AC EV WALLBOX

OCPP 1.6

Implementation Overview

Content

1. Overview

AC chargers support OCPP 1.6 J. This document describes OCPP 1.6 functionality supported by AC chargers according to OCPP protocol specification, which means using JSON over WebSocket.

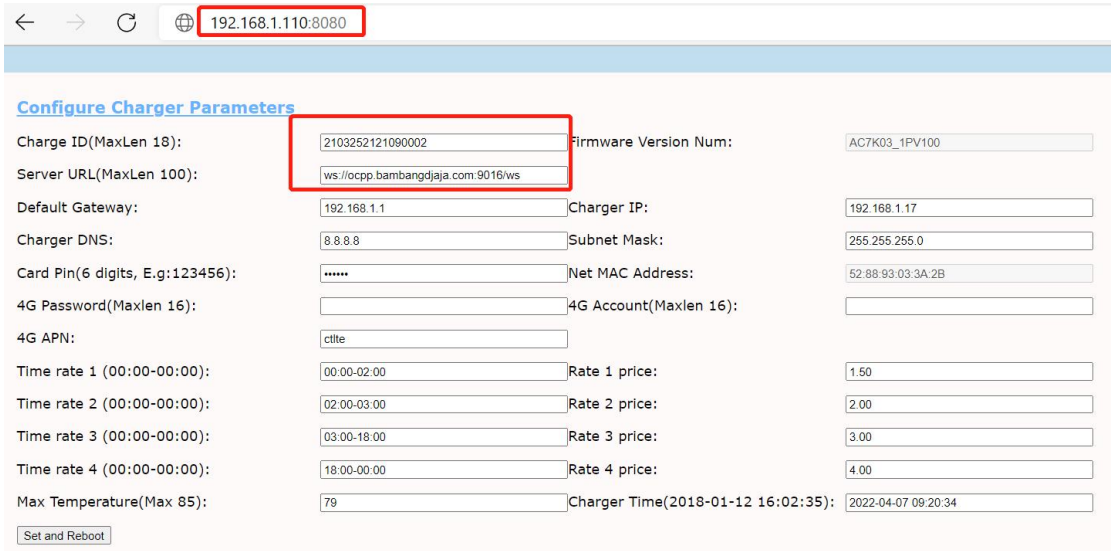
2. OCPP server configuration

2.1 Set your OCPP Server URL address via a PC

Step 1: Use the LAN cable to connect to the charger and your computer.

Step 2: Type the IP address " 192.168.1.110:8080" in your browser to visit the charger configuration page, and set the charger ID and OCPP server URL. The IP address is on the display of the charger.

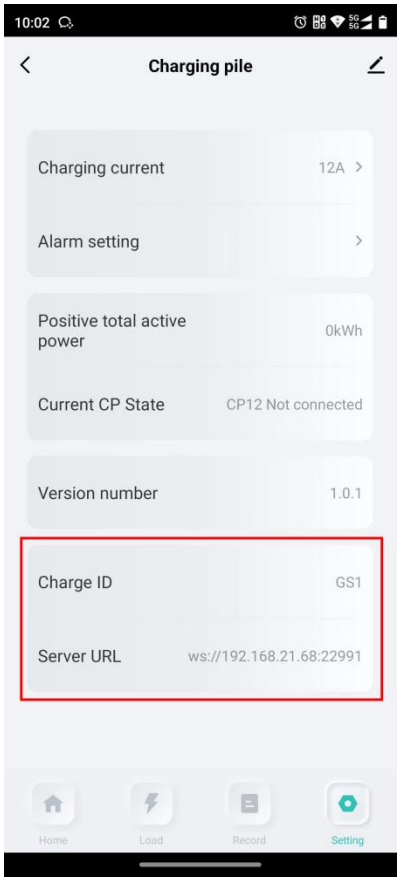
(Display screen of the EV charger)



(Charger parameter page)

2.2 Set your OCPP Server URL address via a smart phone

Download and install the smart life app by Tuya, connect the phone to 2.4G WiFi and enable the Bluetooth function. Register and add the charger device, user can set the charger ID and OCPP server URL on the app settings page as following picture.



2.3 Verify the connection

After the charging station is successfully connected to the OCPP server, an Ethernet or 4G icon will be displayed in the upper right corner of the screen, and instructions can be issued through the OCPP server to test whether the connection is normal.

Remarks: the existing design only support OCPP 1.6J via 4G +Ethernet to ensure the stability.

2.4 Web-socket communication

For the connection between a Charge Point(charger) and a Central System (OCPP Server) using OCPP-J, the Central System acts as a Web-socket server and the Charge Point acts as a Web-socket client.

2.4.1. Client request

The following is an example of an opening HTTP request of an OCPP-J connection handshake:

GET */ocpp/2103252121090001 HTTP/1.1*

Host:*some.ocppserver.com:22991*

Upgrade:websocket

Connection:Upgrade

Sec-WebSocket-Key*:x3JJHMbDL1EzLkh9GBhXDw==*

Sec-WebSocket-Protocol*:ocpp1.6*

Sec-WebSocket-Version*: 13*

The bold parts are found as such in every Websocket handshake request, the other parts are specific to this example. In this example, the Central System's OCPP-J endpoint URL is "ws://some.ocppserver.com:22991/ocpp". The Charge Point's unique identifier is "2103252121090001", so the path to request becomes "ocpp/2103252121090001".

Remarks: The Charge Point's unique identifier is the "S/N" of the display screen of the charger. Or client can modify the Charger ID (referred to S/N above), shown as in 'charger parameter page'.

2.4.2. Server response

Upon receiving the Charge Point's request, the Central System has to finish the handshake with a response as described in RFC6455.

So, if the Central System accepts the above example request and agrees to using OCPP 1.6J with the Charge Point, the Central System's response will look as follows:

HTTP/1.1 101 Switching Protocols

Upgrade:Web-socket

Connection:Upgrade

Sec-Web Socket-Accept:*s3pPLMBiTxaQ9kYGzzhZRbK+xOo=*

Sec-Web Socket-Protocol:*ocpp1.6*

The bold parts are found as such in every Web Socket handshake response, the other parts are specific to this example.

2.4.3. Web Socket ping in relation to OCPP Heartbeat

The Web-socket specification defines Ping and Pong frames that are used to check if the remote endpoint is still responsive. In practice this mechanism is also used to prevent the network operator from quietly closing the underlying network connection after a certain period of inactivity. This Web-socket feature can be used as a substitute for most of the OCPP Heartbeat messages but cannot replace all of its functionality.

Remark:

Charger supports sending PING every certain time interval. The interval range is 0, 10 to 65535 seconds, 0 disables the PING, default value is 60 seconds.

Charger will also respond with PONG to the PING request from the server.

3. Supported Feature profiles

The implementation is following OCPP 1.6 specification of Open Charge Alliance. According to OCPP 1.6 specification all of features and associated messages are grouped into Feature Pro- files.

OCPP 1.6 specified following Feature profiles:

Profile name	Description	Implementation Mandatory
Core	Basic Charge Point functionality.	Required
Firmware Management	Support for firmware update management and diagnostic log file download.	Optional
Local Auth list Management	Features to manage the local authorization list in Charge Points.	Optional
Reservation	Support for reservation of a Charge Point	Optional
Smart Charging	Support for basic Smart Charging	Optional
Remote Trigger	Support for remote triggering of Charge Point initiated messages	Optional

3.1 Messages

Please see below which messages are supported per OCPP feature profile.

Message	Supported (Y/N)	Comment
Core profile		
Authorize	Y	
BootNotification	Y	
ChangeAvailability	Y	
ChangeConfiguration	Y	
ClearCache	Y	
DataTransfer	Y	
GetConfiguration	Y	
HeartBeat	Y	
MeterValues	Y	Supports following Measured types for AC: ● Energy.Active.Import.Register ● Current.Import ● Voltage ● Power.Active.Import ● Current.Offered
RemoteStartTransaction	Y	
RemoteStopTransaction	Y	
Reset	Y	Chargers support hard reset and soft reset. Hard reset restart the charger immediately, and the data of

		the charging transaction in progress will be lost. Soft reset will stop the charging transaction in progress and the charger will be restarted.
StartTransaction	Y	
StatusNotification	Y	
StopTransaction	Y	
UnlockConnector	Y	Message is supported only to socket variants, upon receiving this message, socket variants charger will release the E-lock of socket. If send the message to cable variants, the charger will do nothing.
Firmware Management profile		
GetDiagnostics	Y	Supports 7-day logs with 300 lines/less than 25kb per day. Charger uploads the files by FTP.
DiagnosticsStatusNotification	Y	Support status: Uploading, Uploaded, Upload-Failed, Idle.
FirmwareStatusNotification	Y	Charger will response the status: ● Downloading ● Installed ● DownloadFailed ● InstallationFailed
UpdateFirmware	Y	Charger downloads the file by FTP
Local Auth List Management		
GetLocalListVersion	Y	
SendLocalList	Y	Each list is limited to 5 ID tag, each ID tag with max 20 characters; The charger has a total limit of 20 ID tags.
Reservation		
CancelReservation	Y	
ReserveNow	Y	
Smart charging		
ClearChargingProfile	Y	
GetCompositeSchedule	Y	
SetChargingProfile	Y	ChargeProfileMaxStackLevel = 1
Remote Trigger		
TriggerMessage	Y	Chargers supports below MessageTrigger: ● BootNotification ● DiagnosticsStatusNotification ● FirmwareStatusNotification ● Heartbeat

		• MeterValues • StatusNotification

3.2 Standard Configuration keys

3.2.1 Supported keys

Key Name	Required/ Optional	Description	Type	Accessibility	Default Value
Core profile					
ClockAlignedDataInterval	required	Size (in seconds) of the clock-aligned data interval. This is the size (in seconds) of the set of evenly spaced aggregation intervals per day, starting at 00:00:00 (midnight). For example, a value of 900 (15 minutes) indicates that every day should be broken into 96 15-minute intervals. The range of this value: 0, 30 – (86400-1)	Integer	RW	15
ConnectionTimeOut	required	Interval(from successful authorization) until incipient charging session is automatically canceled due to failure of EV user to (correctly) insert the charging cable connector(s) into the appropriate connector(s). The range of this value: 10 - 240	Integer	RW	60
GetConfigurationMaxKeys	required	The number of configuration keys requested in a single PDU may be limited by the Charge Point. This maximum can be retrieved by reading this configuration key.	Integer	R	10
HeartbeatInterval	required	Interval of inactivity (no OCPP exchanges) with central system after which the Charge Point should send a Heartbeat.req PDU. If the interval less than 10, the AC charger will accept but execute 10	Integer	RW	60
MeterValuesAlignedData	required	Clock-aligned measured(s) to be included in a MeterValues.req PDU, every ClockAlignedDataInterval seconds. Supported value: Current.Import, Current.Offered, energy. Active. Import. Register, Energy.Active.Import.Interval, Power.Active.Import, Power.Offered, Voltage.	CSL	RW	Current.Import,Current. Offered,Energy.Active. Import.Register,Power. Active.Import, Voltage

Key Name	Required/ Optional	Description	Type	Accessibility	Default Value
MeterValuesAligned-DataMaxLength	required	Maximum number of items in a MeterValuesAlignedData Configuration Key.	Integer	R	5
MeterValuesSampleInterval	required	Interval between sampling of metering (or other) data, in- tended to be transmitted by "MeterValues" PDUs. The range of this value: 0, 4 - 65534 If the interval less than 4, the AC charger will reject.	Integer	RW	60
LocalAuthorizeOffline	required	Controls whether a Charge Point will authorize a user when offline using the Authorization Cache and/or the Local Authorization List.	boolean	RW	True
LocalPreAuthorize	required	Controls whether a Charge Point will use the Authorization Cache and/or the Local Authorization List to start a trans- action without waiting for an authorization response from the Central System.	boolean	RW	True
NumberOfConnectors	required	The number of physical charging connectors of this Charge Point.	Integer	R	1
SupportedFeatureProfiles	required	A list of supported Feature Profiles. Possible profile identifiers: Core, FirmwareManagement, LocalAuthListManagement, Reservation, SmartCharging and RemoteTrigger.	CSL	R	Core, FirmwareManagement, LocalAuthicationListManagement, SmartCharging, RemoteTrigger
WebSocketPingInterval	optional	Only relevant for websocket implementations. disables client side websocket Ping/Pong. In this case there is either no ping/pong or the server initiates the ping and client responds with Pong. Positive values are interpreted as number of seconds be- tween pings. Negative values are not allowed. ChangeConfiguration is expected to return a REJECTED result. The range of this value: 0, 10 – 65535	Integer	RW	60

Key Name	Required/ Optional	Description	Type	Accessibility	Default Value
AllowOfflineTxForUnknownId	optional	When offline, a Charge Point may allow automatic authorization of any "unknown" identifiers that cannot be explicitly authorized by Local Authorization List or Authorization Cache entries. Identifiers with status other than "Accepted" (Invalid, Blocked, Expired) must be rejected. Now the charger will not allow any ID except in local authentication list while it is offline	boolean	RW	False
AuthorizeRemoteTxRequests	required	Whether a remote request to start a transaction in the form of a RemoteStartTransaction.req message should be authorized beforehand like a local action to start a transaction.	boolean	RW	True
ResetRetries	required	Number of times to retry an unsuccessful reset of the Charge Point. Charger now only supports value 0.	Integer	RW	0
TransactionMessageAttempts	required	How often the Charge Point should try to submit a transaction-related message when the Central System fails to process it.	Integer	RW	6
TransactionMessageRetryInterval	required	How long the Charge Point should wait before re- submitting a transaction related message that the Central System failed to process it.	Integer	RW	10S
MaxEnergyOnInvalidId	optional	Maximum energy in Wh delivered when an identifier is invalidated by the Central System after start of a transaction.	integer	RW	0
StopTransactionOnInvalidId	required	Whether the Charge Point will stop an ongoing transaction when it receives a non-Accepted authorization status in a StartTransaction.conf for this transaction. Now the default value is true.	Boolean	RW	True

Key Name	Required/ Optional	Description	Type	Accessibility	Default Value
MeterValuesSampledData	required	Sampled measurands to be included in a MeterValues.req PDU, every MeterValueSampleInterval seconds. Supported value: Current.Import, Current.Offered, Energy.Active.Import.Register, Power.Active.Import, Voltage.	CSL	RW	Energy.Active.Import.Register, current import, power active import, current.Offered ,Voltage
MeterValueSampleInterval	required	Interval between sampling of metering (or other) data, in- tended to be transmitted by "MeterValues" PDUs. For charg- ing session data (ConnectorId>0), samples are acquired and transmitted periodically at this interval from the start of the charging transaction. A value of "0" (numeric zero), by convention, is to be interpreted to mean that no sampled data should be transmitted.	Integer	RW	60
AuthorizationCacheEnabled	optional	A Charge Point may implement an Authorization Cache that autonomously maintains a record of previously presented identifiers that have been successfully authorized by the Central System.	boolean	RW	True
MeterVaues-SampledDataMaxLength	Optional	Maximum number of items in a MeterValuesSampledData Configuration Key.	Integer	R	5
SupportedFeatureProfilesMaxLength	optional	Maximum number of items in a SupportedFeatureProfiles Configuration Key.	integer	R	6
ConnectorPhaseRotation	required	For individual connector phase rotation information, the Central System may query the ConnectorPhaseRotation configuration key on the Charging Point via GetConfiguration. The Charge Point shall report the phase rotation in respect to the grid connection.	CSL	RW	False
StopTransactionOnEVSideDiscon-nect	required	When set to true, the Charge Point shall administratively stop the transaction when the cable is unplugged from the EV.	boolean	RW	True

Key Name	Required/ Optional	Description	Type	Accessibility	Default Value
UnlockConnectorOnEVSideDisconnect	required	When set to true, the Charge Point shall unlock the cable on Charge Point side when the cable is unplugged at the EV.	boolean	RW	True
Local Authorization List Management					
LocalAuthListEnabled	required	Whether the Local Authorization List is enabled	boolean	RW	True
LocalAuthListMaxLength	required	Maximum number of identifications that can be stored in the Local Authorization List	Integer	R	20
SendLocalListMaxLength	required	Maximum number of identifications that can be send in a single SendLocalList.req	Integer	R	5
Smart charging profile					
ChargeProfileMaxStackLevel	required	Max StackLevel of a Charging. The number defined also indicates the max allowed number of installed charging schedules per Charging Purposes.	Integer	R	1
ChargingScheduleAllowedChargingRateUnit	required	A list of supported quantities for use in a Charging Schedule. Allowed values: 'Current' and 'Power'.	CSL	R	Current,Power
ChargingScheduleMaxPeriods	required	Maximum number of periods that may be defined per Charging Schedule.	Integer	R	14
MaxChargingProfilesInstalled	required	Maximum number of Charging profiles installed at a time.	Integer	R	Same as ChargeProfileMaxStackLevel
Reservation profile					
ReserveConnectorZeroSupported	optional	If this configuration key is present and set to true: Charge Point support reservations on connector 0.	boolean	R	True

3.2.2 To be supported keys

Key Name	Required/ Optional	Description	Type	Accessibility	Default Value
Core profile					
StopTxnAlignedData	required	Clock-aligned periodic measurand (s) to be included in the TransactionData element of Stop- Transaction.req Meter- Values.req PDU for every ClockAlignedDataInterval of the charging session.	CSL	RW	Unknown
StopTxnSampledData	required	Sampled measurands to be included in the Trans- ac- tionData element of StopTransaction.req PDU, every Meter- ValueSampleInterval seconds from the start of the charging session	CSL	RW	Unknown
StopTxnSampledDataMaxLength	optional	Maximum number of items in a StopTxnSampledData Con- figuration Key.	Integer	R	Unknown

3.2.3 Not supported keys

Key Name	Required/ Optional	Description	Type
Core profile			
MinimumStatusDuration	optional	The minimum duration that a Charge Point or Connector status is stable before a Sta- tusNotification.req PDU is sent to the Central System.	integer
BlinkRepeat	optional	Number of times to blink Charge Point lighting when signaling	integer
ConnectorPhaseRotationMaxLength	optional	Maximum number of items in a ConnectorPhaseRotation Configuration Key	integer
LightIntensity	optional	Percentage of maximum intensity at which to illuminate Charge Point lighting	integer
ConnectorSwitch3to1PhaseSupported	optional	If defined and true, this Charge Point support switching from 3 to 1 phase during a charging session.	boolean

4. Revisions

Rev.	Page (P) Chapt. (C)	Description	Date
1.09		document restructuring.	2022.12.09