



## French C-ITS Deployment Coordination committee

# Common technical specifications for use cases: E8 – Traffic information on the closure of a mountain pass (I2V)

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### 2.4.1.2\_M\_E8

## Activity 2: Studies

## Sub Activity 2.4 > Specifications

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## Information on the document

Document: Common technical specifications for use case – **E8 – Traffic information on the closure of a mountain pass** (I2V)

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## Publication history

Date	Version	Author(s)	Updates & changes	Diffusion
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25/01/2024	0.10	T. BELLACHE (Viveris AMO DMR)	Title of D9b UC renamed to E8	

**Black highlighted text are problem with standards.**

The following legend is used on the document tables:

Standard / Field: if status is mandatory in standard: <b>bold</b> , If optional: <i>italic</i> .
Profile / Status :
<ul style="list-style-type: none"> <li>If mandatory : <b>✓</b></li> <li>If optional in standard : <ul style="list-style-type: none"> <li>Used (<b>U</b>) when always used</li> <li>Not used (<b>N</b>) when never used.</li> <li>Sometimes (<b>S</b>) when it depends.</li> </ul> </li> </ul>
Profile / Content: important settings or information are in <b><i><u>bold italic red underline</u></i></b> .

# 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

C-ITS	Cooperative Intelligent Transport Systems
C-ITS-DATEXII	DateXII specific to the InDiD project
DENM	Decentralized Environmental Notification Message
HMI	Human-Machine Interface
I2V	Infrastructure To 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.
IVIM	Infrastructure to Vehicle Information Message
OEM	Original Equipment Manufacturer
Nfr-ITS-S	National Node
PF	Platform
PFro	Road operator platform
R-ITS-S	Roadside ITS Station
TCC	Traffic Control Centre (the place where road management measures are decided)
TMS	Traffic Management System (the usual system in which the road operator sets its road measures and events)
UC	Use Case
V-ITS-S	Vehicle ITS Station
VMS	Variable Message Sign

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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	4.100	Master technical specifications for I2V use cases

## 2. Figure and example of IVI message for closed mountain pass route use case

In order to clarify the data elements description for the **E8 – Alert approaching a closed mountain pass route** use case, we start by describing the scenario in the figure below and then the data elements associated in the table.



Photo Archives Le DL/Bruno MAGNIEN

Figure 1: illustration about closed mountain.

The driver receives information about a closed mountain pass route approaching. The driver is already engaged in the road to the mountain pass.

#Description of IVI for FR for Alert approaching a closed mountain pass route UC (I2V)

```
value1 IVI ::= {
  header {
    protocolVersion currentVersion=2,
    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" (VMS) =x0, start point of the closed road
          longitude 164801006, #longitude of point "0" (VMS) =y0, start point of the closed road
        }
      }
    }
  }
}
```

line ">zone".

line ">zone".

#See TS14823 table

```

positionConfidenceEllipse {
  semiMajorConfidence unavailable=0,
  semiMinorConfidence unavailable=0,
  semiMajorOrientation unavailable=0
},
altitude {
  altitudeValue unavailable=800001, #But can be provided if known by the system
  altitudeConfidence unavailable=15
},
parts {
  {
    zoneId 1, #description of a zone (detection zone).
    zoneHeading {
      headingValue wgs84East(900), #Heading of the road at the referencePosition
      headingConfidence unavailable=127
    }
    zone segment : {
      line deltaPositions : {
        {
          deltaLatitude -6637, #exemple = xA-x0
          deltaLongitude 9289 #exemple = yA-y0
        },
        {
          deltaLatitude -5379, #exemple = xB-xA
          deltaLongitude 10567 #exemple = yB-y0
        },
        ... # number of point needs to be defined according to DA1 §2.3,
      }
    }
  },
  {
    zoneId 2, #description of a zone. (relevance zone in wich the IVI applies)
    zoneHeading {
      headingValue wgs84East(900), #Heading of road at the referencePosition
      headingConfidence unavailable=127
    }
    zone segment : {
      line deltaPositions : {
        {
          deltaLatitude 7591, #exemple = x1-x0
          deltaLongitude -7420 #exemple = y1-y0
        },
        {
          deltaLatitude 8278, #exemple = x2-x1
          deltaLongitude -5379 #exemple = y2-y1
        },
        ... # number of point needs to be defined according to DA1 §2.3,
      }
    }
  }
},
gic : { #GIC = general lvi container = description of the traffic signs of the VMS
  { #First container = traffic ban
    detectionZonelds {
      1
    },
    relevanceZonelds {
      2
    },
    direction sameDirection=0,
    lviType regulatoryMessages=1,
    roadSignCodes {
      {
        code iso14823 : {
          pictogramCode {
            serviceCategoryCode trafficSignPictogram : regulatory=12,
            pictogramCategoryCode {
              nature 4, #See TS14823:2017 table
              serialNumber 15 #See TS14823:2017 table
            }
          }
        },
      }
    }
  }
}

```



```

    },
    tc : { #TC = text container = description of the text of the VMS => always present
          { #First container = page 1 of the VMS
            detectionZonelds {1},
            relevanceZonelds {2},
            direction sameDirection=0, #To reference toward zoneHeading
            text { #maximum of 4 lines of text. Here, layoutComponentId is optional so not used.
              {
                language 10110 01010, #means 'FR'
                textContent COL DE L'IZOARD FERME #Line n°1 of the VMS
              }
            }
          }
    },
    data "" #empty string as mandatory in standard and not useful.
  }
}

```

Figure 2: IVI message associated with figure above

### 3. Step by step diagram

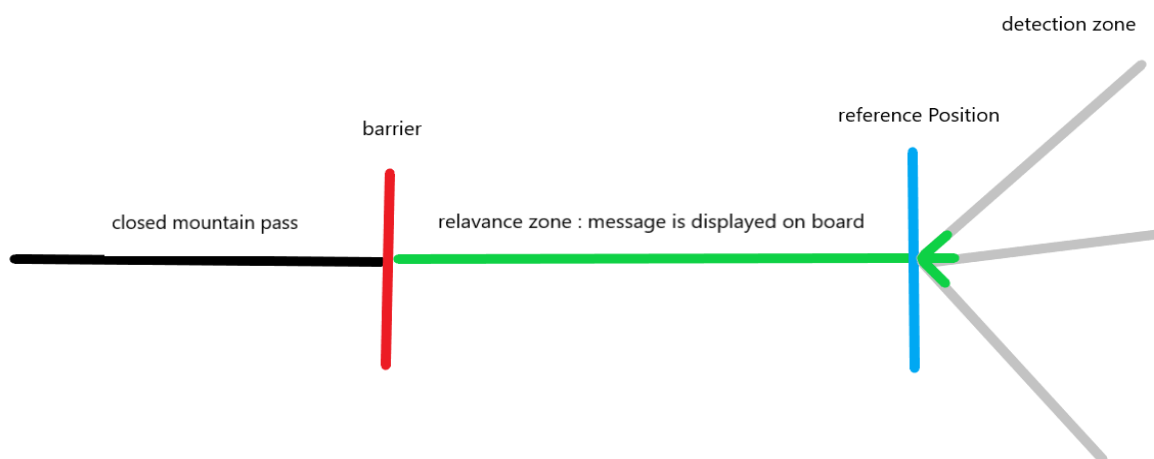
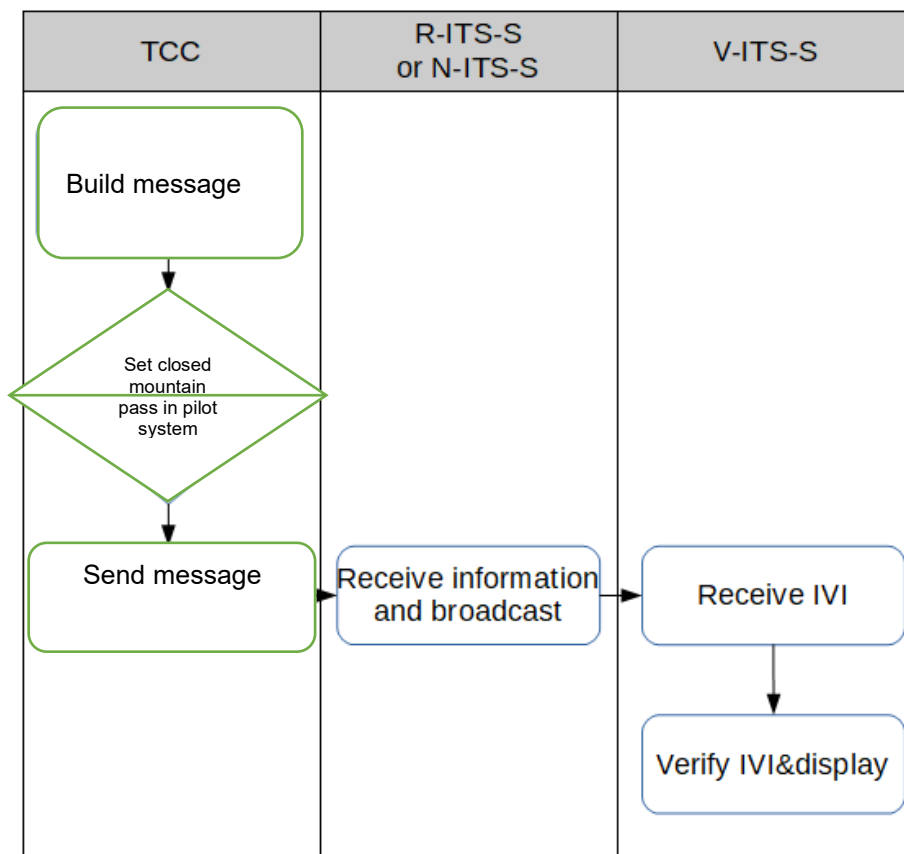


Figure 3 : schematic diagram

### Collect information:

Generally, mountain pass routes are closed due to snow conditions. This road is closed for all or part of the winter period.

### Set traffic ban in traffic management system:

When the information of the decision is known, the road operator, at the traffic control center (TCC) sets a roadClosed in his traffic management system (TMS).

The information about the closed road will be sent with the complement “on mountain passes”

The present use case allows to display on-board information of real VMS (usual VMS present on field) or virtual VMS (non-existing VMS on field).

<b>ID</b>	<b>2.4.1.2_M_E8-BuildMessage (1)</b>
<b>Component(s)</b>	TMS
<b>Requirement</b>	The road operators <b>should</b> define their policy for virtual VMS localization (with virtual static location) and, if possible, set it in their VMS management tool (e.g. with a virtual flag).
<b>Acceptance</b>	
<b>Additional information</b>	Road operators <b>can</b> also choose not to use this virtual possibility and thus not integrate any virtual VMS.

<b>ID</b>	<b>2.4.1.2_M_E8-RelevanceZone (1)</b>
<b>Component(s)</b>	TMS
<b>Requirement</b>	Road operators <b>can</b> set the relevance zone from the beginning of the mountain road to the closing barrier in order to display the message early enough.
<b>Acceptance</b>	
<b>Additional information</b>	The maximum distance for this relevance zone is 29.1km.

The PFro adapts the Datex II coming from the TMS for the R-ITS-S and Nfr-ITS-S.

### Receive information and broadcast (R-ITS-S or Nfr-ITS-S):

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

<b>ID</b>	<b>2.4.1.2_M_E8-ReceiveAndBroadcast (1)</b>
<b>Component(s)</b>	R-ITS-S or Nfr-ITS-S
<b>Requirement</b>	Canal CCH should be used (see <a href="#">DR1</a> for more details).
<b>Acceptance</b>	
<b>Additional information</b>	GeoNetwork dissemination and forwarding are described in <a href="#">DA1</a> .

## Receive IVI (vehicle):

<b>ID</b>	<b>2.4.1.2_M_E8-ReceiveIVI (1)</b>
<b>Component(s)</b>	V-ITS-S
<b>Requirement</b>	<p>Architecture options are not treated in this document (see <a href="#">DR1</a>).</p> <p>Whatever route taken by the message, duplicates of the same IVI messages <b>shall</b> 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>- serviceProviderId+ivIdentificationNumber</li> <li>- timestamp</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.

## Verify IVI and display IVI:

Message is displayed on HMI before referencePosition (pre-awareness is needed). The information is displayed all the relevance zone long if the vehicle enters it. To classify and prioritize the data between several IVI messages, the receiving vehicle **shall** 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 the information is already known, if it is new or if it is an update.
2. The vehicle checks validFrom and validTo to determine if the information is currently applicable.
3. The vehicle checks referencePosition to determine if the closed road is near or far from its position.
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.
5. The vehicle checks presence of General IVI Application Container :
  - presence of trafficSignPictogram, nature and serialNumber with parameters "regulatory", nature "4", serial "15"
6. The vehicle checks presence of Text Container and checks :
  - Presence of text, "COL DE L'IZOARD FERME"



COL DE L'IZOARD FERME

7. HMI displays the message before referencePosition point (pre-awareness), when the vehicle is along the linear of detection zone.

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

<b>ID</b>	<b>2.4.1.2_M_E8 – 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 E8).
<b>Acceptance</b>	Referring to the "Status for the UC" column in the table : CA1: All mandatory <b>V</b> DE and used <b>U</b> DE shall be present in the message emitted, with the defined values. CA2: All optional <b>S</b> DE can be present in the message emitted. See expected values in the table when defined. CA3: All not used <b>X</b> DE shall be absent in the message emitted.
<b>Additional information</b>	At reception, V-ITS-S receiving a message with not used <b>X</b> DE shall not discard the message.

IVI Master_I2V status		Profile E8		
Field	Status (Master)	Status For the UC	Comments	Value set
<b>Header</b>		<b>V</b>		
<b>protocolVersion</b>	<b>V</b>	<b>V</b>	See Master_I2V document / IVI	(is 2)
<b>messageID</b>	<b>V</b>	<b>V</b>	See Master_I2V document / IVI	(is 6)
<b>stationID</b>	<b>V</b>	<b>V</b>	See Master_I2V document / IVI	
<b>Management container</b>		<b>V</b>		
<b>serviceProviderId</b>	<b>V</b>	<b>V</b>	See Master_I2V document / IVI	by PF
<b>iviIdentification Number</b>	<b>V</b>	<b>V</b>	See Master_I2V document / IVI	by PF
<i>timestamp</i>	<b>U</b>	<b>U</b>	See Master_I2V document / IVI	by PF
<i>validFrom</i>	<b>S</b>	<b>S</b>	See Master_I2V document / IVI	From TMS
<i>validTo</i>	<b>U</b>	<b>U</b>	See Master_I2V document / IVI	From TMS or by PF
<i>connectedIviStructures</i>	<b>X</b>	<b>X</b>		
<b>iviStatus</b>	<b>V</b>	<b>V</b>	See Master_I2V document / IVI	by PF
<i>connectedDenms</i>	<b>X</b>	<b>X</b>		
<b>Geographic Location Container</b>		<b>V</b>		
<b>referencePosition</b>	<b>V</b>	<b>V</b>	Position of the barrier for the closed mountain pass.	by PF
<i>referencePosition Time</i>	<b>X</b>	<b>X</b>		
<i>referencePosition Heading</i>	<b>X</b>	<b>X</b>		
<i>referencePositionSpeed</i>	<b>X</b>	<b>X</b>		
<b>parts</b>	<b>V</b>	<b>V</b>	See 5 next lines	
<b>&gt;zoneId</b>	<b>V</b>	<b>V</b>	See Master_I2V document / IVI	by PF
<b>&gt;laneNumber</b>	<b>X</b>	<b>X</b>		
<b>&gt;zoneExtension</b>	<b>X</b>	<b>X</b>		
<b>&gt;zoneHeading</b>	<b>U</b>	<b>X</b>	See Master_I2V document / IVI	
<b>&gt;zone</b>	<b>U</b>	<b>U</b>	See Master_I2V document / IVI The relevanceZone will be built between the start of the mountain road and the closed barrier.	by PF

IVI Master_I2V status		Profile E8		
Field	Status (Master)	Status For the UC	Comments	Value set
<i>General IVI Application Container</i>		U		
<i>detectionZoneIds</i>	U	U	See Master_I2V document / IVI	by PF
<i>its-rrid</i>	X	X		
<i>revelanceZoneIds</i>	U	U	See Master_I2V document / IVI	by TMS or PF
<i>direction</i>	U	U	See Master_I2V document / IVI	Is 0
<i>driverAwarenessZoneIds</i>	X	X		
<i>minimumAwarenessTime</i>	X	X		
<i>applicableLanes</i>	S	X		
<b>iviType</b>	V	V	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
<i>iviPurpose</i>	X	X		
<i>laneStatus</i>	X	X		
<i>vehicleCharacteristics</i>	S	X		
<i>driverCharacteristics</i>	X	X		
<i>layoutId</i>	X	X		
<i>preStoredLayoutId</i>	X	X		
<b>roadSignCodes</b>	V	V	ServiceCategoryCode shall be regulatory, nature shall be 4 and serialNumber shall be 15	by PF
<i>extraText</i>	S	X	See Master_I2V document / IVI.	
<i>Road Configuration Container</i>		X	Not used.	
<i>Text Container</i>		U	This container is used to send text information. One TcPart per text message. If a single VMS is displaying alternatively two different messages, each one is included in a single TcPart. Note: one TcPart can support up to 4 lines via DF text.	
<i>detectionZonelds</i>	U	U	See Master_I2V document / IVI	by PF
<i>revelanceZonelds</i>	V	V	See Master_I2V document / IVI	by TMS or PF
<i>direction</i>	U	U	See Master_I2V document / IVI	is 0.
<i>driverAwarenessZonelds</i>	X	X		
<i>minimumAwarenessTime</i>	X	X		
<i>applicableLanes</i>	S	X		
<i>layoutId</i>	X	X		
<i>prestored LayoutId</i>	X	X		
<i>text</i>	U	U	See Master_I2V document / IVI. This data frame is where the text information of the VMS is given. It can contain a text of at most 4 lines of 32 characters.	By PF
<b>data</b>	V	V		Set to ""
<i>Layout Container</i>		X		