ELECTRIC VEHICLE CONDUCTIVE CHARGING STATION BACKEND COMMUNICATION CURRENT SCENARIO AND CHALLENGES IN INDIA

Sreekumar Uthaman, ARAI

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Introduction

Need for electrification of transportation, particularly road transport, is becoming more important due to key reasons such as rising pollution, global warming, fossil fuel import costs and thrust on solar power generation, etc. This led to the development and installation of charging infrastructure throughout the country.

- **Current scenario and challenges in India.**
  - At present, India faces the challenge to locate, monitor and control the chargers situated at different locations, as there is no backend communication.
  - We are experiencing shortage of conventionally generated power and fluctuation in the availability of power due to heavy load during the peak hours.

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OCPP is globally accepted backend communication standard that is capable of foster the requirement.

- **The Challenges faced at present in India In backend communication are:**
  - Limited availability of indigenously developed OCPP enabled Charger.
  - OCPP enabled server availability to handle large number of charger.
  - Reliable internet connectivity across all over India.
  - Lack of technical know-how to develop OCPP enabled charger
  - Lack of Infrastructure for testing OCPP enabled Chargers.

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Automotive Research Association of India (ARAI), has been working in the area of formulation of regulations for electric and hybrid electric vehicles, testing and validation, vital inputs to Govt. of India in policy formulation, research and development (R&D), etc.

ARAI have indigenously developed “OCPP server “ and “OCPP stack” to cater the requirement of EVSE manufacturers.

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ARAI "OCPP Server" helps EVSE Manufacturer:

- To validate the EV chargers and to check whether the chargers are OCPP compliant.
- To monitor and control the chargers in remote location.

ARAI "OCPP protocol Stack" helps EVSE Manufacturer:

- To make their own EV charger OCPP compliant by integrating the software stack with EV charger Main Code.
- By providing technical knowhow document which will help Indian charger manufacturers to develop their own charger with OCPP compliance.

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Indigenous OCPP Software stack

ARAI has developed OCPP software stack can be either integrated with the EVSE main code embedded in the main controller or can be embedded in the secondary controller thereby making the secondary controller acting as a bridge between OCPP server and EVSE.

OCPP software stack contains all the relevant Wi-Fi (internet connectivity) and websocket drivers required for the connection with the OCPP server. After the connection established the Stack will send the required messages to the OCPP server based on the charger state which is intimated to the stack form the global variables which is updated from the main code.

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Some of the message the ARAI OCPP stack send to the OCPP server listed below.

Table 1. EV Charge Point initiated message

Operations	Test Description
Boot Notification	To inform central system about the Charge box configuration details
Status Notification	To notify about a status or error condition to central system
Heartbeat	To inform the central system at a particular interval that the charge box that it is still alive
Authorize	To authorize user before the charging session starts
Start Transaction	To inform the start of a charging transaction
Stop Transaction	To inform the stop of a charging transaction
Data Transfer	To send vendor specific information to central system
Diagnostics Status Notification	To inform about the completion of diagnostics file upload to central system
Meter value	Charge point should deliver the meter value to the CMS
Firmware Status Notification	To inform about progress of the firmware update

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Table 2. EV sever initiated message

Operations	Test Description
Remote Start Transaction	To request a charge box to start a transaction by sending a remote start transaction
Remote Stop Transaction	To request a charge box to stop a transaction by sending a remote stop transaction
Trigger Message	To request charge point to initiate charge-point messages like Boot Notification, heartbeat etc.
Reserve Now	To reserve a specific connector at the charge box for use by a specific ID-Tag
Cancel Reservation	To cancel a reservation based on the reservation ID
Change Availability	To request the charge box to change the availability to available or unavailable
Reset	To request a charge box to reset itself
Unlock Connector	To request the charge box to unlock one of its connector
Change configuration	To request charge box to change its configuration parameters
Get configuration	To retrieve the value of configuration settings of the charge box
Clear Cache	To request a charge box to clear its cache
Data Transfer	To send vendor specific information to the charge box
Get diagnostics	To request a charge box for diagnostics information
Get local list version	To request the version number of the local list at the charge box

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Indigenous ARAI OCPP server

ARAI OCPP server will enable Indian EVSE manufacturer to test their EV charger for OCPP compliance. The server can be used for validating the communication and connectivity.

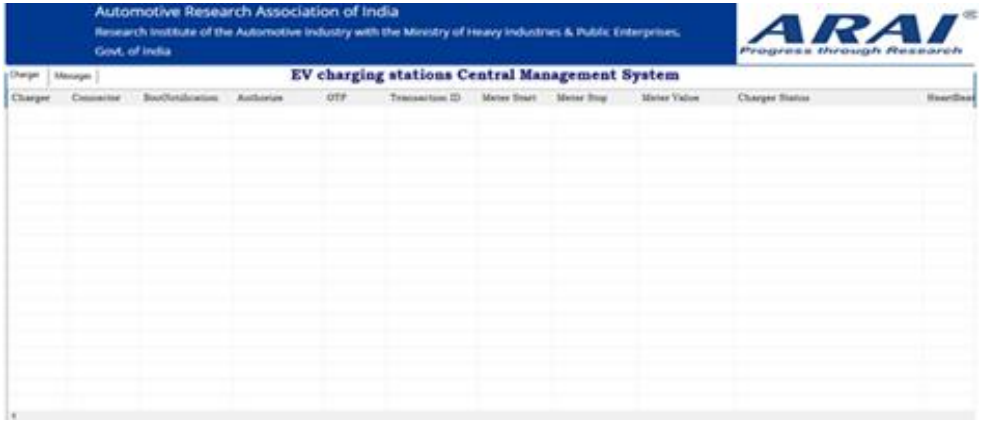

Figure 1. ARAI developed Indigenous OCPP Server

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Conclusions

The demand for EV is increasing which have led to the increase in production of EV chargers. The backend communication has a major role as the user needs to know the location of the EV charger. It will also help in monitoring controlling and regulating the tariff and electric load based on various parameters like Time of charging, Availability of Power and traffic. The ARAI OCPP Software stack and server will be able to help EVSE manufacturer to cope up with the rising demand.

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Thank you

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