

INTERNATIONAL STANDARD



Open Charge Point Protocol (OCPP)

ITeH Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 63584:2024](https://standards.iteh.ai/catalog/standards/iec/04227bdb-5f4e-427e-bf6c-196b7a5d9694/iec-63584-2024)

<https://standards.iteh.ai/catalog/standards/iec/04227bdb-5f4e-427e-bf6c-196b7a5d9694/iec-63584-2024>



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2024 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the IEC. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

ITeH Standards.iteh.ai
Document Preview

[IEC 63584:2024](#)

<https://standards.iteh.ai/catalog/standards/iec/04227bdb-5f4e-427e-bf6c-196b7a5d9694/iec-63584-2024>

INTERNATIONAL STANDARD



Open Charge Point Protocol (OCPP)

iteh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 63584:2024](https://standards.iteh.ai/catalog/standards/iec/04227bdb-5f4e-427e-bf6c-196b7a5d9694/iec-63584-2024)

<https://standards.iteh.ai/catalog/standards/iec/04227bdb-5f4e-427e-bf6c-196b7a5d9694/iec-63584-2024>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 43.120

ISBN 978-2-8327-0109-6

Warning! Make sure that you obtained this publication from an authorized distributor.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPEN CHARGE POINT PROTOCOL (OCPP)

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 63584 has been prepared by IEC technical committee 69: Electrical power/energy transfer systems for electrically propelled road vehicles and industrial trucks. It is an International Standard.

The text of this document is based on OCPP 2.0.1 Edition 3 FINAL, 2024-05-06. It was submitted to the National Committees for voting under the Fast Track Procedure. It is used with permission of the copyright holder: Open Charge Alliance.

The text of this International Standard is based on the following documents:

Draft	Report on voting
69/964/CDV	69/1028/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

The structure and editorial rules used in this publication reflect the practice of the organization which submitted it.

This document was drafted in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 63584:2024](#)

<https://standards.iteh.ai/catalog/standards/iec/04227bdb-5f4e-427e-bf6c-196b7a5d9694/iec-63584-2024>



iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[IEC 63584:2024](https://standards.itih.ai/catalog/standards/iec/04227bdb-5f4e-427e-bf6c-196b7a5d9694/iec-63584-2024)

<https://standards.itih.ai/catalog/standards/iec/04227bdb-5f4e-427e-bf6c-196b7a5d9694/iec-63584-2024>

OCPP 2.0.1
Part 0 - Introduction

Edition 3 FINAL, 2024-05-06

Table of Contents

Disclaimer	1
Version History	2
1. Introduction	3
1.1. OCPP version 2.0.1	3
1.2. Terms and abbreviations	3
1.3. References	4
2. New functionalities in OCPP2.0.1	5
2.1. Device Management	5
2.2. Improvements for better handling of large amounts of transactions	5
2.3. Improvements regarding cyber security	5
2.4. Extended Smart Charging	5
2.5. Support for ISO 15118	6
2.6. Improvements for customer experience	6
2.7. Transport Protocols: OCPP-J Improvements	6
2.8. Minor changes/extensions	7
3. OCPP 2.0.1 Documentation Structure	8
3.1. Overview of Specification Parts	8
3.2. Functional Blocks	9
3.3. All Functional Blocks and use cases	10
4. Basic implementation of OCPP 2.0.1	13

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 63584:2024](#)

<https://standards.iteh.ai/catalog/standards/iec/04227bdb-5f4e-427e-bf6c-196b7a5d9694/iec-63584-2024>

Disclaimer

The OCA hereby grants to IEC a license to fully exploit the OCPP for commercial and non-commercial purposes and to permit IEC National Committees to nationally adopt and translate OCPP under the applicable IEC policies. Notwithstanding the foregoing, IEC is not entitled to share adapted, altered, transformed or otherwise modified versions of the OCPP. Such license includes the right of IEC to grant sub-licenses to its members for purposes of national adoption, distribution and reproduction in any format including electronic for purposes of distribution on a commercial or non-commercial basis.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 63584:2024](#)

<https://standards.iteh.ai/catalog/standards/iec/04227bdb-5f4e-427e-bf6c-196b7a5d9694/iec-63584-2024>

Version History

Version	Date	Description
2.0.1 Edition 3	2024-05-06	OCPP 2.0.1 Edition 3. All errata from OCPP 2.0.1 Part 0 until and including Errata 2024-04 have been merged into this version of the specification.
2.0.1	2020-03-31	Final version of OCPP 2.0.1
2.0	2018-04-11	OCPP 2.0 April 2018 First release of this Introduction document

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[IEC 63584:2024](https://standards.itih.ai/catalog/standards/iec/04227bdb-5f4e-427e-bf6c-196b7a5d9694/iec-63584-2024)

<https://standards.itih.ai/catalog/standards/iec/04227bdb-5f4e-427e-bf6c-196b7a5d9694/iec-63584-2024>

1. Introduction

Electric Vehicles (EVs) are becoming the new standard for mobility all over the world. This development is only possible with a good coverage of Charging Stations. To advance the roll out of charging infrastructure, open communication standards play a key role: to enable switching from charging network without necessarily replacing all the Charging Stations, to encourage innovation and cost effectiveness and to allow many and diverse players participate in this new industry.

Additionally, the EV charging infrastructure is part of the Smart Grid, a larger and still evolving ecosystem of actors, devices and protocols. In this Smart Grid ecosystem, open communications standards are key enablers for two-way power flows, real time information exchange, demand control and eMobility services.

The Open Charge Point Protocol (OCPP) is the industry-supported de facto standard for communication between a Charging Station and a Charging Station Management System (CSMS) and is designed to accommodate any type of charging technique. OCPP is an open standard with no cost or licensing barriers for adoption.

1.1. OCPP version 2.0.1

This specification defines version 2.0.1 of OCPP.

After the release of OCPP 2.0, some issues were found in OCPP 2.0. Some of these issues could not be fixed issuing errata to the specification text only, as has been done with OCPP 1.6, but required changes to the protocol's machine-readable schema definition files that cannot be backward compatible.

To prevent confusion in the market and possible interoperability issues in the field, OCA has decided to name this version: 2.0.1. OCPP 2.0.1 contains fixes for all the known issues, to date, not only the fixes to the messages.

This version replaces OCPP 2.0. OCA advises implementers of OCPP to no longer implement OCPP 2.0 and only use version 2.0.1 going forward.

Any mentions of "OCPP 2.0" refers to revision 2.0.1 unless specifically stated otherwise.

1.2. Terms and abbreviations

This section contains the terminology and abbreviations that are used throughout this document.

1.2.1. Terms

Term	Meaning
Charging Station	The Charging Station is the physical system where an EV can be charged. A Charging Station has one or more EVSEs.
Charging Station Management System (CSMS)	Charging Station Management System: manages Charging Stations and has the information for authorizing Users for using its Charging Stations.
Electric Vehicle Supply Equipment (EVSE)	An EVSE is considered as an independently operated and managed part of the Charging Station that can deliver energy to one EV at a time.
Energy Management System (EMS)	In this document this is defined as a device that manages the local loads (consumption and production) based on local and/or contractual constraints and/or contractual incentives. It has additional inputs, such as sensors and controls from e.g. PV, battery storage.

1.2.2. Abbreviations

Term	Meaning
CSO	Charging Station Operator
CSMS	Charging Station Management System
EMS	Energy Management System.
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
RFID	Radio-Frequency Identification

1.3. References

Table 1. References

Reference	Description
[IEC61851-1]	IEC 61851-1 2017: EV conductive charging system - Part 1: General requirements. https://webstore.iec.ch/publication/33644
[IEC62559-2:2015]	Definition of the templates for use cases, actor list and requirements list. https://webstore.iec.ch/publication/22349
[ISO15118-1]	ISO 15118-1 specifies terms and definitions, general requirements and use cases as the basis for the other parts of ISO 15118. It provides a general overview and a common understanding of aspects influencing the charge process, payment and load leveling. https://webstore.iec.ch/publication/9272
[OCPP1.5]	http://www.openchargealliance.org/downloads/
[OCPP1.6]	http://www.openchargealliance.org/downloads/

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[IEC 63584:2024](#)

<https://standards.itih.ai/catalog/standards/iec/04227bdb-5f4e-427e-bf6c-196b7a5d9694/iec-63584-2024>

2. New functionalities in OCPP2.0.1

OCPP 2.0.1 introduces new functionalities compared to OCPP 1.6 [\[OCPP1.6\]](#).

Due to improvements and new features, OCPP 2.0.1 is not backward compatible with OCPP 1.6 [\[OCPP1.6\]](#) or OCPP 1.5 [\[OCPP1.5\]](#).

2.1. Device Management

Device Management (also known as Device Model) is a long awaited feature especially welcomed by CSOs who manage a network of (complex) charging stations (from different vendors).

It provides the following functionality:

- Inventory reporting
- Improved error and state reporting
- Improved configuration
- Customizable Monitoring

This all should help CSOs to reduce the costs of operating a Charging Station network.

Charging Station Manufacturers are free to decide themselves how much details about a Charging Station they want to publish via Device Management: for example, they can decide what can be monitored, and what not.

2.2. Improvements for better handling of large amounts of transactions

2.2.1. One message for all transaction related functionalities

With the growing of the EV charging market, the number of Charging Stations and transactions that the CSMS needs to manage also grows. The structure and method for reporting transaction is unified in OCPP 2.0. In OCPP 1.x, the reporting of transaction data is split over the messages StartTransaction, StopTransaction, MeterValue and StatusNotification. With the market progressing towards more enhanced scheduling, a need is born for more sophisticated handling of transaction data. All the StartTransaction, StopTransaction, and transaction related MeterValue and StatusNotification messages are replaced by 'TransactionEvent'. The StatusNotification message still exists, but only for non-transaction related status notifications about connector availability.

[IEC 63584:2024](#)

2.2.2. Data reduction

With the introduction of JSON over Websockets in OCPP 1.6 [\[OCPP1.6\]](#) a great reduction of mobile data cost can be achieved. With OCPP 2.0, support for WebSocket Compression is introduced, which reduces the amount of data even more.

2.3. Improvements regarding cyber security

The following improvements have been added to harden OCPP against cyber attacks:

- Security profiles (3 levels) for Charging Station and/or CSMS authentication and Communication Security
- Key management for Client-Side certificates
- Secure firmware updates
- Security event log

2.4. Extended Smart Charging

In OCPP 2.0.1 Smart Charging functionality has been extended (compared to OCPP 1.6 [\[OCPP1.6\]](#)) to support:

- Direct Smart Charging inputs from an Energy Management System (EMS) to a Charging Station
- Improved Smart Charging with a local controller
- Support for integrated smart charging of the CSMS, Charging Station and EV ([\[ISO15118-1\]](#)).

2.5. Support for ISO 15118

The ISO 15118 standard [ISO15118-1] is a newer protocol for EVSE to EV communication, compared to IEC 61851 [IEC61851-1]. ISO 15118 allows a lot of new features and more secure communication between EVSE and EV. OCPP 2.0.1 supports the ISO 15118 standard, the newly added features are:

- Plug & Charge
- Smart Charging including input from the EV

2.6. Improvements for customer experience

2.6.1. More authorization options

OCPP 1.x was designed (mainly) for Charging Stations that authorize an EV driver via an RFID card/token. If other authorization systems or a mix of systems are used, the CSMS needs to know what system is used for which authorization. OCPP 2.0.1 has been extended to support things like: 15118 Plug & Charge [ISO15118-1], Payment Terminals, local mechanical key, Smart-phones, etc.

2.6.2. Display Messages

This provides Charging Station Operators with the possibility to configure - from the CSMS - a message on a Charging Station to be displayed to EV drivers. Messages can be transaction related or global.

2.6.3. EV Driver preferred languages

To be able to show messages to an EV driver in a language the driver understands best, OCPP 2.0.1 provides the possibility to send the language preference of a driver to a Charging Station.

2.6.4. Tariff and Costs

OCPP 2.0.1 allows Charging Stations to show the applicable tariff/price before an EV driver starts charging, to show the running total cost during a charging transaction and/or to show the final total cost after the transaction is finished.

2.7. Transport Protocols: OCPP-J Improvements

2.7.1. Simple Message routing

A description has been added on how to create a simple solution for OCPP message routing in, for example, a Local Controller. This is defined in Part 4, Section 6: OCPP Routing.

2.7.2. No SOAP Support

OCPP 2.0.1 no longer supports SOAP as a transport protocol. This decision was taken by the OCA members, who believe that the protocol does no longer lend itself for constrained computing resources that many Charging Stations operate under. The verbosity of the protocol could lead to slower performance and requires a higher bandwidth, which, in many cases, leads to higher cellular costs. SOAP is also difficult to support when communication is via local site networking.

2.8. Minor changes/extensions

2.8.1. Renamed messages

In the OCPP 1.x series, the names of all messages were kept unchanged for backward compatibility, even though some message names were found to be confusing or misleading in practice. In OCPP 2.0.1 message names have been changed, where appropriate, to improve clarity and understanding.

Example: RemoteStartTransaction.req: a lot of implementers thought it meant the Charging Station should start the transaction, but in fact it is a request to try to start a transaction. However, for example, if no cable is plugged in, no transaction can be started. Since the message was always intended to be a request, it has been changed to a more logical name: RequestStartTransactionRequest.

2.8.2. TransactionId Identification & Message Sequencing

In OCPP 2.0, transaction identifiers are generated by the Charging Station, to facilitate offline charging sessions, in contrast to OCPP 1.x, where transaction identifiers were generated at the CSMS and sent to the Charging Station. In addition, all messages relating to a transaction are assigned incremental sequence numbering, to facilitate transaction data completeness checking at the CSMS.

2.8.3. Extended enumerations

Many enumerations have been extended to support more use cases, provide more options etc.

2.8.4. Offline Transaction Event Indication

Charging Stations can optionally indicate in transaction messages that a transaction event occurred while the Charging Station was Offline. This can assist a CSMS with the processing of transactions.

2.8.5. Personal message

Message that can be shown to the EV Driver and can be used for tariff information, user greetings and for indicating why a driver is not authorized to charge. When a driver uses an authorization method (RFID for example) and the CSMS does not authorize the driver to start charging, this field can thus contain additional reasons to provide the driver with a meaningful explanation why (s)he is not allowed to charge.