

Key Aspect for Approach of Smart Grid Design System

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ABSTRACT

With development of smart grid technology, power generation and distribution network acts as new brain in this field. In this technology, the network will not only get going to integrated and set communicable all over the country but its demand will be tracked by the control centers in different aspect and at high time the usage of power is going to cost higher than the actual rate with intimation given to the customer through notification via sms or email.

Through this research, the designing for Smart Grids was inspected from a logical aspect, monitoring its behavioral, and physical, and must observe the optimal integration of entire system. From the conventional distribution system, we can see the designed for the control of all the constituents as observe to be autonomous with each other. Thus, centralization in control and consolidated functionality are the main challenges discover by the distribution system. To minimize these matter of concern, the term “distribution system and its responsibilities” came into effect by using information and communications technology (ICT) to power the resolution in circulating distribution system. For preparing the outline in this aspect, this paper aims to present a layout in initiating smart grid technology and responsibilities. In contrast we argue to design an interest in the field of Smart Grid.

KEYWORDS: Smart grid; Energy control centre; Distributed Energy Resource; Power System

I. INTRODUCTION

It is fact that with the emerging renewable energy based power generation, they played an important role in burden reduction on utility grid and emissions of carbon make it access for fossil fuel. Through utility grid point of view, such new power generation technologies need a well defined and improved inspection and control of current distribution network. The designing of system has made all possible energy resources, conversion efficiency, and also power demand, to control both environmental and economic issues. We can opt for the evolving with the new technology in generation and detection of any either side which requires updated and intelligent power grid at power distribution that can progressively manage the increasing efficiency which needs it. Besides, they also assist with the utilities to comply the countries regulatory for power supply utility grid and local renewable energy sources. Installing of smart grid technologies may appear in coming era in all varieties of critical distribution systems by adding adjacent layers of for current system.

A. FUNCTIONS

The Smart Grid important objective may be define by the involving the consumers and supply of power to them that are continuously and at the same time economically. Thus, the following functions are defined by Smart Grid:

1. To make the consumer to participate in operation of power system.
2. To change the nature of consumer to adopt higher rating of tariff for the reliability of electric service when in high demand.

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3. The energy storage sources should be accommodating for all generation and intermittent power source.
4. Line switching
5. Automatic reconnection.
6. Flow control of Power
7. Dynamic rating should be enhancing.
8. Monitoring and control is wide.
9. Protection system involves schemes.
10. Limiting fault current

B. BENEFITS

The smart grids involve three aspect such as different technologies for communication, automated control systems (ACS), and intelligence in distribution. Thus, it plays an important role in starting new theory of system. Keeping this in mind, this paper aims to presents some of the important aspects of distribution technology of systems. The main benefits of such kind of systems for utility, consumer and as well as for the general benefit of country are covered below.

- For such benefit of financial point of view, lowering the cost of generation, and stabilizing it.
- From Energy Efficiency the optimum cost of energy usage, reduction in energy loss, peak involves demand, and all possibility to operate at maximum energy.
- Benefits of Power and reliability include clean and reliable management which requires smart grid or micro grid based power distribution.
- Benefits for conservation and environmental may helps to minimize greenhouse gases and some other pollutants air with the use of Smart Grid based system.

- Benefits safety point of view this can be seen which include increasing number of protection and security to system

C. COMPONENTS

The important component of Smart Grid which meets the above function is listed below:

1. electronics devices with intelligence, and phase measurement units
2. Smart sensors
3. Interfacing device with both Digital and analog
4. Communication system (Digital)
5. Renewable energy sources, AC/DC/AC convertors, common DC bus, AC filter reactor
6. High voltage generation units,
7. Protection schemes
8. Data terminal units, trade recorders, PLCs and smart grid controllers.
9. Smart grid routers, IP communication and control
10. Smart energy meters

D. AUTOMATION EVOLUTION

In the earlier stage of automation the focus were mainly on manual operations of automating the industries, which lead to content product with better yield. The technologies which are available in early 1965 made the need to be less fulfilled. Therefore for up gradation of automation there is several industries for keeping the check on years of automation. In 2009, there become another important point to recommend that is safety of apparatus and people who are in industry because the wide use of plant creates an emergency.

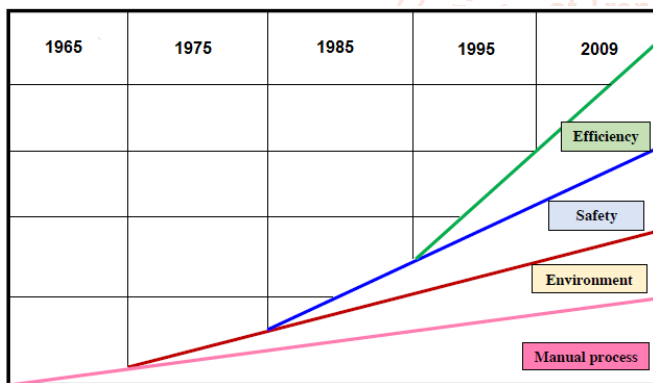


Fig1: Chart showing various year of Evolution

E. EVOLUTION IN TECHNOLOGY

There was need to replace manpower from machine power at the age of this generation (early period). The main industries lead gears and roller for automation which was a mechanical build up. The hydraulic mechanisms were mostly used for controlling signals. The small space lead to pressurizing the liquid which was used for transmitting the signal from one to another place, thus making system a chaos.

Figure 2 explained the evolution of Technology in automation based on Smart Grid

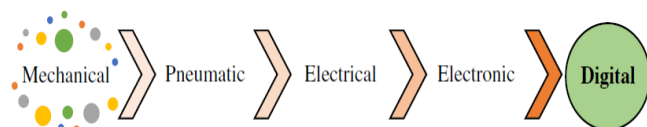


Fig. 2: Chart of the Evolution in technology.

II. TECHNOLOGIES BASED ON SMART GRID

A. The Relevant technology that enables the user to well-designed Smart Grid should follow certain aspect. They are:

1. Participation must be in Wide span:

- The consumer must be up gradated to consume energy timely as well as must aware of schemes of real time pricing.
- Transparency in accepting any energy form

2. Improvement in Efficiency

- Participation of consumer in healthy and friendly power acceptance;
- high-quality power and rate schemes must be appropriate for different level of power in quality
- Optimization for operation of efficient system.

3. Enhancement of Reliability Check:

- In order to avoid minimum interruption we need heeling up to mark.
- to attacks on aspect and determine natural disasters.

B. Relevant Smart Grid Technologies.

- a. Wide-area measurement: situational and control systems including IoT.
- b. These systems include wind turbines, plug-in, green building, PV cell, housing appliances.
- c. It includes communication technology with integrated system, sensor, and diagnostic, approach etc.

III. SMART GRID DESIGN

The designing of Smart Grids System is a combination of logical, physical and managerial support. For allowing the system to behave the system in the above mentioned design aspect make the user to set a design for functioning the Smart Grid in a most accurate and execute it to extent. The deep analysis of Smart Grid in term of Managerial aspect, and the requirements of physical list of components can further derive situational issue, and the operations systems may delay processes requirements to integrate the grid based technology. In addition of Controlling level, the processes may require the derivation of system unit of interfacing, and the need of information transfer manage to operated the integrated system of Smart Grid.

A. Structural Analysis of SG:

The most important and relevant view to decomposed into the desired domains is to provide the structural view for the Smart Grid. This system's view includes the decomposition of the whole Smart Grid system into a small unit functional system which requires a leading to logical artifacts, structure, and develops a relevant logical relations between the various systems and sub-unit of systems which later makes the necessary piece of information flowing in them.

B. Basic Concept of Operations of Smart Grid

The following Figure 3 shows the basic concept and operation for a Smart Grid system which is capable in generating, distributing, storage and control of system, managing its unit and power reliability of services attached. Though there are many capable of many system which can functions alone, but the reliability of the Smart Grid have no comparison to any providers in the current scenarios. The systems have many disputes or it may not operate up to its optimal performance, yet it is defined for many different

operational factors and modes. The whole unit and its function from generation to distribution and ending up with the storage capability of power energy can be seen to be in controlled manner which is done remotely through digital and real system based techniques.

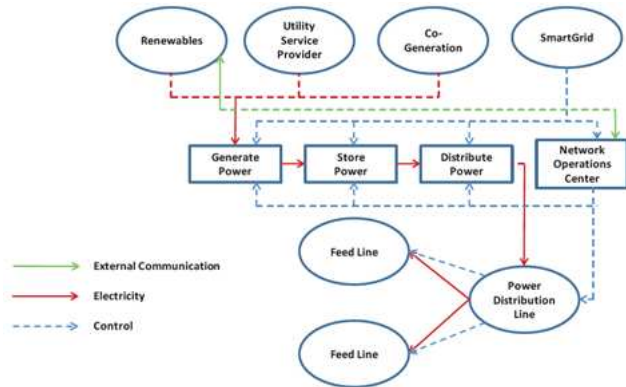


Fig. 3: Concept of Smart Grid

C. Operational Scenario for Smart Grids:

Figure 4 illustrates the main case of defining the behavioral issue of Smart Grid. It may be seen that it includes from generation of energy with the help of renewable system. And is interconnected with public provider of utility for making possible to exchange the different mode of operations.

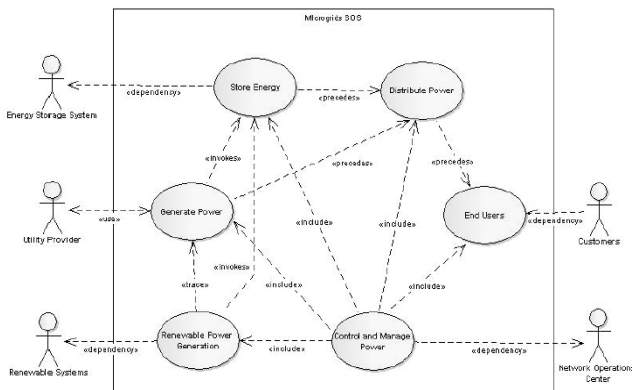


Figure4: Typical Smart Grid

IV. CONCLUSIONS

Smart Grids may be thought to represent a modern energy service provider which utilizes all the natural renewable sources and helps in proving intelligently the controlled generation and supply of power energy to the consumer end in the various department or filed.

SG may be comprises of electricity generation unit, plants of power generation and distribution, strong network of cables, and storage system unit. And also a meter at consumer ends. There should be a nodes to communicate with the other end over Power carrier, satellite, micro grid system, internet to make sure the availability and continuity of supply to all the end and all provided time in a healthy and friendly approach.

Thus the basis of requirement of smart grid can be made to present need of grid to modify its operation and control and enhance its grid flexibility, to actively involve in the consumers benefits. It major uses of green renewable recourses such as wind energy, PV cell, solar thermal power, etc make it standalone.

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