International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 08 | Aug 2021 www.irjet.net p-ISSN: 2395-0072

Real-Time Substation Monitoring with Cloud Computing

Jasleen Kaur Bali[1], Bhavraaj Singh[2]

[1,2]*Engineering students, Dept. of Computer Science, Vellore Institute of Technology, Chennai, Tamil Nadu, India*

Abstract - *Recent upgrades to the smart grid provide real-time control as well monitoring a multi-sectoral energy system communication. A smart grid is needed to improve reliability, efficiency, safety and cost of effective power management for the commencement of its construction. Considering all of this needs from the customer side, we do the project according to the use of cloud computing used for power management and intelligent grid information management. This project overcomes the evil of a smart grid without cloud computing. We also used different powers, for example- it works and reacts on compensation power providing effective power. Through other software programs, we have achieved in real time monitoring activity and efficient energy and efficient use power compensation (capacitor bank) only temporarily in the system.*

Key Words: Cloud computing, smart grid, substation, monitoring, etc.

1. INTRODUCTION

WHO already mentioned Smart grid has a combination of various electrical networks, communication infrastructure and information Technology. With the development of knowledge an intelligent grid for management and multiple communications provides electric power flow is reliable, cost effective and efficient management. Smart Grid tests the power consumption and simulation capabilities along with the responsible use of the system. An intelligent digitally controlled grid provides self-monitoring, self-medication and two-way communication, power generation, transmission, distribution, control and monitoring of power measuring supply and demand. It is important to manage millions of meters on a smart grid safely and in reliable ways. The state should expand their network as well as manage all data in a distributed database. In this regard, Cloud Computing use is one of the most widely used technologies recently which plays an inspiring role in building a smart grid of the future. By using cloud computing the consumer can access their apps at anytime, anywhere, with network-connected editing. The Cloud computing smart grid app offers efficient performance as well safety. Our project is based on other cloud applications using a computer to monitor the real time of the channel. We analysed the data from the cloud to calculate basic power differs from the system, for example, active and reactive energy. We also provide compensation for active force.

2. CLOUD COMPUTING FOR MONITORING AND CONTROL

Various device controls on the channel can be done remotely from the channel data center. Now the automation used for the day plays a very important role in regulating the energy process system. This will control various issues in the system. Storage can be done with system control information. Consumer wants flexibility in the system that will reach by remote control of replacement. Various problems are produced over time system performance that will change the norm in terms of performance of applications in the energy system. In accordance with the need for a smart grid is important to make it bidirectional communication between service and customer. For better grid power management, it needs to be maintained balance in demand and supply used and supplied. A grid capable of fulfilling this requirement is through power management. This establishes a Home Energy Management System (HEM), Demand Side Management (DSM) and Building Energy Control System (BEMS). Proper management of demand and supply, the smart grid uses solar energy and renewable energy sources. On a smart grid, a number of devices are connected such as home appliances, small grid, sensors, communication devices and channels. Therefore, it is very important to protect all of this build by making appropriate solutions that will provide flexibility and reliability of the power supply system. As we know the smart grid, it consists of various power management devices in it. We get variety of details according to requirements. Therefore, the management of this data is very limited. It is important that this meter provides real-time monitoring data as well communication. Scheduled formatting should require a file for intelligent grid as it contains various categories such as electricity generation, transmission and distribution. This can provide perfect managers of the system. Heterogeneous formulation supports various demands feedback, shared generation and real-time intelligent grid values. It is an important characteristic of the intelligent grid. Security is one of the things and an important case for the protection of the privacy of any field. Cyber security, data leakage, threat detection is a variety of problems required to prevent by encouraging the customer the appropriate privacy policy should be kept safe at their end. With the above fulfillment defined terms, cloud computing is a very useful technology recently intelligent grid development. It contains the following properties:

a) Improving costs through real-time monitoring and controlling various parameters.

b) In terms of the potential consumer power consumption payment through other applications or software.

c) Carbon emissions from the grid are a major problem. It can lead to manage this problem by installing hydro, solar and wind power stations.

d) Proper balance of need and provision. This is done with access information to the customer from the resources side. This unlimited data already exists stored in operational management from various techniques on a smart grid.

3. CONTRIBUTION

As we discussed in the previous section that the smart grid is nothing but a combination of intelligent design and various communications. Contains power management, details in management and security in various functions. In this project we calculate different energies, for example, effective and efficient energy from data storage in the cloud. Also provide effective compensation power as a bank capacitor. Our project is based on real-time monitoring and channel control through cloud computing. Various details are located in the data center, all data used by the system software automatically and calculate the effective and efficient power. Project capacitor bank that will work to operate power otherwise will be disconnected from the region. Very much the benefits of our project will allow the capacitor bank to operate on time only active energy, which offers to reduce the decrease in electrical energy capacitor because it does not continue to work. Our goal is to calculate the active power from the station as well as give compensation to it. In this project data from the cloud plays a very important role. With the discovery of this, we had taken over the space in server and also detected daily power consumption. We use our login id and password. We were already creating an account there. We can see various parameters like power studies, current and the power factor. So, by using the basic formulas of active and reactive force, we count its revered readings.

4. CLOUD COMPUTING AND SMART GRID

4.1 Smart Grid

Smart grid is integration of information technology as well smart devices in the power system. It also uses bidirectional communication between customers and usage. As we have discussed, a smart grid makes for more loyalty generation, delivery and distribution. In the production of electrical energy, various energy plants include generation. Transmission provides customization energy from small-scale production in the distribution station. It is very important to make the customer careful to control the use of electricity at their end. Smart grid function under this requirement provides a variety of smart devices and offers bids communication between customers and uses it to achieve distance between demand and supply. The following conditions are extremely important for the smart grid.

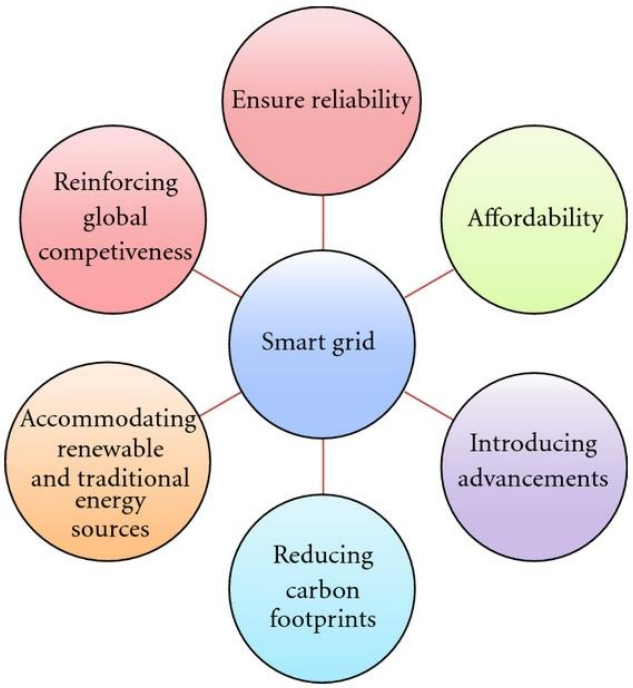

Fig 1: Smart Grid

4.1.1 Smart Meter

Automatic Substation provides power flow flexibility. The newly built smart grid has a variety of infrastructure with smart meters in the end for consumers who make them aware of the power consumption. These smart meters help maintain normalcy details of the use of power and record of the same. Advanced meter infrastructure is used for actual determination of time monitoring and can be controlled remotely. These are located at the end of the distribution and are able to record power use. Through consumer communication, communication on both sides is usable and always in contact. The buyer knows about the use of force alongside them. They can ask about the record what it is and want of resources. And the customer can count all day the use of power at home by taking readings from smart meters. This can help with energy costs which is why they will warn saving energy consumption. Smart meters are actually designed as this is the purpose of knowing the use of force and one should control the use of power.

4.1.2 Micro Grid

Aligning demand with supply creates various challenges in implementation supply system. Power supply systems require less power, efficiency, autonomy and diversity of energy sources. It's small grid use in demand management, power and energy production storage. Entry into renewable distribution production resources such as solar, wind and hydro should be made into the system. Basically, a small grid is one of the most important solutions which is required to maintain requirements at the end of the consumer. Allows the use of various sources of renewable energy such as wind,

hydro and solar. It's small grid used to integrate these distributed energy sources and distribution the ability for consumers to meet needs.

4.2 CLOUD COMPUTING

Cloud computing is a newly developed technology for intelligent grid providing an integration model that will prevent demand model and maintain various records that can be seen on connecting device. Cloud uses data captured by various smart meters on the smart grid. Cloud computing includes the following features:

1) Highly required function: cloud computing provides data stored in every category to the consumer according to his requirement. This can be done and used to know their use of power. By using this information, the consumer will know and want to save energy and money and the customer can see primarily data from the cloud that will help to calculate the energy consumption in their home. Saving their money, controlled by the use of force. This center of the cloud is very important which provides the details accordingly at the demand of the buyer.

2) Extensive network access: the cloud can manage with browsers available anywhere now a days. People are exposed to online searches so they can easily use it. Extensive cloud-based network access ensures Cloud can be a handle from anywhere.

3) Quick Expansion: This function has power over a customer who can read data from the cloud. The data can be support for memory storage. This data can be expanded or reduced according to consumer demand. So, there is a firmness in the data stored in the cloud.

4) Consolidation of resources: There is no limit to the buyer. They can easily access the cloud from anywhere and should read data from the cloud. Cloud computer model is working many consumers in combining resources.

5) Design rating: As discussed previously, cloud computing provides advanced meters set up beside the consumer to know their strengths use that helps them to control energy saving. By using meters, the consumer can easily estimate the cost of energy at home. And these costs must be paid by them.

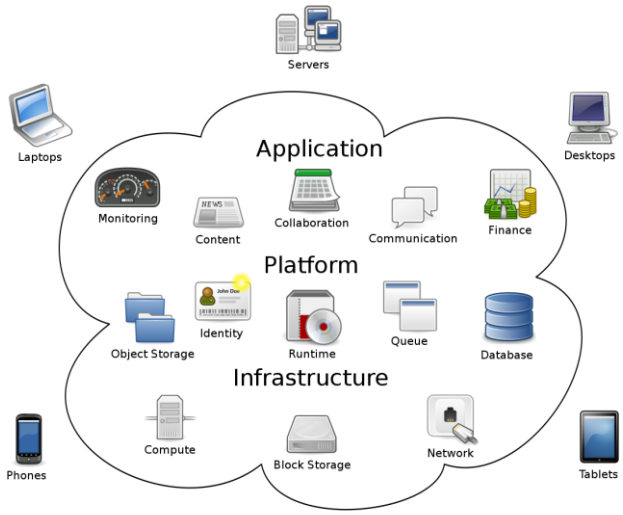

Fig. 2: Cloud Computing

4.3 MANAGEMENT OF ENERGY

Power management is a very common concept on a smart grid. The researchers are always trying to solve this problem by making an implementation in a previous project. Our project is based on energy management. This project demonstrates effective and efficient capacity and provides compensation for active power. It is important to win the active energy from the region. Our project provides information from cloud to the buyer. They see the reading in order to work again with active force. We are developing a software-based program for this. The data from the cloud is automatically taken by the system and we receive active energy values. In the previous design we have noted that the capacitor bank is in continuous circulation operation while this can lead to a decrease in electrical power in all capacitors as well as increase regional costs. We implement implementation of capacitor bank. Capacitor bank only uses when active energy enters region. Active power compensates by using a capacitor bank. Therefore, our main goal is to reduce the cost of capacitor in the region. Industry pays a lot of money for compensation of active energy. Therefore, through this implementation they will save their money and make their working capacity more efficient and reliable.

5. CONCLUSION

We have discussed the various benefits of a smart grid cloud. The grid has intelligent measurement devices for storing data cloud. Cloud computing offers a variety of functions on a smart grid. Cloud computing provides power management, information management and provide various connections between utility and consumer. We've seen data stored in the cloud and we analyzed it by calculating the various parameters. In this project the capacitor provides the

capacitor bank which increases the cost in the region. Therefore, the need to avoid the capacitor bank by continuing to work on it. We offer the use of a capacitor bank only for operation power and otherwise it does not work. In hardware capacitor the bank is shown what the use of compensation for active power is. Therefore, we are doing the benefits of reducing energy consumption and this is also saving the cost of a capacitor bank in a large industry and will provide the cost successfully.

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