

## French C-ITS Deployment Coordination committee

# Common technical specifications for use cases - F1 - Information on parking lots, location, availability and services (I2V)

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### Deliverable 2.4.1.2\_H\_F1

## Activity 2: Studies

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## Information on the document

Document: Common technical specifications for use cases SCooP, InterCor, C-Roads - F1 Information on parking lots, location, availability and services

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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 : **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
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 POI message for parking

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

example illustration



There are two park and ride stations close to the highway in the figure above (little blue squares). The aim of the use-case is to encode the location and the availability of the two parkings.

Message associated with the above figure (site La Gardette)

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

BasicPoiPdu ::= {
  header {
    protocolVersion currentVersion=1,
    messageID ivi=3,
    stationID 4711
  },
  basicPoi {
    poiHeader {
```

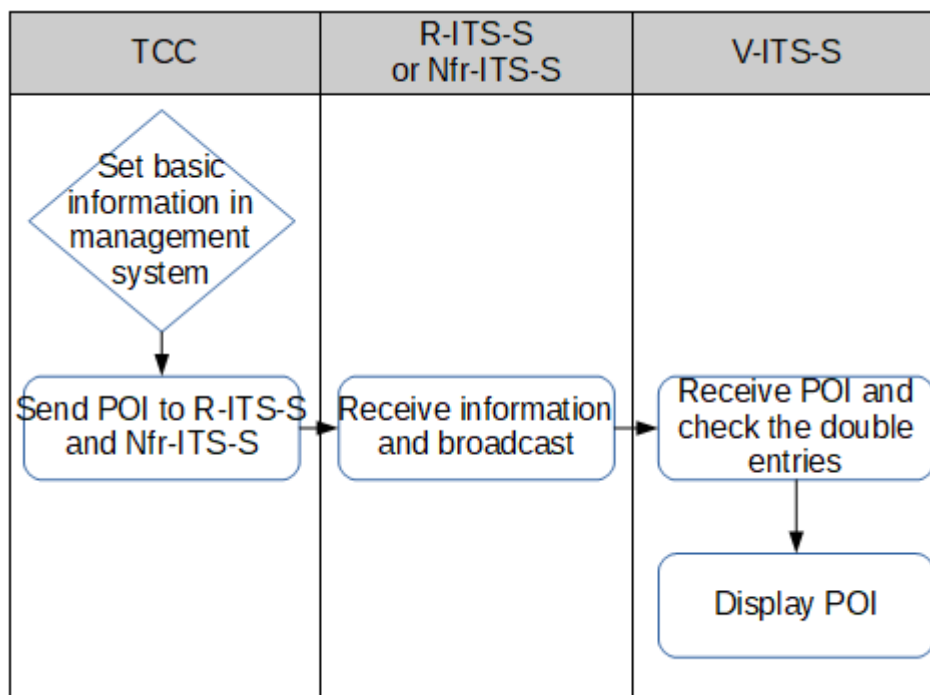


```

poiType 7522, #Park & Ride
timeStamp 352425600000,
relayCapable false
},
poiNumber {
  serviceProviderId {
    countryCode 10110 01010, #means 'FR'
    issuerIdentifier 10033 #DIRA
  },
  basicPoiNumber 942
},
location {
  refPoint {
    latitude 44888360, #latitude of POI
    longitude -0518500, #longitude of POI
    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
    }
  },
  name P+R La Gardette (Tram A), #24 characters here (limited to 32 characters)
  address Chemin du Grand Came 33310 LORMONT,
  website www.infotbm.com
},
status {
  openingStatus 16,
  parkingStatus 210,
  additionalInformation Capacité : 242 places (+5 PMR)
}
} #Closing basicPoi
} #Closing BasiPoiPdu

```

## 2. Step by step diagram



### Set basic information in management system :

The parking operator sets the information about his parkings in his management system, or directly in the PF if it is allowed (further version). The PF **shall** admit DATEX II parking information as a data in entrance from the management system (traffic management system or specific tool of the road operator).

### Send POI to R-ITS-S or Nfr-ITS-S :

- To each R-ITS-S, due to its geographical localization, the PF **should** send POIs with the refPoint that are included on an area of 20 km around the R-ITS-S. Information is transmitted by the PF every minute to each R-ITS-S. The format of the transmission **should** be DATEX II.
- To the Nfr-ITS-S, PF **should** transfer a DATEX II message.

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

The R-ITS-S or Nfr-ITS-S complete the POI with missing information (e.g stationID), or traduce DATEX II to POI, and broadcasts.

Chanel SCH1 **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 POI and check the double entries (vehicle) :** through architecture which options are not treated in this document (see 241H), information from G5 and from hybrid network can be redundant with different timestamps (due to latency). Timestamp gives the versioning of information, so the later is the better. **Unique identifiant of each Poi message is made of poiType+poiNumber (+timestamp for versioning).**

**Display POI :** Car or truck manufacturer domain. A POI is an information of a service around an R-ITS-S (or around a virtual point which can be the ego vehicle or within the limit of a tile with hybrid architecture)

Note that there is no validityDuration of POI message but information should be updated regularly through C-ITS communications. Thus, confidence in dated POI (i.e POI with an old timestamp) should be moderated especially concerning dynamic data as parking spots availability. In addition, vehicle should reset the database information of POI at each start.

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

**Following table of description is out of standard**, but inspired by ETSI TS 101 556-1 V1.1.1 "Electric Vehicle Charging Spot Notification Specification" (see Master)

standard ETSI TS 101 556-1 modified			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<b>header</b>		ItsPduHeader		<b>Contained in BasicPoiPdu</b>  <b>BasicPoiPdu ::= SEQUENCE { header ItsPduHeader, basicPoi BasicPoiMessage }</b>	
<b>protocol Version</b>	"Version of the ITS message and/or communication protocol."	INTEGER{ currentVersion(1) } (0..255)	✓	See Master / POI Current version is 1.	is 1
<b>message ID</b>	"Type of the ITS message."	INTEGER{ denm(1),cam(2), poi(3), spat(4), map(5), ivi(6), ev-rsr(7) } (0..255),	✓	See Master / POI is poi(3)	is 3
<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)	✓	See Master / POI ID of the R-ITS-S or Nfr-ITS-S (I2V)	by R-ITS-S or Nfr-ITS-S
<b>basicPoi</b>		<b>BasicPoiMessage ::= SEQUENCE { poiHeader ItsPOIHeader, poiNumber PoiNumber location LocationData, status StatusData}</b>			
<b>poiHeader</b>		ItsPOIHeader ::= SEQUENCE {poiType POIType, timeStamp TimestampIts, relayCapable BOOLEAN}		See Master / POI	▼▼▼



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standard ETSI TS 101 556-1 modified			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
<b>LpoiType</b>	Type of POI regarding a table of correspondence with the type of POI	INTEGER(0..65535)	✓	See Master / POI For parking : 7520 is used for ParkingLot (free park) ; 7521 is used for ParkingGarage (no free park) ; 7522 is used for ParkAndRide ; 20028 is used for CoachandLorryParking (e.g Truck Parking)	by PF
<b>Ltimestamp</b>	The MinuteOfTheYear data element expresses the number of elapsed minutes of the current year in the time system being used (typically UTC time).	TimestampIts ::= INTEGER {utcStartOf2004(0), oneMillisecAfterUTCStartOf2004(1)} (0..4398046511103)	✓	See Master / POI	by PF
<b>LrelayCapable</b>	Indicates whether the originating ITS station is able to relay further reservation messages	BOOLEAN	✓	See Master / POI	is "false"
<b>LpoiNumber</b>		PoiNumber ::= SEQUENCE { serviceProviderId Provider, basicPoiNumber BasicPoiNumber }		See two next lines	▼▼▼
<b>LserviceProviderId</b>	Identifies the organization that provided the information by using the DE Provider as for an IVI	SEQUENCE of CountryCode and IssuerIdentification  CountryCode is octetString (size(2))  IssuerIdentifier ::= INTEGER(0 .. 16383)	U	See <b>POI</b>	by PF
<b>LbasicPoiNumber</b>		BasicPoiNumber ::= INTEGER(0..65535)		Unique number of the service for the road operator (previous DE) and the poiType.	by PF
<b>Llocation</b>		LocationData ::= SEQUENCE { refPoint ReferencePosition, name UTF8String (SIZE (1..31)), address UTF8String (SIZE (1..255)) OPTIONAL, phoneNumber UTF8String (SIZE (1..31)) OPTIONAL, website UTF8String (SIZE (1..31)) OPTIONAL }		See five next lines	▼▼▼
<b>LrefPoint</b>	"Any suitable position which serves as reference for the polygonal line, using the DE ReferencePosition."	ReferencePosition ::= SEQUENCE { latitude Latitude, longitude Longitude, positionConfidenceEllipse PosConfidenceEllipse, altitude Altitude }	U	Similar to DENM/eventPosition.  A POI is attached to an X/Y position. Generally corresponding to the main entrance.  Neither positionConfidenceEllipse nor altitude are needed.  <b>In case of an area of multiple services (e.g a relay parking or a service area), refpoint of each service should be the same and correspond to the main entrance.</b>	by PF
<b>Lname</b>		UTF8String (SIZE (1..31))	U	<b>Official name of the service shall be given</b>	by PF

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standard ETSI TS 101 556-1 modified			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
Laddress		UTF8String (SIZE (1..255))	S	Address <b>may</b> be given. A format number-street-zip-city <b>should</b> be used.	by PF
LphoneNumber		UTF8String (SIZE (1..31))	S	Phone number <b>may</b> be given. In ITU E.164 standard, with a space after the country code, <b>should</b> be used : "+", then CountryCode (1-3 digits), then a space, then phone number without first "0" (no space, no dash).  <b>French phone numbers, if given, should be noted : "+33 NNNNNNNNN"</b>	by PF
LwebSite		UTF8String (SIZE (1..31))	S	A website address <b>may</b> be given. A format without http(s):// <b>should</b> be used.	by PF
status		StatusData ::= SEQUENCE { openingStatus OpeningStatus, parkingStatus ParkingStatus, openingDaysHours SEQUENCE (SIZE (7)) OF DailyOpeningHours OPTIONAL, additionalInformation UTF8String (SIZE (1..255)) OPTIONAL}		See four next lines	▼▼▼
LopeningStatus		OpeningStatus ::= INTEGER { closed (0), open (1), subscriberonly (2), unknown (15)} (0..15)	U	Status of opening of the service in real time (else, use unknown (16))	by PF
LparkingStatus		ParkingStatus ::= SEQUENCE { freeSpots FreeSpots, totalSpots TotalSpots}  FreeSpots ::= INTEGER { full (0), onespot (1), -- only one place is available freespaces (16382), unknown (16383) }(0..16383)  TotalSpots ::= INTEGER { noparking (0), unknown (16383) }(0..16383)	U	Number of available places (in real time) through freeSpots with unknown (16383) if unknown and freespaces (16382) if there is available places but the manager of the parking cannot give the number (or don't want to communicate it)  Total number of places through totalSpots (with unknown (16383) if unknown and noparking (0) if there is no parking)	by PF
LopeningDaysHours		openingDaysHours SEQUENCE (SIZE (7)) OF DailyOpeningHours OPTIONAL, DailyOpeningHours ::= SEQUENCE (SIZE(0..4)) OF OpeningPeriod	S	Opening hours by day, starting by monday, in local time. See Master for details on OpeningPeriod	by PF

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standard ETSI TS 101 556-1 modified			Master choices		
Field	Description / Meaning	Type of data	Status	Content	Value set
Additional Information		UTF8String SIZE ((1..255))	S	Additional information may be given by this DE. Eventual restriction (e.g vehicle type restrictions) could be given here. Eventually, real time process to be constructed.	by PF