

OCIT®

Open Communication Interface for Road Traffic Control Systems
Offene Schnittstellen für die Straßenverkehrstechnik

OCIT-SREM-SSEM Profile

OCIT-SREM-SSEM-Profile_V1.0

OCIT Developer Group (ODG) & Partner

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Document history

| Version Issue | Date | Comment |
|---------------|------------|-------------------------------------|
| V1.0 A01 | 2026-02-23 | OCIT-SREM-SSEM Profile V1.0 Release |

Specifications

The **OCIT outstations configuration document OCIT-O CD V3.1** contains an overview of all of the specifications having a copyright administered by ODG and assigns versions and issue statuses according to:

- associated specifications of the interface "OCIT outstations for traffic signal controllers" with reference to the corresponding OCIT-C specifications (for this see note in 1.2),
- gives information on the use of the transmission profiles and
- provides an overview of packages of specifications for interfaces for the use of which a nominal fee is required by ODG

The current issue of the document is published on www.ocit.org.

1 Introduction

1.1 Scope of this document

In order to let traffic signal controllers (TSC) communicate with vehicles and road users in an effective, safe and platform independent way, interoperability has to be ensured by creating commonly used specifications and interfaces for C2X technology. Aim of this documentation is to establish uniform agreements within international standards - further named as OCIT-SREM-Profile - and herein scoping the C2X prioritization use cases. The OCIT-SREM-Profile is compliant to international standards and developed within the ODG partnership. The unambiguous use of these uniform agreements, within international standards, by all related governmental bodies and businesses is the base for interoperability and a good and reliable operation.

1.2 Standards and relations

The following standards according to the documents listed below have been used to prepare this profile.

NOTE Some documents contains multiple profiles, where C specifies the region specific parts considered for this profile: associated profile(s) are listed within braces.

- SAE J2735, Dedicated Short Range Communications (DSRC) Message Set Dictionary {A, B, C}
- ISO/TS 19091, Intelligent transport systems — Cooperative ITS — Using V2I and I2V communications for applications related to signalized intersections
- ETSI/TS 102 894-2 , Intelligent Transport Systems (ITS); Users and applications requirements; Part 2: Applications and facilities layer; common data dictionary {C}
- ETSI TS 103 301 - Intelligent Transport Systems (ITS) ;Vehicular Communications; Basic Set of Applications; Facilities layer protocols and communication requirements for infrastructure services
- [C-ROADS]: TF2: C-ITS Service and Use Case Definitions
[C-ROADS]: TF3: C-ITS Message Profiles

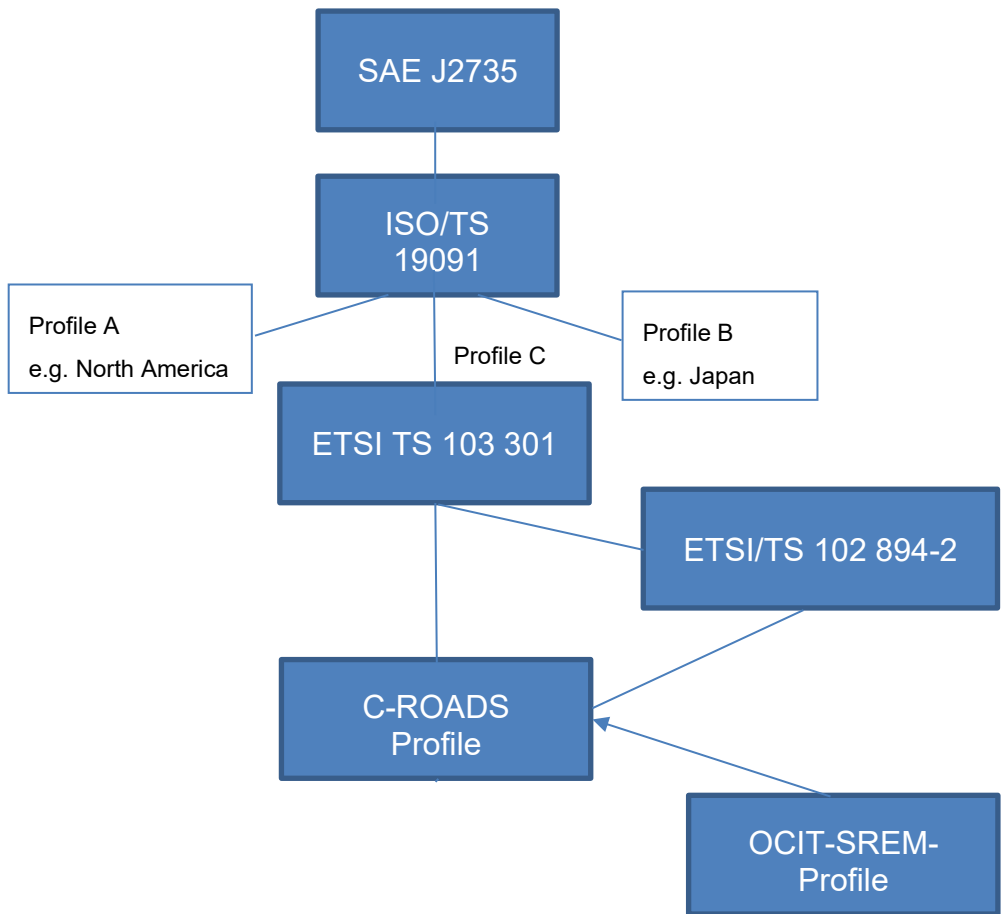


Figure 1: Relation of referring C2X standards and profiles referring SREM

2 Service overview and use cases

Services and use cases are described as well in the underlying specifications and profiles. Aim is to keep in line with this documentation. Reference is given in table below.

Table 1: Document references to SREM/SSEM

| Ref-ID | Reference to document | Version | Chapter | Comment |
|--------|--|------------------|---------|--|
| [1] | ETSI TS 103 301 | V2.1.1 (2021-03) | | |
| | | | 8 | Traffic Light Control (TLC) service (high level overview) The Signal Control service uses the SREM and the SSEM as defined in Annex A. The header of the SREM and the SSEM are defined in the data dictionary ETSI TS 102 894-2 . The data elements of the SREM and the SSEM payload are defined in ISO/TS 19091. |
| [2] | ISO/PRF TS 19091 | 2019 (E) | | |
| | | | 2.2 | Service overview and basic message content |
| | | | 5.5 | Priority/pre-emption use cases |
| | | | 5.5.4 | Public transport signal priority application |
| | | | 5.5.5 | Freight vehicle signal priority application |
| | | | 5.5.6 | Emergency (public safety) vehicle pre-emption application |
| [3] | C-ITS Message Profiles [C-ROADS] | 2.0.7 | 4.2.4 | Traffic Light Control (TLC) FLS |
| [4] | C-ITS Message Profiles [C-ROADS] | 3.0.0 | 4.2.4 | Traffic Light Control (TLC) FLS |
| | C-ITS Service and Use Case Definitions [C-ROADS] | 3.0.0 | 5.1 | SI – Service introduction |
| | | | 5.2.4 | SI - Traffic Light Prioritisation (SI-TLP) |
| | | | 5.2.5 | SI - Emergency Vehicle Priority (SI-EVP) |

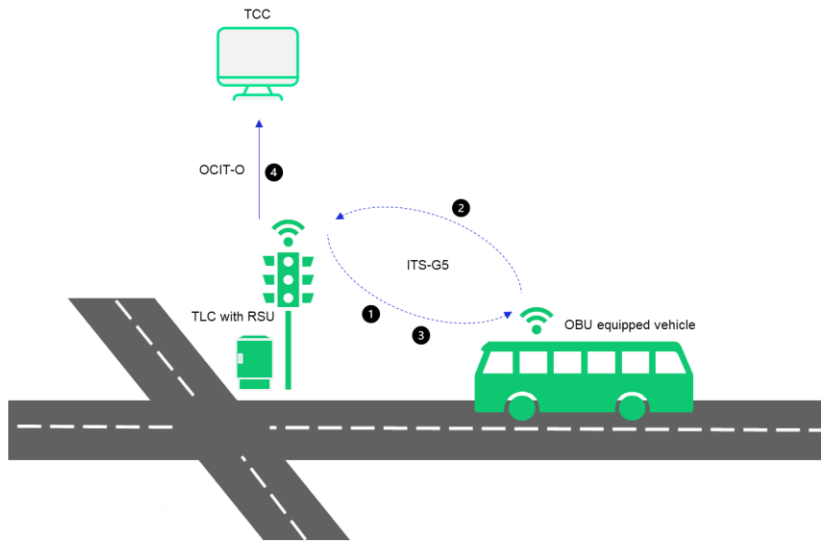
This section states the OCIT specific scope towards the SREM/SSEM related service and use cases and adds reference to these standards.

Unlike references from ISO TS19091 [2] chapter 5.5 and C-ROADS [3] chapter 5.2, use cases described by OCIT do not distinguish cases derived from vehicle roles, furthermore it scopes the system and communication aspects in first place. However, use case descriptions in OCIT shall cover the aspects of emergency vehicle and freight vehicle cases as well.

OCIT use cases are drafted in accordance to a general architecture composition as described in ISO TS19091 [2] chapter 2.2 and shall cover functional requirements stated there.

2.1 Use Cases

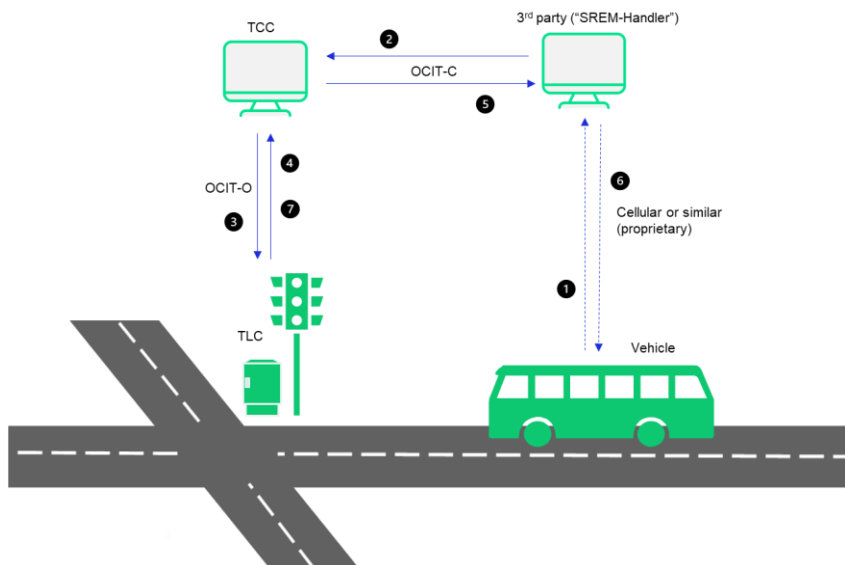
2.1.1 Localized vehicle signal priority



- 1 RSU sends SPATEM and MAPEM messages including IntersectionId etc.
- 2 Based on vehicle position (IntersectionId, distanceToStopline, etc.) OBU generates and sends SREM messages including ETA
- 3 TLC processes SREM requests and sends priority status via SSEM. Vehicle can make use of SSEM-status.
- 4 Signal priority data are gathered in archive for quality analysis

Figure 2: Localized vehicle signal priority

2.1.2 Centralized vehicle signal priority



- 1 Vehicle sends (proprietary) prioritization message to 3rd party priority server (e.g. position / ETA / SREM or similar).
- 2 SREM-Handler generates and sends prioritization request via OCIT-C to TCC
- 3 TCC transmits prioritization request to TLC via OCIT-O
- 4 TLC-VA processes priority request and sends priority status via OCIT-O to TCC
- 5 TCC sends priority status via OCIT-C to 3rd party
- 6 Priority status is transmitted to vehicles on a proprietary basis.
- 7 Signal priority data are gathered in archive for quality analysis

Figure 3: Centralized vehicle signal priority

2.1.3 Proxy for unequipped intersections

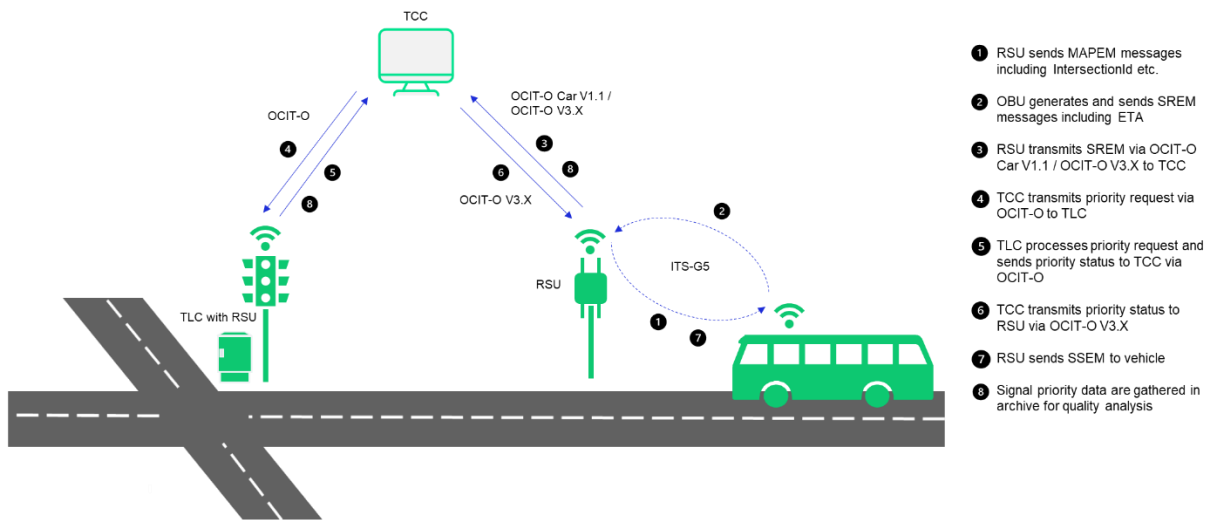


Figure 4: Proxy for unequipped intersections

2.1.4 Route Prioritization

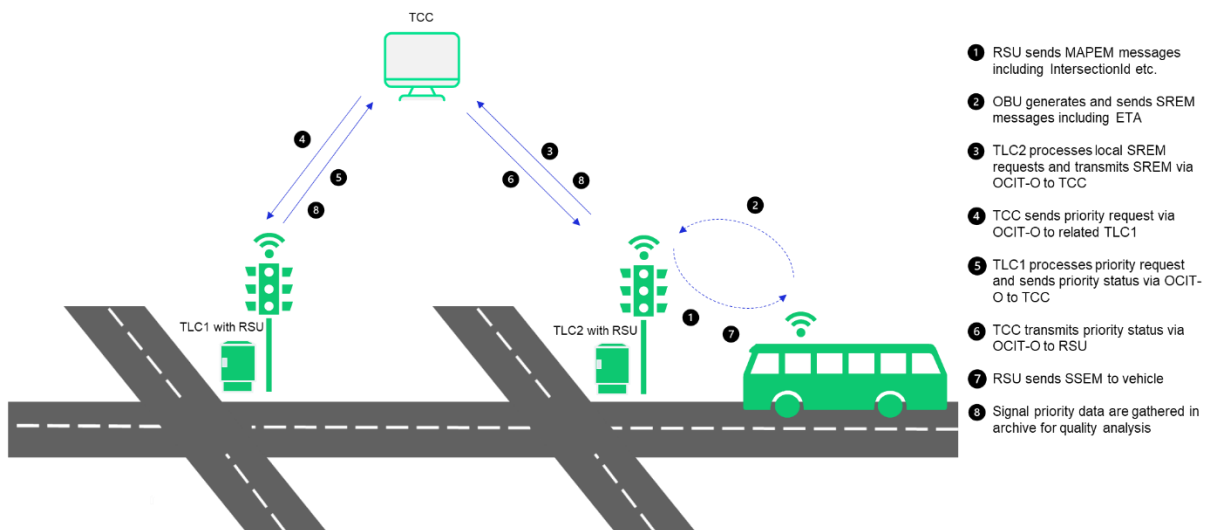


Figure 5: Route Prioritization

2.2 Service overview and basic message content

OCIT use cases are drafted in accordance with a general architecture composition as described in [2] chapter 2.2 and shall cover functional requirements stated there.

Furthermore, OCIT implementation shall comply to the so-called TLC FLS service described in C-ROADS [3] chapter 5.2.

2.3 Interoperability Requirements

Interoperability requirements shall be applied taken from C-ROADS described in C-ROADS [3] chapter 5.2. In addition to this, OCIT aims to allow usage of SREM/SSEM without the need of a parallel CAM-message for positioning purposes and reflected in the OCIT-SREM-Profile.

3 Signal priority message (SREM/SSEM) Profile

3.1 General remarks

This OCIT profile strongly relates to the norms and regulations described in chapter 1.

In consequence the profile shall conform to the specifications from C-ROADS. This document provides the OCIT Profile for the Signal priority message. It offers an interpretation of data elements and describes the use of them as extension to the standards.

As noted in C-ITS C-Roads Profile same applies to OCIT-Profile:

“The TLC FLS including operational parameters is defined in [ETSI TS 103 301], which refers to [ISO/TS 19091], which in turn refers to [SAE J2735]. Data elements, data frames and service parameters shall be used according to the definitions in 4.2.4.1 and 4.2.4.2. The header SREM/SSEM shall be as specified in the data dictionary [ETSI TS 102 894-2]”

The relationships of the tables of SREM are depicted in Figure 6 for the relationship of the SSEM tables.”

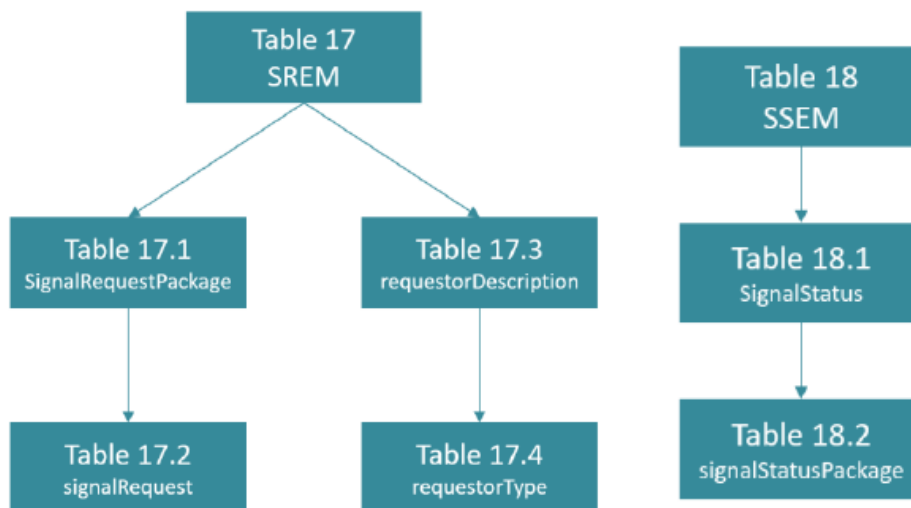


Figure 6: C-ROADS Reference (as of version 2.0.7) - Relationship of SREM/SSEM data element tables

3.1.1 C-ROADS Profile 3.0.0 and relation to OCIT-Profile

C-ROADS Profile 3.0.0 stepped away from table references as below. However, structure in this documentation is kept to mark-up C-ROADS requirements and definitions.

Table 2: C-ROADS Reference - Table 17 SREM general elements

| Level | Name | Type | M/O | Usage | Comment |
|-------|-----------|------|-----------|--------------------------|-----------------|
| 0.0 | SREM | DF | Mandatory | | |
| 0.1 | timeStamp | DE | Mandatory | timeStamp shall be used. | MP_Req_2576 (1) |

| | | | | | |
|-----|----------------|----|-----------|--|---|
| 0.2 | second | DE | Mandatory | | |
| 0.3 | sequenceNumber | DE | Mandatory | sequenceNumber shall be used | MP_Req_2577 (1) |
| 0.4 | requests | DE | Mandatory | SignalRequestList ::= SEQUENCE (SIZE(1..32)) OF SignalRequestPackage (see table 17.1). | |
| 0.5 | requestor | DF | Mandatory | See table 17.3. | |
| 0.6 | regional | DF | Optional | | Difference to C-ROADS: not used in OCIT |

Table 3: C-ROADS Reference - Table 17.1 SignalRequestList → SignalRequestPackage

| Level | Name | Type | M/O | Usage | Comment |
|-------|-----------------------|------|-----------|----------------------------------|---------|
| 1.0 | signalRequest Package | DF | Mandatory | Continues 'requests' | |
| 1.1 | request | DF | Mandatory | See table 17.2 | |
| 1.2 | minute | DE | Optional | | |
| 1.3 | second | DE | Optional | | |
| 1.4 | duration | DE | Optional | | |
| 1.5 | regional | DF | Optional | REGION.Reg-SignalRequest-Package | |

Table 4: C-ROADS Reference - Table 17.2 request → signalRequest

| Level | Name | Type | M/O | Usage | Comment |
|-------|---------------|------|-----------|---|-----------------|
| 2.0 | signalRequest | DF | Mandatory | Continues 'request' | |
| 2.1 | id | DE | Mandatory | id shall be the same as of the corresponding target intersection in the related MAPEM | MP_Req_2578 (1) |
| 2.1.1 | region | DE | Mandatory | | |
| 2.1.2 | id | DE | Mandatory | requestId in combination with the stable stationId shall be unique for the requesting ITS station and duration of the requested action. In very seldom cases it could occur, that two vehicles use the same combination of requestId and stationId. | MP_Req_0579 (1) |
| | | | | This ID is used in the corresponding SSEM. | MP_Inf_0580 (1) |
| 2.2 | RequestID | DE | Mandatory | | |

| Level | Name | Type | M/O | Usage | Comment |
|-------|--------------|------|-----------|--|--------------------------|
| 2.3 | requestType | DF | Mandatory | | |
| 2.4 | inBoundlane | DF | Mandatory | In typical use either an approach, a lane or connection shall be given, this indicates the requested path through the intersection to the degree it is known. | MP_Req_0581 (1) |
| | | | | This mechanism is distinctly different from more traditional prioritisation practices e.g. for public transport, which typically is based on vehicle or line numbers, which are known by the traffic light controller and tied to movements and signal groups. SREM is based on the concept of more specific prioritisation requests which can also extend to other vehicle classes | MP_Inf_0582 (1) |
| 2.4.1 | lane | DE | Optional | (choice) | |
| 2.4.2 | approach | DE | Optional | (choice) | |
| 2.4.3 | connection | DE | Optional | (choice) | |
| 2.5 | outBoundLane | DF | Optional | In typical use either an approach, a lane or connection should be given, this indicates the requested path through the intersection to the degree it is known. | MP_Rec_0583 (1) |
| | | | | This mechanism is distinctly different from more traditional prioritisation practices e.g. for public transport, which typically is based on vehicle or line numbers, which are known by the traffic light controller and tied to movements and signal groups. SREM is based on the concept of more specific prioritisation requests which can also extend to other vehicle classes | MP_Inf_0584 (1) |
| 2.5.1 | lane | DE | Optional | (choice) | |
| 2.5.2 | approach | DE | Optional | (choice) | |
| 2.5.3 | connection | DE | Optional | (choice) | |
| 2.6 | regional | DE | Optional | 2.0.7 => Not used | opposed to C_ROADS 2.0.7 |

Table 5: C-ROADS Reference - Table 17.3 requestor → requestorDescription

| Level | Name | Type | M/O | Usage | Comment |
|-------|----------------------|------|-----------|-----------------------|---------|
| 3.0 | requestorDescription | DF | Mandatory | Continues 'requestor' | |

| Level | Name | Type | M/O | Usage | Comment |
|-------|------------------|------|-----------|--|---|
| 3.1 | id | DF | Mandatory | | |
| 3.1.1 | entityID | DE | Optional | Not used. | |
| 3.1.2 | stationID | DE | Mandatory | Shall be identical to the stationID of the CAM message and shall not change during pending SREM. | MP_Req_0585 (1) |
| 3.2 | type | DF | Optional | See table 17.4 | |
| 3.2.1 | role | DE | Mandatory | | |
| 3.2.2 | subrole | DE | Optional | | |
| 3.2.3 | request | DE | Optional | | |
| 3.2.4 | Iso3833 | DE | Optional | 2.0.7 => Not used | opposed to C_ROADS 2.0.7 |
| 3.3 | position | DF | Optional | 2.0.7 => Not used | opposed to C_ROADS 2.0.7 |
| 3.4 | name | DE | Optional | | |
| 3.5 | routeName | DE | Optional | This DE should be used to provide information route, line and direction of the vehicle. | MP_Rec_0586 (1) Difference to C-ROADS just informative use in OCIT |
| 3.6 | transitStatus | DE | Optional | | |
| 3.7 | transitOccupancy | DE | Optional | 2.0.7 => Not used | opposed to C_ROADS 2.0.7 |
| 3.8 | transitSchedule | DE | Optional | | |
| 3.9 | regional | DE | Optional | 2.0.7 => optional with defined extension | opposed to C_ROADS 2.0.7 |

Table 6: C-ROADS Reference - Table 17.4 type → requestorType

| Level | Name | Type | M/O | Usage | Comment |
|-------|---------------|------|-----------|-------------------|--------------------------|
| 4.0 | requestorType | DF | Mandatory | Continues 'type' | |
| 4.1 | role | DE | Mandatory | | |
| 4.2 | subrole | DE | Optional | | |
| 4.3 | request | DE | Optional | | |
| 4.4 | iso3833 | DE | Optional | 2.0.7 => Not used | opposed to C_ROADS 2.0.7 |
| 4.5 | hpmsType | DE | Optional | 2.0.7 => Not used | opposed to C_ROADS 2.0.7 |
| 4.6 | regional | DE | Optional | 2.0.7 => Not used | opposed to C_ROADS 2.0.7 |

Table 7: C-ROADS Reference - Table 18 SSEM general elements

| Level | Name | Type | M/O | Usage | Comment |
|-------|-----------|------|-----------|--|--------------------------|
| 0.0 | SSEM | DF | Mandatory | | |
| 0.1 | timeStamp | DE | Mandatory | timestamp shall be used. | MP_Req_0587 (1) |
| 0.2 | second | DE | Mandatory | | |
| 0.3 | status | DF | Mandatory | SignalStatusList ::= SE- QUENCE (SIZE(1..32)) OF Sig- nalStatus See table 18.1. | |
| 0.4 | regional | DF | Optional | 2.0.7 => Not used. | opposed to C_ROADS 2.0.7 |

Table 8: C-ROADS Reference - Table 18.1 SignalStatusList → SignalStatus

| Level | Name | Type | M/O | Usage | Comment |
|-------|----------------|------|-----------|--|---|
| 1.0 | signalStatus | DF | Mandatory | Continues 'status'. | |
| 1.1 | sequenceNumber | DE | Mandatory | | |
| 1.2 | id | DF | Mandatory | | |
| 1.2.1 | region | DE | Optional | | Difference to C-ROADS: mandatory in OCIT |
| 1.2.2 | id | DE | Mandatory | | |
| 1.3 | sigStatus | DF | Mandatory | SignalStatusPackageList ::= SE- QUENCE (SIZE(1..32)) OF Sig- nalStatusPackage See table 18.2. | |
| 1.4 | regional | DF | Optional | 2.0.7 => Not used. | opposed to C_ROADS 2.0.7 |

Table 9: C-ROADS Reference - Table 18.2 SignalStatusPackageList → signalStatusPackage

| Level | Name | Type | M/O | Usage | Comment |
|---------|--------------------------|------|-----------|-------------------------|-----------------|
| 2.0 | signalStatusPack- age | DF | Mandatory | Continues 'sigStatus' | |
| 2.1 | requestor | DF | Mandatory | requester shall be used | MP_Req_0588 (1) |
| 2.1.1 | id | DE | Mandatory | | |
| 2.1.1.1 | entityID | DE | Optional | Choice: not used. | |
| 2.1.1.2 | stationID | DE | Mandatory | Choice | |
| 2.1.2 | request | DE | Mandatory | | |
| 2.1.3 | sequenceNumber | DE | Mandatory | | |
| 2.1.4 | role | DE | Optional | Not used. | |

| Level | Name | Type | M/O | Usage | Comment |
|---------|---------------------|------|-----------|--|--------------------------|
| 2.1.5 | <i>typeData</i> | DE | Mandatory | | |
| 2.1.5.1 | <i>role</i> | DE | Mandatory | | |
| 2.1.5.2 | <i>subrole</i> | DE | Optional | | |
| 2.1.5.3 | <i>request</i> | DE | Optional | Not used. | |
| 2.1.5.4 | <i>iso3833</i> | DE | Optional | Not used. | |
| 2.1.5.5 | <i>hpmsType</i> | DE | Optional | Not used. | |
| 2.1.5.6 | <i>regional</i> | DF | Optional | 2.0.7 => Not used. | opposed to C_ROADS 2.0.7 |
| 2.2 | <i>inBoundlane</i> | DF | Mandatory | | |
| 2.2.1 | <i>lane</i> | DE | Optional | (choice) | |
| 2.2.2 | <i>approach</i> | DE | Optional | (choice) | |
| 2.2.3 | <i>connection</i> | DE | Optional | (choice) | |
| 2.3 | <i>outBoundLane</i> | DF | Optional | | |
| 2.3.1 | <i>lane</i> | DE | Optional | (choice) | |
| 2.3.2 | <i>approach</i> | DE | Optional | (choice) | |
| 2.3.3 | <i>connection</i> | DE | Optional | (choice) | |
| 2.4 | <i>minutes</i> | DE | Optional | 2.0.7 => Mandatory | opposed to C_ROADS 2.0.7 |
| 2.5 | <i>second</i> | DE | Optional | 2.0.7 => Mandatory | opposed to C_ROADS 2.0.7 |
| 2.6 | <i>duration</i> | DE | Optional | | |
| 2.7 | <i>status</i> | DE | Mandatory | | |
| 2.8 | <i>regional</i> | DF | Optional | 2.0.7 => optional with defined extension | opposed to C_ROADS 2.0.7 |

3.2 OCIT-SREM profiled elements and usage

3.2.1 Definitions and Legend

This chapter contains actual profile specification for OCIT-O and describes how data elements (DE) and data frames (DF) of the standard shall be used to comply to OCIT-O implementations.

The description of the DFs and DEs can be found in referenced standards. The description of the DEs and DFs in this document build upon the descriptions in these standards.

The font style of the name of DEs and DFs indicates the status as defined in the standards:

- **Bold**: required by the standard;
- *Italic*: these are optional in the standard;

- Underlined: one of these can be chosen (OR);

The status in the profile is indicated in a separate column by means of one of the following labels:

- Mandatory. This DF or DE is mandatory in the standard and is thus always provided.
- Profiled. This DF or DE is mandatory in the C-ROADS and OCIT-O profile although optional in the standard. It is therefore assumed that this DF or DE will always be provided.
- Profiled_O. This DF or DE is mandatory in the OCIT-O profile although optional in the standard. It is therefore assumed that this DF or DE will always be provided.
- Conditional. This DF or DE is mandatory in specific conditions and not used in other conditions. The conditions are provided in the profile.
- Optional. This DF or DE is optional in the standard as well as in the profile.
- Used. This DF or DE is a choice in the standard and used in the profile. It is therefore assumed that this DF or DE can be provided.
- Not used. This DF or DE is optional or a choice in the standard but not used in the profile. A response to the use of this DF or DE is therefore not guaranteed, but as the message is compliant with the SN.1

specification, the message is valid.

3.2.2 SREM general elements

Table 10: OCIT Profile - SREM general elements

| Level 0: SRM | | | | | |
|--------------|--|---|-----------|--|--|
| Standard | | | Profile | | |
| Level | Field | Meaning | Status | Content | Value |
| 0.1 | <i>timeStamp</i> [Minute-OfTheYear] | The MinuteOfTheYear data element expresses the number of elapsed minutes of the current year in the time system being used (typically UTC time). | Profiled | Mandatory in profile as opposed to standard. It is used to provide a longer range time stamp indicating when a message was created. Taken together with the DSecond data element, it provides a range of one full year with a resolution of 1mSecond. | MinuteOfTheYear ::= INTEGER (0..527040) -- the value 527040 shall be used for invalid |
| 0.2 | <i>second</i> [Dsecond] | The DSRC second expressed in this data element represents the milliseconds within the current UTC minute. | Mandatory | - | DSecond ::= INTEGER (0..65535) – units of milliseconds |
| 0.3 | <i>sequenceNumber</i> [MsgCount] | The MsgCount data element is used to provide a sequence number within a stream of messages with the same DSRCmsgID and from the same sender. Depending on the application the sequence number may change with every message or may remain fixed during a stream of messages when the content within each message has not changed from the prior message sent. For this element, the value after 127 is zero | Profiled | Mandatory in profile as opposed to standard. The sequence number will be increased by one when the content of the message has changed from the prior message. The receipt of a non-sequential MsgCount value (from the same sending device and message type) implies that one or more messages from that sending device may have been lost, unless MsgCount has been re-initialized due to an identity change. | MsgCount ::= INTEGER (0..127) |

| Level 0: SRM | | | | | | |
|--------------|--|--|--|-----------|---|-------------|
| Standard | | | | Profile | | |
| Level | Field | Meaning | | Status | Content | Value |
| 0.4 | <i>requests</i> [SignalRequest-List] (1..32) | The SignalRequestList data frame consists of a list of SignalRequest entries. Request Data for one or more signalized intersections that support SRM dialogs. | SignalRequestPackage The SignalRequestPackage DF contains both the service request itself (the preemption and priority details and the inbound/outbound path details for an intersection) and the time period (start and end time) over which this service is sought from one single intersection. One or more of these packages are contained in a list in the Signal Request Message (SRM). | Profiled | Mandatory in profile as opposed to standard. One package contains the SignalRequests for one Intersection, therefore one SRM message might contain multiple requests for multiple intersections. It is not guaranteed that each SSM response contains the exact same SignalRequests (no 1:1 relation between SRM and SSM messages). | See level 1 |
| 0.5 | <i>requestor</i> [Requestor-Description] | Requesting Device and other User Data contains vehicle ID (if from a vehicle) as well as type data and current position and may contain additional transit data | | Mandatory | - | See level 3 |
| 0.6 | <i>regional</i> [REGION.RegSignalRequest-Message] | The element is used for additional "regional information", as defined in ISO/PDTS 19091. | | Not used | - | - |

Table 11: OCIT Profile - SignalRequestList → SignalRequestPackage

| Level 1: SignalRequestList → SignalRequestPackage | | | | | | |
|---|-------------------------------------|--|--|------------|--|---|
| Standard | | | | Profile | | |
| Level | Field | Meaning | | Status | Content | Value |
| 1.1 | <i>request</i> [SignalRequest] | The SignalRequest data frame is used (as part of a request message) to request either a priority or a preemption service from a signalized intersection. | | Mandatory | - | See level 2 |
| 1.2 | <i>minute</i> [Minute-OfTheYear] | The Estimated Time of Arrival (ETA) when the service is requested, expressed with "minute" and "second" field | | Profiled_O | Mandatory in profile as opposed to standard If used the data elements minute and second must be both filled to indicate the Estimated Time of Arrival (ETA) to the intersection stopline from the moment when the service was requested. ETA is computed as: travel time to MAP area + travel time through MAP area (distance to stop line / global speed limit of the intersection). The time to the ETA shall not exceed 5 minutes. 527040 = invalid. Note: legacy systems might not be able to make use of ETA. In such cases it must be ensured that line, route navigation and | MinuteOfTheYear ::= INTEGER (0..527040) |

| Level 1: SignalRequestList → SignalRequestPackage | | | | | | |
|---|---|--|--|------------|--|---|
| Standard | | | | Profile | | |
| Level | Field | Meaning | | Status | Content | Value |
| | | | | | reporting points is provided by using regional extension (see 3.9) | |
| 1.3 | <i>second</i> [Dsecond] | <p>The DSRC second expressed in this data element represents the milliseconds within the current UTC minute.</p> <p>The V2X DSsecond expressed in this data element consists of integer values from zero to 60999, representing the milliseconds within a minute. A leap second is represented by the value range 60000 to 60999. The value of 65535 shall represent an unavailable value in the range of the minute. The values from 61000 to 65534 are reserved</p> | | Profiled_O | Mandatory in profile as opposed to standard. Also see minute. | DSecond ::= INTEGER (0..65535) -- units of milliseconds |
| 1.4 | <i>duration</i> [DSecond] | <p>The duration value is used to provide a short interval that extends the ETA so that the requesting vehicle can arrive at the point of service with uncertainty or with some desired duration of service. The requester must update the ETA and duration values if the period of services extends beyond the duration time. It should be assumed that if the vehicle does not clear the intersection when the duration is reached, the request will be cancelled and the intersection will revert to normal operation.</p> | | Optional | <p>Only used in addition to ETA determination by minute and second</p> <p>When the duration value that extends the ETA is unknown, the field should not be provided, as opposed to providing 0 or 65535, which have other meaning.</p> | DSecond ::= INTEGER (0..65535) – units of milliseconds |
| 1.5 | <i>regional</i> [REGION.RegSignalRequestPackage] | <p>The element is used for additional “regional information”, as defined in ISO/PDTS 19091.</p> | | Not used | - | - |

Table 12: OCIT Profile - request → SignalRequest

| Level 2: SignalRequest | | | | | | |
|------------------------|--|--|--|-----------|---|--|
| Standard | | | | Profile | | |
| Level | Field | Meaning | | Status | Content | Value |
| 2.1 | <i>id</i> [IntersectionReferenceID] | <p>The IntersectionReferenceID is a globally unique value set, consisting of an optional RoadRegulatorID and a required IntersectionID assignment, providing a unique mapping to the intersection MAP.</p> | <p><i>region</i> [RoadRegulatorID]</p> <p>The RoadRegulatorID data element is a globally unique identifier assigned to a regional authority.</p> | Profiled | <p>Mandatory in profile as opposed to standard.</p> <p>The identifier shall be defined by the region specific road operator consortium.</p> | RoadRegulatorID ::= INTEGER (0..65535) |
| | | | <p><i>id</i> [IntersectionID]</p> <p>The IntersectionID is used within a region to uniquely define an intersection within that country or region.</p> <p>The values zero through 255 are allocated for testing purposes.</p> | Mandatory | The identifier shall be defined by the road operator. | IntersectionID ::= INTEGER (0..65535) |
| 2.2 | <i>requestID</i> [RequestID] | <p>The RequestID data element is used to provide a unique ID between two parties for various dialog exchanges. Combined with the sender's VehicleID, this provides a unique string for some mutually defined period of time.</p> | | Mandatory | <p>The requestID uniquely links the request to the corresponding status from the intersection (SSM).</p> <p>The requestID must be</p> | RequestID ::= INTEGER (0..255) |

| Level 2: SignalRequest | | | | | | |
|------------------------|---|--|--------------------------------------|---|--|---|
| Standard | | | Profile | | | |
| Level | Field | Meaning | Status | Content | Value | |
| | | | | stable during the live time of the request | | |
| 2.3 | <i>requestType</i> [PriorityRequestType] | The PriorityRequestType data element provides a means to indicate if a request (found in the Signal Request Message) represents a new service request, a request update, or a request cancellation for either preemption or priority services. | Mandatory | Types: priorityRequestTypeReserved (0), priorityRequest (1), new request priorityRequestUpdate (2) – an update shall be sent at least every 10 seconds and when the difference between the actual and previous ETA is more than 10% of the remaining travel time (with a minimum of 1 second), priorityCancellation (3) – a cancellation shall be sent when the vehicle has passed the stop line, when the updated ETA exceeds 5 minutes or in response to an SSM-rejected, in response to an SSM-maxPresence and in response to an SSM-re-serviceLocked. | PriorityRequestType ::= ENUMERATED { priorityRequestTypeReserved (0), priorityRequest (1), priorityRequestUpdate (2), priorityCancellation (3)} | |
| 2.4 | <i>inBoundLane</i> [IntersectionAccessPoint] | The IntersectionAccessPoint data frame is used to specify the index of either a single approach or a single lane at which a service is needed. The IntersectionAccessPoint data frame is used to indicate the inbound points by which the requestor can traverse an intersection. One of the following three options can be chosen: LaneID, ApproachID or LaneConnectionID. | | Mandatory | Usage of inBoundLane field shall be the preferred option in case TLC can manage to make use of line, route navigation and reporting points by using regional extension (see 3.9) as well | - |
| | | | <i>lane</i> [LaneID] | Choice (alternative option) | This is the alternative option to choose, the preferred option is the LaneConnectionID. This option can be used if the direction/route taken at the intersection is not known. | LaneConnectionID ::= INTEGER (0..255) the value 0 shall be used when the lane ID is not available or not known the value 255 is reserved for future use |
| | | | <i>approach</i> [ApproachID] | Choice (alternative option) | This is the alternative option to choose, the preferred option is the LaneConnectionID. This option can be used if the direction/route taken at the intersection is not known. | ApproachID ::= INTEGER (0..15) -- zero to be used when valid value is unknown |
| | | | <i>connection</i> [LaneConnectionID] | Choice (preferred option) | This is the preferred option. If set, it must be in accordance with the LaneID defined in the MAP message. Note that this option can only be selected if the direction/route taken at the intersection is known. | LaneConnectionID ::= INTEGER (0..255) |
| 2.5 | | | Optional | | | |

| Level 2: SignalRequest | | | | | | |
|------------------------|--|--|--------------------------------------|-----------------------------|---------|------------------|
| Standard | | | | Profile | | |
| Level | Field | Meaning | | Status | Content | Value |
| | <i>outBoundLane</i> [IntersectionAccessPoint] | The IntersectionAccessPoint data frame is used to specify the index of either a single approach or a single lane at which a service is needed. | <i>lane</i> [LaneID] | Choice (alternative option) | - | See InBound-Lane |
| | | | <i>approach</i> [ApproachID] | Choice (alternative option) | - | See InBound-Lane |
| | | | <i>connection</i> [LaneConnectionID] | Choice (preferred option) | - | See InBound-Lane |
| 2.6 | <i>regional</i> [REGION.RegSignalRequest] | The element is used for additional "regional information", as defined in ISO/PDTS 19091. | | Not used | - | - |

Table 13: OCIT Profile - requestor → requestorDescription

| Level 3: RequestorDescription | | | | | | |
|-------------------------------|--|--|----------------------------------|------------|---|---------------------------------------|
| Standard | | | | Profile | | |
| Level | Field | Meaning | | Status | Content | Value |
| 3.1 | <i>id</i> [VehicleID] | <p>The VehicleID is used to uniquely identify a vehicle or other object.</p> <p>The VehicleID data frame is used to contain either a (US) TemporaryID or an (EU) StationID in a simple frame.</p> <p>In normal use cases, this value changes over time to prevent tracking of the subject vehicle.</p> | | Mandatory | - | - |
| | | | <i>entityID</i> [TemporaryID] | Not used | - | - |
| | | | <i>stationID</i> [StationID] | Profiled | The stationID must be identical to the stationID of the CAM message of the vehicle. The stationID is subject to change at intervals (pseudonym), but may not change while passing an intersection or during pending SRMs (i.e. active services). | StationID ::= INTEGER (0..4294967295) |
| 3.2 | <i>type</i> [RequestorType] | The RequestorType data frame is used when a DSRC-equipped device is requesting service from another device. The most common use case is when a vehicle is requesting a signal preemption or priority service call from the signal controller in an intersection. | | Profiled | Mandatory in profile as opposed to standard. Information regarding all type and class data about the requesting vehicle is required. | See level 4 |
| 3.3 | <i>position</i> [RequestorPositionVector] | The RequestorPositionVector data frame provides a report of the requestor's position, speed, and heading. | | Profiled_O | Information regarding the requestor's position, speed and heading is needed. Delivery via CAM cannot be expected in all projects, since it implies | - |

| Level 3: RequestorDescription | | | | | |
|-------------------------------|--|---|----------|---|---|
| Standard | | | Profile | | |
| Level | Field | Meaning | Status | Content | Value |
| | | | | enhanced safety and latency demands. | |
| 3.4 | <i>name</i> [Descriptive-Name] | A human readable name for debugging use. | Optional | Can be used for descriptive information only, not foreseen for any routing or navigation purpose | DescriptiveName ::= IA5String (SIZE(1..63)) |
| 3.5 | <i>routeName</i> [Descriptive-Name] | The DescriptiveName data element is used to provide a human readable and recognizable name for transit operations use. | Optional | Can be used for descriptive information only, not foreseen for any routing or navigation purpose | DescriptiveName ::= IA5String (SIZE(1..63)) |
| 3.6 | <i>transitStatus</i> [TransitVehicleStatus] | The TransitVehicleStatus data element is used to relate basic information about the transit run in progress. Types: <ul style="list-style-type: none"> loading (0), -- parking and unable to move at this time anADAuse (1), --an ADA access is in progress (wheelchairs, kneeling, etc.) aBikeLoad (2), -- loading of a bicycle is in progress doorOpen (3), -- a vehicle door is open for passenger access charging (4), -- a vehicle is connected to charging point atStopLine (5), -- a vehicle is at the stop line for the lane it is in | Optional | Mandatory in case of transit operations. Each time the status changes an updated SRM shall be send. Note that the CAM message allows tracking of the vehicle. Types shall be considered as of original SAE definition | TransitVehicleStatus ::= BIT STRING {<Types>} (SIZE(8)) |
| 3.7 | <i>transitOccupancy</i> [TransitVehicleOccupancy] | The TransitVehicleOccupancy data element is used to relate basic level of current ridership. Types: <ul style="list-style-type: none"> occupancyUnknown (0), occupancyEmpty (1), occupancyVeryLow (2), occupancyLow (3), occupancyMed (4), occupancyHigh (5), occupancyNearlyFull (6), occupancyFull (7) | Optional | | TransitVehicleOccupancy ::= ENUMERATED {<Types>} |
| 3.8 | <i>transitSchedule</i> [DeltaTime] | The DeltaTime data element provides a time definition for an object's schedule adherence (typically a transit vehicle) within a limited range of time. When the reporting object is ahead of schedule, a positive value is used; when behind, a negative value is used. A value of zero indicates schedule adherence. Supporting a range of +/- 20 minute in steps of 10 seconds <ul style="list-style-type: none"> the value of -121 shall be used when more than -20 minutes the value of +120 shall be used when more than +20 minutes the value -122 shall be used when the value is unavailable | Optional | This value is sent from a vehicle to the traffic signal controller's RSU to indicate the urgency of a signal request in the context of being within schedule or not. -120 = 20 Minuten (1200s) zu spät -3 = 30s zu spät 0 = pünktlich 3 = 30s zu früh 120 = 20 Minuten zu früh | DeltaTime ::= INTEGER (-122 .. 121) |

| Level 3: RequestorDescription | | | | | |
|-------------------------------|--|--|----------|--|-------------|
| Standard | | | Profile | | |
| Level | Field | Meaning | Status | Content | Value |
| 3.9 | <i>regional</i> [REGION.RegRequestor-Description] | The element is used for additional "regional information", as defined in ISO/PDTS 19091. | Optional | Optional as legacy systems can make use of line, route navigation and reporting points by using regional extension | See level 5 |

Table 14: OCIT Profile - type → requestorType

| Level 4: RequestorType | | | | | |
|------------------------|---|--|-----------|---|---|
| Standard | | | Profile | | |
| Level | Field | Meaning | Status | Content | Value |
| 4.1 | <i>role</i> [BasicVehicle-Role] | The BasicVehicleRole data element provides a means to indicate the current role that a DSRC device is playing. | Mandatory | SAEJ2735 states 0-7 as international and upper values as US ETSI TS 103 301 V2.1.1 (2021-03) describes as SAEJ2735 states 0-22 as US | ENUMERATED {default(0), publicTransport(1), specialTransport(2), dangerousGoods(3), roadWork(4), rescue(5), emergency(6), safetyCar(7),...} |
| 4.2 | <i>subrole</i> [RequestSub-Role] | The RequestSubRole data element is used to further define the details of the role which any DSRC device might play when making a request to a signal controller. Meanings based on regional needs to refine and expand the basic roles which are defined elsewhere. | Optional | To be used to enrich information provided by the BasicVehicleRole data element. | |
| 4.3 | <i>request</i> [RequestImportanceLevel] | The RequestImportanceLevel data element is used to state what type of signal request is being made to a signal controller by a DSRC device in a defined role. The levels of the request typically convey a sense of urgency or importance with respect to other demands to allow the controller to use predefined business rules to determine how to respond. Meanings based on regional needs to refine and expand the basic roles which are defined elsewhere. | Optional | To be used to enrich sense of urgency by using predefined business rules known by TSC. | RequestImportanceLevel ::= ENUMERATED {1...15}; 0=unknown 1=least important ... 14=most important 15=reserved |
| 4.4 | <i>iso3833</i> [Iso3833Vehicle-Type] | The Iso3833VehicleType data element represents the value domain provided by ISO 3833 for general vehicle types. It is a European list similar to the list used for the Highway Performance Monitoring System (HPMS) in the US region. In this standard, the HPMS list is used in the data concept named VehicleType. | Not used | - | |
| 4.5 | <i>hpmsType</i> [VehicleType] | The VehicleType data element is a type list (i.e., a classification list) of the vehicle in terms of overall size. | Not used | - | |
| 4.6 | <i>regional</i> [REGION.RegRequestor-Type] | The element is used for additional "regional information", as defined in ISO/PDTS 19091. | Not used | - | |

Table 15: OCIT Profile - OCIT Extension Frame

| Level 5: OCIT Extension Frame | | | | | |
|-------------------------------|-----------------------|--|----------|---------|---------------|
| Standard | | | Profile | | |
| Level | Field | Meaning | Status | Content | Value |
| 5.1 | <i>reportingPoint</i> | The element contains reporting point as of R09 | Optional | | 0..65535 |
| 5.2 | <i>priorityLevel</i> | The element contains priority level as of R09 | Optional | | 0..255 |
| 5.3 | <i>length</i> | The element contains train length as of R09 | Optional | | 0..7 |
| 5.4 | <i>route</i> | The element contains route as of R09 | Optional | | 0..65535 |
| 5.5 | <i>line</i> | The element contains line as of R09 | Optional | | 0..65535 |
| 5.6 | <i>direction</i> | The element contains direction as of R09 | Optional | | 0..255 |
| 5.7 | <i>tour</i> | The element contains tour (Kurs) as of R09 | Optional | | 0..4294967295 |
| 5.8 | <i>version</i> | Basic version of the OEV supply. | Optional | | 0..4294967295 |

3.2.3 SSEM general elements

Table 16: OCIT Profile - SSEM general elements

| Level 0: SSEM | | | | | |
|---------------|--|---|-----------|--|--|
| Standard | | | Profile | | |
| Level | Field | Meaning | Status | Content | Value |
| 0.1 | <i>timeStamp</i> [MinuteOfTheYear] | The MinuteOfTheYear data element expresses the number of elapsed minutes of the current year in the time system being used (typically UTC time). | Profiled | Mandatory in profile as opposed to standard. To be used in combination with the following data element second. | MinuteOfTheYear ::= INTEGER (0..527040) -- the value 527040 shall be used for invalid |
| 0.2 | <i>second</i> [Dsecond] | The DSRC second expressed in this data element represents the milliseconds within the current UTC minute. | Mandatory | - | DSecond ::= INTEGER (0..65535) -- units of milliseconds |
| 0.3 | <i>sequenceNumber</i> [MsgCount] | The MsgCount data element is used to provide a sequence number within a stream of messages with the same DSRCmsgID and from the same sender. Depending on the application the sequence number may change with every message or may remain fixed during a stream of messages when the content within each message has not changed from the prior message sent. For this element, the value after 127 is zero | Profiled | Mandatory in profile as opposed to standard. The sequence number will be increased by one when the content of the message has changed from the prior message. The receipt of a non-sequential MsgCount value (from the same sending device and message type) implies that one or more messages from that sending device may have been lost, unless MsgCount has been re-initialized due to an identity change. | MsgCount ::= INTEGER (0..127) |
| 0.4 | <i>status</i> [SignalStatusList] (1..32) | The Signal-StatusList data frame consists of a list of SignalStatus entries. | Mandatory | The SignalStatusList entries shall include one SignalStatus for each Intersection. | See Level 1 |

| Level 0: SSEM | | | | | |
|---------------|---|--|----------|---------|-------|
| Standard | | | Profile | | |
| Level | Field | Meaning | Status | Content | Value |
| 0.5 | <i>regional</i> [RE-GION.RegSignalStatusMessage] | The element is used for additional "regional information", as defined in ISO/PDTS 19091. | Not used | - | - |

Table 17: OCIT Profile - SignalStatusList → SignalStatus

| Level 1: SignalStatusList → SignalStatus | | | | | | |
|--|---|---|--|--|---|--|
| Standard | | | Profile | | | |
| Level | Field | Meaning | Status | Content | Value | |
| 1.1 | <i>sequenceNumber</i> [MsgCount] | The MsgCount data element is used to provide a sequence number within a stream of messages with the same DSRCmsgID and from the same sender. Depending on the application the sequence number may change with every message or may remain fixed during a stream of messages when the content within each message has not changed from the prior message sent. For this element, the value after 127 is zero | Mandatory | Mandatory in profile as opposed to standard. The sequence number will be increased by one when the content of the message has changed from the prior message. The receipt of a non-sequential MsgCount value (from the same sending device and message type) implies that one or more messages from that sending device may have been lost, unless MsgCount has been re-initialized due to an identity change. | MsgCount ::= INTEGER (0..127) | |
| 1.2 | <i>id</i> [IntersectionReferenceID] | The IntersectionReferenceID is a globally unique value set, consisting of an optional RoadRegulatorID and a required IntersectionID assignment, providing a unique mapping to the intersection MAP. | <i>region</i> [RoadRegulatorID] The RoadRegulatorID data element is a globally unique identifier assigned to a regional authority | Profiled | Mandatory in profile as opposed to standard. The identifier shall be defined by the region specific road operator consortium. | RoadRegulatorID ::= INTEGER (0..65535) |
| | | | <i>id</i> [IntersectionID] The IntersectionID is used within a region to uniquely define an intersection within that country or region. The values zero through 255 are allocated for testing purposes | Mandatory | The identifier shall be defined by the road operator. | IntersectionID ::= INTEGER (0..65535) |
| 1.3 | <i>sigStatus</i> [SignalStatusPackageList] | The SignalStatusPackageList data frame consists of a list of SignalStatusPackage entries. | SignalStatusPackage The SignalStatusPackage data frame contains all the data needed to describe the preemption or priority state of the signal controller with respect to a given request and to uniquely identify the party who requested that state to occur. | Mandatory | - | See level 2 |

| Level 1: SignalStatusList → SignalStatus | | | | | |
|--|---|--|----------|---------|-------|
| Standard | | | Profile | | |
| Level | Field | Meaning | Status | Content | Value |
| 1.4 | <i>regional</i> [REGION.RegSignalRequestPackage] | The element is used for additional "regional information", as defined in ISO/PDTS 19091. | Not used | - | - |

Table 18: OCIT Profile - SignalStatusPackageList → SignalStatusPackage

| Level 2: SignalStatusPackageList → SignalStatusPackage | | | | | | | |
|--|---|--|-------------------------------------|---|---|---|--------------------------------|
| Standard | | | Profile | | | | |
| Level | Field | Meaning | Status | Content | Value | | |
| 2.1 | <i>Requestor</i> [SignalRequesterInfo] | <p>The SignalRequesterInfo data frame is used to contain information regarding the entity that requested a given signal behaviour. In addition to the VehicleID, the data frame also contains a request reference number used to uniquely refer to the request and some basic type information about the request maker which may be used by other parties.</p> <p>-- The party that made the initial SRM request</p> | | Profiled | Mandatory in profile as opposed to standard. | - | |
| | | | <i>id</i> [VehicleID] | Mandatory | The VehicleID should reflect the VehicleID defined in the SRM message. The data element StationID will be used, see SRM level 3.1 | See SRM level 3.1 | |
| | | | <i>request</i> [RequestID] | Mandatory | The RequestID data element is used to provide a unique ID between two parties for various dialog exchanges. Combined with the sender's VehicleID, this provides a unique string for some mutually defined period of time. | The RequestID should reflect the RequestID defined in the SRM message. | RequestID ::= INTEGER (0..255) |
| | | | <i>sequenceNumber</i> [MsgCount] | Mandatory | | The MsgCount should reflect the MsgCount defined in the SRM message 0.3. | MsgCount ::= INTEGER (0..127) |
| | | | <i>role</i> [BasicVehicleRole] | Not used | | - | - |
| | | | <i>typeData</i> [RequestorType] | Mandatory | The RequestorType data frame is used when additional data besides the role is needed, at which point the role entry above is not sent. It holds information regarding all type and class data about the requesting vehicle. | Mandatory in profile as opposed to standard. The RequestorType should reflect the RequestorType defined in the SRM message. | See SRM level 4 |
| | | | 2.2 | <i>inboundOn</i> [IntersectionAccessPoint] | The IntersectionAccessPoint data frame | | Mandatory |
| <i>lane</i> [LaneID] | Choice | The LaneID should reflect the LaneID defined in the | | | | See SRM Level 2 | |

| Level 2: SignalStatusPackageList → SignalStatusPackage | | | | | | |
|--|---|---|---|-----------|--|--|
| Standard | | | | Profile | | |
| Level | Field | Meaning | | Status | Content | Value |
| | | | | | SRM message (if provided). | |
| | | | <i>approach</i> [ApproachID] | Choice | The ApproachID should reflect the ApproachID defined in the SRM message (if provided). | See SRM Level 2 |
| | | | <i>connection</i> [LaneConnectionID] | Choice | The LaneConnectionID should reflect the LaneConnectionID defined in the SRM message (if provided). | See SRM Level 2 |
| 2.3 | <i>outboundOn</i> [IntersectionAccessPoint] | The IntersectionAccessPoint data frame. | | | | |
| | | | <i>lane</i> [LaneID] | Choice | The LaneID should reflect the LaneID defined in the SRM message (if provided). | See SRM Level 2 |
| | | | <i>approach</i> [ApproachID] | Choice | The ApproachID should reflect the ApproachID defined in the SRM message (if provided). | See SRM Level 2 |
| | | | <i>connection</i> [LaneConnectionID] | Choice | The LaneConnectionID should reflect the LaneConnectionID defined in the SRM message (if provided). | See SRM Level 2 |
| 2.4 | <i>minute</i> [MinuteOfTheYear] | The MinuteOfTheYear data element expresses the number of elapsed minutes of the current year in the time system being used (typically UTC time). | | Not used | | See SRM Level 1 |
| 2.5 | <i>second</i> [Dsecond] | The DSRC second expressed in this data element represents the milliseconds within the current UTC minute. | | Not used | | See SRM Level 1 |
| 2.6 | <i>duration</i> [Dsecond] | The duration value is used to provide a short interval that extends the ETA so that the requesting vehicle can arrive at the point of service with uncertainty or with some desired duration of service. This concept can be used to avoid needing to frequently update the request. The requester | | Optional | This data element echoes the data of the request. | See SRM Level 1 |
| 2.7 | <i>status</i> [PrioritizationResponseStatus] | <p>The PrioritizationResponseStatus data element is used to indicate the general status of a prior prioritization request.</p> <p>Types (see SAE J2735 for details):</p> <ul style="list-style-type: none"> • unknown (0), Unknown state • requested (1),-- This prioritization request was detected by the traffic controller • processing (2), Checking request (request is in queue, other requests are prior) • watchOtherTraffic (3),- Cannot give full permission,therefore watch for other traffic-- Note that other requests may be present • granted (4),-- Intervention was successful and now prioritization is active • rejected (5),-- The prioritization or preemption request was rejected by the traffic controller | | Mandatory | | PrioritizationResponseStatus ::= ENUMERATED {0-7}; |

| Level 2: SignalStatusPackageList → SignalStatusPackage | | | | | |
|--|--|---|----------|---------|-------|
| Standard | | | Profile | | |
| Level | Field | Meaning | Status | Content | Value |
| | | <ul style="list-style-type: none"> • maxPresence (6), The Request has exceeded maxPresence time. Used when the controller has determined that the requester should then back off and request an alternative. • reserviceLocked (7), Prior conditions have resulted in a reservice locked event: the controller requires the passage of time before another similar request will be accepted | | | |
| 2.8 | <i>regional</i> <i>REGI-</i> <i>ON.RegSignal-</i> <i>StatusPackage]</i> | The element is used for additional "regional information", as defined in ISO/PDTS 19091. | Not used | - | - |

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Glossary

The explanations of the technical terms and abbreviations used in this document can be found in “OCIT – O Glossary V3.1”