

A blockchain solution for operational parameters monitoring platform for DC microgrids

Abstract

Large penetration of renewable distributed energy resources, as well as the effective integration of storage systems and electric vehicles, are some of the required strategies to reduce the impact of the energy sector on greenhouse gas emissions. Microgrids offer an efficient platform to facilitate the integration of these systems, however, the increased complexity this strategy comes with, requires the use of sophisticated, reliable, and secure monitoring and control systems. The outbreak of cryptocurrency technologies has drawn particular attention, especially, the underlying Blockchain technology. The decentralized structure of this technology enables implementing control strategies, parameters monitoring, and business processes in microgrids. The aim of this work is to present the development of a framework to monitor operational parameters from an islanded microgrid. To build the Blockchain network, the Hyperledger-Fabric development platform was used. To simulate the behavior of the microgrid, an object-oriented open-source library using the Modelica modeling language was used to model a DC microgrid. The performance of the architecture was evaluated through operational parameters such as the difficulty and the number of nodes. Results suggest that changes in these factors can affect significantly the transaction time. The proposed architecture can be used as a basis to study Blockchain communication effects in smart grids and their development.