OCPP Chronicles

2009 - 2023

Since 2009, OCPP is helping the EV Charging Industry around the world to develop open, secure and state of the art charging systems.

OCPP helps the EV charging industry to grow, to compete and to improve! OCPP enables freedom for hardware manufacturers to join any charging network and vice versa: for charging networks to choose any type or brand of charging station. OCPP is developed by many companies in the industry around the world, which means that ideas and solutions are shared, challenged and improved upon. New market participants bring new ideas and solutions. Global participation by the charging infrastructure industry, OEMS, Utilities, Academia and more ensures that the EV charging technology accommodates all needs.

This paper presents the beginning and objects of OCPP, and its development over the years. It describes its relation with Standards Developments Organizations and OCAs plans for the bright future!

1. The beginning of OCPP

In 2009 ElaadNL, the non-profit organization founded by the Dutch DSOs, started OCPP, the Open Charge Point Protocol. ElaadNL was aiming to install 10.000 charging stations in the Netherlands, wanted to procure these from different vendors, and therefor asked this emerging market for a standard way of exchanging information. Since there was no standard available this early in the industry, ElaadNL decided to start writing OCPP. In 2010 OCPP1.0 was published, followed by OCPP1.5 in 2012. From the very beginning, ElaadNL made this protocol freely available, to support the growing industry. With the growing adoption and support for OCPP, ElaadNL transferred OCPP to the Open Charge Alliance (OCA) in 2014, a non-profit foundation under Dutch Law. The two co-founders of OCA are ESB, the Irish Utility and Greenlots, back then a US based startup in EV charging networks.

In its Deed of Incorporation of January 2014, the Open Charge Alliance has stated its objects:

a. *to foster development, adoption, and compliance of the OCA Standards and any other additional standards in connection therewith, specifically the Open Charge Point Protocol (OCPP), globally through collaboration, education, testing, and certification;*

b. *to improve compliancy of Charge Points and Charge Point Management Systems working with these protocols by establishing and offering testing, compliancy and certification programs;*

c. *to promote the awareness, adoption, and success of Electric Vehicle charging systems based on to OCA Standards via outreach to constituencies including regulators, system operators, consultants and system integrators, system and equipment vendors, manufacturers of Electric Vehicles, and end customers (Electric Vehicle drivers);*

d. to obtain and hold intellectual property assets and to make such intellectual property assets gen-
    erally available in the most unencumbered form practicable; and

e. the performance of everything related or conducive to the above, all this in the broadest sense of
    the word.

2. The Open Charge Alliance objects in practice

Over the past 9 years OCA has worked hard, together with its participants, to translate these objects
into activities.

A) Protocol Development of OCPP

a. *to foster development, adoption, and compliance of (..) OCPP, globally through collaboration, edu-
    cation, testing, and certification;*

OCA has set up working groups: the Technology Working Group is in charge of developing the proto-
col OCPP and whitepapers and application notes; the Compliancy Working Group is in charge of de-
veloping test cases, test procedures & plans and the outlines of the certification program.

These working groups are open to all members and meet online in general on a bi-weekly basis. On
occasion face to face meetings are organized (twice a year).

Group decisions are in principle determined by consensus during meetings/calls. If no consensus is
reached, a deferral may be made to allow wider participation and/or further reflection, or a vote
(simple majority or a multi-round elimination among three or more options) is held.

B) Testing, compliancy and Certification

b. *to improve compliancy (..) by establishing and offering testing, compliancy and certification pro-
    grams;*

Since 2018 OCA organizes 'Plugfests', where participants can join in person or online for interopera-
bility testing. These Plugfests are held 3 times a year, are free of charge and are open to OCA mem-
bers and non-members alike.

OCA is developing conformance testing tools, with which vendors can check their implementation for
conformance to the OCPP specification. The aim is to help expedite the development of the EV charg-
ing industry, and provide a tool that can be used for certification testing.

OCA has contracted independent testing laboratories (to date 3 testing laboratories (DEKRA, DNV
and KSGA) operating in 7 locations in Asia, North America and Europe). These laboratories execute
the certification tests, provide the test reports to OCA and the vendor. OCA then issues and publishes

the OCPP compliance certificate. With this certificate, vendors can show their correct implementation of the specification to buyers and buyers can verify that they are buying OCPP compliant products. To date 325 OCPP Conformance certificates have been issued and are valid globally.

Test labs are located in regions where OCPP is being adopted, to help the industry and legislators in that region.

C) OCPP promotion

c. to promote the awareness, adoption, and success of Electric Vehicle charging systems based on to OCA Standards via outreach to constituencies including regulators, system operators, consultants and system integrators, system and equipment vendors, manufacturers of Electric Vehicles, and end customers (Electric Vehicle drivers);

OCA provides all information for free on the OCA website. Webinars are organized frequently to promote and educate regarding specific topics. These webinars are free to join for anyone, and are afterwards made available on the OCA YouTube channel.

OCPP is recommended or mandated in various regions of the world by Governments and Regulators. In these global regions, OCA engages with these Legislators to learn their specific requirements, timelines and preferences. Recent examples are the publication of the 'OCPP and UK EV Regulation 2021' whitepaper (September 2022) and the 'OCPP and (Californian) DMS EVSE Regulation' (July 2020) and the new "mode 1/2" charging station certification for Korea (February 2023).

Since OCPP is used globally and needs vary across the globe, this close cooperation is very important and one of the top priorities of OCA.

D) OCPP is an Open Source Standard

d. to obtain and hold intellectual property assets and to make such intellectual property assets generally available in the most unencumbered form practicable; and

OCPP is an open source standard. OCPP is patent and royalty free with no cost or licensing barriers. To avoid forking and fragmentation of the market the OCPP specification is made available under the *'Creative Commons Attribution-No Derivatives 4.0 International Public License'* and the OCPP logo is trademarked.

OCA believes Open Source Standards are key:

- Through open cooperation and social development ideas and solutions are shared, challenged, improved upon and finally adopted and supported by all.
- Open development allows for competition of many players, pushing all parties to be the best they can be.
- Open development allows for inclusion of new entrants, bringing ideas, solutions and capabilities from other, perhaps more advanced industries into existing industries.

OCPP is freely downloadable, in the last year the specification has been downloaded to more than 70.000 individual IP addresses in 142 countries worldwide. As such, the frontrunner EV charging industry players are helping and inspiring new comers to the market, providing a low barrier to entry and getting them off to a head's start.

When OCA was targeted with litigation threats regarding IP infringement, OCA has joined forces with the Open Invention Network (OIN), the largest patent non-aggression community in history that supports freedom of action in Linux as a key element of Open Source Software (OSS).

Because of OCA's no-IP policy, only participants that have signed the OCA Participant Agreements' IP policy are allowed to contribute to the OCPP specification. Still, to be as inclusive and open as possible, the OCPP specification, testing tools, certification program, webinars and plugfests are available for everyone, OCA participant or not.

E) And everything else that helps the development of EV charging infrastructure

e. the performance of everything related or conducive to the above, all this in the broadest sense of the word.

While OCPP connects the charging stations with Charging Station management systems, it also provides a gateway to exchange information with EVs and the electricity grid. OCA works with partners to connect with other standards (e.g. ISO 15118, CHAdeMO, OpenADR, IEEE 2030.5 and IEC61850). Since OCPP is used globally and globally there are already various established standards in the field, OCPP aims to work with all. One end to end protocol is not feasible, but helping industry connect both worlds is.

3. OCPP responding to market needs

The OCPP development started back in 2009 and has shown a steady development cycle of about three years. Every three years, progress made and lessons learned in the industry justified a protocol update with new features.
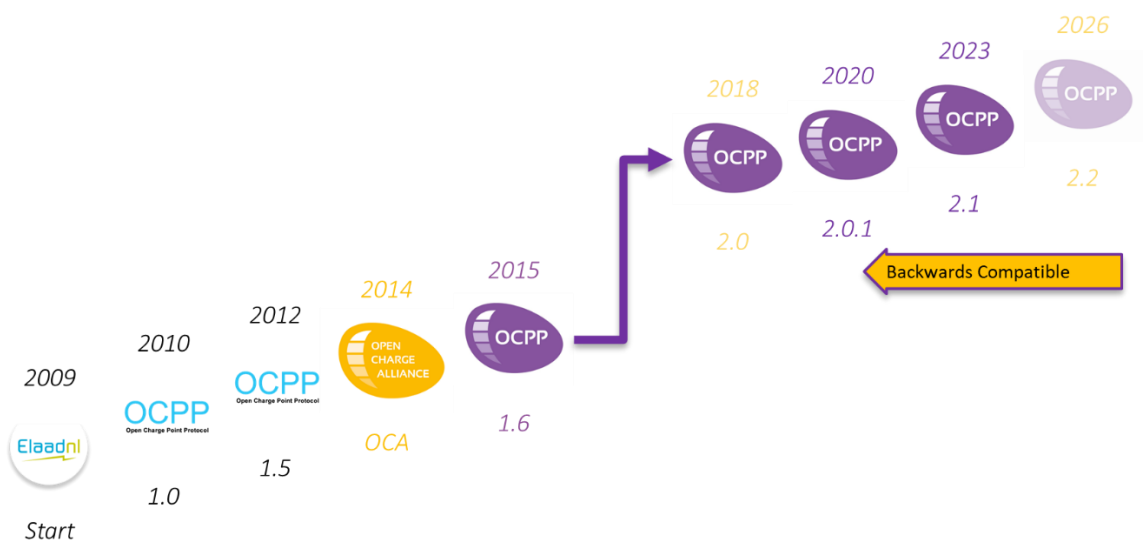
The market needs, lessons learned and bugfixes provided by OCPP implementers and legislators across the world offer an agile way to let innovation and experimentation go hand in hand with standardization. Once an OCPP protocol version is published, OCA issues an Errata list every 2 years.
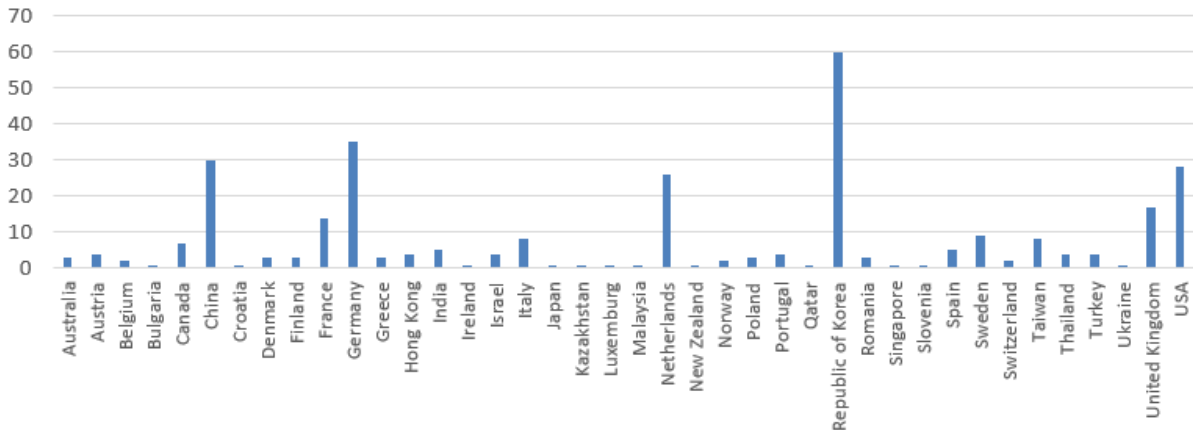
With the step change made from the OCPP1.x series to the OCPP2.x series, the adoption of the latest version of OCPP2.0.1 has proven to be a big job. The lack of backwards compatibility between OCPP1.6 and OCPP2.0.1 has been holding many companies back. That is why in future OCPP 2.x versions will be backwards compatible with OCPP2.0.1.

4. OCPP across the world

OCPP is used across the world. The protocol has been downloaded since 2015 to more than 70.000 individual IP addresses to 146 countries (see graph below), inspiring and helping developers in all regions to develop EV charging infrastructure.
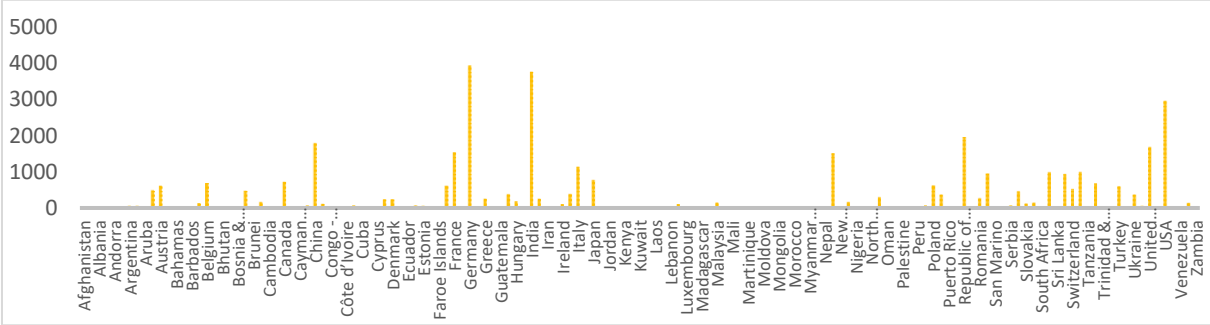
Since OCPP is an open source standard, developers can implement it without joining the Open Charge Alliance. Still, when developers want to be more involved in the development of OCPP, they can opt to become a member of OCA. Today, 335 companies from 41 countries are OCA participants.

A bar chart showing values by country (0–70 scale): Australia, Austria, Belgium, Bulgaria, Canada, China (~30), Croatia, Denmark, Finland, France (~14), Germany (~35), Greece, Hong Kong, India, Ireland, Israel, Italy (~8), Japan, Kazakhstan, Luxemburg, Malaysia, Netherlands (~26), New Zealand, Norway, Poland, Portugal, Qatar, Republic of Korea (~60), Romania, Singapore, Slovenia, Spain, Sweden (~9), Switzerland, Taiwan (~8), Thailand, Turkey, Ukraine, United Kingdom (~17), USA (~28).

5. Ambitions of OCA for the future

We are only at the beginning of the transition to Electric mobility. As more and more countries adopt EV charging, and more and more industries join in (shipping, aircraft), the requirements for OCPP keep evolving. Some markets require more sophisticated functionalities (such as grid frequency support), others require more straightforward features, such as prepayment support. OCA and OCPP will support all these developments, since they all contribute to the success and growth of EV charging.

Additionally, to support this ever growing group of developers, OCA aims to develop training programs with professional educational institutions.

OCA will support OCPP1.6 for as long as the industry requires, with errata maintenance, plugfests, white paper publications, the OCPP 1.6 Conformance Testing Tool and the Certification Program.

OCA will support the OCPP2.x series for as long as the industry requires, with the development of new functionalities, errata maintenance, plugfests, white paper publications, the OCPP2.x conformance Testing Tool and the Certification Program.

If the industry desires, OCPP will make another step change, to an OCPP3.x series.

6. OCPP and Standards Development Organizations

The Open Charge Alliance is an Industry association solely focused on fostering one specific standard, OCPP, and on the beforementioned testing, certification, promotion and outreach. It is not a Standards Development Organization (SDO) such as OASIS, IEC, IEEE or ISO. These type of organizations have a broader – and at the same time more limited – scope. They foster many different standards covering a broad range of topics. However, they are limited to protocol development only and do not cover testing, certification, promotion and outreach. These activities are usually addressed by industry associations (e.g. CharIN for ISO 15118, OpenADR for IEC 62746-10-1 ED1, UCAIug for IEC 61850)

and commercial organizations for test tool development (e.g. Keysight for ISO 15118, Quality Logic for OpenADR, DNV for IEC 61850).

In 2016 OCAs members asked OCA to consider transferring the OCPP protocol development to a Standards Development Organization. In certain jurisdictions, legislators are familiar with these established SDOs and trust their tried and tested methods to result in good standards. OCA was at the time a much less known organization with 64 participants. OCA evaluated IEEE, SAE, IEC and OASIS.

6.1 Standardization at OASIS

The Open Source nature of OCPP was and is very important to OCA and its participants, so OCA looked for an SDO that could allow for an open source standard. Also, given the developing nature of the EV charging industry, OCA looked for an SDO that could develop a standard within a few years. Of all the SDOs, OASIS was the only SDO that would offer a 'Non-Assertion Mode' standard and an expedite development process of 18 months. Additionally, under the cooperation agreement between OASIS and IEC, a future path to an IEC standard was offered (a similar approach had been taken with OpenADR).

In September 2016 the work started at OASIS. In November 2016 the then US market leader, ChargePoint made litigation threats to OASIS and the Open Charge Alliance. The claims were trademark infringement (OCPP stands for Open Charge Point Protocol), patent infringement (ChargePoint owns a patent portfolio), unfair competition, restraint of trade and violation of the Sherman act. As a consequence of this legal threat, OASIS management forced a ballot in the Technical Committee in December 2016 to change the IP policy to 'RAND', and allow for inclusion of Third Party IP. Unanimously the members of the TC voted against this proposal by OASIS, and as a consequence OASIS terminated the TC on December 23rd 2016.

Undaunted and determined to continue the Open Source development for the benefit of the industry, OCA decided to continue the development of OCPP as before, under the guidance, support and protection of the Open Charge Alliance.

6.2 Standardization at IEC

In July 2016 OCA asked for a liaison between the Open Charge Alliance and IEC TC57 ('*Power systems management and associated information exchange'*) and TC69 (*'Electrical power/energy transfer systems for electrically propelled road vehicles and industrial trucks'*), which was approved in that same month as a liaison D (Category D liaison organizations have the right to participate as full members in a working group, maintenance team or project team but not as project leaders or convenors).

In September 2016 Germany and in October 2016 France submitted a New Work Item Proposal to IEC. It was decided in November 2016 to start a new WG under the joint leadership of both France and Germany.

In January 2017 the JWG11 (*'Management of Electric Vehicles charging and discharging infrastructures'*) started. In February 2018 OCA contributed the Enterprise Architect files of the Information Model of OCPP2.0 and several OCA members have been participating in the IEC JWG11 over the past 6 years.

In 2022 IEC published the 63110-1 Use case document. In April 2023 the IEC Standards Management Board announced that all projects already older than 5 years and not having reached the approval stage would be cancelled on 30 June 2023 (in line with the ISO/IEC Directives Part 1 Clause 2.1.6). This included the work on IEC 63110. IEC JWG11 is discussing if they should submit a new work item proposal to TC69 and ask for approval to restart work.

With the support and encouragement of the European Commission, in July 2023 IEC and OCA have agreed to propose to TC69 to adopt OCPP 'as-is' as an IEC International Standard. If the proposal gets the positive vote of the National Committees (in this case under TC69), OCPP2.0.1 will be an IEC International Standard by the end of 2023. The Open Charge Alliance will remain the maintaining organization of the current and future versions of OCPP.

7. Global adoption of OCPP

In September 2021 the Korean Government made OCPP a prerequisite for government funding. The State of California did the same in July 2022, the US Federal Government in February 2023 (https://www.federalregister.gov/documents/2023/02/28/2023-03500/national-electric-vehicle-infrastructure-standards-and-requirements). These decisions boosted the development and interoperability of OCPP in their industries. Before their OCPP mandates, both the Korean Government, Californian and US Government solicited feedback from their industries on their proposed mandate for OCPP.

7.1 The European Commission mandate for Europe

With the ambitious European climate goals and transition to zero emissions transportation by 2035, the EC wants to be a leader in setting EV charging standards.

In March of 2022 the EC has asked Cenelec to set a standard for the European Union, no later than December 2023 (Commission Implementing Decision M/581).

The European Commission has a preference to refer to standards of Standards Development Organizations, in particular IEC or ISO. These organizations work with a One Country – One Vote – system (as opposed to e.g. IEEE that works with a 'One Company – One Vote system'). This means that the European Union is represented by 27 votes, whereas the US or China have 1.

The European Commission has asked IEC and OCA to work together to make OCPP available to IEC before the end of 2023.

7.2 OCPP going forward

OCA remains committed to the objects defined in the deed of incorporation of 2014: to foster development, adoption, and compliance of OCPP globally; to offer testing, compliancy and certification programs; to promote the awareness, adoption, and success of Electric Vehicle charging systems; to obtain and hold IP assets and to make such IP assets generally available in the most unencumbered form practicable, and everything related or conducive to the above.

8. More information

More information about the Open Charge Alliance and OCPP can be found on the OCA website: www.openchargealliance.org.
- The OCPP2.0.1 specification itself: https://www.openchargealliance.org/downloads/
  - o Part 0 – Introduction
  - o Part 1 – Architecture & Topology
  - o Part 2 - Specification
  - o Part 2a - Appendices
  - o Part 3 – JSON schemas
  - o Part 4 – Implementation Guide
  - o Part 5 – Certification Profiles
  - o Part 6 – Test Cases
- Whitepapers and application notes: https://www.openchargealliance.org/about-us/info-en-whitepapers/
- The Certification Procedures and Test Plans: https://www.openchargealliance.org/certification/ocpp-201-certification/
- All issued OCPP conformance certificates: https://www.openchargealliance.org/certification/certified-companies-201/

Additionally, on the Open Charge Alliance Youtube channel, the recordings of all OCA webinars are available: https://www.youtube.com/@openchargealliance8146/videos.