CERIS : Civil Engineering Research and Innovation for Sustainability

4IR Technologies for the management of distributed telecoms infrastructure assets in a developing economy

Summary

In developing or emerging markets, power availability in telecom operations is one of the critical factors to ensure sustainable network availability and quality of services (QoS) for customers' services, internet connection, and applications. When there is an outage or failure in these distributed telecoms assets or asset power systems, customers' expectations, satisfaction and value-added services are impacted, thereby causing a loss of revenue and customer dissatisfaction. The goal of this research is to contribute to the accomplishment of sustainable network availability and quality of service and effective asset management practices that reduce intermittent outages and unforeseen failures, malfunction and power performance degradation.

The research is focused on critical distributed assets of passive telecommunication infrastructure in emerging markets, such as power generating sets, cooling units, solar systems and hybrid battery solutions. These distributed assets are challenging to manage because of the operating environment that faces low public power availability. This concern has led to the increasing demand for these assets to function twenty-four hours a day, continuously impacting asset functionality, behaviour, performance, and lifecycle management. There is a need to optimise asset management practices, which comprise operations and maintenance practices, including spare management, real-time visibility on outages, monitoring and tracking maintenance activities, diesel delivery, allocation and management.

This research explores the potential benefits of 4IR technologies, specifically blockchain and digital twin, for enhanced lifecycle management of passive telecommunication infrastructure assets. It is expected that the integration of these 4IR technologies can be valuable for addressing the maintenance challenges faced by organisations in emerging economies, as it reshapes the existing conventional maintenance strategy to the predictive-based maintenance strategy that aligns with the 4IR that focuses on efficiency, productivity and flexibility while enabling intelligent and digitalised approaches and decision-making processes.

Keywords

4IR Technologies, blockchain technology, digital twin, asset management telecommunication industry.

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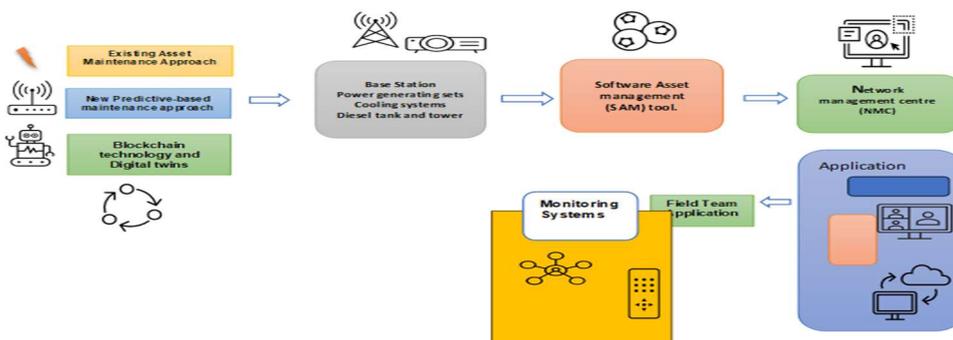Nuno Almeida (CERIS, IST, University of Lisbon)

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Integrated blockchain and digital twin technologies in passive telecommunication infrastructure asset management.