

Establishment of PLC Test Beds in India
Industry Connections Activity Initiation Document (ICAID)

Version: 4.0, 11 May 2023

IC17-005-04 Approved by the CAG 10 July 2023

Instructions

- Instructions on how to fill out this form are shown in red. Please leave the instructions in the final document and simply add the requested information where indicated.
- Spell out each acronym the first time it is used. For example, "United Nations (UN)."
- 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: Dr. A. Paventhan

Email Address: paventhan@ernet.in

Employer: ERNET (Education and Research Network is an autonomous scientific society of Ministry of Electronics and Information Technology)

Affiliation: ERNET India

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).

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.

India is on the cusp of a '**Digital Revolution**'. With the Digital Backbone Initiatives being created by the Indian Government and the rush of Entrepreneurial capital, the stage is now being set for the unlocking of a Trillion Dollar Economy with the GDP expected to grow by 20-30% by 2025. Initiatives like 'Digital India', 'Skill India' and around 'Smart Cities' have created a huge growth opportunity for Infrastructure.

Several IoT technologies are coming into play to cater to various verticals like Transportation, Urban planning, Healthcare, Connected Vehicles, Agriculture, Telecom, etc. One of the significant technologies that will serve as a backbone for Infrastructure growth is likely to be Power-Line Communications (PLC). This technology is being ably supported by the IEEE 1901 Standards and is being increasingly adopted in several projects across the world. PLC technology has also been recommended by the Bureau of Indian Standards (BIS) as part of its Smart City Framework Policy Recommendations.

This IC program will help in further engaging with various stakeholders like Industries, Academia, Utility companies, etc. **TO ESTABLISH A SERIES OF TEST BEDS FOR PLC.** The Test Beds will provide an ecosystem for various stakeholders, ranging from established industries to enterprising startups, to develop and test their solutions that have PLC as the core technology.

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.).

Various consortia like National Smart Grid Mission (NSGM), India Smart Grid Forum (ISGF) exist to popularize the Smart Grid Architecture for the growth of Smart Cities and Smart Energy sector in India. However, there seems to be no prior work on establishing a 'TEST BED' that will help in the development of the entire ecosystem. It is likely to exist as a captive resource within Industries and Academia but those are few and far between

3.3 Previously Published Material

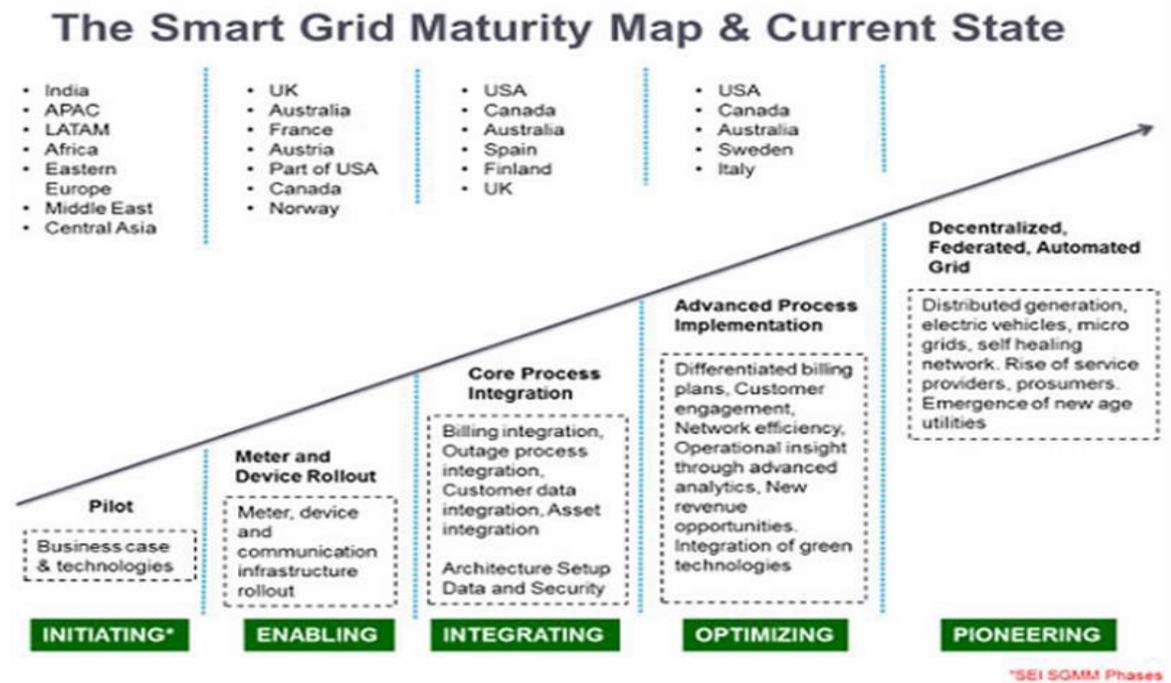
Provide a list of any known previously published material intended for inclusion in the proposed deliverables of this activity.

IEEE 1901 Standards

3.4 Potential Markets Served

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

This work has the potential to impact emerging markets like India wherein PLC Technology has not yet been adopted as a core technology. This would include much of APAC, Africa, LATAM, Middle East, Eastern Europe & Central Asia. Please see figure below.



Source : Wipro

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

Describe how this activity will benefit the IEEE, society, or humanity.

PLC system utilize existing electrical power system network as a communication medium enabling data transmission over powerlines. Last two decades have seen PLC being used for home/building automation, in-vehicle communication, automated meter reading (AMR) and demand response. PLC will be a complementary technology to RF while avoiding the requirements for any new wired infrastructure setting up.

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: 12/2023

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.

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.

1. Outreach programs leading to Whitepaper/Reports on “Opportunities for PLC in India”
2. Establishment of at least 3 PLC Test Beds in a 2-year timeframe
3. Workshop / Conference with a focus on PLC-based solutions for ‘Emerging India’
4. Specific standard clauses that could be added to the existing IEEE 1901 Standards based on unique challenges in countries like India (ex: how to overcome the bad quality of wiring, multi-hop technology, etc.)

Specify the deliverables for this IC activity, please be specific.

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?

Yes, some of the Testbed software framework can incorporate open source software in the deliverables.

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 ICom.

Industry Connections staff will provide standard support as made available to all IEEE-SA IC activities. Activity members will provide or seek grants/sponsors for any needed support for outreach events or other activities that exceed available Industry Connections program support. Test Bed Infrastructure implementation costs will involve the pursuit of government, utilities and industry grants as needed.

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

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

IEEE Committee Name: Committee Name

Chair's Name: Full Name

Chair's Email Address: who@where

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 activity will be managed by officers elected by participants engaged in the activity. Participants may opt for a committee style approach with chair, vice-chair, etc. as needed to be determined at the initial participant meetings

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 ICom review and approval of the P&P is required. If option (c) or (d) is chosen, then ICom approval of the use of the P&P is required.

(a) Will use the modified baseline Industry Connections Activity Policies and Procedures

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.

Government & Private entities including, but not limited to, power distribution, AMR, Surveillance, Smart City Infrastructure, Telecom, R&D, Academia

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.

15-20 entities

8.3 Initial Participants

Provide a few of 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 |
|--|------------------------|----------------------------|
| ERNET India | Dr A. Paventhan | |
| Bangalore Electricity Supply Company Limited | Anil Dsouza | Lakshmi K |
| Kumaraguru College of Technology | Dr. Vinoth Kumar | Surya Prakash |
| ST Microelectronics | Dr. Manoj Kumar | Varun Bansal |
| Velankani Electronics Pvt Ltd | Narayan P S | Mayank Singh |
| SLS Solutions | Tejas Vaghela | Krunal Patel |
| Central Power Research Institute | Shiva Kumar V | Pradish M |
| Siddhant College of Engineering | Dr. Chanakya Kumar Jha | |
| SenRa Tech Private Limited | Shobhit Jain | |
| National Smart Grid Mission | Arun Kumar Mishra | Kumud Wadhwa |
| HybridSync | Vikas Jha | Sameer Patil |
| Qualcomm | Ramanathan Subramanian | Sesh Sankarapuram |

| | | |
|---|--------------------------|-----------------|
| Tripura State Electricity Corporation Limited | Dr Kele | Abhrajit Da |
| India Smart Grid Forum | Reji Pillai | Reena Suri |
| M2M Cybernetics | Subhashis Mukerjee | |
| NASSCOM | Sudhanshu Mittal | |
| Shrama Technologies | Amarjeet Kumar | |
| National Power Training Institute | Dr Selvam | S Senthil Kumar |
| Tamil Nadu Electricity Board | Shiva Kumar | |
| IIT Madras | Dr Ramkrishna Pasumarthy | |
| IISc Bangalore | Dr TV Prabhakar | |
| NIT Trichy | Dr MP Selvan | |

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? No

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

IEEE Committee Name: Committee Name

Chair’s Name: Full Name

Chair’s Email Address: who@where

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