speed limit displayed on VMS)
            detectionZonelds {
                1
            },
            relevanceZonelds {
                2
            },
            direction sameDirection=0,
            iviType regulatoryMessages=1,
            vehicleCharacteristics { #Optional, but DF attributes of DF roadSignCode shall be well defined (see bellow)
                {
                    train {
                        ranges {
                            {
                                comparisonOperator greaterThan=0,
                                limits vehicleWeightLimits : {

```



2. Step by step diagram



Collect information which triggers dynamic traffic ban :

Generally, traffic bans are motivated by hard weather conditions (snow, violent wind, flooding, ...). Information can come from the field, but most of the time by weather prediction. Decisions are taken by Prefectural authority.

Set traffic ban in traffic management system :

When the information of the decision (of Prefectural authority) is given to the road operator, the road operator of the traffic control center (TCC) set a traffic ban in his traffic management system (TMS).

Three types of measures are possible and shall not be set the same way in the TMS. The three types are : (1) storage on road or area/parking ; (2) U-turn and go back ; (3) road is closed.

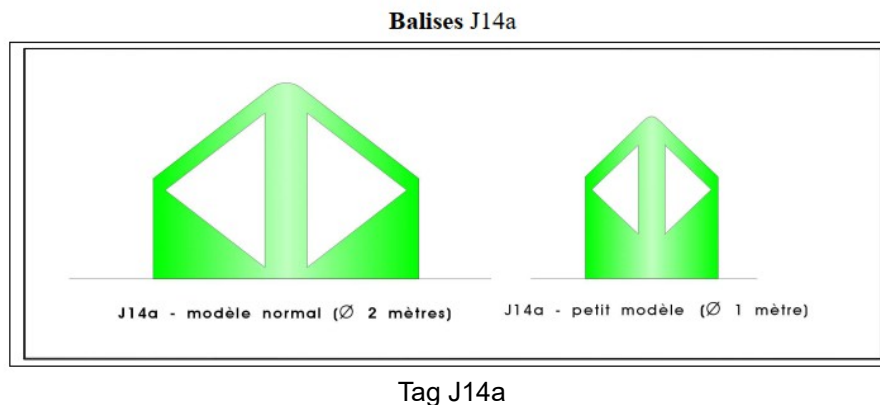
TCC **may** follow the following parameters to set different situations (TBC by 2.4.3.1_H SAGT deliverable) :

1. For a storage on road (1a) or on area/parking (1b) :
 - vehicleType = lorry (PL) if relevant
 - weight = greater than 7,5t if relevant
 - TYPE_ELT = RoadOrCarriagewayOrLaneManagement
 - roadOrCarriagewayOrLaneManagementType = vehicleStorageInOperation
 - Optionally : a comment can precise name of the area, rate of occupancy, etc.
 - ComplianceOption = mandatory
1. For a U-turn and go back to the other direction :
 - vehicleType = lorry (PL) if relevant
 - weight = greater than 7,5t if relevant
 - TYPE_ELT = RoadOrCarriagewayOrLaneManagement
 - RoadOrCarriagewayOrLaneManagementType = turnAroundInOperation
 - ComplianceOption = mandatory.
1. For a road closed to all type of vehicles :
 - TYPE_ELT = RoadOrCarriagewayOrLaneManagement
 - roadOrCarriagewayOrLaneManagementType = roadClosed

- This last situation is handled by an other use case.

The following parameters for the situation **shall** be set in the TCC:

- **For any situation the starting point of the event is the position from which the traffic ban applies i.e no (truck) vehicle are allowed downstream this point :**
 - **(type 1a) head/first position of storage for on road parking (position of the vehicle which is ahead)**
 - **(type 1b) J14 of exit to the area/parking**
 - **(type 2) J14 of exit to the U-turn road interchange.**
 - **If the event is set as a linear in the TMS, this linear is a zone in which the traffic ban applies.**



The TMS sends a DATEX II message of the event to the PF.

Send traffic ban to R-ITS-S or Nfr-ITS-S :

The PF adapts the Dtex II coming from the TMS for the R-ITS-S and Nfr-ITS-S. The data for future(s) IVI/detectionZone (similar to DENM/trace) are calculated as usually. **The data for IVI/relevanceZone(s) (similar to DENM/eventHistory) are calculated as usually if the event set in TMS is a linear. If not, the SCOOP PF constructs an IVI/relevanceZone for the linear of the road to next interchange or on a default distance set by road operator in the PF (1 to 5km). However, i the road operator should set the linear of the relevance zone in the TMS for a better information to the driver..**

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.

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 which 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 the vehicle treats one message or the other, but not both of them.

Verify IVI and display IVI : **message is displayed on HMI before referencePosition (pre-awareness is needed).**

The information is displayed all the **relevanceZonelds** long if the vehicle enters it (which shouldn't be the case for vehicles that are concerned, because it is a traffic ban). To classify and prioritize the data between several IVI messages, the receiving vehicle **may** use the data element IviType (see below for further details), that provides the message category. For this UC, iviType is regulatory (1).

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

1. The vehicle checks serviceProviderID+ivIdentificationNumber and timestamp to verify if event is already known, a new event or an update.
2. The vehicle checks validFrom and validTo to determine if it is active.

3. The vehicle checks referencePosition to determine if near or 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).

5. The vehicle checks absence of extraText container without // and checks :

- presence of trafficSignPictogram, nature and serialNumber with parameters "regulatory", nature "4", serial "21" (i.e B8 in French-IISR) with attributes of wei (DE wei of DF attributes of DF roadSignCodes).



7,5t

In this case the UC is the dynamic traffic ban to truck vehicle (note that if an extraText without // is present, the UC is an e-VMS instead).

- Or presence of trafficSignPictogram, nature and serialNumber with parameters "regulatory", nature "4", serial "15" (i.e B0 in French-IISR) without attributes (no DF attributes of DF roadSignCodes).












































In this case the UC is the dynamic traffic ban to all vehicles (note that if an extraText without // is present, the UC is an e-VMS instead).

1. HMI displays the message before referencePosition point (pre-awareness), when the vehicle is along the linear of detectionZone. Lane specific is not applicable. VehicleCharacteristics can be processed by the vehicle-receiver and message can be not displayed in the vehicles that are not concerned (it involved that the vehicle-receiver knows its own characteristics and that vehicleCharacteristics are provided).

3. Information profile - Message description (in details)

IVI transverse state		Profile DTB		
Field	Status from Master	Status For the UC	Comments	Value set
Header				
protocolVersion	U	U	See Master document / IVI	
messageID	U	U	See Master document / IVI	(is 6)
stationID	U	U	See Master document / IVI	
Management container				
serviceProviderId	U	U	See Master document / IVI	
iviIdentification Number	U	U	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	R			
iviStatus	U	U	See Master document / IVI	
Geographic Location Container				

IVI transverse state		Profile DTB		
Field	Status from Master	Status For the UC	Comments	Value set
referencePosition			Position of the start of the dynamic traffic ban zone. Transverse position is in the middle of the carriageway . (which is conform with ISO TS 17426 standard)	by PF
referencePositionTime				
referencePositionHeading				
referencePositionSpeed				
parts			See 5 next lines	
>zoneId			First zone(s) Ids may be used to define the "detection zone(s)", approach of the dynamic traffic ban (similar to traces in DENM). Then, next zone Ids may be used to define "relevance zone(s)" in which the dynamic traffic ban is relevant (e.g. the display zone / eventHistory). 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 traffic ban zone continues. Minimum is 2 zone Id for Dynamic Traffic Ban UC (e.g. one trace / detection zone and one eventHistory / relevance zone)	by PF
>laneNumber				
>zoneExtension				
>zoneHeading			Heading direction of the carriageway concerned by the DTB at the point of referencePosition. If unknown, the confidence is set to unavailable (127)	by PF
>zone			See Master document / IVI	
General IVI Application Container				
detectionZoneIds			See Master document / IVI	
its-rrid				
revelanceZoneIds			See Master document / IVI	
direction			See Master document / IVI	
driverAwarenessZoneIds				
minimumAwarenessTime				
applicableLanes			Traffic ban applies to all lanes	
iviType			Dynamic traffic ban is a B8 in french IISR, corresponding to TS14823 regulatory-4-21. By consequence, iviType is regulatory for this UC.	is 1
iviPurpose				
laneStatus				
vehicleCharacteristics			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) 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).	
driverCharacteristics				
layoutId				

IVI transverse state		Profile DTB		
Field	Status from Master	Status For the UC	Comments	Value set
<i>preStoredLayoutId</i>				
roadSignCodes			<p><i>For trucks traffic ban, ServiceCategoryCode shall be regulatory, nature shall be 4 and serialNumber shall be 21.</i></p> <p><i>Attributes wei shall be given (important to well define the targeted vehicle by the traffic ban)</i></p> <p><i>For all vehicle traffic ban, ServiceCategoryCode shall be regulatory, nature shall be 4 and serialNumber shall be 15. (no attributes provided in that case)</i></p>	
<i>extraText</i>			<p><i>Presence of extraText without // should be avoided to offer the vehicle-receiver the capability to distinguish an IVI of e-VMS talking of a DTB to the IVI of the measure of DTB itself.</i></p>	
<i>Road Configuration Container</i>				
<i>Text Container</i>				
<i>Layout Container</i>	