



OCPP API Documentation

- Charge Amps Aura

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1. About this document

1.1. Summary

This document describes the OCPP API support of the Charge Amps Aura EVSE.
The target audience of this document is technical staff performing direct integration Aura EVSEs into their CPMS.

1.2. Changelog

| FW version | Description |
|----------------|---|
| 127 | First release of this document. |
| 133 | Update for firmware version 133; add High Level Supervision keys. |
| 134 | No changes |
| 138 | No changes |
| 138 revision 2 | Additional information on Remote Debug and Security profiles |
| 140 | No changes |
| 141 | Update defaults for HlSuperv and HlSupervCharge Update on UserCurrent, AssignedCurrent and AssignedPhase |
| 142 | Adjust limit on HlSuperv |
| 143 | No changes |
| 144 | Add DataTransfer ChargingLimitations |
| 145 | No changes |
| 146 | No changes |
| 147 | Update firmware image download location |
| 148 | No changes |
| 149 | No changes |

1.3. Acronyms

| Acronym | Description |
|---------|--|
| CPMS | Chargpoint Management System. Also known as CSMS, Charging Station Management System. |

| | |
|-------------|--|
| EVSE | Electric Vehicle Supply Equipment |
| LMI | Local Management Interface. For local connection to and configuration of the EVSE using a Wi-Fi hotspot of the EVSE or over a local network. |
| OCA | Open Charge Alliance |
| OCPP | Open Charge Point Protocol, specified by OCA. |

1.4. References

| Nr | Description | Link |
|-----------|--|---|
| 1 | OCPP 1.6 specification from Open Charge Alliance | https://www.openchargealliance.org/protocols/ocpp-16/ |

2. OCPP Compliance

OCPP version supported: **OCPP-J 1.6**

2.1. Supported feature profiles

The following feature profiles of OCPP 1.6 are supported.

| Profile Name | Supported | Comments |
|----------------------------|-----------|-----------------|
| Core | YES | |
| Firmware Management | YES | |
| Local Auth List Management | YES | |
| Reservation | NO | |
| Smart Charging | PARTLY | See Deviations. |
| Remote Trigger | PARTLY | See Deviations. |

2.2. Security Profiles

2.2.1. Default behavior

A newly installed Aura EVSE without any change to its configuration has the following default behavior when initializing its connection to the OCPP server.

| Security Aspect | Default Behavior |
|-------------------------------|--|
| Encryption (TLS) | Controlled by protocol scheme in the <i>Server</i> configuration key. E.g., "ws:" or "wss:" |
| Charge Point Authentication | None. |
| Central System Authentication | Using non-verified server-side certificate. |

Defaults for security related configuration keys:

| Configuration Key | Default Value |
|-------------------|------------------------------|
| ChargePointId | Serial number of the EVSE |
| AuthorizationKey | "" |
| Server | wss://ocpp.charge.space/ocpp |

2.2.2. Increasing security

The standard OCPP key *AuthorizationKey* contains the password used in basic authentication, where the EVSE authenticates itself towards the CPMS using a username and password. By default, the *AuthorizationKey* is empty and by configuring it from the CPMS, the EVSE will start using basic authentication when connecting to the CPMS, using the configured *AuthorizationKey* as the password and the *ChargePointID* as the username.

| AuthorizationKey | |
|------------------|---|
| Description | Password used for basic authentication when the EVSE connects to the OCPP server. Reading this key will always return an empty string for security reasons. |
| Read/Write | W |
| Type | String, 16 to 20 bytes long. Represented as 32 to 40 hexadecimal digits. |
| Values | - |
| Default | - (no default) |

2.2.3. Recommendations

For security profile level 2, the installed certificate is limited by the available hardware resources. Certificate key size is recommended to be maximum 2048 bit. Server certificate chain is recommended to be up total of three certificates excluding the installed certificate. Variations of key size and number of certificates in the certificate chain is possible but should be thoroughly tested.

2.3. Meter values

The EVSE supports sampled meter data, which is frequently (per default every 30 seconds) sent to the central system in *MeterValues* messages during an ongoing transaction. At the end of the transaction the *StopTransaction* message includes the final meter value of the connector when charging stopped.

Clock aligned meter values for temperature measurement are supported.

2.4. Firmware Upgrade

New firmware packages, **AURA_FW_UPGRADE_####**, can be retrieved from Charge Amps web <https://www.chargeamps.com/firmware-updates/>.

Supported file transfer protocols for downloading new firmware packages: **FTP**

2.5. Get Diagnostics

The output of a GetDiagnostics operation is an EVSE log file for more advanced troubleshooting.

Supported file transfer protocols for uploading diagnostics: **FTP**

3. Vendor extensions

3.1. Vendor-specific data transfer messages

There are no implemented custom data transfer messages except for internal troubleshooting by Charge Amps while connected to Charge Amps CPMS.

3.2. Custom configuration keys

This section specifies the custom configuration keys added by Charge Amps on top of the standard configuration keys from OCPP specification.

3.2.1. Read-only capabilities of the EVSE

| MaxCurrent | |
|-------------|--|
| Description | Maximum current that can be delivered by the EVSE. |
| Read/Write | R |
| Type | CSL |
| Values | - |
| Default | 0.64,1.32,2.32 |

| MaxPhases | |
|-------------|--|
| Description | Maximum number of phases for the EVSE. |
| Read/Write | R |
| Type | Integer |
| Values | - |
| Default | 3 |

| ACPhaseSwitchingSupported | |
|---------------------------|---|
| Description | Informs that the EVSE supports selection of and switching between phases for 1-phase charging and supports the <i>phaseToUse</i> property in smart charging profiles. |
| Read/Write | R |
| Type | Boolean |
| Values | - |
| Default | true |

| HardwareVersion | |
|-----------------|---------------------------------------|
| Description | Hardware version of the charge point. |
| Read/Write | R |
| Type | String |
| Values | - |
| Default | - |

| FirmwareVersion | |
|-----------------|-------------------------------------|
| Description | Current installed firmware version. |
| Read/Write | R |
| Type | String |
| Values | - |
| Default | - |

3.2.2. Connectivity and communication

| ManagementInterface | |
|---------------------|---|
| Description | Control availability of the local management interface, LMI. When disabled, local access through both the EVSE built-in Wi-Fi access point and over the local network is disabled. <i>Note:</i> If disabled, the only way to access the EVSE is over the OCPP interface. In case of lost OCPP connection there would be no way to troubleshoot or perform a factory reset. |
| Read/Write | RW |
| Type | Integer |
| Values | 0 – Disabled 1 – Enabled >2 – Enabled for these many seconds after boot. |
| Default | 1 |

| WifiSSID | |
|-------------|---|
| Description | SSID for the local Wi-Fi network the EVSE shall connect to. |
| Read/Write | RW |
| Type | String, max length 32 characters. |
| Values | - |
| Default | - |

| WifiPassword | |
|--------------|---|
| Description | Password for the local Wi-Fi network the EVSE shall connect to. Reading this key will always return an empty string for security reasons. |
| Read/Write | W |
| Type | String, max length 32 characters. |
| Values | - |
| Default | - |

For both Wi-Fi SSID and password, due to a limited character set in the local management interface of the EVSE, limiting the used characters to alphanumeric characters is recommended.

| Server | |
|-------------|---|
| Description | OCPP-J endpoint URL for the EVSE to connect to. |
| Read/Write | RW |
| Type | String, max length 63 characters. |
| Values | - |
| Default | wss://ocpp.charge.space/ocpp |

As default, the *Server* configuration key points to the endpoint URL of the Charge Amps CPMS. To manage an EVSE with another CPMS, this key needs to be changed. Apart from changing it over OCPP from the CPMS that is currently managing the EVSE, this can also be configured using the local management interface.

| ChargePointID | |
|---------------|---|
| Description | ID of the EVSE used in OCPP communication and authentication. |
| Read/Write | RW |
| Type | String, max length 20 characters |
| Values | - |
| Default | The EVSE serial number. |

The ChargePointID is the ID used by the charge point to identify itself.

- It is used as the username in basic authentication.
- It is used in the connection URL towards the OCPP server and each charge point within the OCPP server must have a unique ChargePointID.

Special care must be taken when considering changing this configuration key. To guarantee uniqueness within the set of charge points of the CPMS is the responsibility of the CPMS performing the change.

RetryBackOffRepeatTimes

| | |
|-------------|---|
| Description | When OCPP connectivity is lost, the EVSE tries to reconnect after a delay and at each reconnection attempt the previous delay is doubled. After <i>RetryBackOffRepeatTimes</i> unsuccessful reconnection attempts, the EVSE will continue to attempt reconnection using the final delay. |
| Read/Write | RW |
| Type | Integer |
| Values | <0-65535> |
| Default | 5 |

RetryBackOffRandomRange

| | |
|-------------|--|
| Description | Add a new random value to every increasing back-off time in seconds. |
| Read/Write | RW |
| Type | Integer |
| Values | <0-65535> |
| Default | 10 |

RetryBackOffWaitMinimum

| | |
|-------------|---|
| Description | After a connection loss, it will use this variable as the minimum backoff time in seconds, first time trying. |
| Read/Write | RW |
| Type | Integer |
| Values | <0-65535> |
| Default | 30 |

If both *RetryBackOffWaitMinimum* and *RetryBackOffRandomRange* are set to 0, then the EVSE will attempt to reconnect every 1 second.

HiSuperv

| | |
|-------------|---|
| Description | High level supervision timeout in seconds. The used value is the maximum value of HiSuperv key value and HeartbeatInterval + 2x [Network backoff retry intervals] |
| Read/Write | RW |
| Type | Integer |
| Values | <0,300-2147483647> 0=disabled |
| Default | 3600 |

HiSupervCharge

| | |
|-------------|---|
| Description | High level supervision timeout during charging in seconds. The used value is the maximum value of HISupervCharge key value and HeartbeatInterval + 2x [Network backoff retry intervals] |
| Read/Write | RW |
| Type | Integer |
| Values | <0,300-2147483647> 0=disabled |
| Default | 86400 |

High Level Supervision monitors connectivity with OCPP server. The EVSE restarts when timeout is reached without any communication.

Both *HISuperv* and *HISupervCharge* must be set to 300 seconds or more to activate supervision.

3.2.1. EVSE Functional Behavior

| CableLock | |
|-------------|--|
| Description | Enable/Disable permanent cable lock, individually for connector 1 and connector 2. Enabling permanent cable lock overrides <i>UseLegacyLock</i> . |
| Read/Write | RW |
| Type | CSL |
| Values | 1.<0 1>,2.<0 1> 0 – Disabled 1 – Enabled |
| Default | 1.0,2.0 |

| UseLegacyLock | |
|---------------|--|
| Description | Control cable locking behavior. |
| Read/Write | RW |
| Type | Boolean |
| Values | true – Charging cable is only locked during active charging (Legacy proprietary behavior). false – Charging cable is locked during an entire transaction (OCPP behavior). |
| Default | false |

| FreeCharging | |
|--------------|--|
| Description | Enable/Disable free charging mode per connector, in which no authorization is required to start charging. Charging is started directly when an EV is connected. Can only be changed when there is no active transaction. |
| Read/Write | RW |
| Type | CSL |

| | |
|---------|---|
| Values | 0 – Free charging is disabled 1 – Free charging is enabled |
| Default | 1.1,2.1 |

RfidTagFreeCharging

| | |
|-------------|--|
| Description | RFID used by the EVSE towards central system for transactions when free charging is enabled. |
| Read/Write | RW |
| Type | String, max length 20 characters |
| Values | - |
| Default | 00000000000000 |

AssignedPhase

| | |
|-------------|---|
| Description | Configuration of the phase or phases which the EVSE shall use, per connector. This key is ignored when smart charging profile is used. |
| Read/Write | RW |
| Type | CSL |
| Values | 1.<L1 L2 L3 L123>,2.<L1 L2 L3 L123> |
| Default | If <i>InstallationPhases</i> = 1: 1.L1,2.L1 If <i>InstallationPhases</i> = 3: 1.L123,2.L123 |

AssignedCurrent

| | |
|-------------|--|
| Description | Configuration of the current assigned to each connector. This key is ignored when smart charging profile is used. |
| Read/Write | RW |
| Type | CSL |
| Values | 1.<0- <i>InstallationCurrent</i> (1)>,2.<0- <i>InstallationCurrent</i> (2)> |
| Default | 1.32,2.32 |

UserCurrentLimit

| | |
|-------------|---|
| Description | Current limit set by the end-user 0=charging suspended by EVSE |
| Read/Write | RW |
| Type | CSL |
| Values | 1.<0,6- <i>InstallationCurrent</i> >,2.<0,6- <i>InstallationCurrent</i> > |
| Default | 1.32,2.32 |

WakeupEnable

| | |
|-------------|---|
| Description | Wake-up signalling after long period of inactivity for legacy EVs (IEC 61851-1:A.5.3) |
| Read/Write | RW |
| Type | Boolean |

| | |
|---------|------------------------------------|
| Values | true – Enabled false – Disabled |
| Default | false |

3.2.1. Electrical installation configuration

The following configuration keys are protected and require authentication with the EVSE specific PIN code to enable configuration changes to them. When setting the EVSE specific PIN code to the configuration key *InstallationChange* using a *ChangeConfiguration* request, a 60 second window is opened during which the protected configuration keys can be changed.

| InstallationChange | |
|--------------------|--|
| Description | Enables writability of the <i>InstallationCurrent</i> , <i>InstallationPhases</i> , <i>InstallationOfflinePhase</i> , and <i>InstallationOfflineCurrent</i> configuration keys. A <i>GetConfiguration</i> operation for this key will always return an empty string for security reasons. The PIN code (per EVSE) must be communicated to the CPMS using a channel outside of OCPP. |
| Read/Write | W |
| Type | String of 8 digits. |
| Values | EVSE PIN code |
| Default | - |

| InstallationCurrent | |
|---------------------|--|
| Description | Maximum current that can be used by the EVSE, limited by the electrical installation. Can only be changed after <i>InstallationChange</i> has been correctly set. |
| Read/Write | R(W) |
| Type | Integer |
| Values | 0.<6-64>,1.<6-32>,2.<6-32> |
| Default | 0.64,1.32,2.32 |

| InstallationPhases | |
|--------------------|--|
| Description | Number of phases installed. Can only be changed after <i>InstallationChange</i> has been correctly set. |
| Read/Write | R(W) |
| Type | Integer |
| Values | 1 3 |
| Default | 3 |

| InstallationOfflinePhase | |
|--------------------------|--|
| Description | Phase(s) to use when charging in an offline state, i.e., while not connected to the CPMS and without option to use dynamic load balancing. When offline, this setting is used instead of AssignedPhase. |
| Read/Write | R(W) |
| Type | CSL |
| Values | 1.<L1 L2 L3 L123>,2.<L1 L2 L3 L123> |
| Default | If <i>InstallationPhases</i> = 1: 1.L1,2.L1 If <i>InstallationPhases</i> = 3: 1.L123,2.L123 |

| InstallationOfflineCurrent | |
|----------------------------|---|
| Description | Current to use when charging in an offline state, i.e., while not connected to the CPMS and without option to use dynamic load balancing. When offline, this setting is used instead of AssignedCurrent. |
| Read/Write | R(W) |
| Type | CSL |
| Values | 1.<0-32>,2.<0-32> |
| Default | 1.32,2.32 |

3.2.2. Charge Amps Internal

The following custom configuration keys are exposed by the EVSE but are not relevant for other CPMS systems than the Charge Amps CPMS and should be ignored by 3rd party integrations.

| RemoteDebug | |
|-------------|---------------------------------------|
| Description | Control of logging level on the EVSE. |
| Read/Write | RW |
| Type | String |
| Values | - |
| Default | 0,E,0x0 |

| CAserviceNetworks | |
|-------------------|--|
| Description | When enabled, the EVSE will automatically attempt to connect to the Charge Amps production network if it is available, provided that the user configured <i>WifiSSID</i> is not available. |
| Read/Write | RW |
| Type | Boolean |
| Values | true false |
| Default | true |

| WeldCheck | |
|-------------|--|
| Description | Enable/Disable of relay weld detection |

| | |
|------------|-------------------|
| Read/Write | RW |
| Type | Enum |
| Values | 0 – Off 1 – On |
| Default | 1 |

| ReportPWM | |
|-------------|--|
| Description | Send PWM data as DataTransfer messages to the server |
| Read/Write | RW |
| Type | Boolean |
| Values | true false |
| Default | false |

3.3. Custom DataTransfer

This section specifies the custom DataTransfer added by Charge Amps.

3.3.1. Backend requested

| networkStatus | |
|--|---|
| Description | Request a string of json encoded information on the network connectivity status. |
| DataTransfer.req - vendorId - messageId - data (optional) | 'com.chargeamps' 'networkStatus' " |
| DataTransfer.conf - status - data | Accepted Rejected UnknownMessageId Serialized json |
| Example data (only information on interface eth or wlan populated depending on interfaceUsed) | "version":1, "interfaceUsed":"eth", "interfaces": { "interfaceName":"eth", "ipAddress":"192.168.0.9", "macAddress":"4C:BC:98:00:96:22", "connectionType":"FixedLAN"}, { "interfaceName":"wlan", "ssid":"<SSID>", "ipAddress":"192.168.0.10", "rssi":-65, "channel":1, "macAddress":"4C:BC:98:00:96:23", "connectionType":"WiFi", |

| | |
|--|---|
| | "apMacAddress":"4C:BC:98:00:96:24"]}]} |
| RcdTestConN | |
| Description | Request an RCD trip test for connector N. Requires charging vehicle. |
| DataTransfer.req - vendorId - messageId - data (optional) | 'com.chargeamps' 'RcdTestCon1' 'RcdTestCon2' " |
| DataTransfer.conf - status | Accepted Rejected UnknownMessageId |

| | |
|--|---|
| RcdTestConN | |
| Description | Request an RCD trip test for connector N. Requires charging vehicle. |
| DataTransfer.req - vendorId - messageId - data (optional) | 'com.chargeamps' 'RcdTestCon1' 'RcdTestCon2' " |
| DataTransfer.conf - status | Accepted Rejected UnknownMessageId |

| | | |
|--|--|---|
| Charging Limitations | | |
| Description | Request a list of charging limitations for current and phase. | |
| DataTransfer.req - vendorId - messageId - data (optional) | 'com.chargeamps' 'ChargingLimitations' 'connectorId': 1 2 | |
| DataTransfer.conf - status - data | Accepted Rejected UnknownMessageId 'version': 1 'connectors': [{ 'connectorId': 1 2 'currentOffered': 6-32 'phasesOffered': 1 3 'limitations': [{ 'limitationId': 1 'limitationName': "HW Limit" 'current': 6-32 'phases': 1 3 }] }] | |
| LimitationId | LimitationName | Description |
| 1 | HW Limit (i.e. Configuration keys MaxCurrent and NumberOfPhases) | Current and Phase Limitation Different for different HW models |
| 2 | Installation Limit | Current and Phase Limitation |

| | | |
|----|-------------------------|---|
| 3 | Assigned Limit | Current and Phase Limitation |
| 4 | User Limit | Current Limitation |
| 5 | TxDefaultProfile | Current and Phase Limitation |
| 6 | TxProfile | Current and Phase Limitation |
| 7 | CPMaxProfile | Current and Phase Limitation |
| 8 | Temperature Limit | Current Limitation |
| 9 | Cable Limit | Current Limitation |
| 10 | Simplified Limit | Current and Phase Limitation |
| 11 | Internal Load Balancing | Current Limitation (not used in Halo/Dawn/Luna) |

3.3.2. Device generated

| RcdCalibrationFailure | |
|---|--|
| Description | RCD Calibration fault information. This example is from a normal condition. |
| DataTransfer.req - vendorId - messageId - data | 'com.chargeamps' 'RcdCalibrationFailure' Serialized json (see example) |
| Example data | "connector":1, "coefficient":40, "pos_calib":199, "neg_calib":-199, |

| RcdTripInformation | |
|---|---|
| Description | RCD information when RCD tripped by fault or triggered by test. |
| DataTransfer.req - vendorId - messageId - data | 'com.chargeamps' 'RcdTripInformation' Serialized json (see example) |
| Example data | "connector":1, "zero":16375, "tripTime":27, "measurements":[4, -23, 6, -1, 1, 2, 6, 4, -11, -2, -2, 1, 5, 6, 127, -128, -2, -1, 1, 4, 5, 9, -21, -2, -1, 3, 8, 5, -14, -2] |

4. Deviations

1. The *GetCompositeSchedule* operation of the SmartCharging feature profile is not supported.
2. TriggerMessage requests from the OCPP server for the specific requestMessage *DiagnosticsStatusNotification* is not supported.

All other TriggerMessage request types are supported.

3. Changing the OCPP configuration key *ConnectorPhaseRotation* using a ChangeConfiguration operation has no actual effect.