



CiMS/VAS Interface

External Interface Description

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1 Scope

This document defines the protocol used between a VAS and CiMS. If the protocol requires a certain action or response from one side or the other, than this will be stated in this document.

The specification does not define the communication technology. Any technology will do, as long as it supports TCP/IP connectivity.

2 Terminology and Conventions

Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

All sections and appendixes, except "Scope" and "Introduction", are normative, unless they are explicitly indicated to be informative.

Definitions

This section contains the terminology that this used throughout this document.

CiMS

Charge point interactive Management System: the central system that manages charge points and has the information for authorizing users for using its charge points.

VAS

The Value Added Services supplier, i.e. the external party using the VAS interface.

Charge Point

The Charge Point is the physical system where an electric vehicle can be charged.

Abbreviations

EV Electrical Vehicle

FTP(S) File Transport Protocol (Secure)

HTTP(S) HyperText Transport Protocol (Secure)

ICCID Integrated Circuit Card Identifier

IMSI International Mobile Subscription Identify

PDU Protocol Data Unit
SOAP Simple Object Access Protocol
SSL Secure Socket Layer
TLS Transport Layer Security
URL Uniform Resource Locator
WSDL Web Service Definition Language

References

- [RFC2119] "Key words for use in RFCs to Indicate Requirement Levels". S. Bradner. March 1997. <http://www.ietf.org/rfc/rfc2119.txt>
- [SOAP] "SOAP Version 1.2 Part 0: Primer (Second Edition)". 27 April 2007. <http://www.w3.org/TR/2007/REC-soap12-part0-20070427/>
- [WS-ADDR] "Web Services Addressing 1.0", <http://www.w3.org/2005/08/addressing>
- [SOAP-SCEN] "SOAP Version 1.2 Usage Scenarios", <http://www.w3.org/TR/xmlp-scenarios/#S23>

3 Introduction

This document describes an interface to CiMS through which third parties, called VAS (Value Added Services) suppliers, can obtain information about location, type and status of charge points.

What is CiMS?

CiMS is a central system to manage charge points for the charging of electric vehicles. Customers wanting to charge their vehicle identify themselves at the charge point using a contactless card. The charge point will request permission to start charging from CiMS. When charging ends, the charge point will send transaction details, such as time and electricity usage, to the central system. From there, this information can be used to bill the customer and to gather statistical data about charge point usage

An essential part of CiMS is the protection of privacy of its users and to prevent that their whereabouts can be tracked. CiMS has therefore been split into two independent components: an INFRA part, that manages the infrastructure of charge points and collects transactions, and a CRM part that manages customers and cards.

The interface between a VAS supplier and CiMS consists of a web service based on SOAP 1.2. A VAS supplier requests static information about locations and capabilities of charge points and dynamic information about availability of charge points.

Context

The following diagram shows the VAS interface between VAS Supplier and CiMS INFRA in context. There may be several VAS suppliers requesting information from CiMS. Data flows one way from CiMS INFRA to VAS supplier and is always on request from a VAS supplier.

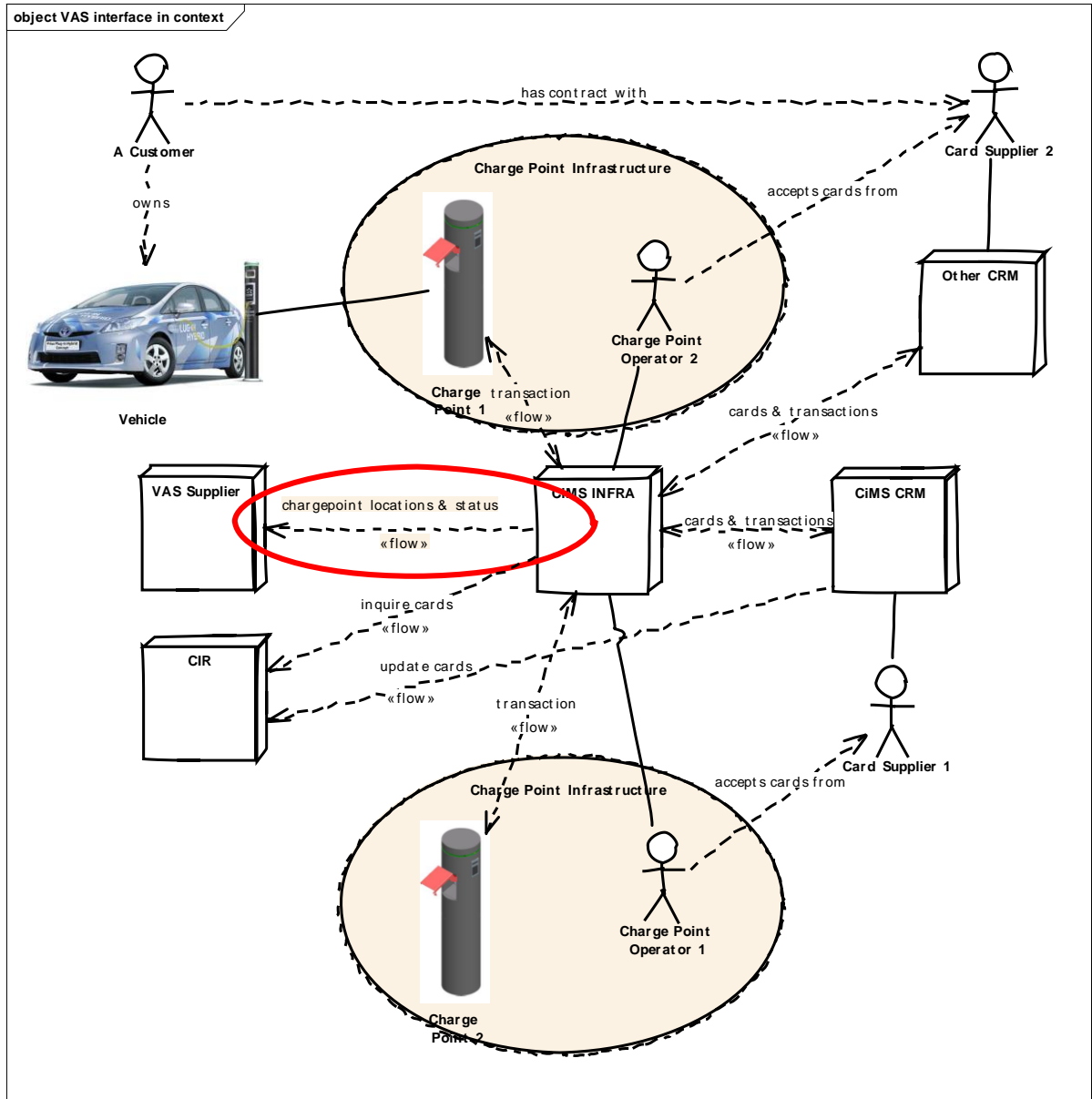


Figure: VAS interface in context

3.1 General view of operation

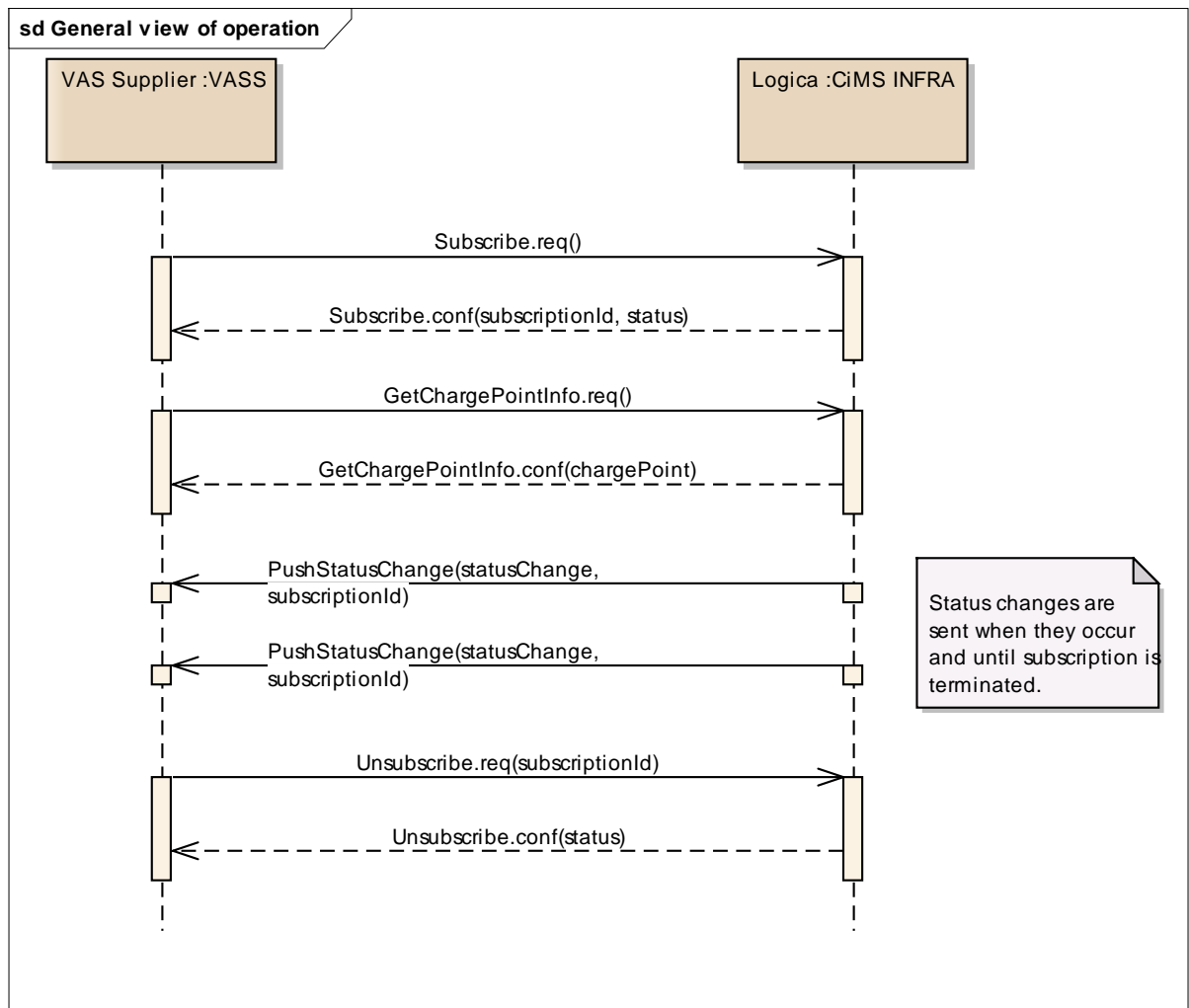


Figure: General view of operation

The general mode of operation is described in the sequence diagram above. A VAS supplier subscribes to receive status updates and receives a subscription ID upon successful subscription. From this moment on VAS will receive a notification whenever a charge point changes state. In order to receive the static information, such as location and type, of charge points, VAS supplier issues a request (GetChargePointInfo) to retrieve this information. Since static information of charge points is not likely to change, this request will only be made once every day or week to retrieve a new list.

When a VAS supplier wishes to terminate receipt of status updates, it should unsubscribe from this service.

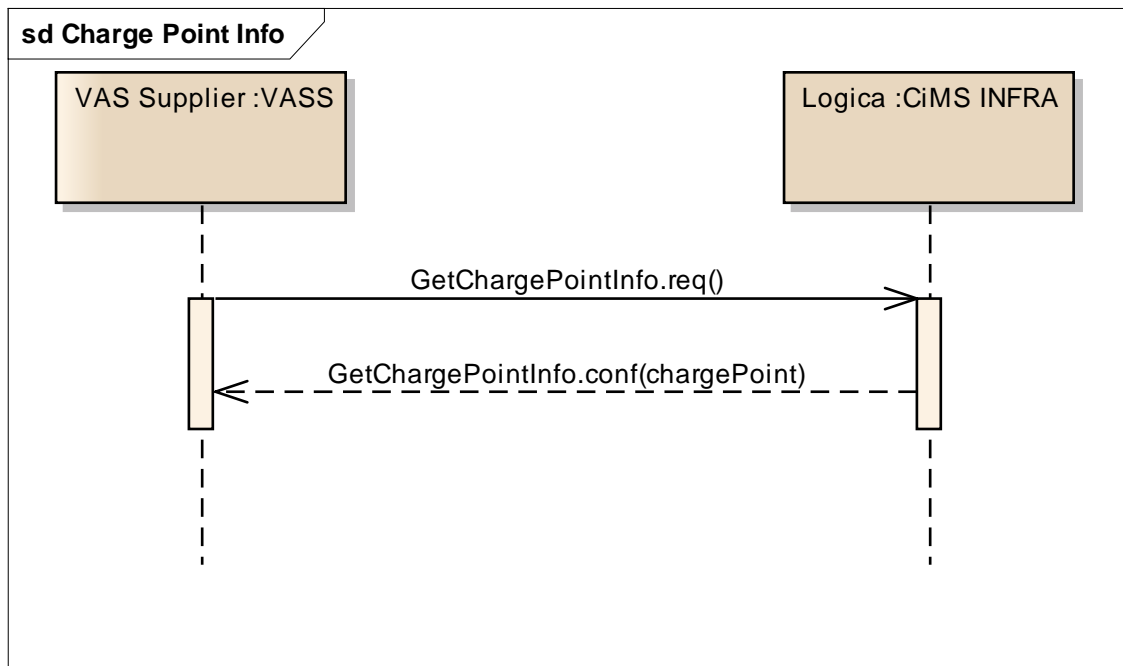
Note on the use of a subscription ID

A subscription ID is part of the protocol in order to allow for the possibility to have multiple subscriptions. Currently, one can only subscribe to status

updates from all charge points known to CiMS. Future implementations may provide the ability to subscribe to status updates of a specific region. Multiple subscriptions may then be done to receive updates on multiple regions.

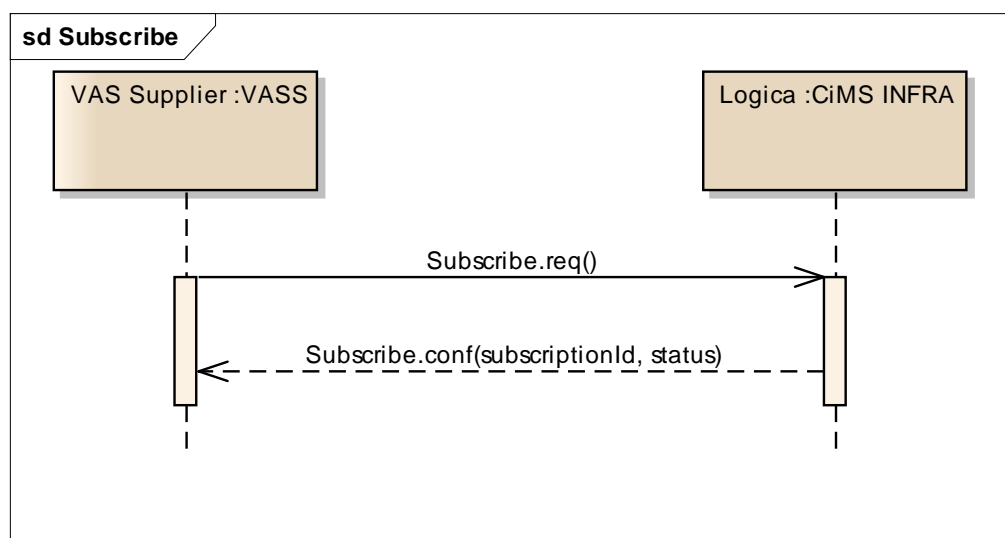
4 Operations initiated by VAS Supplier

4.1 Charge Point Info



In order to receive static information about charge points, a VAS supplier SHALL send the [GetChargePointInfo.req](#) PDU. CiMS SHALL return static information of all charge points it knows of in the PDU [GetChargePointInfo.conf](#). This contains attributes like location and charging capabilities, but also the last known status of each charge point.

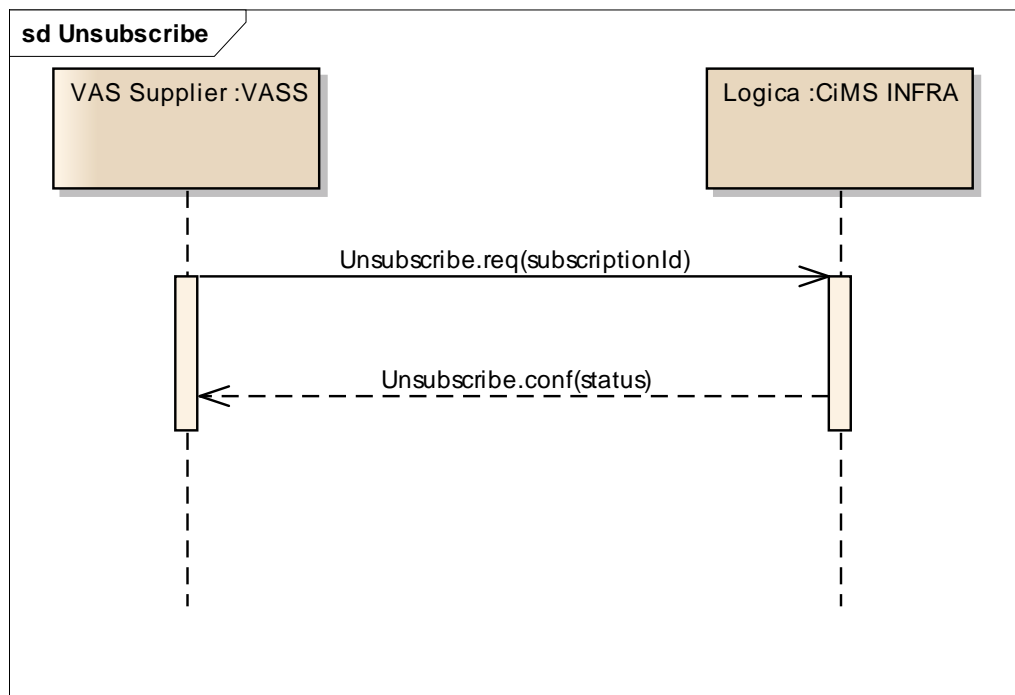
4.2 Subscribe



If a VAS supplier wishes to receive status updates whenever a charge point changes state, it SHALL request this using the [Subscribe.req](#) PDU. Upon receipt CiMS SHALL respond with a [Subscribe.conf](#) PDU, which indicates whether subscription is accepted, rejected or ignored and includes a subscription ID that is needed to unsubscribe.

CiMS MAY reject a subscription when VAS supplier is not authorized to receive status updates. CiMS SHALL ignore a subscription when VAS supplier is already subscribed; this is indicated using an 'ignored' status (see [SubscribeStatus](#)).

4.3 Unsubscribe

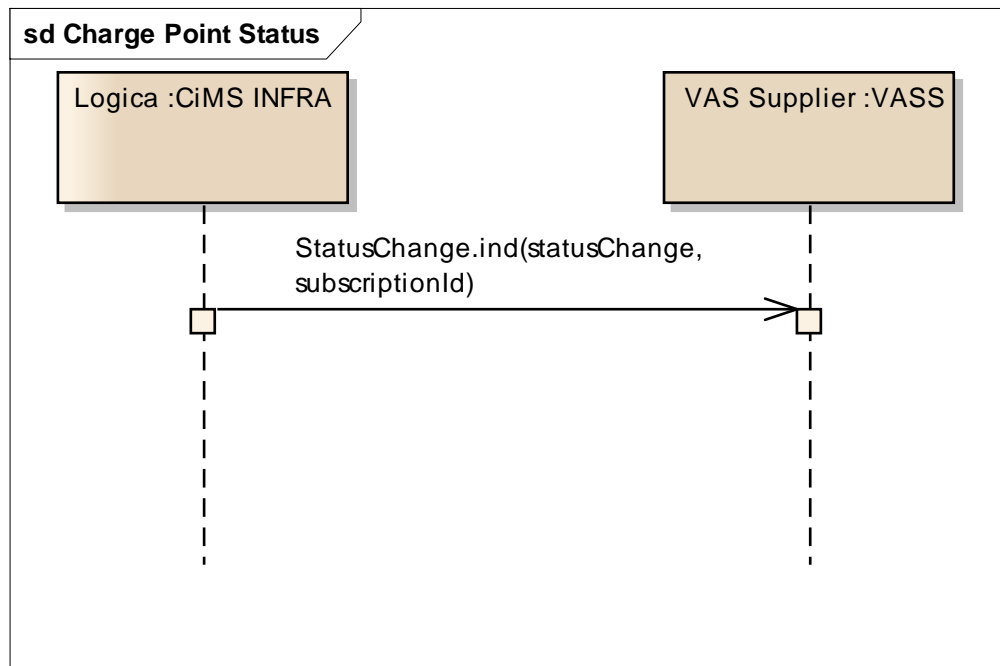


If a VAS supplier wishes to no longer receive status updates whenever a charge point changes state, it SHALL request this using the [Unsubscribe.req](#) PDU. Upon receipt CiMS SHALL respond with a [Unsubscribe.conf](#) PDU, which indicates whether termination of the subscription is accepted or rejected:

CiMS SHALL reject an unsubscribe request when VAS supplier does not have a subscription matching subscription ID. (see [SubscribeStatus](#)).

5 Operations initiated by CiMS

5.1 Status Change



CiMS SHALL send a [StatusChange.ind](#) PDU within one minute after a charge point has changed state. The possible states are described in by the enumeration [ChargePointStatus](#).

CiMS MAY combine several status changes into one request. The PDUs are sent as 'fire-and-forget'. No response is expected.

6 Messages

6.1 Unsubscribe.req

Message sent by VAS to request CiMS to stop the specific subscription to status change information.

Field Name	Field Type	Card.	Description
subscriptionId	int	1..1	Mandatory. Unique ID of subscription that is to be unsubscribed;

6.2 Unsubscribe.conf

Response sent by CiMS to confirm or reject an Unsubscribe.req.

Field Name	Field Type	Card.	Description
status	SubscribeStatus	1..1	Mandatory. Status indicating success or failure of unsubscribe request.

6.3 GetChargePointInfo.req

Message sent by VAS to request CiMS to send static information, including current status, of all charge points.

This PDU has no fields.

6.4 GetChargePointInfo.conf

Response sent by CiMS to return static information, including current status, of all charge points.

Field Name	Field Type	Card.	Description
chargePoint	ChargePoint	0..*	List of static information of charge points, including their actual status.

6.5 StatusChange.ind

Message sent by CiMS to sends a (list of) status changes.

Field Name	Field Type	Card.	Description
statusChange	StatusChange	1..*	Mandatory. Status change of a charge point.
subscriptionId	int	1..1	Mandatory. ID referring to the subscription for which this information is sent.

6.6 Subscribe.req

Message sent by VAS to request CiMS to start sending status changes every time they occur.

This PDU has no fields.

6.7 Subscribe.conf

Response from CiMS to confirm or reject subscription to status changes.

Field Name	Field Type	Card.	Description
status	SubscribeStatus	1..1	Mandatory. Status indicating success or failure of subscription.
subscriptionId	int	0..1	Optional. Unique ID for this subscription. Only optional, because in case of a status=Rejected there will be no subscriptionId.

7 Types

This section documents the XSD schema for this interface.

7.1 Accessibility

Enumeration

This lists the types of access to a charge point.

Field Name	Field Type	Description
FREE_PUBLIC		Freely accessible to the public.
PAYING_PUBLIC		Accessible to the public, but in a location with paid access, e.g. a paid parking.
RESTRICTED		Charge point not accessible to the public, e.g. restricted to private or company use.

7.2 ChargePoint

Class

This holds the static information of a charge point and its status at the time of the request.

Field Name	Field Type	Description
address	String	The address where the charge point is installed
chargingCapability	ChargingCapability	Mandatory. This is a list of currently envisioned charging capabilities. More than one may apply to a charge point.
chargingMode	ChargingMode	Mandatory. Supported charging mode.
city	String	The city in which the charge point is installed.
connectors	int	Mandatory. The number of connectors on this charge point.
connectorsFree	int	Mandatory. The number of currently free connectors on this charge point
connectorType	ConnectorType	Mandatory. Contains the type of connector the charge point supports. More than one may apply to a charge point.
coordinates	WGS84Coordinate	Mandatory. WGS84 coordinates of the charge point.

country	String	Country code where charge point is located. Code is according to ISO 3166 alpha-3 (http://unstats.un.org/unsd/methods/m49/m49alpha.htm)
hasFixedCable	boolean	Mandatory. Indicates whether charge point as a fixed cable attached. If so, then connectorType refers to the connector at loose end of the cable.
isReservable	boolean	Mandatory. Indicates whether charge point can be reserved.
openingPeriod	OpeningPeriod	Opening periods applicable to charge point.
operator	String	Mandatory. Operator of this charge point.
postalCode	String	The postal code where the charge point is installed.
public	Accessibility	This attribute indicates whether this ChargePoint is publicly accessible.
region	String	Region (province, state) in which the charge point is located.
status	ChargePointStatus	Mandatory. This contains the current status of this ChargePoint.
uid	String	Mandatory. This contains the unique identifier or name of a Charge Point by which it is known in the physical world.

7.3 ChargePointStatus

Enumeration

This lists the possible values for the status of a ChargePoint.

Field Name	Field Type	Description
AVAILABLE	n/a	This means that a charge point is available for charging.
OCCUPIED	n/a	This means that all connectors of a charge point are occupied.
UNAVAILABLE	n/a	The means that a charge point is (temporarily) out of service.
UNKNOWN	n/a	This means that the charge point cannot communicate with the central system. The charge point may still be available for charging, but the central

		system cannot determine if that's true. It could be that the charge point just couldn't communicate due to network problems.
--	--	--

7.4 ChargingCapability

Enumeration

This lists all currently envisioned charging capabilities.

Field Name	Field Type	Description
UNSPECIFIED	n/a	Unspecified
BATTERY_EXCHANGE	n/a	Battery exchange
120V_1_PHASE_10A	n/a	100-120V 1 phase 10A
120V_1_PHASE_12A	n/a	100-120V 1 phase 12A
120V_1_PHASE_16A	n/a	100-120V 1 phase 16A
240V_1_PHASE_10A	n/a	200-240V 1 phase 10A
240V_1_PHASE_12A	n/a	200-240V 1 phase 12A
240V_1_PHASE_16A	n/a	200-240V 1 phase 16A
240V_1_PHASE_32A	n/a	200-240V 1 phase 32A
240V_3_PHASE_16A	n/a	200-240V 3 phase 16A
240V_3_PHASE_32A	n/a	200-240V 3 phase 32A
480V_3_PHASE_16A	n/a	380-480V 3 phase 16A
480V_3_PHASE_32A	n/a	380-480V 3 phase 32A
480V_3_PHASE_63A	n/a	380-480V 3 phase 63A
DC_FAST_CHARGING		

7.5 ChargingMode

Enumeration

Charging modes supported by charge point as defined by IEC 61851. A charge point may support more than one charging mode, but one connector supports one charging mode.

Field Name	Field Type	Description
UNSPECIFIED		No charging mode specified.

MODE_1		Regular household charging.
MODE_2		Charging using a cable with a box to emulate mode 3.
MODE_3		High power charging with car and charge point negotiating the power to be delivered.
MODE_4		DC fast charging.

7.6 ConnectorType

Enumeration

List of all known connector types.

Field Name	Field Type	Description
unspecified		
small paddle inductive		
large paddle inductive		
avcon connector		
tesla connector		
sae J1772 (Yazaki)		
nema 5-20		
tepco (CHAdeMO fast charging)		
iec 62196-2 type 1 (Yazaki)		
iec 62196-2 type 2 (Mennekes)		
iec 62196-2 type 3 (Scame)		
60309 - industrial 2P (DC)		
60309 - industrial P + N + E (AC)		
60309 - industrial 3P + E (AC)		
60309 - industrial 3P + E + N (AC)		
domestic plug type A		

(NEMA 1-15 unpolarised)		
domestic plug type A (NEMA 1-15 polarised)		
domestic plug type A (JIS C 8303, Class II)		
domestic plug type B (NEMA 5-15)		
domestic plug type B (NEMA 5-20)		
domestic plug type B (JIS C 8393, Class I)		
domestic plug type C (CEE 7/16 Europlug)		
domestic plug type C (CEE 7/17)		
domestic plug type C (GOST 7396 C 1)		
domestic plug type D (BS 546, 2 pin)		
domestic plug type D (BS 546, 3 pin)		
domestic plug type E (CEE 7/5)		
domestic plug type F (CEE 7/4 Schuko)		
domestic plug type E+F (CEE 7/7)		
domestic plug type G (BS 1363, IS 401 & 411, MS 58)		
domestic plug type H (SI 32)		
domestic plug type I (AS/NZS 3112)		
domestic plug type I (CPCS-CCC)		
domestic plug type I (IRAM 2073)		
domestic plug type J (SEV 1011)		

domestic plug type K (Section 107-2-D1)		
domestic plug type K (Thailand TIS 166 - 2549)		
domestic plug type L (CEI 23-16/VII)		
domestic plug type IEC 60906-1 (2 pin)		
domestic plug type IEC 60906-1 (3 pin)		

7.7 OpeningPeriod

Class

This defines an opening period of a charging point. Usually a charge point will have one or more opening periods per day.

Field Name	Field Type	Description
endTime	Time	Mandatory. End time of the opening period. Refers to local time at the charge point location.
startTime	Time	Mandatory. Start time of the opening period. Refers to local time at the charge point location.
weekDay	WeekDay	Mandatory. Day of week

7.8 StatusChange

Class

This contains the last known status of a charge point.

Field Name	Field Type	Description
chargePoint	string	Mandatory. Unique identifier (uid) of charge point.
connectorsFree	int	Mandatory. Number of connectors currently free for charging.
status	ChargePointStatus	Mandatory. New status of charge point
timestamp	dateTime	Mandatory. Time (UTC) when status change occurred.

7.9 SubscribeStatus

Enumeration

Field Name	Field Type	Description
ACCEPTED		Subscription or unsubscription is accepted.
REJECTED		Subscription or unsubscription is not accepted.
DUPLICATE_IGNORED		Subscription request is ignored, because caller is already subscribed.

7.10WGS84Coordinate

Class

GPS location coordinates.

Field Name	Field Type	Description
latitude	float -90 <= latitude <= 90	Mandatory. Latitude of position in decimal degrees.
longitude	float -180 < longitude <= 180	Mandatory. Longitude of position in decimal degrees.

7.11WeekDay

Enumeration

This lists all days of the week to specify opening periods.

Field Name	Field Type	Description
MONDAY		
TUESDAY		
WEDNESDAY		
THURSDAY		
FRIDAY		
SATURDAY		
SUNDAY		

8 Binding to Transport Protocol

This section describes how the VAS PDUs can be conveyed over SOAP.

The rationale behind using SOAP as a transport is that SOAP already provides the infrastructure of sending messages. SOAP has a good support in the industry, which results in tools that improve the ease of implementing the protocol.

The used version of SOAP MUST be 1.2. See [SOAP].for a general description and [SOAP-SCEN] for the specific usage scenario "Event notification" used in this VAS interface specification to push status changes..

8.1 Identity Headers

VAS Supplier SHALL add a header with the element subscriberIdentity to each message. SubscriberIdentity is a string of maximum 15 characters to identify the VAS Supplier. Although this identifier is not currently used for authorization, it MUST be used with the same value consistently for each VAS Supplier.

In the same manner CiMS shall add a publisherIdentity header to all messages sent to VAS Supplier.

8.2 Fault Response

In cases where the receiving party (e.g. VAS or CiMS) cannot process the request and the corresponding confirmation PDU doesn't have to ability to report the error, then the SOAP Fault Response Message SHOULD be used. This can be used, for instance, when the operation is not implemented or when an internal error has occurred.

The following fault codes can be used by the service:

Value belongs to the namespace "http://www.w3.org/2003/05/soap-envelope".

SubCode belongs to the namespace "urn://Vas/Cs/2010/12".

- *Value* = Sender, *SubCode* = SecurityError; Sender failed authentication or is not authorized to use the requested operation.
- *Value* = Sender, *SubCode* = IdentityMismatch; Sender sent the wrong identity value.
- *Value* = Sender, *SubCode* = ProtocolError; Sender's message does not comply with protocol specification.
- *Value* = Receiver, *SubCode* = InternalError; An internal error occurred and the receiver is not able to complete the operation.
- *Value* = Receiver, *SubCode* = NotSupported; The receiver does not support the requested operation.

8.3 Compression

In cases where bandwidth needs to be reduced, a communicating party can use of the HTTP capability of compressing data. HTTP defines a 'Content-Encoding' header, which contains the compression method.

The VAS and CiMS MAY use HTTP compression. Compression can be performed on a HTTP request and/or response.

The VAS and CiMS MUST support the 'gzip' and 'deflate' compression methods. These are the most common compression methods.

When using compression, one should take great care if indeed the message size decreases. If the message is small, then it's possible that the compression will increase the size.

8.4 Security

Although the information carried over this interface is not privacy-sensitive, it is destined for a limited audience: VAS partners. Messages therefore need to be transported securely. The sender must be sure that the receiving party is the one intended and the receiving party must be sure that the sending party is a trusted source. To avoid exposure of private sensitive data, the transport of SOAP messages SHOULD be secured with SSL/TLS (e.g. HTTPS).

For a receiving party to trust a received message, the sending party SHOULD use a client certificate.

8.5 WSDL

The versions of the WSDL descriptions corresponding to this VAS description are:

- urn://Vas/Cs/2010/12

A Abbreviations

CIMS	Charge point interactive Management System
HTTP(S)	HyperText Transport Protocol (Secure)
SOAP	Simple Object Access Protocol
SSL	Secure Socket Layer
TLS	Transport Layer Security
URL	Uniform Resource Locator
WSDL	Web Service Definition Language

Version History

Version	Status	Date	Details of Changes	Author(s)
0.1	DRAFT	23.07.2010	Initial version	Franc Buve
0.2	DRAFT	16-09-2010	Updated with input from VAS suppliers	Franc Buve
0.3	DRAFT	17-09-2010	Review 120.002.020 incorporated	Franc Buve
0.4	DRAFT	29-10-2010	Change of PDUs. Replaced polling mechanisme for status info with publish- subscribe mechanism. Changed document layout.	Franc Buve
0.5	DRAFT	04-11-2010	Review 120.002.021	Franc Buve
0.6	DRAFT	21-11-2010	Issue #26526 CHAdEMO charging mode	Franc Buve
0.7	DRAFT	22-12-2010	Issue #26580 Typos corrected. Issue #26845 Updated after implementation.	Franc Buve
1.0	FINAL	22-02-2011	Issue #226 Using ISO country codes. Status final.	Franc Buve