High Power Electric Vehicle Charging Infrastructure

Industry Connections Activity Initiation Document (ICAID)

Version: 1.0, 12 February 2022

IC22-002-01 Approved by the CAG 14 March 2022

Instructions

- Instructions on how to fill out this form are shown in red. It is recommended to leave the instructions in the final document and simply add the requested information where indicated.
- Shaded Text indicates a placeholder that should be replaced with information specific to this ICAID, and the shading removed.
- Completed forms, in Word format, or any questions should be sent to the IEEE Standards Association (IEEE SA) Industry Connections Committee (ICCom) Administrator at the following address: industryconnections@ieee.org.
- The version number above, along with the date, may be used by the submitter to distinguish successive updates of this document. A separate, unique Industry Connections (IC) Activity Number will be assigned when the document is submitted to the ICCom Administrator.

1. Contact

Provide the name and contact information of the primary contact person for this IC activity. Affiliation is any entity that provides the person financial or other substantive support, for which the person may feel an obligation. If necessary, a second/alternate contact person's information may also be provided.

Name: Farid Katiraei
Email Address: FKatiraei@Quanta-Technology.com
Employer: Quanta Technology
Affiliation: Quanta Technology

IEEE collects personal data on this form, which is made publicly available, to allow communication by materially interested parties and with Activity Oversight Committee and Activity officers who are responsible for IEEE work items.

2. Participation and Voting Model

Specify whether this activity will be entity-based (participants are entities, which may have multiple representatives, one-entity-one-vote), or individual-based (participants represent themselves, one-person-one-vote).

Specify: "Entity-Based"

3. Purpose

3.1 Motivation and Goal

Briefly explain the context and motivation for starting this IC activity, and the overall purpose or goal to be accomplished.

Technologies, methodologies, and power ratings (kW) associated with Electric Vehicle Charging Stations (EVCS) are evolving at a rapid pace, both in vehicle and facilitating infrastructure. Specifically, in the domain of "fast charging" there are countless innovations. Due to increase in power and voltage

ratings of the EVCS in public areas, commissioning considerations, performance verification for both submetering accuracy and interoperability, and safety of operation are becoming key challenges for faster deployment and widespread adoption that both vendors and users are facing.

A broad, open, cross-industry dialogue is needed to exchange views, debate and agree upon common challenges and coordinated activities needed, including;

- Technology Enablers for Electric Vehicles – Trade Offs
- Battery innovations
- Vehicle and charging Platforms and Business
- Infrastructure for Electric Vehicles
- Standards for interoperability and EVCS compliance
- Safety aspects of high-power charging
- Commissioning and testing procedures
- Operation and maintenance considerations, accuracy, and calibration
- Battery charging balancing techniques and leak detection for fast and extremely fast charging processes

The work will cover high-power charging systems and DC fast chargers for light, medium and heavy-duty vehicles. Target ratings are 25 kW plus (e.g., 60 KW, 125 kW, and 350 kW, 500 k, …).

3.2 Related Work

Provide a brief comparison of this activity to existing, related efforts or standards of which you are aware (industry associations, consortia, standardization activities, etc.).

There are numerous (standards) initiatives which address EV Charging. This IC activity aims to structure them, identify gaps, and provide recommendations.

- IEEE SA EV charging conformity assessment program.
  - https://standards.ieee.org/products-services/icap/programs/ev/index.html
- NIST Handbook 44 (EVSE submetering testing guide)
- IEEE P2690 – Draft Standard for Charging Network Management Protocol for Electric Vehicle Charging Systems
  - https://standards.ieee.org/project/2690.html
- IEEE 2030.1.1 – IEEE Standard Technical Specifications of a DC Quick Charger for Use with Electric Vehicles
  - https://standards.ieee.org/standard/2030_1_1-2015.html
- IEEE P2030.1.2 – Draft Standard Technical Specifications for Ultra-High-Power Electric Vehicle Chargers
  - https://standards.ieee.org/project/2030_1_2.html
- IEEE P2030.13 – Guide for Electric Transportation Fast Charging Station Management System Functional Specification
  - https://standards.ieee.org/project/2030_13.html

The IC activity will coordinate with other ongoing activities through participants and liaison with active IEEE or IEC standard working groups.

3.3 Previously Published Material

Provide a list of any known previously published material intended for inclusion in the proposed deliverables of this activity.

None

3.4 Potential Markets Served

Indicate the main beneficiaries of this work, and what the potential impact might be.

Reducing the carbon footprint drives the transformation of the EV industry. New business opportunities arise, new mobility markets evolve.
To master a smooth evolution, a close cooperation of automotive incumbents and power and energy heavyweights is crucial.

IEEE has the opportunity to be the place for both industries to work together.
The automotive manufacturers, tier one suppliers, power companies, and power electronics companies, alongside business-oriented research centers and think tanks are the primary beneficiaries of this initiative.
The initiative will address the entire market for EV vehicles and charging infrastructure as well as the engineering, testing, validation, and much more.
Standards help to create markets as large and homogenous as possible to maximize economies of scale.

This initiative will address primarily High-power Charging Technologies. IEEE SA has the capacity to facilitate the exploitation of research results through standards related activities.

Government initiatives, paired with further demand to improve safety, and make road traffic sustainable and environment friendly, will strongly benefit the market and by consequence this initiative.

Industries to be involved includes: EVCS OEM, EV vendors, National Laboratories, Electric Utilities, Nationally Recognized Laboratories, and standard development organizations.

3.5 How will the activity benefit the IEEE, society, or humanity?

IEEE & Society benefits: It is expected that this activity will help identify and involve a group of experts and organizations directly involved in EVCS and associated technologies that can contribute to development of white papers, proposal for standards, and recommended best practices.

Society benefits: Investigating and aiming to close the gaps and resolve interoperability issues will help accelerate customer adaptation of EVs and increase the electrifications of service centers for large fleets (FedEx, UPS, Amazon distribution centers, metro depo, …) which all will bring significant benefit to society and for saving the environment.

IEEE benefits: Several standards proposals are expected to be initiated as the direct results of discussions and engagements with appropriate expert groups to contribute to development of standards.

4. Estimated Timeframe

Indicate approximately how long you expect this activity to operate to achieve its proposed results (e.g., time to completion of all deliverables).

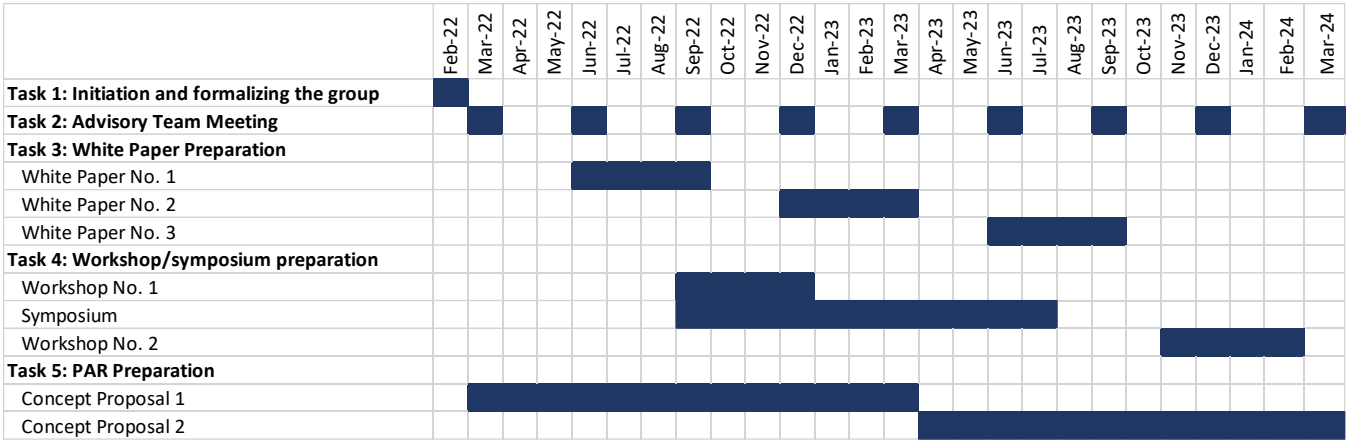
Expected Completion Date: 03/2024

IC activities are chartered for two years at a time. Activities are eligible for extension upon request and review by ICCom and the responsible committee of the IEEE SA Board of Governors. Should an extension be required, please notify the ICCom Administrator prior to the two-year mark.

Work will be conducted over 2 years from the IC activity start date and will include:

- quarterly meetings to exchange ideas and discuss technology advancements, by utilizing guest speakers
- development of white papers based on surveys and experts' inputs
- organizing workshops and symposium (one per year)
- and proposing topics for initiating new standards proposals based on gap analysis.

A tentative schedule is shown in the timeline below.



5. Proposed Deliverables

Outline the anticipated deliverables and output from this IC activity, such as documents (e.g., white papers, reports), proposals for standards, conferences and workshops, databases, computer code, etc., and indicate the expected timeframe for each.

- Up to three white papers (application reports) on key aspects of EVCS interoperability, safety, and testing / commissioning.
- Webinars on key topics associated with high power charging technologies
- Initiating proposal preparation for standards proposals for standard development and identifying a group of participants
- One in-person meeting (symposiums) involving technical tours and half-day courses to be organized by the parties involved.

5.1 Open Source Software Development

Indicate whether this IC Activity will develop or incorporate open source software in the deliverables. All contributions of open source software for use in Industry Connections activities shall be accompanied by an approved IEEE Contributor License Agreement (CLA) appropriate for the open source license under which the Work Product will be made available. CLAs, once accepted, are irrevocable. Industry Connections Activities shall comply with the IEEE SA open source policies and procedures and use the IEEE SA open source platform for development of open source software. Information on IEEE SA Open can be found at https://saopen.ieee.org/.

Will the activity develop or incorporate open source software (either normatively or informatively) in the deliverables? No

6. Funding Requirements

Outline any contracted services or other expenses that are currently anticipated, beyond the basic support services provided to all IC activities. Indicate how those funds are expected to be obtained (e.g., through participant fees, sponsorships, government, or other grants, etc.). Activities needing substantial funding may require additional reviews and approvals beyond ICCom.

Some limited funding may be required for supporting logistical aspects of in-person meetings. The funds will be raised internally from supporting members or through applying for funds from supporting committee.

7. Management and Procedures

7.1 Activity Oversight Committee

Indicate whether an IEEE Standards Committee or Standards Development Working Group has agreed to oversee this activity and its procedures.

Has an IEEE Standards Committee or Standards Development Working Group agreed to oversee this activity? No – The activity will have a management board to oversee the progress and deliverables

If yes, indicate the IEEE committee's name and its chair's contact information.

IEEE Committee Name: None
Chair's Name: None
Chair's Email Address: None

Additional IEEE committee information, if any. Please indicate if you are including a letter of support from the IEEE Committee that will oversee this activity.

IEEE collects personal data on this form, which is made publicly available, to allow communication by materially interested parties and with Activity Oversight Committee and Activity officers who are responsible for IEEE work items.

7.2 Activity Management

If no Activity Oversight Committee has been identified in 7.1 above, indicate how this activity will manage itself on a day-to-day basis (e.g., executive committee, officers, etc.).

The following IC Activity management structure is proposed:

- Chair
- Vice-Chair
- secretary
- Two or more workstream leads and/or liaisons for cross organizational (IEC, SAE, …) and cross committee coordination of the IC activities.
    - The Activity will identify 2 or 3 workstreams for each year of operation to focus on the key topics of interest and progress toward specified deliverables

The IC activity will hold a minimum of two workstream meetings per quarter and one in-person meeting per year.

7.3 Procedures

Indicate what documented procedures will be used to guide the operations of this activity; either (a) modified baseline *Industry Connections Activity Policies and Procedures* (entity, individual), (b) *Abridged Industry Connections Activity Policies and Procedures* (entity, individual), (c) Standards Committee policies and procedures accepted by the IEEE SA Standards Board, or (d) Working Group policies and procedures accepted by the Working Group's Standards Committee. If option (a) is chosen, then ICCom review and approval of the P&P is required. If option (c) or (d) is chosen, then ICCom approval of the use of the P&P is required.

Specify the policies and procedures document to be used. Attach a copy of chosen policies and procedures.

The IC activity will utilize Option (a) to follow modified baseline Industry Connections Activity Policies and Procedures (entity).

8. Participants

8.1 Stakeholder Communities

Indicate the stakeholder communities (the types of companies or other entities, or the different groups of individuals) that are expected to be interested in this IC activity and will be invited to participate.

Medium and heavy-duty EV vendors (Ford, GM, Tesla, …), EV Chargers OEM (ABB, Charge Point, Siemens, Trillium,…) Fleet operation organizations (FedEx, Amazon, …), National Labs (NREL, Argon, …), EV Charging Developers, Consulting and Engineering companies, Universities, Utilities.

8.2 Expected Number of Participants

Indicate the approximate number of entities (if entity-based) or individuals (if individual-based) expected to be actively involved in this activity.

Number of entities or number of individuals.

8 to 12 entities are expected – four entities are confirmed; 3 entities are tentative.

8.3 Initial Participants

Provide a few the entities or individuals that will be participating from the outset. It is recommended there be at least three initial participants for an entity-based activity, or five initial participants (each with a different affiliation) for an individual-based activity.

Use the following table for an entity-based activity:

Entity Name	Primary Contact Name	Additional Representatives
Quanta Technology	Farid Katiraei	Nikoo Kouchakipour
State Grid Corporation of China (SGCC)	Ms. Shangjie Wu	
Dept. Electrical Engineering, Tsinghua University	Prof Zedong Zheng	
NC State University	Professor Iqbal Husain	

Use the following table for an individual-based activity:

Individual Name	Employer	Affiliation

8.4 Activity Supporter/Partner

Indicate whether an IEEE committee (including IEEE Societies and Technical Councils), other than the Oversight Committee, has agreed to participate or support this activity. Support may include, but is not limited to, financial support, marketing support and other ways to help the Activity complete its deliverables.

Has an IEEE Committee, other than the Oversight Committee, agreed to support this activity?
Yes (TEC)

If yes, indicate the IEEE committee's name and its chair's contact information.

IEEE Committee Name: Transportation Electrification Community (TEC)

Chair's Name: Bruno Lequesne
Chair's Email Address: blequesne@outlook.com

Please indicate if you are including a letter of support from the IEEE Committee.

Yes.