Transactive Energy Blockchain Use Cases Segmentation and Standardization Framework

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Transactive Energy Systems are designed by using the advantage of the advance control and economic operational functionalities to dynamically balance the electrical demand and supply within the electrical grid using advanced information and communication technologies. Distributed Ledger Technology (DLT, in particular Blockchain, is considered as one of the most promising emerging technologies which will transform the future business and social consumer behaviour in several industrial segments fundamentally. DLT and decentralization of the energy sector are two disruptive components of the future of the transactive power markets. DLT is a perfect fit for future power systems and markets use cases which has the capability to empower the decentralization, cost-efficiency and transparency of the entire sector. Next generation transactive power systems will be more autonomous and democratic to a greater extent with the help of new derivative technologies at a high degree of complexity and flexibility. [1]

Similar to other emerging technology fields, there is also a strong need to create standards in the Energy Blockchain domain. With this proposition, the IEEE Standards Association (SA) created, in September 2018, the newest IEEE P2418.5 Blockchain/DLT in Energy Working Group Standards, as the first global standards to address reference architecture, interoperability, and use cases. Technology mapping use case segmentation and system level modelling of the entire energy blockchain landscape are the critical missions to accomplish a successful standardization framework. [2]

The typical segmentation of blockchain application in the energy sector focuses on physical area of use case and applications such as “grid transactions”, “peer-to-peer energy trading” and “electric vehicles” as shown in [3] for instance. The proposed use cases segmentation here is based on key functionalities of blockchain technology. Those are, when roughly classified, 1) decentralized transactions that guarantee validity and provide auditability and 2) data recoding with proof of existence and immutability. For example, peer-to-peer energy trading, the most popular use case in the energy sector, falls on 1) as it focuses on transactions, while renewable traceability falls on 2) as it focuses on recording energy data and attribute data of renewable generation plants. Second approach of use case segmentation can be accomplished by classifying the energy blockchain applications on the energy system supply chain. The Working group aims to merge two methodologies for the Energy Blockchain use case segmentation process.

The benefit of the proposed method is that it makes it clear what functionalities are largely used in applications thereby providing better understanding of where benefits of applications come from. For example, an application of renewable traceability takes advantage of blockchain's functionality of recording data in an immutable manner so it could be used for guarantee of origin and could be a base for monetary transaction as certificate. This article proposes to demonstrate the one of the critical activities of the IEEE P2418.5 Blockchain/DLT in Energy Working Group in the field of use case segmentation.

References

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