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IOT based Wide-Area Monitoring System (WAMS) & AMI

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ABSTRACT: Wide Area Measurement System (WAMS) is technology to improve situational awareness and visibility within power system of today's and future grids. It uses real time synchro phasor data to measure the state of grid that enables improvement in stability and reliability of power grid. WAMS architecture plays an important role in these real time and data intensive systems. Phasor measurement units (PMUs) provide great potential for monitoring an electrical grid by recording synchronized measurements across a wide area. However, with more and more PMUs being deployed, the traditional workflow of processing these data is facing a major challenge. This paper IOT based Wide Area monitoring system (WAMS) Smart Sensor Telemetry & Advanced Metering Infrastructure (AMI), will propose a new scalable architecture of smart telemetry system based on IoT (Internet of Things) devices, it uses cellular (SMS solution) and internet (TCP/UDP Solution) networks to transmit, in real time, data to or from supervised and controlled system. Smart Grid has evolved as a recent topic of discussion and research in many parts of the world and thus the smart metering systems. The electrical supply industry is in the process of integration with bidirectional information and power flow infrastructure commonly called smartgrid

KEYWORDS: Smart grid, Telemetry, IOT.

I. INTRODUCTION

Wide-area measurement systems (WAMS) in smart grid can be defined as a system that captures measurements in the power grid over a wide area and across traditional control boundaries, and then uses those measurements to improve grid stability. A phasor measurement unit (PMU) measures the phasor values of current and voltage. These values get a high precision time stamp and together with the values of power frequency, power frequency change rate and optional binary data that are also time stamped are transmitted to a central analysis station. A smart sensor is a device that takes input from the physical environment and uses built-in compute resources to perform predefined functions upon detection of specific input and then process data. The goal of an AMI is to provide utility companies with real-time data about power consumption and allow customers to make informed choices about energy usage based on the price at the time of use. AMI is seen as an important part of any smart grid initiative.

II. BACKGROUND OF THE INVENTION

Wide area measurement system (WAMS) refers to a measurement system composed of strategically placed time-synchronized sensors (which are PMUs) which can monitor the current status of a critical area in real-time. The critical area can be the entire power system or a part of the system. Wide Area Monitoring System use a GPS satellite signal to time-synchronize from phasor measurement units (PMUS) at important nodes in the power system, send real-time phasor (angle and magnitude) data to a Control Centre.

A phasor measurement unit (PMU) measures the phasor values of current and voltage. These values get a high precision time stamp and together with the values of power frequency, power frequency change rate and optional binary data that are also time stamped are transmitted to a central analysis station. AMI's Telemetry Systems transmit real-time sensor data from a rotating device while the system is running. The system consists of one or more rotating Signal Conditioner/Transmitter modules with power source (battery pack or inductive) and a stationary Receiver.

III. WORKING

Wide-area measurement systems (WAMS) in smart grid can be defined as a system that captures measurements in the power grid over a wide area and across traditional control boundaries, and then uses those measurements to improve grid stability and events through wide-area situational awareness and advanced analysis. A phasor measurement unit (PMU) is a device used to estimate the magnitude and phase angle of an electrical phasor quantity (such as voltage or current) in the electricity grid using a common time source for synchronization. The resulting measurement is known as a synchrophasor.

Sensors capture data from preferred environments and transform their physical properties into measurable electrical signals. These properties include temperature, mass, speed, pressure, or presence of heat bodies like humans. The goal of an AMI is to provide utility companies with real-time data about power consumption and allow customers to make informed choices about energy usage based on the price at the time of use. AMI is seen as an important part of any smart grid initiative.

IV. CONCLUSIONS AND FUTURE WORK

Wide Area Measurement System (WAMS) is technology to improve situational awareness and visibility within power system of today's and future grids. It uses real time synchro phasor data to measure the state of grid that enables improvement in stability and reliability of power grid. Phasor measurement unit (PMU) measures the phasor values of current and voltage. These values get a high precision time stamp and together with the values of power frequency, power frequency change rate and optional binary data that are also time stamped are transmitted to a central analysis station.

In future, sensors will also be able to work autonomously in the same manner. A machine will then become self-learning. So, artificial intelligence with deep learning algorithms is the future. The Advanced Metering Infrastructure Market was valued at USD 10.47 billion in 2020, and it is expected to reach USD 22.98 billion by 2026, registering a CAGR of 13.9%, during the forecast period of 2021-2026. Smart Meters represent a transformative technology for the utility industry.

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