

## French C-ITS Deployment Coordination committee

# Common technical specifications for use cases - G1 - Green Light Optimal Speed Advisory (I2V)

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### 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 (**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)
MAPPF	A platform with basic information of MAP (map of intersections, mostly static)
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)
SPATPF	A platform with basic information of SPAT (signal phase and time of intersections, partly static and partly dynamic (cycle of phase of the traffic lights))
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)

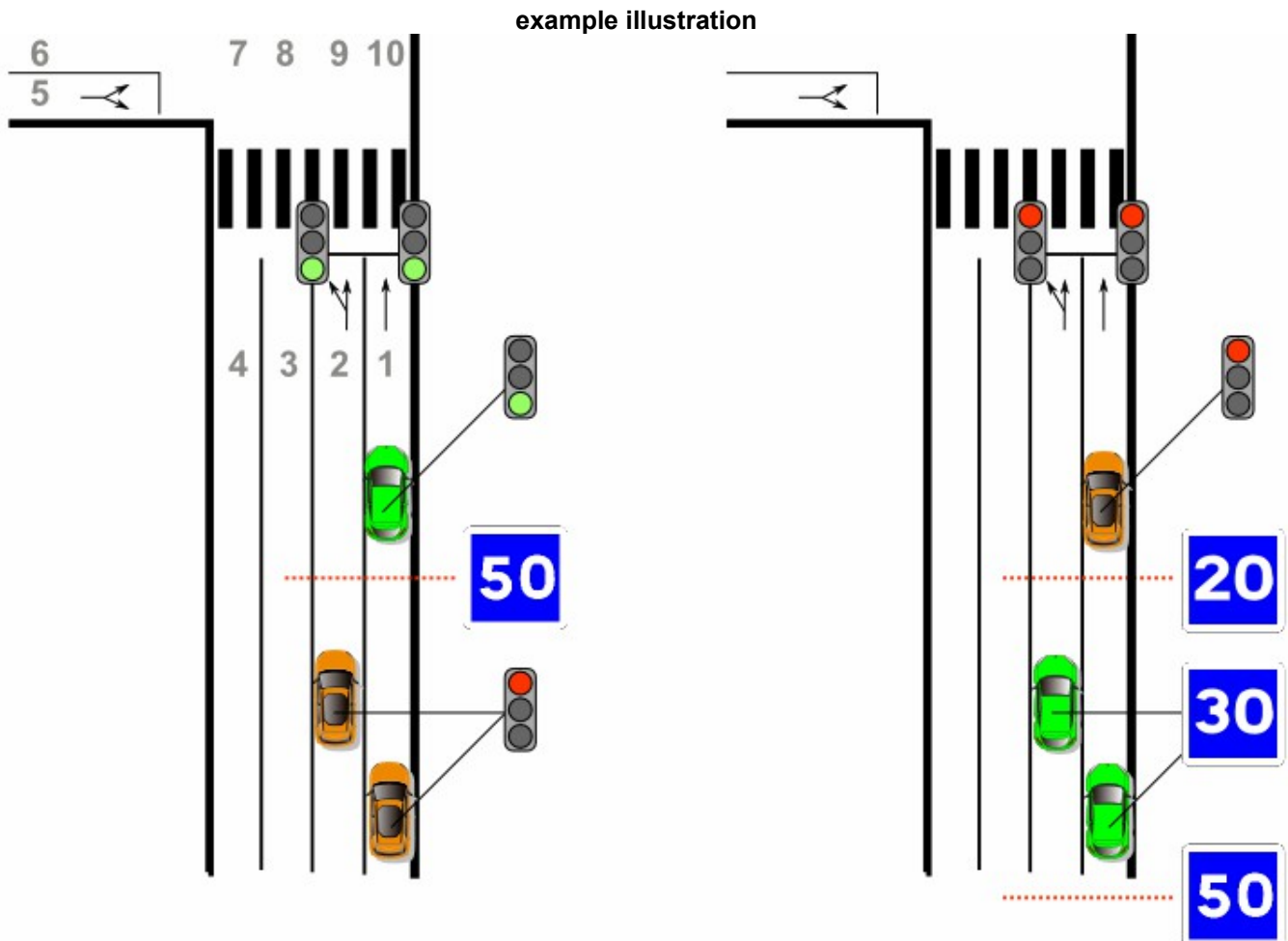
N/A	<i>Not Applicable</i>
TBC	<i>To Be Checked, with MS or associated partner</i>
WIP	<i>Work in progress : when mentioned next to the version number, it means the document is an in-between version</i>

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# 1. Figure and example of GLOSA message

In order to clarify the data elements description for the GLOSA use case, we start by describing the scenario in the figure below and then the message associated with the figure.



<p>▲</p> <p>HMI of the green car may display the speed limit or a green light as it is sure it will get it.</p> <p>HMI of the orange cars may display a red light as they should overpass the speed limit of 50 km/h to get the green.</p> <p>Red line corresponding to the limit at which a car pass the light at the end of current phase at 50 km/h (this limit depends on time to next phase).</p>	<p>▲</p> <p>HMI of orange car may display a red light as it is sure it will have to stop (or drive very slowly).</p> <p>HMI of the green cars may display a speed advisory corresponding to the speed to get the green without stopping.</p> <p>Red line in front of green cars corresponding to the limit at which a car pass the light at the end of current phase at 20 km/h (this limit depends on time to next phase).</p>
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## Message associated with figure above

```

MAPEM ::= {
  header: ItsPduHeader ::= {
    protocolVersion: 1
    messageID: 5
    stationID: 2518815527
  }
  map: MapData ::= {
    msgIssueRevision: 0
    intersections: IntersectionGeometryList ::= {
      IntersectionGeometry ::= {
        id: IntersectionReferenceID ::= {
          region: 3300 #Bordeaux métropole
          id: 12
        }
        revision: 3
        refPoint: Position3D ::= {
          lat: 447080650 #lat center of the intersection
          long: -5826130 #long center of the intersection
        }
        speedLimits: SpeedLimitList ::= {
          RegulatorySpeedLimit ::= {
            type: 5 (vehicleMaxSpeed)
            speed: 694 #50km/h converted in 0.02m/s
          }
        }
      }
    }
    laneSet: LaneList ::= {
      GenericLane ::= {1
        laneID: 1
        name: one lane described for example #champ optionnel
        laneAttributes: LaneAttributes ::= {
          directionalUse: 10 #means ingress, bit string size 2
          sharedWith: 0000000000 #bitstring size 10
          laneType: 00000000 #bit string size 8
        }
      }
      nodeList: NodeSetXY ::= {
        NodeXY ::= {
          delta: Node-XY-20b ::= {
            x: 87
            y: 49
          }
        }
        NodeXY ::= {
          delta: Node-XY-28b ::= {
            x: 6013
            y: -6749
          }
        }
        NodeXY ::= {
          delta: Node-XY-22b ::= {
            x: -79
            y: -922
          }
        }
        NodeXY ::= {
          delta: Node-XY-26b ::= {
            x: -2844
            y: -2257
          }
        }
      }
    }
    connectsTo: ConnectsToList ::= {
      Connection ::= {
        connectingLane: ConnectingLane ::= {
          lane: 9
          maneuver: 100000000000 #go straight is allowed
        }
        signalGroup: 1
      }
    }
  }
}

```

```

connectingLane: ConnectingLane ::= {
  lane: 10
  maneuver: 100000000000 #go straight is allowed
}
signalGroup: 1
}
Connection ::= {
  connectingLane: ConnectingLane ::= {
    lane: 6
    maneuver: 010000000000 #turn left is allowed
  }
  signalGroup: 1
}
} #connectsTo section is closed
} #first GenericLane is closed

```

*#Here should be described other lanes of the example with other GenericLane sections (not done in this example)*

```

} #laneSet section is closed
} #first and only intersectionGeometry of this example is closed
} #intersections section is closed
} #MapData section is closed
} #MAPEM section is closed

```

```

SPATEM ::= {
  header: ItsPduHeader ::= {
    protocolVersion: 1
    messageID: 4
    stationID: 2518815527
  }
  spat: SPAT ::= {
    intersections: IntersectionStateList ::= {
      IntersectionState ::= {
        name: carrefour_fictif_example #champ optionnel
        id: IntersectionReferenceID ::= {
          region: 3300 #Bordeaux métropole
          id: 12 #make the link with the appropriate map message
        }
        revision: 3
        status: 0000000000000000
        states: MovementList ::= {
          MovementState ::= {
            signalGroup: 1
            state-time-speed: MovementEventList ::= {
              MovementEvent ::= {
                eventState: 6 (protected-Movement-Allowed)
                timing: TimeChangeDetails ::= {
                  minEndTime: 12620 #HH : 21min : 02s
                  likelyTime: 12640 #HH : 21min : 22s
                  confidence: 12 #94% (likelyTime is quite guaranteed,
but next phase can occurs later or sooner with 6% of probability. If sooner, not
before minEndTime)
                }
              } #first MovementEvent section is closed but several can be
given
            }
          } #first MovementState is closed but several should be given (for
other lanes depending on other signalGroup : 2, 3, 4 ...)
        }
      }
    } #intersections section is closed
  } #spats section is closed
} #SPATEM section is closed

```

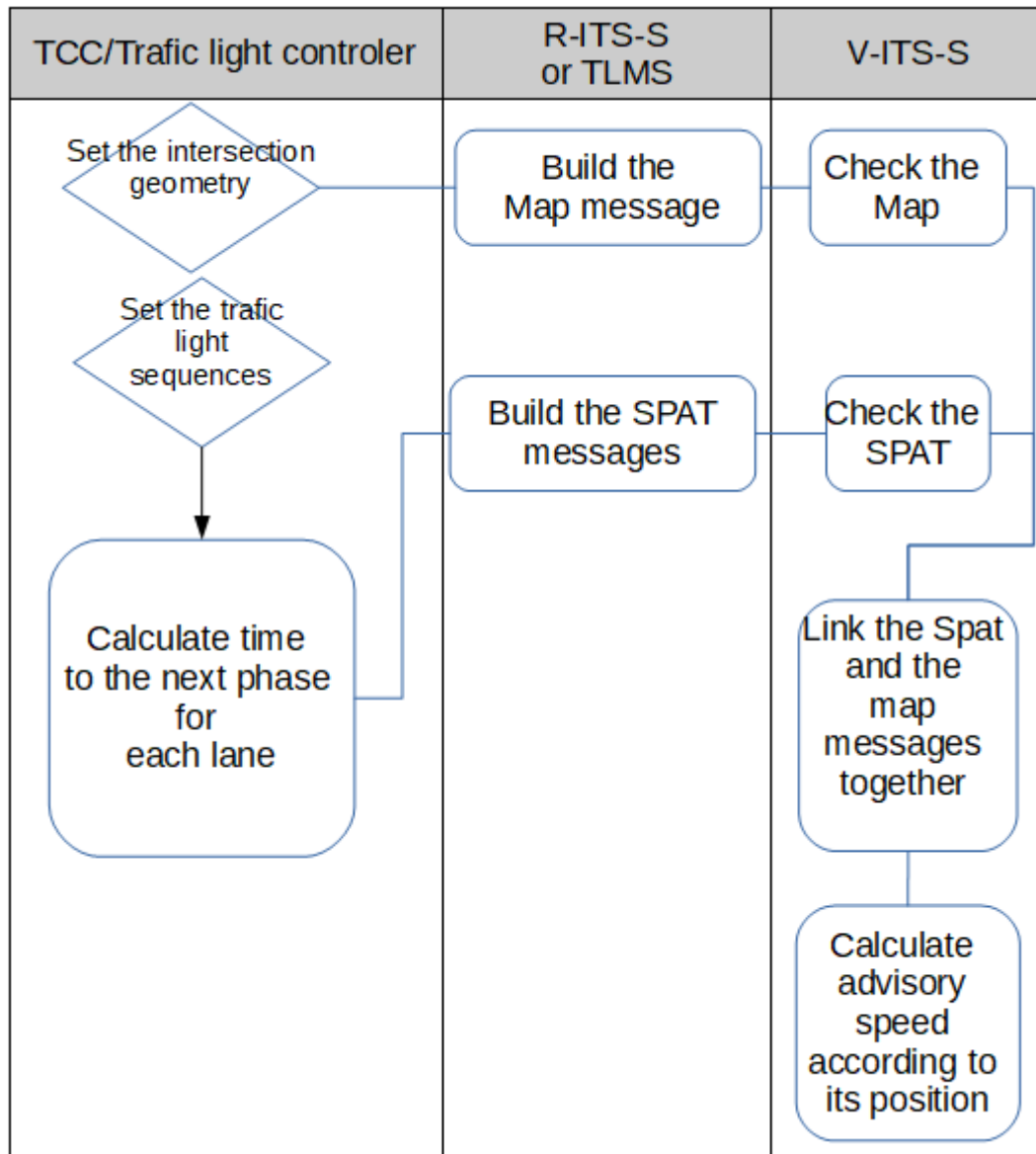
```

SPATEM ::= {
  header: ItsPduHeader ::= {
    protocolVersion: 1
    messageID: 4
    stationID: 2518815527
  }
  spat: SPAT ::= {
    intersections: IntersectionStateList ::= {
      IntersectionState ::= {
        name: carrefour_fictif_example #champ optionnel
        id: IntersectionReferenceID ::= {
          region: 3300 #Bordeaux métropole
          id: 12 #make the link with the appropriate map message
        }
        revision: 3
        status: 0000000000000000
        states: MovementList ::= {
          MovementState ::= {
            signalGroup: 1
            state-time-speed: MovementEventList ::= {
              MovementEvent ::= {
                eventState: 3 (stop-And-Remain)
                timing: TimeChangeDetails ::= {
                  minEndTime: 13460 #HH : 22min : 26s
                  likelyTime: 13460 #HH : 22min : 26s
                  confidence: 15 #100% (time of next phase is
guaranteed)
                }
              }
            }
          }
        }
      }
    }
  }
}

```

## 2. Step by step diagram





**Set the intersection geometry** : *through a system, the traffic light operator has to describe the geometry of intersections. At least center of the intersection, the lanes (ingress and egress) with nodes and the signal group (lane traffic lights that are working together)*

**Set the traffic light sequences** : parameters of the traffic light controller are set by the traffic light operator in a system. *Link with the lanes of each intersection is made through an intersection ID and the signalGroup which controls the lane.*

**Calculate time to the next phase(s) for each lane** : phase time are calculated following several methods depending on traffic light operator system :

1. Central calculations by a centralized management of traffic lights (e.g Gertrude Bordeaux),
2. Local calculations directly on the field by the traffic light controller system with public transports, bike, or emergency vehicle asking for priority (and changing time of phases) and/or loops or detectors to detect local congestion,
3. On field controller with fixed periods set directly in local controller (same phases all day long or depending on month-day-time system), no real-time adaptation of phases (no detectors).

System	Main strength for GLOSA	Main weakness for GLOSA
--------	-------------------------	-------------------------

1	Information on traffic light phases are centralized, with real time adaptation (ask for priority, adaptive system, etc.). A tough system of frequent synchronization of the clock of the traffic light management system is easy to build.	Next phases can hardly be anticipated and can change very often.*
2	G5 broadcasting is possible even if no connection with the TCC (no connection built or connection lost)	If the local detector change the phases, it has an impact on the GLOSA.* For direct G5, a tough system of frequent synchronization of the clock of the traffic light is needed to avoid untrue time dissemination. For non-G5 dissemination a system is needed to push real-time local information up to the system (because preset phases can have real-time changes).
3	Phases can be totally anticipated even from TCC without connection. G5 broadcasting is possible without connection with the TCC.	For direct G5, a tough system of frequent synchronization of the clock of traffic light is needed to avoid untrue time dissemination.

\* To avoid lack of confidence in the whole system, a change of next phase should never reduced time to next phase suddenly to "current time" when more than 5 seconds was expected just before the change. As a consequence, a change in SPAT **should** always leave at least 5 seconds left to the current phase of the traffic light.

**Build the MAP and SPAT messages** : the map message (up to 32 intersections) is build only once for all (if no local topology changes or setting modification, in this case it evolves). The spat messages is build **every second**. This messages **can** be built by the R-ITS-S in the field or by the centralized traffic light management system. SPAT and MAP messages are pushed to the Nfr-ITS-S with the local signature (R-ITS-S signature or TL management system signature).

In G5 broadcasting, an R-ITSS only disseminate information on intersections centers inside a circle of 100 meters around the station (indeed, SPAT needs to be updated on real time). By consequence, in most of case, one RSU per intersection is needed.

**Check the SPAT and MAP messages :**

**For each intersection made unique by its intersectionReferenceID (id in IntersectionGeometry in MAP, id in intersectionState in SPAT) :**

- Latest MAP information is known by checking the revision (MsgCount) in intersectionGeometry.
- Latest SPAT information is known by checking moy + timestamp (DSecond) in intersectionState.

**Link The SPAT messages to the MAP message :**

Link between MAP and SPAT is made through two cumulative conditions :

- MAP/intersectionGeometry/Id+revision is linked with SPAT/intersectionState/Id+revision. They **shall** be the same or information are not linked each other (and must be rejected by the V-ITS-S). If the revision matches, see next bullet.
- MAP/intersectionGeometry/lane/connectsTo/signalGroup is linked with SPAT/intersectionState/states/signalGroup. They **shall** be the same or information are not linked each other (and must be rejected by the V-ITS-S).

**Calculate the Advisory Speed according to its position and display** : the calculate speed **shall** take in account current position of vehicle, speed limit (speedLimits of MAP), current state of traffic light (eventState of SPAT) and next time of phase (timing of SPAT).

The advisory speed displayed **shall** never overpass regulatory speed limit. The displayed advisory speed **should** not be under 25-30km/h (because it is difficult to drive slowly especially when other drivers don't understand why). This limit should be configurable and may evolves during on road testing. The advisory speed **can** be replaced by time-to-

green or time-to-red but time under 5 seconds **should** not be given (to avoid start before green or attempt to pass before red within 5 seconds)

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

### 3.1 MAP

**For mapping, all static information are initially set in MAPPF system of each road operator. Information are static, e.g they are set one time for all, except when intersection's description needs to evolve.**

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<b>Header</b>					
<b>protocolVersion</b>	"Version of the ITS message and/or communication protocol."	INTEGER{ currentVersion(1) } (0..255)	I	Current version is 1.	is 1
<b>messageID</b>	"Type of the ITS message."	INTEGER{ denm(1), cam(2), poi(3), spat(4), map(5), ivi(6), evrsr(7) } (0..255).	I	map(5)	is 5
<b>stationID</b>	"The identifier of the ITS-S that generates the ITS message in question." This is the ID of the station broadcasting the message.	INTEGER(0..4294967295)	I	ID of the R-ITSS or C-ITSS (I2V)	by R-ITSS or C-ITSS
<b>MapData</b>					
<b>timestamp</b>	The MinuteOfTheYear data element expresses the number of elapsed minutes of the current year in the time system being used (typically UTC time).	tMinuteOfTheYear OPTIONAL	I	Not needed because map data is quite very static, the transmission latency is not relevant. revision number in intersections DF is sufficient.	
<b>msgIssueRevision</b>	The msgIssueRevision data element is used to provide a revision related to the issued standard, to be able to identify the compatibility.	MsgCount ::= INTEGER (0..127)	I	Other than the IntersectionGeometry, this element is used to indicate the revision number of the defining standard. 0 = ISO/TS 19091:2016(E)	is 0
<b>layerType</b>	The LayerType data element is used to uniquely identify the type of information to be found in a layer of a geographic map fragment such as an intersection.	LayerType OPTIONAL	I	This profile always describe intersections, so type intersectionData is fully implicit. Not clear on what it is used for, so not provided.	
<b>layerID</b>	The LayerID data element is used to uniquely identify the layers of a geographic map fragment such as an intersection. Used to identify the number of MapData messages needed to describe the complete topology.	LayerID OPTIONAL	S	Mandatory in profile if, as defined in 19091, two MapData messages are needed. Then the LayerID of the first is set to 21, and the second to 22. If the complete topology fits into one MapData message, this field is not used.	
<b>intersections</b>	All Intersection definitions.	IntersectionGeometryList OPTIONAL  IntersectionGeometryList ::= SEQUENCE (SIZE(1..32)) OF IntersectionGeometry	U	<b>See next table o</b> <b>In</b> <b>y</b>	

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<i>roadSegments</i>	All roadway descriptions.	RoadSegmentList OPTIONAL	I	Not needed for the UC GLOSA (intersections). Future use for roadway description.	
<i>dataParameters</i>	Any meta data regarding the map contents. The DataParameters data frame is used to provide basic (static) information on how a map fragment was processed or determined.	DataParameters OPTIONAL  DataParameters ::= SEQUENCE {processMethod IA5String(SIZE(1..255)) OPTIONAL, processAgency IA5String(SIZE(1..255)) OPTIONAL, lastCheckedDate IA5String(SIZE(1..255)) OPTIONAL, geoidUsed IA5String(SIZE(1..255)) OPTIONAL, ...}	S	See four next lines (optional but not really needed : may be provided but not useful for the UC)	▼▼▼
<i>processMethod</i>			I	Not used	
<i>processAgency</i>			S	Optionally used to indicate the creator of the MapData.	by MAPPF
<i>lastCheckedDate</i>			S	Optionally used to indicate the date the source data was last checked. As discussed through C-Roads TF3, format is YYYY-MM-DD (to offer possibility to automatically compares version)	by MAPPF
<i>geoidUsed</i>			I	Not used	
<i>restrictionList</i>	Any restriction ID tables which have established for these map entries. The RestrictionClassList data frame is used to enumerate a list of user classes which belong to a given assigned index.	RestrictionClassList OPTIONAL	I	Not used for the UC of this set of document. Future use. (is optional in C-Roads PF/TF3)	
<i>regional</i>	The element is used for additional "regional information", as defined in ISO/PDTS 19091.	SEQUENCE (SIZE(1..4)) OF RegionalExtension {{Reg-MapData}} OPTIONAL	I	The European extension 'MapData-addGrpC' defines the 3D location of the signal heads. Not needed for the UC of this set of document (and seems unusefull in any case)	

### intersections IntersectionGeometryList ::= SEQUENCE (SIZE(1..32)) OF IntersectionGeometry

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<b>IntersectionGeometry</b>					
<i>name</i>	For debug use only	DescriptiveName OPTIONAL  DescriptiveName ::= IA5String (SIZE(1..63))	S	Optional and <b>not needed for the UC</b> . Id should be sufficient and anyway, retpoint check can be used to verify concordance between id map and reality.	by MAPPF

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
id	A globally unique value set, consisting of a regionID and intersection ID assignment  IntersectionID : The values zero through 255 are allocated for testing purposes Note that the value assigned to an intersection will be unique within a given regional ID only	IntersectionReferenceID  IntersectionReferenceID ::= SEQUENCE { region RoadRegulatorID OPTIONAL, id IntersectionID}  RoadRegulatorID ::= INTEGER (0..65535)  IntersectionID ::= INTEGER (0..65535)	I	region (type RoadRegulatorID) : proposal of similarity to serviceProvider in IVI (example : 10 033 for DIRA, 3300 for Bordeaux-Métropole, etc. ; See Master/IVI/serviceProviderId for more details)  <b>region is optional in C-Roads PF TF3 max number of regulatorID is not sufficient for Europe (without country code).</b>  id (type intersectionID) : for each road operator, one unique id by intersection.	by MAPPF
revision		MsgCount	I	The revision number must be increased by 1 each time the MapData of this intersection changes. <b>The revision numbers of SPAT and MAP must be the same as an indication that the right MAP version is used.</b>	by MAPPF
refPoint	The reference from which subsequent data points are offset until a new point is used.	Position3D	I	Center of the intersection. See next 4 lines	▼▼▼
Lat	in 1/10th micro degrees	Latitude	I		by MAPPF
Long	in 1/10th micro degrees	Longitude	I		by MAPPF
Elevation	in 10 cm units	Elevation OPTIONAL	I	Not used. Use of regional altitude instead is preferred, as it is similar to DENM/altitude	
Regional		SEQUENCE (SIZE(1..4)) OF RegionalExtension {{Reg-Position3D}} OPTIONAL	S	Only present for altitude with altitudeConfidence when they are known and can be provided.	
laneWidth		LaneWidth OPTIONAL	I	Seems not needed to reach aims of the UC (but optional in C-Roads PF / TF3)	

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<i>speedLimits</i>	Reference regulatory speed limits used by all subsequent lanes unless a new speed is given Speed in units of 0.02 m/s. See Section 11 for converting and translating speed expressed in mph into units of m/s	SpeedLimitList OPTIONAL  SpeedLimitList ::= SEQUENCE (SIZE(1..9)) OF RegulatorySpeedLimit  RegulatorySpeedLimit ::= SEQUENCE { type SpeedLimitType, speed Velocity - The speed in units of 0.02 m/s}  SpeedLimitType ::= ENUMERATED { unknown, maxSpeedInSchoolZone, maxSpeedInSchoolZoneWhenChildrenArePresent, maxSpeedInConstructionZone, vehicleMinSpeed, vehicleMaxSpeed, - Regulatory speed limit for general traffic vehicleNightMaxSpeed, truckMinSpeed, truckMaxSpeed, truckNightMaxSpeed, vehiclesWithTrailersMinSpeed, vehiclesWithTrailersMaxSpeed, vehiclesWithTrailersNightMaxSpeed, ...}	U	Type vehicleMaxSpeed shall be used. <b>For speed, be careful of unit in s</b> <b>standard (units of 0.02 m/s)</b> This information should be used by calculate and display system.  Optional in C-Roads PF / TF3	by MAPPF
<i>laneSet</i>	Data about one or more lanes (all lane data is found here)	LaneList ::= SEQUENCE (SIZE(1..255)) OF GenericLane	I	<b>See next table o</b>	
<i>preemptPriorityData</i>	data about one or more regional preempt or priority zones	PreemptPriorityList OPTIONAL	I		
<i>regional</i>		SEQUENCE (SIZE(1..4)) OF RegionalExtension {{Reg-IntersectionGeometry}} OPTIONAL	I		

### laneSet LaneList ::= SEQUENCE (SIZE(1..255)) OF GenericLane

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<b>GenericLane</b>					
<i>laneID</i>	The unique ID number assigned to this lane object The value 0 shall be used when the lane ID is not available or not known the value 255 is reserved for future use	LaneID ::= INTEGER (0..255)	I	Provided for each lane of one intersection (see figure next this table for details) Use of 0 <b>should</b> be avoided.	by MAPPF
<i>name</i>	Often for debug use only but at times used to name ped crossings	DescriptiveName OPTIONAL  DescriptiveName ::= IA5String (SIZE(1..63))	S	Used optionally for debug purposes, not always provided. <b>Not needed for the UC.</b>	by MAPPF

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<i>ingressApproach</i>	Inbound Approach IDs to which this lane belongs	ApproachID OPTIONAL  ApproachID ::= INTEGER (0..15) -- zero to be used when valid value is unknown	1	Block of inbound lane ID going to the intersection. Redundancy if lane to lane description is used either. So not used, because not needed. (see figure next this table for details) Optional in C-Roads PF / TF3	
<i>egressApproach</i>	Outbound Approach IDs to which this lane belongs	ApproachID OPTIONAL  ApproachID ::= INTEGER (0..15) -- zero to be used when valid value is unknown	1	Block of outbound lane ID coming from the intersection. Redundancy if lane to lane description is used either. So not used, because not needed. (see figure next this table for details) Optional in C-Roads PF / TF3	
<b>laneAttributes</b>	All Attribute information about the basic selected lane type Directions of use, Geometric co-sharing and Type Specific Attributes. These Attributes are 'lane - global' that is, they are true for the entire length of the lane.	LaneAttributes ::= SEQUENCE { directionalUse LaneDirection, sharedWith LaneSharing, laneType LaneTypeAttributes, regional RegionalExtension {Reg-LaneAttributes}} OPTIONAL	1	See 4 next lines	
<b>directionalUse</b>	Directions of lane use  BIT STRING with bits as defined: - Allowed directions of travel in the lane object - All lanes are described from the stop line outwards  ingressPath (0), - travel from rear of path to front is allowed  egressPath (1) - travel from front of path to rear is allowed  Notes : No Travel, i.e. the lane object type does not support - travel (medians, curbs, etc.) is indicated by not asserting any bit value - Bi-Directional Travel (such as a ped crosswalk) is indicated by asserting both of the bits	LaneDirection ::= BIT STRING { ingressPath (0), egressPath (1)} (SIZE (2))	1	Examples (with bit string left to right) : - 10 for an ingress - 01 for an egress - 00 for an nor egress nor ingress lane - 11 for an both ways lane Do not use both ways (ingress and egress) for vehicle lanes; this can be used for pedestrians or bidirectional bicycle paths (future use).	is '10'B for an ingress lane and is '01'B for an egress lane



standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
L-sharedWidth	Co-users of the lane path  ► overlappingLaneDescriptionProvided (0) : assert when another lane object is present to describe the path of the overlapping shared lane. This construct is not used for lane objects which simply cross. ► multipleLanesTreatedAsOneLane (1) : assert if the lane object path and width details represents multiple lanes within it that are not further described.  ► otherNonMotorizedTrafficTypes (2) : horse drawn etc.  All zeros would indicate 'not shared' and 'not overlapping'	LaneSharing ::= BIT STRING { overlappingLaneDescriptionProvided (0), multipleLanesTreatedAsOneLane (1), otherNonMotorizedTrafficTypes (2), individualMotorizedVehicleTraffic (3), busVehicleTraffic (4), taxiVehicleTraffic (5), pedestriansTraffic (6), cyclistVehicleTraffic (7), trackedVehicleTraffic (8), pedestrianTraffic (9) } (SIZE (10))		Provided as it is mandatory in standard, fill in as correctly as possible. If any difficulty to do so, can be fill with all bit set to '0' as it is not really useful for the UC.	By MAPPF
L-laneType	Specific lane type data	LaneTypeAttributes ::= CHOICE { vehicle LaneAttributes-Vehicle, crosswalk LaneAttributes-Crosswalk, bikeLane LaneAttributes-Bike, sidewalk LaneAttributes-Sidewalk, median LaneAttributes-Barrier, striping LaneAttributes-Striping, trackedVehicle LaneAttributes-TrackedVehicle, parking LaneAttributes-Parking, }  LaneAttributes-Vehicle ::= BIT STRING { isVehicleRevocableLane (0), isVehicleFlyOverLane (1), hovLaneUseOnly (2), restrictedToBusUse (3), restrictedToTaxiUse (4), restrictedFromPublicUse (5), hasIRbeaconCoverage (6), permissionOnRequest (7) } (SIZE (8,...))		<b>As in GLOSA we only aim to describe vehicle lane without specificity, LaneTypeAttributes will be set to LaneAttributes-Vehicle.</b>  LaneAttributes-Vehicle is filled as correctly as possible, but if any difficulty to do so, it can be filled with "0" as it is not fully usefull for the UC.  In C-Roads PF / TF3, crosswalk, bikeLane and trackedVehicle may also be optionally described in the MAP.	is LaneAttributes-Vehicle with proper description given by MAPPF
L-regional		RegionalExtension OPTIONAL			
maneuvers	The permitted maneuvers for this lane.	AllowedManeuvers OPTIONAL		Not used, because AllowedManeuvers are provided instead in the ConnectsTo data field (for each ingress lane).	



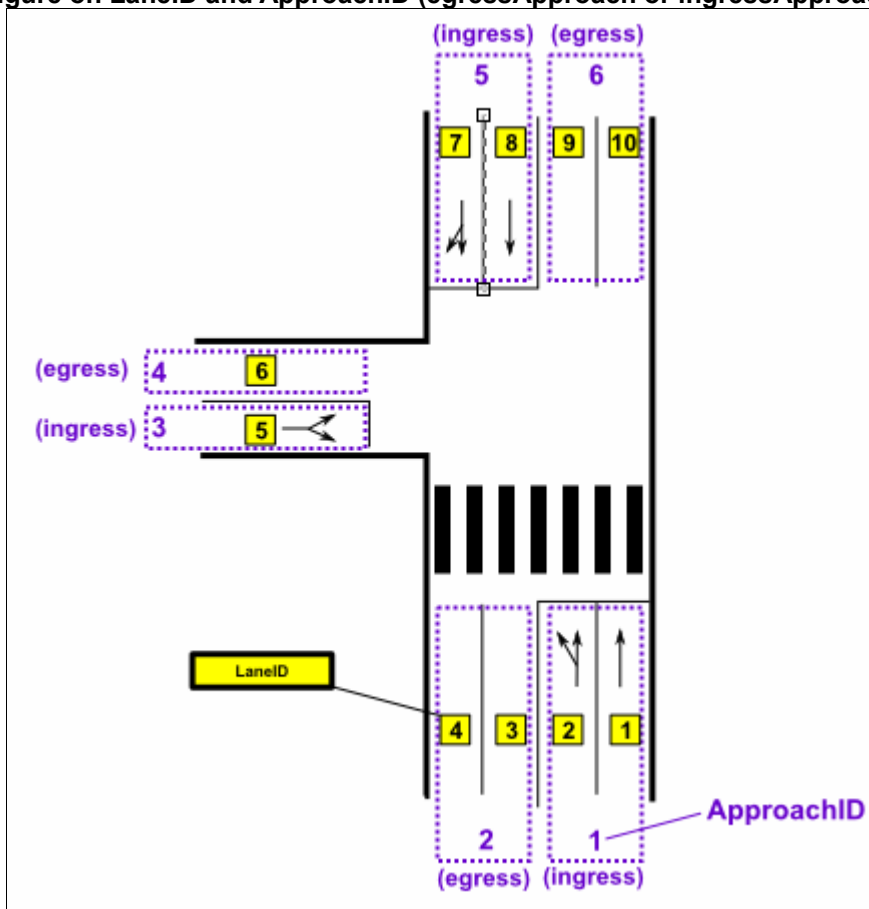
standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<b>nodeList</b>	<p>Lane spatial path information as well as various Attribute information along the node path. Attributes found here are more general and may come and go over the length of the lane.</p> <p>►NodeSetXY : a lane made up of two or more XY node points and any attributes defined in those nodes</p> <p>►ComputedLane : a lane path computed by translating the data defined by another lane</p>	<p>NodeListXY ::= CHOICE { nodes NodeSetXY, computed ComputedLane, ...}</p> <p>NodeSetXY ::= SEQUENCE (SIZE(2..63)) OF NodeXY</p> <p>NodeXY ::= SEQUENCE delta NodeOffsetPointXY, attributes NodeAttributeSetXY OPTIONAL, ... }</p>	1	<p><b>Set to "nodes NodeSetXY"</b> as approach with delta is quite typical (same kind of approach in DENM traces, eventHistory or in IVI)</p> <p>See next two lines for details.</p>	<p>is 'NodeSetXY' + ▼▼▼</p>
<b>delta</b>	<p>A choice of which X,Y offset value to use this includes various delta values as well a regional choices</p> <p>Nodes with X,Y content :</p> <p>►Node-XY-20b : node is within 5.11m of last node</p> <p>►Node-XY-22b : node is within 10.23m of last node</p> <p>►Node-XY-24b : node is within 20.47m of last node</p> <p>►Node-XY-26b : node is within 40.96m of last node</p> <p>►Node-XY-28b : node is within 81.91m of last node</p> <p>►Node-XY-32b : node is within 327.67m of last node</p> <p>►Node-LLmD-64b : node is a full 32b Lat/Lon range</p> <p>►RegionalExtension {{Reg-NodeOffsetPointXY}} : node which follows is of a regional definition type.</p>	<p>NodeOffsetPointXY ::= CHOICE { node-XY1 Node-XY-20b, node-XY2 Node-XY-22b, node-XY3 Node-XY-24b, node-XY4 Node-XY-26b, node-XY5 Node-XY-28b, node-XY6 Node-XY-32b, node-LatLon Node-LLmD-64b, regional RegionalExtension {{Reg-NodeOffsetPointXY}} }</p>	1	<p><b>Nodes XY-20b to XY-32b will be used. Not Node-LLmD-64b nor RegionalExtension</b></p> <p><b>Example :</b></p> <p>NodeXY ::= { delta: Node-XY-28b ::= { x: 6013 y: -6749 } } NodeXY ::= { delta: Node-XY-22b ::= { x: -79 y: -922 } } NodeXY ::= { delta: Node-XY-26b ::= { x: -2844 y: -2257 } }</p>	<p>by MAPPF</p>

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<i>attributes</i>	Any optional Attributes which are needed. This includes changes to the current lane width and elevation	NodeAttributeSetXY ::= SEQUENCE { localNode NodeAttributeXYList OPTIONAL, disabled SegmentAttributeXYList OPTIONAL, enabled SegmentAttributeXYList OPTIONAL, data LaneDataAttributeList OPTIONAL, dWidth Offset-B10 OPTIONAL, dElevation Offset-B10 OPTIONAL, regional SEQUENCE (SIZE(1..4)) OF RegionalExtension {{Reg- NodeAttributeSetXY}} OPTIONAL, ... }	<b>I</b>	Not needed and quite complex, not used.	
<i>connectsTo</i>	A list of other lanes and their signal group IDs each connecting lane and its signal group ID is given, therefore this element provides the information formerly in "signalGroups" in prior editions.	ConnectsToList OPTIONAL  ConnectsToList ::= SEQUENCE (SIZE(1..16)) OF Connection  Connection ::= SEQUENCE { connectingLane ConnectingLane, remoteIntersection IntersectionReferenceID OPTIONAL, signalGroup SignalGroupID OPTIONAL, userClass RestrictionClassID OPTIONAL, connectionID LaneConnectionID OPTIONAL}	<b>S</b>	<b>Always absent for egress lane.</b>  <b>Present for ingress lane. In this case, each</b>  <b>c</b> <b>o</b> <b>nn</b> <b>e</b> <b>cti</b> <b>o</b> <b>n</b> <b>fr</b> <b>o</b> <b>m current lane (ingress) to each egress lane(s) i</b> <b>in</b> <b>t</b> <b>ers</b> <b>e</b> <b>cti</b> <b>o</b> <b>n).</b>  See next five lines for details.	by MAPPF  ▼▼▼

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<b>ConnectingLane</b>	<p>► ConnectingLane : the index of the connecting lane and also the maneuver from the current lane to it.</p> <p>► LaneID : index of the connecting lane</p> <p>► AllowedManeuvers : the Maneuver between the enclosing lane and this lane at the stop line to connect them.</p> <p>All maneuvers with bits not set are therefore prohibited !</p> <p>A value of zero shall be used for unknown, indicating no Maneuver</p> <p>► maneuverLaneChangeAllowed (6) : a movement which changes to an outer lane on the egress side is allowed in this lane - (example: left into either outbound lane)</p> <p>► maneuverNoStoppingAllowed (7) : the vehicle should not stop at the stop line - (example: a flashing green arrow)</p> <p>► yieldAllwaysRequired (8) : the allowed movements above are not protected - (example: an permanent yellow condition)</p> <p>► goWithHalt (9) : after making a full stop, may proceed</p> <p>► caution (10): proceed past stop line with caution</p> <p>► reserved1 (11) : used to align to 12 Bit Field</p>	<p>ConnectingLane ::= SEQUENCE { lane LaneID, maneuver AllowedManeuvers OPTIONAL }</p> <p>AllowedManeuvers ::= BIT STRING { maneuverStraightAllowed (0), maneuverLeftAllowed (1), maneuverRightAllowed (2), maneuverUTurnAllowed (3), maneuverLeftTurnOnRedAllowed (4), maneuverRightTurnOnRedAllowed (5), maneuverLaneChangeAllowed (6), maneuverNoStoppingAllowed (7), yieldAllwaysRequired (8), goWithHalt (9), caution (10), reserved1 (11) } (SIZE(12))</p>		<p>Lane ID of egress lane is provided (for each ingress lane)</p> <p>If the lane described is an egress lane, the manoeuvres is not provided, but if it is an ingress lane manoeuvres are always provided.</p> <p>In details (for ingress lane) : ►bit 0 to 2 are given (set to 0 or 1) ►bit 3 is sometime set to 1, but most often set to 0 (no U-turn allowed)</p> <p>►bit 4 and 5 are set to '0' as this kind of rules doesn't exist in FR ►bit 6 is set to '0' as it is a bit unclear ►bit 7 is set to '0' as this kind of rule doesn't exist in FR ►bit 8, 9 and 10 are sometime provided. (with 8 for flashing yellow), but most of time not given as in the GLOSA UC only traffic light intersection may be broadcasted. ►bit 11 is always set to '0' (future use)</p>	by MAPPF with bits 4 to 12 most of time set to 0
<b>RemoteIntersection</b>	<p>► IntersectionReferenceID : this entry is only used when the indicated connecting lane belongs to another intersection layout. This provides a means to create meshes of lanes</p>	<p>IntersectionReferenceID ::= SEQUENCE { region RoadRegulatorID OPTIONAL, id IntersectionID }</p>	S	<p><b>When gtarget removed in the intersection, the target is not removed in the intersection.</b></p>	

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<i>signalGroup</i>	<p>SPAT mapping details at the stop line are :</p> <p>► SignalGroupID : the matching signal group send by the SPAT message for this lane/maneuver. Shall be present unless the connectingLane has no signal group (is un-signalized)</p> <p>The value 0 shall be used when the ID is not available or not known.</p> <p>The value 255 is reserved to indicate a permanent green movement state therefore a simple 8 phase signal controller device might use 1..9 as its groupIDs.</p>	SignalGroupID ::= INTEGER (0..255)	U	<p>Mandatory if lane is controlled by a traffic light. The ID refer to a group of synchronised traffic light at the current intersection (that are green, orange, red all together at every same instant).</p> <p><b>Important</b></p> <p><b>because timings of phase changes are grouped by signalGroup in the SPAT. Here is the link between the lane described in MAP and the phases described in the SPAT.</b></p>	
<i>userClass</i>	<p>► RestrictionClassID : the Restriction Class of users this applies to the use of some lane/maneuver and SignalGroupID pairings are restricted to selected users. When absent, the SignalGroupID applies to all.</p>		I	<p>Not needed so not used. Future use.</p> <p>Optional in C-Roads PF / TF3</p>	
<i>connectionID</i>	<p>Movement assist details are given by:</p> <p>► LaneConnectionID : an optional connection index used to relate this lane connection to any dynamic clearance data in the SPAT. Note that the index may be shared with other connections if the clearance data is common.</p>	<p>connectionID</p> <p>LaneConnectionID ::= INTEGER (0..255)</p>	I	<p>Not needed and not used. Quite not clear. Note this not the ID of egress lane in current intersection, this one is provided through connectingLane / laneID (see above)</p>	
<i>overlays</i>	A list of any lanes which have spatial paths that overlay (run on top of, and not simply cross) the path of this lane when used	OverlayLaneList OPTIONAL	I		
<i>regional</i>		SEQUENCE (SIZE(1..4)) OF RegionalExtension {{Reg-GenericLane}} OPTIONAL	I		

Figure on LaneID and ApproachID (egressApproach or ingressApproach)



## 3.2 SPAT

For SPAT, all information are given by SPATPF system of each road operator which is synchronised with pilot system of traffic light. Some information are static (no evolution on real time) and some are dynamic (can change in real time).

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<b>Header</b>					
<b>protocolVersion</b>	"Version of the ITS message and/or communication protocol."	INTEGER{ currentVersion(1) } (0..255)	1	Current version is 1.	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),	1	spat(4)	is 4
<b>stationID</b>	"The identifier of the ITS-S that generates the ITS message in question." This is the ID of the station broadcasting the message.	INTEGER(0..4294967295)	1	ID of the R-ITSS or C-ITSS (I2V)	by R-ITSS or C-ITSS
<b>SPAT</b>					
<b>timestamp</b>	The MinuteOfTheYear data element expresses the number of elapsed minutes of the current year in the time system being used (typically UTC time).	MinuteOfTheYear OPTIONAL	1	Not used because minute of year is not precised enough. moy+timestamp in intersection DF is preferred.	

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<i>name</i>	For debug use only	DescriptiveName OPTIONAL  DescriptiveName ::= IA5String (SIZE(1..63))	<b>S</b>	Most often not used. If any, it would be the name of the generic name of the SPAT. Seems not so needed. Note that a name can be included in each intersections in the SPAT (preferred). <b>Anyway, this information is not needed for the UC.</b>	by SPATPF (static)
<i>intersections</i>	► IntersectionStateList, : sets of SPAT data (one per intersection)	IntersectionStateList OPTIONAL  IntersectionStateList ::= SEQUENCE (SIZE(1..32)) OF IntersectionState	<b>U</b>	<b>See next table</b>	
<i>regional</i>	The element is used for additional "regional information", as defined in ISO/PDTS 19091.	SEQUENCE (SIZE(1..4)) OF RegionalExtension {{Reg-MapData}} OPTIONAL	<b>I</b>	Not used (not needed)	

### intersections IntersectionStateList ::= SEQUENCE (SIZE(1..32)) OF IntersectionState

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<b>IntersectionState</b>					
<i>name</i>	For debug use only	DescriptiveName OPTIONAL  DescriptiveName ::= IA5String (SIZE(1..63))	<b>S</b>	Optional. Only for debug. Not useful for the UC. Preferred to a name at previous level (SPAT)	by SPATPF (static)
<b>id</b>	A globally unique value set, consisting of a regionID and intersection ID assignment  IntersectionID : The values zero through 255 are allocated for testing purposes Note that the value assigned to an intersection will be unique within a given regional ID only	IntersectionReferenceID  IntersectionReferenceID ::= SEQUENCE { region RoadRegulatorID OPTIONAL, id IntersectionID}  RoadRegulatorID ::= INTEGER (0..65535)  IntersectionID ::= INTEGER (0..65535)	<b>I</b>	region (type RoadRegulatorID) : proposal of similarity to serviceProvider in IVI (example : 10 033 for DIRA, 3300 for Bordeaux-Métropole, etc. ; See Master/IVI/serviceProviderId for more details)  <b>region is optional in C-Roads PF TF3 max number of regulatorID is not sufficient for Europe (without country code).</b>  id (type intersectionID) : for each road operator, one unique id by intersection.	by SPATPF (static)
<b>revision</b>		MsgCount	<b>I</b>	The revision number must be increased by 1 each time the MapData of this intersection changes. <b>The revision numbers of SPAT and MAP must be the same as an indication that the right MAP version is used.</b>	by SPATPF (static)

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<b>status</b>	<p>General status of the controller(s)</p> <ul style="list-style-type: none"> <li>► manualControlsEnabled (0) : timing reported is per programmed values, etc. but person at cabinet can manually request that certain intervals are terminated early (e.g. green).</li> <li>► stopTimelsActivated (1) : and all counting/timing has stopped.</li> <li>► failureFlash (2) : above to be used for any detected hardware failures, e.g. conflict monitor as well as for police flash.</li> <li>► fixedTimeOperation (5) : schedule of signals is based on time only (i.e. the state can be calculated)</li> <li>► trafficDependentOperation (6) : operation is based on different levels of traffic parameters (requests, duration of gaps or more complex parameters)</li> <li>► standbyOperation (7) : controller: partially switched off or partially amber flashing</li> <li>► failureMode (8) : controller has a problem or failure in operation</li> <li>► off (9) : controller is switched off</li> </ul> <p>Related to MAP and SPAT bindings :</p> <ul style="list-style-type: none"> <li>► recentMAPmessageUpdate (10) : Map revision with content changes</li> <li>► recentChangeInMAPAssignedLanesIDsUsed (11) : change in MAP's assigned lanes used (lane changes).</li> </ul> <p>Changes in the active lane list description :</p> <ul style="list-style-type: none"> <li>► noValidMAPisAvailableAtThisTime (12) : MAP (and various lanes indexes) not available</li> <li>► noValidSPATisAvailableAtThisTime (13) : SPAT system is not working at this time</li> </ul>	<p>IntersectionStatusObject ::= BIT STRING {</p> <p>manualControlsEnabled (0),</p> <p>stopTimelsActivated (1),</p> <p>failureFlash (2),</p> <p>preemptIsActive (3),</p> <p>signalPriorityIsActive (4),</p> <p>fixedTimeOperation (5),</p> <p>trafficDependentOperation (6),</p> <p>standbyOperation (7),</p> <p>failureMode (8),</p> <p>off (9),</p> <p>recentMAPmessageUpdate (10),</p> <p>recentChangeInMAPAssignedLanesIDsUsed (11),</p> <p>noValidMAPisAvailableAtThisTime (12),</p> <p>noValidSPATisAvailableAtThisTime (13)</p> <p>Bits 14,15 reserved at this time and shall be zero</p> <p>} (SIZE(16))</p>	1	<p>Provided as much as possible, but no real use in GLOSA calculation. May be set to a static "0000000000000000" when too difficult to provide properly.</p> <p>Bit 10 to 13 should lead to malfunction of the system if they are set to "1" (if MAP or SPAT is not valid data cannot be properly processed. "recent" is not very clear. Anyway, revision number of SPAT and MAP shall be the same)</p> <p>Bit 3 is a clue that timing can change suddenly (because the traffic light can be preempted).</p> <p>Bit 5 is a clue that timing should not change suddenly (because the traffic light is on fixed time operations)</p> <p>...</p>	by SPATPF
<i>moy</i>	Minute of current UTC year used only with messages to be archived	MinuteOfTheYear OPTIONAL	U	<p><b>With next DE used to</b></p> <p><b>horoda</b></p> <p><b>t</b></p> <p><b>e the SPAT message (when</b></p> <p><b>two are</b></p> <p><b>r</b></p> <p><b>e</b></p> <p><b>ceived by vehicle)</b></p>	by SPATPF (dynamic)

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<i>timeStamp</i>	The mSec point in the current UTC minute that this message was constructed	DSecond OPTIONAL  DSecond ::= INTEGER (0..65535) -- units of milliseconds	U	<b>With previous DE used to horoda</b> <b>t</b> <b>e the SPAT message (when two are</b> <b>r</b> <b>e</b> <b>ceived by vehicle)</b>	by SPAT PF (dynamic)
<i>enabledLanes</i>	A list of lanes where the RevocableLane bit has been set which are now active and therefore part of the current intersection	EnabledLaneList OPTIONAL  EnabledLaneList ::= SEQUENCE (SIZE(1..16)) OF LaneID	I	No revocable lane within the UC.	
<b>states</b>	Each Movement is given in turn and contains its signal phase state, mapping to the lanes it applies to, and point in time it will end, and it may contain both active and future states	MovementList ::= SEQUENCE (SIZE(1..255)) OF MovementState  MovementState ::= SEQUENCE { movementName DescriptiveName OPTIONAL, signalGroup SignalGroupID, state-time-speed MovementEventList, maneuverAssistList ManeuverAssistList OPTIONAL, regional SEQUENCE (SIZE(1..4)) OF RegionalExtension {{Reg-MovementState}} OPTIONAL, ... }	I	See next five lines	▼▼▼
<i>LmovementName</i>	Uniquely defines movement by name human readable name for intersection to be used only in debug mode.	DescriptiveName OPTIONAL  DescriptiveName ::= IA5String (SIZE(1..63))	S	Optional but may be useful for debug purposes. <b>Not needed for the UC.</b>	by SPATPF (static)
<i>LsignalGroup</i>	The group id is used to map to lists of lanes (and their descriptions) which this MovementState data applies.  The value 0 shall be used when the ID is not available or not known. The value 255 is reserved to indicate a permanent green movement state therefore a simple 8 phase signal controller device might use 1..9 as its groupIDs.	SignalGroupID ::= INTEGER (0..255)	I	One ID by phase of the intersection. <b>Important</b> <b>b</b> <b>e</b> <b>cause each lane</b> <b>pilo</b> <b>t</b> <b>ed by a traffic light refers to a signalGroup.</b>	by SPATPF (static)





standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<b>state-time-speed</b>	Consisting of sets of movement data with: - a) SignalPhaseState - b) TimeChangeDetails, and - c) AdvisorySpeeds (optional) - Note one or more of the movement events may be for a future time and that this allows conveying multiple predictive phase and movement timing for various uses for the current signal group	MovementEventList ::= SEQUENCE (SIZE(1..16)) OF MovementEvent  MovementEvent ::= SEQUENCE {eventState MovementPhaseState, timing TimeChangeDetails OPTIONAL, speeds AdvisorySpeedList OPTIONAL, regional SEQUENCE (SIZE(1..4)) OF RegionalExtension {{Reg-MovementEvent}} OPTIONAL, ... }  ManeuverAssistList OPTIONAL  ManeuverAssistList ::= SEQUENCE (SIZE(1..16)) OF ConnectionManeuverAssist  ConnectionManeuverAssist ::= SEQUENCE { connectionID LaneConnectionID, queueLength ZoneLength OPTIONAL, availableStorageLength ZoneLength OPTIONAL, waitOnStop WaitOnStopline OPTIONAL, pedBicycleDetect PedestrianBicycleDetect OPTIONAL, regional SEQUENCE (SIZE(1..4)) OF RegionalExtension {{Reg-ConnectionManeuverAssist}} OPTIONAL, ...}	<b>I</b>	<b>See next table</b>  One phase shall be provided by the system (obviously because it's mandatory). <b>3 MovementEvent should be provided to cover green+orange+red sequence (when traffic light is not a flashing yellow situation or else).</b>	
<b>maneuverAssistList</b>	This information may also be placed in the IntersectionState when common information applies to different lanes in the same way.	ManeuverAssistList OPTIONAL  ManeuverAssistList ::= SEQUENCE (SIZE(1..16)) OF ConnectionManeuverAssist  ConnectionManeuverAssist ::= SEQUENCE { connectionID LaneConnectionID, queueLength ZoneLength OPTIONAL, availableStorageLength ZoneLength OPTIONAL, waitOnStop WaitOnStopline OPTIONAL, pedBicycleDetect PedestrianBicycleDetect OPTIONAL, regional SEQUENCE (SIZE(1..4)) OF RegionalExtension {{Reg-ConnectionManeuverAssist}} OPTIONAL, ...}	<b>S</b>	Optional, but kept only to provide queueLength (with a connectionID which is mandatory) if information can be provided by the system (loop, radar, ...).  Indeed, information displayed on board can be different if there is a queue at the traffic light (no chance to reach the advisory speed limit, for example)	By SPATPF (dynamic)
<b>regional</b>		SEQUENCE (SIZE(1..4)) OF RegionalExtension {{Reg-MovementState}} OPTIONAL	<b>I</b>	Not used, not needed.	
<b>maneuverAssistList</b>	Assist data	ManeuverAssistList OPTIONAL	<b>I</b>	Not used, not needed.	
<b>regional</b>		SEQUENCE (SIZE(1..4)) OF RegionalExtension {{Reg-IntersectionState}} OPTIONAL	<b>I</b>	Not used, not needed.	

### state-time-speed MovementEventList ::= SEQUENCE (SIZE(1..16)) OF MovementEvent

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<b>Movement Event</b>					

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<b>eventState</b>	Consisting of Phase state (the basic 11 states) Directional, protected, or permissive state.	MovementPhaseState ::= ENUMERATED { unavailable (0), dark (1), stop-Then-Proceed (2), stop-And-Remain (3), pre-Movement (4), permissive-Movement-Allowed (5), protected-Movement-Allowed (6), permissive-clearance (7), protected-clearance (8), caution-Conflicting-Traffic (9) }  Reds : 2 and 3 Greens : 4-5-6 Yellow/Ambers : 7-8-9	1	In detail, in FR possible values are : - unavailable (0) if any problem for providing information, - stop-And-Remain (3) for static red (stop), - permissive-Movement-Allowed (5) for a green with conflict (example : turn left with caution), - protected-Movement-Allowed (6) for a green without conflict (example : go straight or turn left with no conflict), - protected-clearance (8) : static orange (prepare to stop). - caution-Conflicting-Traffic (9) for a flashing yellow (intersection control is off)  - permissive-clearance (7) is not a possible value in FR	by SPATP F (dynamic)

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
timing	<p>Timing Data in UTC time stamps for event includes start and min/max end times of phase confidence and estimated next occurrence.</p> <p>► <b>startTime</b> : when this phase 1st started</p> <p>► <b>minEndTime</b> : expected shortest end time</p> <p>► <b>maxEndTime</b> : expected longest end time</p> <p>► <b>likelyTime</b> : best predicted value based on other data</p> <p>► <b>confidence</b> : applies to likelyTime only</p> <p>► <b>nextTime</b> : a rough estimate of time when this phase may next occur again used to support various ECO driving power management needs.</p> <p>► <b>TimeMark</b> :</p> <ul style="list-style-type: none"> <li>- Tenths of a second in the current or next hour</li> <li>- In units of 1/10th second from UTC time</li> <li>- A range of 0~36000 covers one hour</li> <li>- The values 35991..35999 are used when a leap second occurs</li> <li>- The value 36000 is used to indicate time &gt;3600 seconds</li> <li>- 36001 is to be used when value undefined or unknown</li> <li>- Note that this is NOT expressed in GPS time or in local time</li> </ul>	<p>TimeChangeDetails OPTIONAL</p> <p>TimeChangeDetails ::= SEQUENCE {</p> <p>startTime TimeMark OPTIONAL,</p> <p>minEndTime TimeMark, maxEndTime TimeMark OPTIONAL,</p> <p>likelyTime TimeMark OPTIONAL,</p> <p>confidence TimeIntervalConfidence OPTIONAL,</p> <p>nextTime TimeMark OPTIONAL</p> <p>}</p> <p>TimeMark ::= INTEGER (0..36001)</p> <p>TimeIntervalConfidence ::= INTEGER (0..15)</p> <p>with Value==Probability :</p> <p>0==21% ; 1==36% ; 2==47% ; 3==56% ; 4==62% ; 5==68% ; 6==73% ; 7==77% ; 8==81% ; 9==85% ; 10==88% ; 11==91% ; 12==94% ; 13==96% ; 14==98% ; 15==100%</p>	U	<p><b>MinEndTime, likelyTime and c</b></p> <p><b>o</b></p> <p><b>nfidence are provided by the SPAT. It gives the next time signal change phase to next o</b></p> <p><b>ne.</b></p> <p><b>For a</b></p> <p><b>o</b></p> <p><b>n</b></p> <p><b>si</b></p> <p><b>t</b></p> <p><b>e</b></p> <p><b>c</b></p> <p><b>o</b></p> <p><b>ntroller with fixed periods, minEndTime is equal to likelyTime and c</b></p> <p><b>o</b></p> <p><b>nfidence is 15 (100%). Indeed, in that case, there is no preempti</b></p> <p><b>o</b></p> <p><b>n and no adaptive sy</b></p> <p><b>s</b></p> <p><b>t</b></p> <p><b>em to the traffic.</b></p> <p><b>For adaptive sy</b></p> <p><b>s</b></p> <p><b>t</b></p> <p><b>em to the traffic, minEndTime is the time of next change if a priority sy</b></p> <p><b>current time. C</b></p> <p><b>sy</b></p> <p><b>s</b></p> <p><b>t</b></p> <p><b>ems, mean</b></p> <p><b>o</b></p> <p><b>n period of the day or night or predictive sy</b></p> <p><b>s</b></p> <p><b>t</b></p> <p><b>ems)</b></p>	<p><b>by SPAT F (dynamic)</b></p>

standard TS19091			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<i>speeds</i>	Various speed advisories for use by general and specific types of vehicles supporting green-wave and other flow needs Speed expressed in mph into units of m/s	AdvisorySpeedList OPTIONAL  AdvisorySpeedList ::= SEQUENCE (SIZE(1..16)) OF AdvisorySpeed  AdvisorySpeed ::= SEQUENCE { type AdvisorySpeedType, speed SpeedAdvice OPTIONAL, confidence SpeedConfidence OPTIONAL, distance ZoneLength OPTIONAL, class RestrictionClassID OPTIONAL, regional SEQUENCE (SIZE(1..4)) OF RegionalExtension {{Reg-AdvisorySpeed}} OPTIONAL, ...}  AdvisorySpeedType ::= ENUMERATED { none (0), greenwave (1), ecoDrive (2), transit (3), ... }  SpeedAdvice ::= INTEGER (0..500) in 0,1 m/s		Not used.  Optional in C-Roads PF /TF3 to provide an advisorySpeedType greenwave (speed to pass several next intersection, not to get a green at current intersection). It is an other UC and it doesn't work with real time adaptative intersections.	
<i>regional</i>		SEQUENCE (SIZE(1..4)) OF RegionalExtension {{Reg-MovementEvent}} OPTIONAL		Not needed.  Optional in C-Roads PF / TF3 to provide for example that the current phase is due to bus or tram preemption for example.	