A STUDY OF SECURED DESIGN OF SMART METER WITH ENERGY EFFICIENT IN SMART GRID

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Abstract - *Smart grid replaces analog mechanical meters with digital meters that record usage in real state of affairs. The power grid has been converted into an essential in the recent world. A smart grid is the integration of information and communications technology into electric transmission and distribution networks. Nowadays, the electricity make available manufacturing is grappling with an exceptional array of issues, period from a on-requirement gap to getting higher expenses. In addition these and more forces are motivating the necessitate to pertaining the trade. Hence, it makes, is motivating the necessitate for a smart grid. With the increase in unit cost of electricity, there is a need for utilities to replace and renew aging transmission and distribution infrastructure with a pressure of using the assets wisely. Human errors and deliberate errors can be lowered by using smart instruments like smart meters. Smart grid can improve outage management performance by responding faster to repair equipment before it fails unexpectedly. The smart grid can improve load factors and reduce system losses. We can integrate renewable energy projects into the grid.*

Key Words: Smart Meter, Advanced Metering Infrastructure, energy detection schemes, Intrusion Detection System and three phase AMI smart meter.

1. INTRODUC`TION

Electricity demand in India is growing much faster than the transmission system, making the transmission system in tremendous strain. The smart grid will improve the grid's resilience and robustness. The advances in computing and telecommunications during the last half century have affected almost every facet of life. One reason the smart grid is taken seriously is because advanced computing and telecommunications have made it possible. Smart Meters establishes from corner to corner the set of connections. Quantities of these are yet functioning as smart meters, significance that the meter comprehension is together by means of distant interactions systems. In all the contents are examined, recursive recover system that transport electrically otherwise gas production resources,

as well as scattered recoverable resources, to means of utilization. These are effective power deliverance and make possible two-way contact crosswise the grid, facilitate client energy administration, diminishing power interference and carrying only the necessary quantity of power. Smart grid generates a kind of connected network electrically power system. It produces cost-effectively power generation system with protection to the end-users.

2. SMART GRID WITH AMI

AMI is an updated version of automatic or automated meter reading (AMR).AMR did not meet the current requirements for two-way communication and thus, Advanced Metering Infrastructure (AMI) is introduced. That is used to measure, collect, and analyse energy utilization and communicate with various metering strategy. The parts of the system are H/W, S/W, integrated system components and monitoring, Customers associated systems, Meter Data Management System (MDMS) software, and supplier business systems.

AMI is consists of three components such as smart meter, data concentrator and AMI head end. AMI is composed of smart power meter, information management software of bi-directional communication network & data analysis, circuit protection scheme.

Smart grid includes the parts are Advanced Metering Infrastructure, in which huge quantity of samples from 100s-1000s of AMI meters are composed and processed through an AMI communication infrastructure. End-users can be on familiar terms with precisely how much energy they have inspired at any time and fine-tune their power spending settlement to the vibrant power cost.

3. RECENT WORK

Energy loss is a significance issue to the smart meter performance. The non-technical loss during communication of electrical power, it is most complex for the convenience companies to identify and struggle the people guilty for energy attack. Scalability and resource scarceness is a very significance challenges for the Advanced Metering Infrastructure operation in smart grid. Since a smart meter consumes most of its processor and main memory resources for its core businesses, only a

small fraction of its already limited resources is available **for IDS' data processing purpose.** They are mostly equipped with low end processor with less main memory storage.Horrific data insertion is a very hazardous issues in smart grid. Due to this energy loss and root stop working on the energy production.

4. SYSTEM ARCHITECTURE

Advanced Metering Infrastructure power loss identification methods divided into three kinds. They are classification, state and game theory. General way out for power loss identification is state identification methods. It utilize observing state to get better the discovery rate. The observe state can be resultant from wireless sensor networks.

To protect AMI from malicious attacks, the Intrusion Detection System (IDS) aspect of security. An IDS is used as a monitoring system for detecting any unwanted entity into a targeted system solution. Thus a number of data stream mining algorithms are used to detect the anomalous events or attacks. An IDS follows a sequential process. It uses a separate network which increases reliability. Resource scarceness can be solved by proposing to use a separate IDS entity, either installed outside the smart meter (for existing ones) or integrated within the smart meter (for new ones). AMI Intrusion Detection System an integrated intrusion detection solution to identify malicious energy theft attempts in advanced metering infrastructures. AMIDS can detect various types of energy theft attempts accurately using individual sensors.

4.1 Detection Schemes

AMI energy-theft detection schemes are different kinds. The post processing, and suspected customer list generation. A security technique is proposed process to suspicious customers. This procedure is designed and implemented. It was the development of approximate energy consumption patterns of several customers based **on customers' geographical location, load capacity, and** their type. A dataset representing the energy consumption patterns of several customers is developed based on the historical data. In addition, they analyse the influence of energy theft on the power grid by comparing the electricity load on the grid. Then, the input training data is used to train the SVM model and the electricity consumption patterns of several customers are tested whenever needed. At last, this classification is done based on rules and the customers with suspicious energy consumption profiles are grouped and prosecuted.

The goal is third detection scheme is game theory-based detection.The main focus is smart metering for households and small business customers. The objective of this report

is to present the issue of smart metering from an energy **regulator's point of view.**To provide a more efficient and secured smart meter to the customer, the three phase AMI Smart Meter has been designed. The Fig-1 smart meter.

1. Communication Module Cover
2. Nameplate Label.
3. LCD
4. Test LEDs (Wh and VArh) The light (LED) will pulse (on & off.
5. Phase Indicators
6. Alternate Display Scroll Button (1)
7. ARM Breaker Reconnect/ Load Control Boost Button (2)
8. Optical Port
9. Terminal Cover Seal
10. Terminal Cover

Fig -1: Smart meters
with components explained . AMI three phase meter start with 0530xxxxxx. Unauthorized access and safety of customer and personnel indicated separately.

4.2 Advantages

Secrecy: No legacy of data.
Reliability: No information altered.
Accessibility: **Information's take in ready state to correct**
Confidentiality: No general information.
Physical hardware testing is done that verifies the functionality of different types of equipment. Meter testing needs to be performed per type of meter. Network bandwidth and latency testing are performed under real-time loads. Devices such as meters and in-home devices are tested which may change regularly.Security testing verifies that the data passing across the network is protected. It must be performed on all components of the smart grid program, including new systems, legacy systems, interfaces, networks and hardware such as meters.

5. CONCLUSION

It manages the consumers' data and validates their inputs with immediate notification to users at remote locations. The research may move toward more secure AMI deployments by the use of stream data mining based IDSs in the future.

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