IIT MADRAS
Indian Institute of Technology Madras

Technology Transfer Office
TTO – IPM Cell

Industrial Consultancy & Sponsored Research (IC&SR)

Blockchain based Electricity Market Trading Platform

IITM Technology Available for Licensing

PROBLEM STATEMENT

- **Evolution of electric distribution networks** has led to the rise of distributed energy resources, resulting in P2P trading concepts.
- **Blockchain technology** is used to optimize power demand and supply in the electricity market.
- Developments include a **multi-energy P2P trading platform with seven layers**, a PC-DA for order generation, and a blockchain-based decentralized electricity market trading platform.
- **Conventional systems lack a decentralized and distributed network approach**, requiring a central aggregator for transactions.
- **Existing solutions are unreliable and ineffective**, necessitating a blockchain-based decentralized electricity trading platform with reduced computational burden.

TECHNOLOGY CATEGORY/ MARKET

Technology: Blockchain based Electricity Market Trading Platform
Category: Blockchain
Industry: Trading Platform
Application: commercial sector
Market: The global market size estimated at **USD 4.8 Billion in 2022** and is expected to hit around **USD 69 Billion by 2032,** poised to grow at a compound annual growth rate **(CAGR) of 68% from 2023 to 2032.**

INTELLECTUAL PROPERTY

IITM IDF Ref. 2675
Application No: 202341070142

TRL (Technology Readiness Level)

TRL- 3, Experimental proof of concept

Research Lab

Prof. Shanthi Swarup K
Dept. of Electrical Engineering

TECHNOLOGY

Decentralized Electricity Trading Platform Architecture

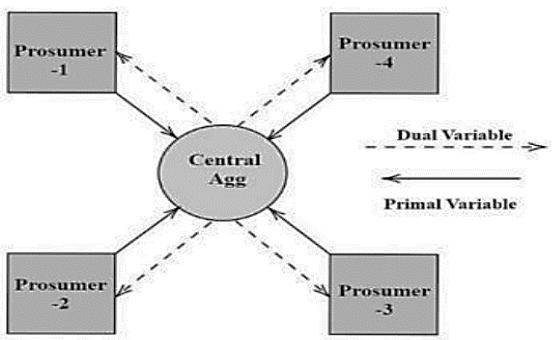
- **Prosumers access blockchain network for peer-to-peer transactions.**
- **Layers enable transaction based on consensus.**
- **Provides a decentralized electricity trading platform.**

The layers of the decentralized electricity trading platform includes

(i) A smart contract layer having decentralized self-executing smart contracts for receiving the real-time power demands and supply from one or more prosumer and is configured to perform one or more transaction,

(ii) A Physical and Optimization Layer (POL) in communication with the contract layer, to perform optimizations for reaching a consensus between prosumers

(iii) A monetary settlement layer (MSL) in communication with the digital contract layer to execute monetary transaction after execution of one or more smart contracts.

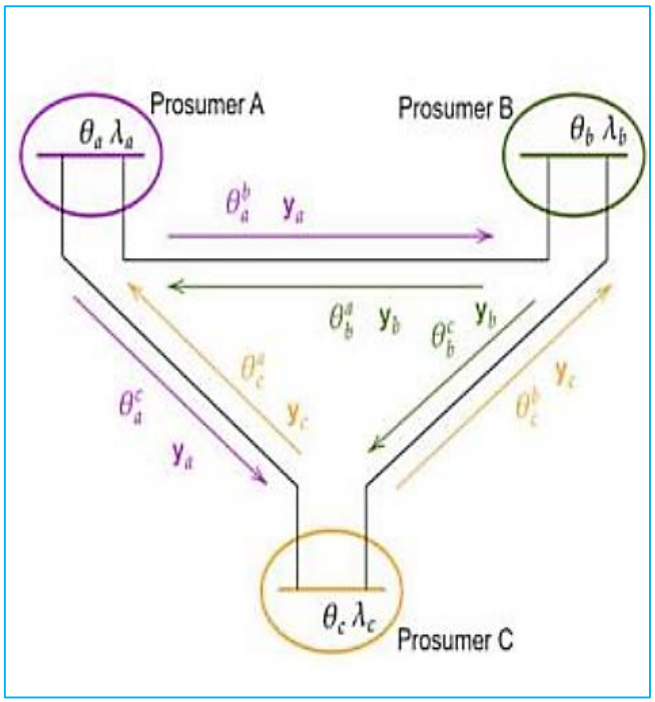


CONTACT US
Dr. Dara Ajay, Head TTO
Technology Transfer Office,
IPM Cell- IC&SR, IIT Madras

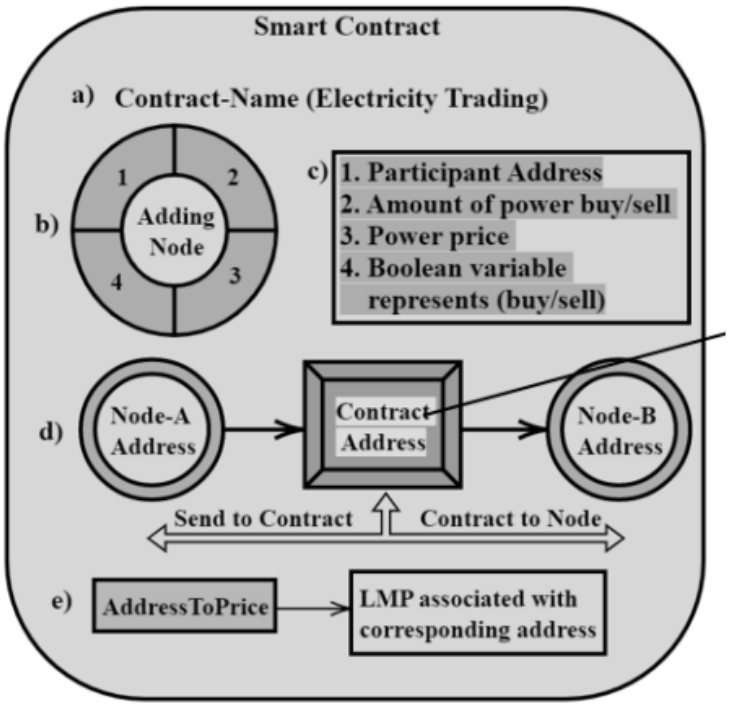
IITM TTO Website:
https://ipm.icsr.in/ipm/

Email: headtto-icsr@icsrpis.iitm.ac.in
tto-mktg@icsrpis.iitm.ac.in
Phone: +91-44-2257 9756/ 9719

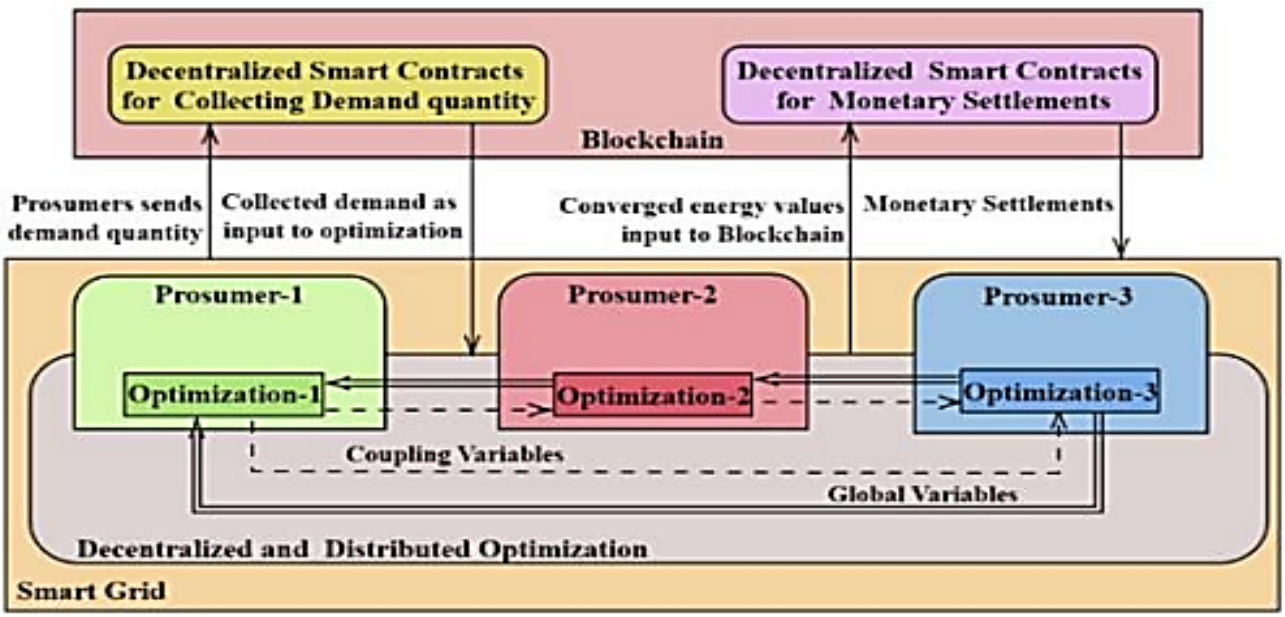
The below fig illustrates Alternating Direction Method of Multipliers (ADMM) communication strategy for 3-bus system



The below fig illustrates a structure of smart contract for monetary settlements



The below chart illustrates a graphical abstract of peer-to-peer energy trading platform,



CONTACT US
Dr. Dara Ajay, Head TTO
Technology Transfer Office,
IPM Cell- IC&SR, IIT Madras

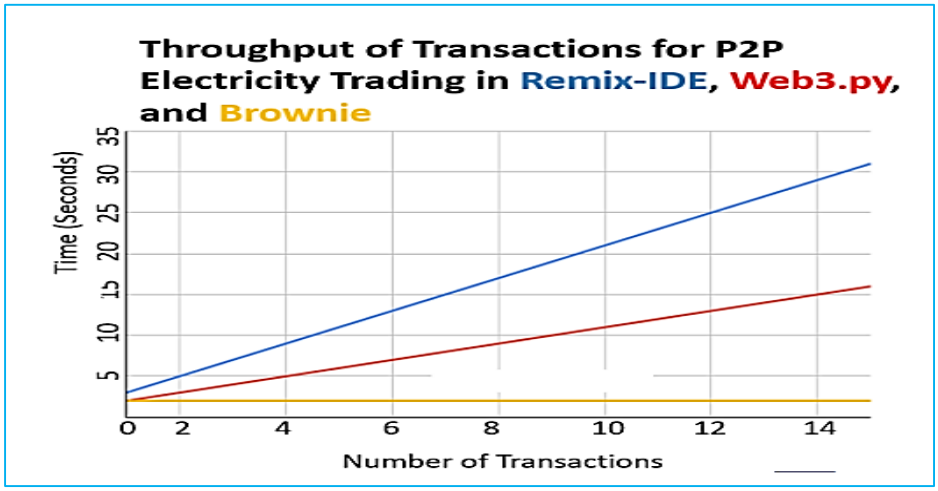
IITM TTO Website:
https://ipm.icsr.in/ipm/

Email: headtto-icsr@icsrpis.iitm.ac.in
tto-mktg@icsrpis.iitm.ac.in
Phone: +91-44-2257 9756/ 9719

Key Features / Value Proposition

- Deployment of smart contracts on Ethereum Blockchain network.
- Facilitation of consensus based on variable function of electricity demand and supply via Alternating Direction Method Of Multipliers (ADMM) algorithm.
- Configuration of MSL for monetary transactions in a Brownie environment.
- Development of smart contracts using solidity language.
- Presence of Procurement Optical Liquidity (POL) outside blockchain.

The graph illustrates a plot of Number of transactions Vs. Time, to depict throughput of 25 transactions for peer-to-peer electricity trading in various blockchain environments,



CONTACT US
Dr. Dara Ajay, Head TTO
Technology Transfer Office,
IPM Cell- IC&SR, IIT Madras

IITM TTO Website:
https://ipm.icsr.in/ipm/

Email: headtto-icsr@icsrpis.iitm.ac.in
tto-mktg@icsrpis.iitm.ac.in
Phone: +91-44-2257 9756/ 9719