Africa Center of Excellence in Internet of Things (ACEIoT)

College of Science and Technology

Virtual Research Seminar

An efficient LPWAN smart fault detection and monitoring platform for the power distribution grid using energy harvesting IoT nodes

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DATE & TIME:

14th January, 2022
10:00 am to 11:00AM

Abstract:

Power outages and supply disruptions are a common yet unwelcome phenomenon of the power distribution system, more so in sub-Saharan Africa. The growing demand for greater reliability and dependability in power delivery has aroused the interest of researchers and renewed the search for advanced technological solutions for fault detection and finding at medium and low voltage level. The length of the distribution network typically runs into hundreds of thousands of kilometers. In this regard, the management of the distribution network including the identification of a faulted segment is a significant recurrent challenge facing network operators. With an ever-expanding distribution network and regulatory demands for service reliability, the challenge on network operators is daunting. However, the deployment of IoT technologies in the energy distribution infrastructure would greatly accelerate the detection and location of faults hence making the electricity delivery services more robust, attractive, responsive and communicative. This paper proposes, designs and implements a reasonably priced IoT-based LPWAN platform for monitoring the energy distribution network. Results have shown that an alarm is raised at the network-monitoring center in about 100msec of the occurrence of a fault at the distribution network thus enabling quick and prompt commencement of reparative action. Furthermore, practical evaluation has determined that this system is well suited for developing countries where budgetary constraints hinder the upgrade of the current legacy grid into fully-fledged smart entities.