Smart grid monitoring

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These days smart grids are very popular. They are not only the power networks; rather they serve the people and businesses in many different ways. In order to carry out all these functions, a lot of measurements are needed in the smart grids. Similarly, a lot of control and monitoring related tasks are essential for the smooth operation of the smart grids. In this article, we present emerging information and communication technologies (ICT) used for the measurement, control and monitoring tasks in the smart grids.

ICT has several roles in smart grids. In general, ICT can help in the control, management and overall monitoring operation in smart grids. The large structures of smart grids are complex due to the presence of multiple heterogeneous components, different type of generators, and load diversities. These complex parts are dependent on each other. Trouble in one part can affect the other parts and even the entire grid [1]. Therefore, fault detection in a grid section and its reporting to other associated sections are of immense importance for overall smooth functioning of smart grids. ICT can play crucial roles in these aspects. It can also fix several of these problems autonomously.

In the last three decades, wireless communication technologies have become very popular. New initiatives in ICT such as the Internet of things (IoT) and wireless sensor networks (WSN) perform accurate measurements in different fields. These technologies can be applied in the smart grids for measurements [2]. Both these technologies are really good at measuring physical parameters using sensors and actuators. In addition to the measurement tasks these systems can take some corrective actions to overcome the faulty situation through the actuators. IoT and WSN can measure the following physical parameters of the power grids [2].

Control of the grid parameters is very important to keep the performance optimum all the time. The dynamics of the smart grids are combinations of many complex processes. Overall control of the grid depends on the control of individual constituent parts. ICT based control and feedback mechanism can support the following aspects in the smart grids [2].

Due to the size and importance of the continuous services of smart grids, monitoring is essential for some key

physical parameters. Some of these parameters include: terminal voltage, frequency, power factor and temperature at key locations. Monitoring of these parameters is possible in the IoT based framework [2]. Using both the IoT and WSNs, key information related to the grid performances can be collected from the appropriate locations. Overall, this helps in the performance optimization and fault avoidance. Cascade failures and several other sequential failures can be avoided using ICT based monitoring systems [2].

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