PARITY
Newsletter #5

March 2022
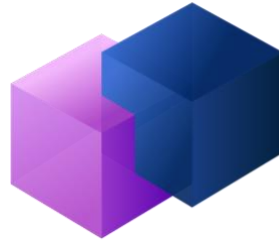
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Latest News

PARITY Second period ends in March 2022 and is a significant milestone for the project progress.

March 2022 marks the end of the second period of the PARITY project that begun in April 2021 and lasted for a year. During this second period of the project, PARITY component were further developed to add functionalities and make improvements. In addition to the updated versions of the Blockchain platform and off-chain components (D5.4, D5.3) as well as the tools for the DSO (D6.3), the tools implemented for flexibility management have been presented (D7.3, D7.4, D7.5) along with initial results that demonstrate the feasibility of the proposed approaches. Focus has also been given on the integration between the components and data exchange, and initial results have been reported (D8.1). The procurement and installations of the equipment at the pilot sites have been performed, as well as the commissioning through internal workshops (D8.3). Activities for informing and engaging the pilot users have been started at the pilot sites (D8.2). Regarding exploitation activities and market development, the involved partners finalized the emerging trends description and provided a market adoption roadmap for the PARITY offerings (D10.1).

Progress beyond the state of the art, expected results until the end of the project and potential impacts

PARITY aims to go beyond state of the art on multiple aspects. Firstly, a smart contract-enabled energy and flexibility market platform has been designed, allowing both peer-to-peer energy trading among prosumers within the Local Energy Market, and flexibility trading by involving the DSO and the Aggregator actors and supported by the PARITY system architecture. A key point is the automated validation of energy/flexibility scheduling which is facilitated through the monitoring capabilities of the Oracle component and the defined representation of Service Level Agreements. Another important aspect is the automated discovery and provision of flexibility through the use of the IoT platform and models, such as the human-centric Power-to-Heat model and Electric Vehicle load and flexibility forecasting model. Moreover, Smart Grid Monitoring and Active Network Management functionalities have been developed within the DSO

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toolset, and along with the DER dispatch module and STATCOM device will contribute to improved grid stability. With regard to expected potential impact, added value will be provided by the PARITY platform to prosumers, local aggregators and DSOs, enhancing the PARITY unique selling propositions. R&D results of the project have been reported in scientific publications and through participation in workshops and events.

Publications from UNICOSIA published in December 2021 in Journal The Next Blockchain Wave Current Challenges and Future Prospects)

Blockchain technology is highly coupled with cryptocurrencies; however, it provides several other potential use cases, related to energy and sustainability, Internet of Things (IoT), smart cities, smart mobility and more. Blockchain can offer security for Electric Vehicle (EV) transactions in the Internet of Vehicles (IoV) concept, allowing electricity trading to be performed in a decentralized, transparent and secure way. Additionally, blockchain provides the necessary functionalities for IoV decentralized application development, such as data exchange, personal digital identity, sharing economy and optimized charging pattern. Moreover, blockchain technology has the potential to significantly increase energy efficiency, decrease management costs and guarantee the effective use of the energy recourses. Therefore, its application in the IoV concept provides secure, autonomous and automated energy trading between Evs. While several studies on blockchain technology in smart grids have been conducted, insufficient attention has been given to conducting a detailed review and state-of-the-art analysis of blockchain application in the IoV domain. To this end, this work published under the title *Blockchain Application in Internet of Vehicles: Challenges, Contributions and Current Limitation,* provides a systematic literature review of blockchain-based applications in the IoV domain. The aim is to investigate the current challenges of IoV and to highlight how blockchain characteristics can contribute to this emerging paradigm. In addition, limitations and future research directions related to the integration of blockchain technology within the IoV are discussed. To this end, this study incorporates the theoretical foundations of several research articles published in scientific publications over the previous five years, as a method of simplifying our assessment and capturing the ever-expanding blockchain area. We present a comprehensive taxonomy of blockchain-enabled applications in the IoV domain, such as privacy and security, data protection and management, vehicle management, charging optimization and P2P energy trading, based on a structured, systematic review and content analysis of the discovered

literature, and we identify key trends and emerging areas for research. The contribution of this article is two-fold: (a) we highlight the limitations presented in the relevant literature, particularly the barriers of blockchain technology and how they influence its integration into the IoV and (b) we present a number of research gaps and suggest future exploratory areas.

The article can be accessed in the following link: https://www.mdpi.com/1999-5903/13/12/313#

Publication co-authored by University of Deusto and UNICOSIA was published in March 2022 in Journal: Connection Science

Flexible and distributed energy markets are a reality that is progressively reaching many regions. Despite their clear benefits, they should be accepted by the prosumers. Additionally, blockchain technology and smart contracts have been characterised as a technological enabler for the energy sector and P2P Energy Markets (PEM). However, little research has been done to explore blockchain's user-centred perspective. Therefore, this paper under the title: _**Blockchain application in P2P energy markets: social and legal aspects**_ analyses the reluctance and/or concerns of prosumers regarding smart contracts, and investigates their perception on blockchain within PEMs. The authors present the results of a survey conducted across several European countries addressing the implementation of automated trading systems and analysing the adoption of smart contracts. Considering that the main survey outcomes are related to the regulation and legislation uncertainty around blockchain usage, this paper explores also the fit of smart contracts from a legal perspective. Additionally, a set of recommendations to be used as the basis for the design and development of PEMs is delivered, aiming to adopt blockchain and smart contracts. As a key take-away, the authors confirm the crucial role that blockchain will play in the deployment of fair, secure, flexible and distributed energy markets by ensuring transparency in the exchange of information between prosumers and energy stakeholders.

The article can be accessed following the link: https://www.tandfonline.com/doi/full/10.1080/09540091.2022.2047157