



विद्युत मंत्रालय
MINISTRY OF
POWER



इलेक्ट्रॉनिक्स एवं
सूचना प्रौद्योगिकी मंत्रालय
MINISTRY OF
ELECTRONICS AND
INFORMATION TECHNOLOGY

Technical Report on Research Project and its practical use

Title: Development of **Unified (foreign and domestic) indigenous test tool** named as Smart Meter Integrated Testing and Higher Analysis for Bharat Smart Meter Protocol Analysis (SMITHA-BSMPA).

Background: The DLMS/COSEM open protocol standard is accepted for communication between various devices involving Smart Meters, Data Concentrator Units (DCU), Meter Data Management Systems (MDMS) and Smart Home Appliances, etc, especially in the case of Advanced Metering Infrastructure (AMI). The Smart Energy Meters deployed in India conform to the DLMS/ COSEM open protocol, based on the International Standard IS/IEC 62056. In addition to IS/IEC 62056 conformance, these Smart Energy Meters are required to comply with IS 16444/ IS 15959 series of testing standards to meet with the Indian utility requirements for parameterization, communicability and functional requirements. Due to massive deployment of smart meters taking place in the country, it is expected that these testing standards will be revised/amended frequently based on field experience. It is a major task to upgrade available test tools as & when these testing standards are revised/ amended. Meter manufacturers use the available expensive DLMS/ COSEM stacks that adds cost on Smart Meters and hence meters are expensive. There is a hindrance to many new manufacturers due to non-affordability of DLMS/ COSEM stack and its cumbersome maintenance.

Consequently, a sample smart meter is to be tested for both Conformance as per IS/IEC 62056 (Conformance tests) and Parameterization as per IS 15959 series (Parameter verification tests) along with tests for communicability and Functional requirements.

Introduction: For testing a sample Smart meter in India, currently, multiple test tools like (1) Conformance / Development Test Tool (CTT/DTT) – a highly expensive foreign test tool is used for Conformance tests as per IS/IEC 62056 (supplied by M/s. EuroDCS GmbH, Germany). The foreign test tool however does not fulfil the complete requirement as per IS 16444/ IS 15959 series of Indian testing standards. As such, an additional domestic test tool is used along with the foreign test tool for complete testing of a Sample Smart Meter complying to IS 16444 series. (2) Functional Evaluation Tool (FET) / Meter Explorer – a domestic test tool is used for Parameterization, Communicability and Functional requirement tests as per IS 15959 series (supplied M/s.Kalki Communication Technologies Private Limited, Bengaluru).

To fulfil the requirements of testing standard IS 16444/ IS 15959 series, both these test tools are essential where IS 15959 (Part 1): 2011 recommends use of CTT for Conformance tests. For over a decade, the country is dependent on the foreign test tool that provides minimal technical support. This test tool is frequently revised where most of its available test features remain unutilized in India. This test tool is also available only for its members and the members need to pay annual membership fees, annual license fees, test tool upgrade cost and revision charges. The country is forced to buy the frequent revisions/ upgrades of this foreign test tool as the previous versions become obsolete with every new release even though the previous older versions are more than enough to fulfil the testing requirements as per Indian testing standard IS 16444/ IS 15959 series.

Objective: To develop an economically viable Unified (foreign and domestic) indigenous test tool on behalf of Govt. of India that shall replace the currently used highly expensive multiple test tools - both foreign and domestic make for testing and certification of Sample Smart Energy Meters that comply with IS/IEC 62056 and IS 16444/ IS 15959 series of testing standards

Methodology: As part of a collaborative research activity driven by Ministry of Electronics & Information Technology (MeitY), CDAC-Thiruvananthapuram and CPRI-Bengaluru under the aegis of Ministry of





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Power (MoP) have worked for the development of **Unified indigenous test tool**. A Desktop Standalone software application is developed using 'C Sharp' based on Windows platform and Dot Net Framework that can be installed on a Personal Computer/ Laptop with Operating System - Windows 10 or above and Framework - Dot Net Framework 4.8 or above. Testing & Certification procedure of the developed **Unified indigenous test tool** will ensure quality, safety and interoperability of the tested sample smart meter any device complying to IS/IEC 62056 and IS 16444/IS 15959 series of standards.

Conclusion: The product developed i.e. SMITHA-BSMIPA is an application comprising of various modules integrated as 'Unified indigenous test tool' for conducting Conformance tests, Parameter verification tests, Communicability and functional requirement tests included in it for testing of Digital/Conventional and Smart Energy Meters that comply with IS/IEC 62056 & IS 16444/IS 15959 series of standards. This is the first indigenous test tool with the support of MeitY under Atmanirbhar Bharat initiative as an import substitution. It is an economically viable solution available as simple user friendly PC based license for testing Digital/Conventional and Smart Energy Meters with customized report generation.

SMITHA-BSMIPA is demonstrated in the country to various smart meter stakeholders such as smart meter manufacturers, various testing laboratories, power distribution utilities (both Govt. & private sectors), System integrators for AMI (Advanced Metering Infrastructure), Technology & Solution providers / partners, Engineers, Consultants, Researchers etc. Beta version of SMITHA-BSMIPA is released on 17.05.2023 by Director General, CPRI. It has been tested including for cyber security, validated at different testing labs of CPRI and YMPL (Yadav Measurements Pvt. Ltd) to test different types of Smart Energy Meters of various meter manufacturers. The functional performance of the product is validated in comparison with the primary test tools (existing). The various types of Digital/Conventional and Smart Energy Meters tested using SMITHA-BSMIPA is verified to be complying with IS/IEC 62056 and IS 16444/IS 15959 series of testing standards.

Different categories of Digital/Conventional and Smart Energy Meters are also tested at individual meter manufacturer's premises, at CDAC, at utility premises of Karnataka and Kerala, at testing laboratories of ERTL, etc. Smart meter stakeholders in the country have shown satisfaction towards performance of SMITHA-BSMIPA and has also been tested and appreciated by meter manufacturer's like M/s.Schneider Eclectic India Pvt. Ltd., M/s.HPL Electric & Power Ltd., M/s.Secure Meters Ltd., M/s.Genus Power Infrastructure Ltd., M/s.YMPL, M/s.Capital Power Systems Ltd., M/s.Linkwell Telesystems Pvt. Ltd., M/s.Allied Engineering Works Pvt. Ltd., etc.

Successful deployment of SMITHA-BSMIPA in India will be a revolutionary milestone in the power distribution sector that benefits various smart meter stakeholders and the Nation in many ways as shown below:

- huge savings on foreign exchange
- curbing the country's existing dependability on foreign test tools for smart meter testing & deployment of utility Head End System (HES)
- Its ease of operation helps utilities for load connect/ disconnect specific consumers, (ii) testing of sample meters at their Meter Testing Labs for communicability tests before field installation similar to the present practice of Accuracy testing etc.
- Utilities can use also SMITHA-BSMIPA for Demand side/ load side / energy management purposes, AMI etc., which can be upgraded easily for their specific needs of MDAS & MDMS of HES
- helps start-ups and MSMEs enter into smart meter business, etc.



Thus **SMITHA-BSMPA contributes to self-reliant India similar to UPI** and it can be globally distributed to other countries based on IS/IEC 62056 with further development.

SMITHA-BSMPA is ready for launch in India and needs to push for policy in the Nation's interest to harness Rollout of smart meters as per utility needs and market requirement of India and to move forward in a phased manner. The SMITHA-BSMPA development team led by a woman has five members with majority women (three) – the Naari Shakti of Bharat.

The way forward: Various smart meter stakeholders in the country have suggested to take the development forward in a consortium mode for the benefit of Government of India. For deployment of SMITHA-BSMPA in India for its practical use, establishing another independent forum like Bharat Smitha Association (BSA), a non-profit organization comprising of various smart meter stakeholders in India is imperative to effectively regulate and maintain the unified indigenous test tool (SMITHA-BSMPA) to ensure its updates as per relevant testing standards.

SMITHA-BSMPA product is the first step in the Atmanirbhar Bharat initiative in the power distribution sector, where the modern way of colonization by means of intellectual invasion is making slavery from generation to generation. Since the power sector is a strategic area with respect to the country, this type of product will enable complete control of the power distribution sector in the hands of Government of India.

Project copyrights (IPR): Filed by CPRI-Bengaluru and CDAC-Thiruvananthapuram are as follows:

- 1) Development of COSEM (Companion Specification for Energy Metering) sub module in DLMS (Device Language Message Specification) /COSEM Testing tool for Smart Energy Meters (Diary Number:23677/2022-CO/SW)
- 2) Parameter Verification sub module for Profile Parameters under Meter Reader Association, in DLMS/COSEM Testing tool for Smart Energy Meters” (Diary Number:2044/2023-CO/SW)

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Fig 1: Test Setup of SMITHA-BSMPA

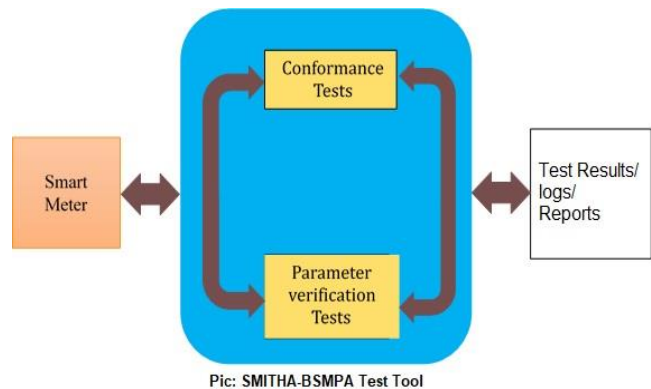


Fig 2: Block diagram of SMITHA-BSMPA