



Open Charge Point Protocol 1.6

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Interface description between Charge Point and Central System

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Version History

VERSION	DATE	AUTHOR	DESCRIPTION
1.6 edition 2	2017-09-28	Robert de Leeuw <i>IHomer</i> Brendan McMahon <i>ESB ecars</i> Klaas van Zuuren <i>ElaadNL</i>	OCPP 1.6 edition 2 Final release. Contains all of the known erratas (including v3.0) and improved styling.
1.6	2015-10-08	Robert de Leeuw <i>IHomer</i> Reinier Lamers <i>The New Motion</i> Brendan McMahon <i>ESB ecars</i> Lambert Muhlenberg <i>Alfen</i> Patrick Rademakers <i>IHomer</i> Sergiu Tcaciu <i>smartlab</i> Klaas van Zuuren <i>ElaadNL</i>	1.6 Final Release. For changes relative to 1.5, see appendix New in OCPP 1.6 .
1.5	2012-06-01	Franc Buve	Specification ready for release. Includes: CR-01 Authentication/authorization lists CR-02 Interval meter readings CR-03 Charge point reservation CR-04 Generic data transfer CR-05 More detailed status notifications CR-06 Query configuration parameters CR-07 Timestamp in BootNotification mandatory CR-08 Response to StartTransaction.req with status other than Accepted is not clearly defined CR-09 Increase size of firmwareVersion in BootNotification
1.2	2011-02-21	Franc Buve	
1.0	2010-10-19	Franc Buve	Final version approved by e-laad.nl. Identical to version 0.12.

1. Scope

This document defines the protocol used between a **Charge Point** and **Central System**. If the protocol requires a certain action or response from one side or the other, then 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

2.1. 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], subject to the following additional clarification clause:

The phrase “valid reasons in particular circumstances” relating to the usage of the terms “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, and “NOT RECOMMENDED” is to be taken to mean technically valid reasons, such as the absence of necessary hardware to support a function from a charge point design: for the purposes of this specification it specifically excludes decisions made on commercial, or other non-technical grounds, such as cost of implementation, or likelihood of use.

All sections and appendixes, except “Scope” and “Terminology and Conventions”, are normative, unless they are explicitly indicated to be informative.

2.2. Definitions

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

Central System	Charge Point Management System: the central system that manages Charge Points and has the information for authorizing users for using its Charge Points.
CiString	Case Insensitive String. Only printable ASCII allowed.
Charge Point	The Charge Point is the physical system where an electric vehicle can be charged. A Charge Point has one or more connectors.
Charging Profile	Generic Charging Profile, used for different types of Profiles. Contains information about the Profile and holds the Charging Schedule . In future versions of OCPP it might hold more than 1 Charging Schedule .
Charging Schedule	Part of a Charging Profile. Defines a block of charging Power or Current limits. Can contain a start time and length.
Charging Session	A Charging Session is started when first interaction with user or EV occurs. This can be a card swipe, remote start of transaction, connection of cable and/or EV, parking bay occupancy detector, etc.
Composite Charging Schedule	The charging schedule as calculated by the Charge Point. It is the result of the calculation of all active schedules and possible local limits present in the Charge Point. Local Limits might be taken into account.
Connector	The term “Connector”, as used in this specification, refers to an independently operated and managed electrical outlet on a Charge Point. This usually corresponds to a single physical connector, but in some cases a single outlet may have multiple physical socket types and/or tethered cable/connector arrangements to facilitate different vehicle types (e.g. four-wheeled EVs and electric scooters).
Control Pilot signal	Signal used by a Charge Point to inform EV of maximum Charging power or current limit, as defined by [IEC61851-1].
Energy Offer Period	Energy Offer Period starts when the EVSE is ready and willing to supply energy.
Energy Offer SuspendPeriod	During a transaction, there may be periods the EnergyOffer to EV is suspended by the EVSE, for instance due to Smart Charging or local balancing.

Energy Transfer Period	Time during which an EV chooses to take offered energy, or return it. Multiple Energy Transfer Periods are possible during a Transaction.
Local Controller	Optional device in a smart charging infrastructure. Located on the premises with a number of Charge Points connected to it. Sits between the Charge Points and Central System. Understands and speaks OCPP messages. Controls the Power or Current in other Charge Point by using OCPP smart charging messages. Can be a Charge Point itself.
OCPP-J	OCPP via JSON over WebSocket
OCPP-S	OCPP via SOAP
Phase Rotation	Defines the wiring order of the phases between the electrical meter (or if absent, the grid connection), and the Charge Point connector.
Transaction	The part of the charging process that starts when all relevant preconditions (e.g. authorization, plug inserted) are met, and ends at the moment when the Charge Point irrevocably leaves this state.
String	Case Sensitive String. Only printable ASCII allowed. All strings in messages and enumerations are case sensitive, unless explicitly stated otherwise.

2.3. Abbreviations

CSL	Comma Separated List
CPO	Charge Point Operator
DNS	Domain Name System
DST	Daylight Saving Time
EV	Electrical Vehicle, this can be BEV (battery EV) or PHEV (plug-in hybrid EV)
EVSE	Electric Vehicle Supply Equipment [IEC61851-1]
FTP(S)	File Transport Protocol (Secure)
HTTP(S)	HyperText Transport Protocol (Secure)
ICCID	Integrated Circuit Card Identifier
IMSI	International Mobile Subscription Identity
JSON	JavaScript Object Notation
NAT	Native Address Translation
PDU	Protocol Data Unit
SC	Smart Charging

SOAP	Simple Object Access Protocol
URL	Uniform Resource Locator
RST	3 phase power connection, Standard Reference Phasing
RTS	3 phase power connection, Reversed Reference Phasing
SRT	3 phase power connection, Reversed 240 degree rotation
STR	3 phase power connection, Standard 120 degree rotation
TRS	3 phase power connection, Standard 240 degree rotation
TSR	3 phase power connection, Reversed 120 degree rotation
UTC	Coordinated Universal Time

2.4. References

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- | | |
|---------------------|---|
| [IEC61851-1] | "IEC 61851-1 2010: Electric vehicle conductive charging system - Part 1: General requirements"
https://webstore.iec.ch/publication/6029 |
| [OCPP1.5] | "OCPP 1.5: Open Charge Point Protocol 1.5" http://www.openchargealliance.org/downloads/ |
| [OCPP_1.6CT] | "OCPP 1.6 Compliance testing" http://www.openchargealliance.org/downloads/ |
| [OCPP_IMP_J] | "OCPP JSON Specification" http://www.openchargealliance.org/downloads/ |
| [OCPP_IMP_S] | "OCPP SOAP Specification" http://www.openchargealliance.org/downloads/ |
| [RFC2119] | "Key words for use in RFCs to Indicate Requirement Levels". S. Bradner. March 1997. http://www.ietf.org/rfc/rfc2119.txt |
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3. Introduction

This is the specification for OCPP version 1.6.

OCPP is a standard open protocol for communication between Charge Points and a Central System and is designed to accommodate any type of charging technique.

OCPP 1.6 introduces new features to accommodate the market: Smart Charging, OCPP using JSON over Websockets, better diagnostics possibilities ([Reason](#)), more Charge Point [Statuses](#) and [TriggerMessage](#). OCPP 1.6 is based on OCPP 1.5, with some new features and a lot of textual improvements, clarifications and fixes for all known ambiguities. Due to improvements and new features, OCPP 1.6 is not backward compatible with OCPP 1.5.

For a full list of changes, see: [New in OCPP 1.6](#).

Some basic concepts are explained in the sections below in this introductory chapter. The chapters: [Operations Initiated by Charge Point](#) and [Operations Initiated by Central System](#) describe the operations supported by the protocol. The exact messages and their parameters are detailed in the chapter: [Messages](#) and data types are described in chapter: [Types](#). Defined configuration keys are described in the chapter: [Standard Configuration Key Names & Values](#).

3.1. Edition 2

This document is OCPP 1.6 edition 2. This document still describes the same protocol: OCPP 1.6, only the documentation is improved. On message level there are no changes compared to the original release of OCPP 1.6 of October 2015. All known errata (previously published in a separate document) have been merged into this document, making it easier for the implementers to work with the specification. When there is doubt about the way OCPP 1.6 should be implemented, this document over rules the original document.

3.2. Document structure

With the introduction of OCPP 1.6, there are two different flavours of OCPP; next to the SOAP based implementations, there is the possibility to use the much more compact JSON alternative. To avoid confusion in communication on the type of implementation we recommend using the distinct suffixes -J and -S to indicate JSON or SOAP. In generic terms this would be OCPP-J for JSON and OCPP-S for SOAP.

To support the different flavours, the OCPP standard is divided in multiple documents. The base document (the one you are reading now) contains the technical protocol specification. The technical protocol specification must be used with one of the transport protocol specifications. the [OCPP SOAP Specification](#) contains the implementation specification needed to make a OCPP-S implementation. For OCPP-J, the [OCPP JSON Specification](#) must be used.

For improved interoperability between the Central Systems and Charge Points, it is advised to meet the requirements stated in the [OCPP 1.6 Compliance testing](#) documentation.

3.3. Feature Profiles

This section is normative.

In OCPP 1.6 features and associated messages are grouped in *profiles*. Depending on the required functionality, implementers can choose to implement one or more of the following profiles.

PROFILE NAME	DESCRIPTION
Core	Basic Charge Point functionality comparable with OCPP 1.5 [OCPP1.5] without support for firmware updates, local authorization list management and reservations.
Firmware Management	Support for firmware update management and diagnostic log file download.
Local Auth List Management	Features to manage the local authorization list in Charge Points.
Reservation	Support for reservation of a Charge Point.
Smart Charging	Support for basic Smart Charging, for instance using control pilot.
Remote Trigger	Support for remote triggering of Charge Point initiated messages

These profiles can be used by a customer to determine if a OCPP 1.6 product has the required functionality for their business case. Compliance testing will test per profile if a product is compliant with the OCPP 1.6 specification.

Implementation of the Core profile is required. Other profiles are optional.

When the profiles **Core**, **Firmware Management**, **Local Auth List Management** and **Reservation** are implemented, all functions originating from OCPP 1.5 [OCPP1.5] are covered.

The grouping of all messages in their profiles can be found in the table below.

MESSAGE	CORE	FIRMWARE MANAGEMENT	LOCAL AUTH LIST MANAGEMENT	REMOTE TRIGGER	RESERVATION	SMART CHARGING
Authorize	X					
BootNotification	X					
ChangeAvailability		X				
ChangeConfiguration	X					
ClearCache	X					
DataTransfer	X					
GetConfiguration		X				
Heartbeat	X					

MESSAGE	CORE	FIRMWARE MANAGEMENT	LOCAL AUTH LIST MANAGEMENT	REMOTE TRIGGER	RESERVATION	SMART CHARGING
MeterValues	X					
RemoteStartTransaction	X					
RemoteStopTransaction	X					
Reset	X					
StartTransaction	X					
StatusNotification	X					
StopTransaction	X					
UnlockConnector	X					
GetDiagnostics		X				
DiagnosticsStatusNotification		X				
FirmwareStatusNotification		X				
UpdateFirmware	X					
GetLocalListVersion			X			
SendLocalList			X			
CancelReservation				X		
ReserveNow				X		
ClearChargingProfile					X	
GetCompositeSchedule					X	
SetChargingProfile					X	
TriggerMessage						X

The support for the specific feature profiles is reported by the [SupportedFeatureProfiles](#) configuration key.

3.4. General views of operation

This section is informative.