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THE SMART GRID VISION IN PRESENT INDIA'S POWER SECTOR

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ABSTRACT

In this research Paper I am focusing on the Today, one of the new solutions to build organizational Smart grid is thought to be consecutive generation installation, that provides bi-directional flow of electricity and data, with up the ability grid reliableness, security, and potency of electrical system from generation to transmission and to distribution. As sensible grid continues to develop, realization of a reliable and stable system is critical. this text reviews on the present state-of-art technology in physical protection. this text additionally focuses on the system reliableness analysis and failure in protection mechanism. additionally, the challenges of each the topics are bestowed beside the urged answer.

Keywords-component:* *failure in protection mechanism, physical protection ,Smart grid,, system reliability analysis

I. INTRODUCTION

Dependable and moderate electrical force is vital to the cutting edge society. The cutting edge electrical force frameworks provide food the requests in extensive variety of regions which incorporate the significant segments, for example, generators, transformers, transmission lines, engines and so on. The accessibility of new propelled innovations has made a more brilliant, more effective and practical network to guarantee a higher unwavering quality of electrical force supplied to humankind. Viewed as the cutting edge power matrix, shrewd lattice has changed the interconnected system between power shoppers and power suppliers. The brilliant matrix framework includes transmission, dispersion and era of power. In a shrewd framework, the operation of force frameworks foundation has advanced into a dynamic outline rather than a static configuration. The outline of brilliant network is examined in Section 2.

As shrewd framework innovation and its selection are extending all through the world, acknowledgment in savvy matrix assurance is imperative. Assurance assumes a critical part to guarantee acknowledgment of force matrix dependability, security, and productivity in era, transmission, dissemination and control system. It is a subsystem of Smart Grid which gives advance matrix dependability and security examination in physical assurance and data insurance administrations. In perspective of the improved capacity of Smart Grid with its keen foundation and administration, the part of Smart Grid in a security framework which bolsters the disappointment insurance components successfully and productively. In Section 3, the physical security in shrewd matrix is examined, alongside the audit of the present condition of craftsmanship. Segment 4 is the discourse on the assurance as a rule. At last, Section 5 makes the conclusion.

II SMART GRID OVERVIEW

Simply put, a smart grid is the integration of information and communications technology into electric transmission and distribution networks. The smart grid delivers electricity to consumers using two-way digital technology to enable the more efficient management of consumers' end uses of electricity as well as the more efficient use of the grid to identify and correct supply demand-imbalances instantaneously and detect faults in a "self-healing" process that improves service quality, enhances reliability, and reduces costs. Thus, the smart grid concept is not confined to utilities only; it involves every stage of the electricity cycle, from the utility through electricity markets to customers' applications.

The emerging vision of the smart grid encompasses a broad set of applications, including software, hardware, and technologies that enable utilities to integrate, interface with, and intelligently control innovations. Some of the enabling technologies that make smart grid deployments possible include:

- Meters
- Storage devices
- Distributed generation
- Renewable energy
- Energy efficiency
- Home area networks
- Demand response
- IT and back office computing
- Security
- Integrated communications systems
- Superconductive transmission lines.

An ordinary brilliant network structure is outlined in Figure 1. It contains four subsections which are era, transmission, conveyance and control system [1]. Every system interconnected from different areas, data trade and imparts through keen correspondence subsystem, for example, an entrance point with wired or remote correspondence base. Crude data on the system wellbeing or execution is gotten from keen data subsystem, for example, a savvy meter, sensor and phasor estimation unit (PMU). Constant system observing, administration and control are performed at the control system, for example, the electric utility control focus. Other than that, a circulation system can be a person when scattered era (DG) (renewable vitality assets) is inserted, that permitting power supply from both DG and utility.

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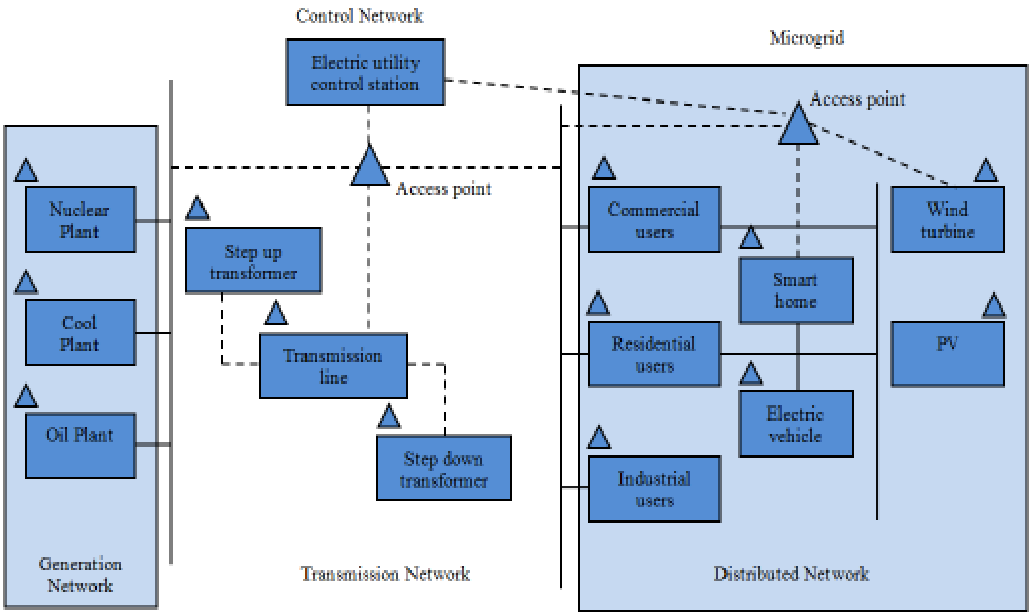

Figure 1. Typical smart grid structures

III. SMART GRID CHARACTERISTIC

This subsection describes three smart grid characteristics namely grid self healing ability, formation of Microgrid system and enable embedded distributed generation (DG).

Table 1: How the smart grid can affect generation and transmission			
Primary Function	**Description of Functions**	**How the smart grid affects these functions**	**How an intelligent communications infrastructure enables and amplifies the smart grid impact**
	Generation		
Load control and dispatch	Economical load dispatch scheduling and optimization help to select the right dispatch for the right load at the right time, reducing	The smart grid helps with the scheduling of committed generating units so as to meet the required load demand at minimum operating cost while satisfying all units and	Economic load dispatch during unforeseen events warrants robust real-time communication infrastructure between the demand and generation functions

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	the cost of generation (startup, operations, and wind down)	system equality and inequality constraints	
Load shaping	Shaping the load during peak demand times reduces the idle and standby generating capacity	Demand-side management helps to manage and accurately estimate demand to as to meet demand without extra generation	Load shaping with DSM involves reliable communication between AMI and CIS (customer information systems) and generation functions
Distributed, renewable generation	The integration of micro-grids as well as customer premises with the utility infrastructure	The smart grid enables distributed generation and automated adjustment of feed-in tariff regulation to receive premiums in the case of forced switch-off of distributed-generation asset for balancing	Infrastructure is needed to confirm, analyze, and dispatch available load to distribution generation sources
Generation equipment maintenance	Diagnoses and maintenance of the generation equipment reduces faults and prevents their propagation	The smart grid helps asset management and conditioning in preventive maintenance. It also helps accessing newly sensed data.	Data from utilities need to be transferred to the generation control center for better equipment conditioning and monitoring.
Distribution			
Primary Function	**Description of Functions**	**How the smart grid affects these functions**	**How an intelligent communications infrastructure enables and amplifies the smart grid impact**
Transmission-grid monitoring and control	Energy management systems and transmission SCADA for data	Automatic regulation of load tap changer and capacitor banks for voltage regulation.	Substation automation results in two-way communication between transmission SCADA equipment and the energy management system.

	acquisition needed for the following functions: 1) outage management, 2) Volt/VAR management, 3) state estimation, 4) network sensitivity analysis, 5) automatic generation control, and 6) phasor data analysis.	Wide-area phasor management and control for grid optimization and control. Volt/VAR management using capacitor switches and controls.	Communication between transmission and generation units is necessary for automatic generation control.
Maintenance	The transmission control center is the	Automated operations eliminate human	Real-time communication between primary and backup
transmission control center	first line of defense for transmission fault detection and prevention	interventions in fault prevention, detection, isolation, and correction	Transmission control center, transmission, generation, and distribution units is necessary for control center operations. Security technology deployment provides for secure data sharing between transmission and other utility function.

IV. DISCUSSION

Section 3 reviews and discusses the current state-of-art of physical protection in terms of system reliability analysis and failures in protection mechanism. Ensuring of system reliability is important in realizing effective and efficient means of smart grid operation. The development of protection mechanism to resist the attacks and failure is also necessary in order to maintain the continuity of supply as well as ensure stability and reliability operation of smart grid. Although realization of the importance in each of the topic is essential, its challenges must also be addressed. Therefore, the challenge in each of the topic is discussed and some possible solutions to overcome the challenges are provided.

Ensuring system reliability is important, but it poses the increase in system reliability risk. Moslehi *et al.*, [25] critically reviewed the reliability impacts of major smart grid resources and he observed that an ideal mix of these resources could lead to a flatter net demand which will eventually accentuates reliability challenges further and making it more susceptible to failure. Flatter net demand implies that the grid is operating close to its near peak load condition at most of the time; operating close to the boundary of saturation or breakdown. These consequences are from the impacts of increasing consumption of energy and asset utilization, which is an unavoidable situation if the development of smart grid continues. Since in flatter net demand, grid is operating at the boundary of breakdown, we can address this issue by developing an effective approach, to construct and compute the margin before the boundary. And with a real-time monitoring system, the margin level can be known instantaneously, and we could response in advance to minimize system reliability risk. Besides that, maximizing asset utilization could lead to reduction in the margin level, thus we must ensure the balance in asset utilization to guarantee the maximizing level provide a reasonable margin.

On the other hand, ensuring proper protection mechanism is important, but it poses the increase of complexity in decision making process. Assuming in smart grid, there are millions and millions of node. In order to process the failure, smart grid have to solve a lot of complex decision problems in the fastest possible time to avoid any further damage or cascading event. To address this challenge, a possible solution is to introduce more decision making systems into the network, so that each system focuses in processing its respective region locally. This can decrease the complexity in decision making process and also reduce the failure response time. Each of this system will also communicate with one another, to ensure an optimum decision making in the global network.

Throughout the literature review, two lessons were obtained. Firstly, system reliability is a topic that cannot be neglected, it is important in power grid research, design and development. Consequences of low system reliability may result network failure (endangering human), and possibly even blackout of whole network (bringing discomfort to consumer and affecting industrial and commercial progress). To ensure system reliability, adaptive protection mechanisms in detecting failure play an important role. Because these adaptive protection mechanisms are the one to sense and response to the failure; if a weak protection mechanism is use, the reliability and stability will also be weak. Therefore proper consideration between protection mechanisms for reliability of system is required, to ensure the operation of smart grid to be effective and efficient.

Next, another lesson learnt is that new technology and infrastructure are introduced and deployed for smart grid, the possible risks and challenges must also be assessed. This is to ensure an efficient and effective operation of smart grid with higher security, reliability and stability. For instance, although ensuring system reliability is important, however the increase of system reliability risk may be introduced from the mix of sources in smart grid. Besides that, we also observed that the usage of smart metering itself although enable fast tracking of customer power usage, it may also introduce failure. Therefore, a throughout assessment on the new technologies and infrastructure is necessary.

Last but not least, there is no doubt that the fast growing of smart grid will enable many new paradigms, achieving a sustainable and environmental sound future, with the improve services of power supply and eventually transforming human ways of living. It is still a long way to go before the whole picture is puzzled up.

In the meantime we need to continue explore and search for reliable method and ways to make this new paradigm vision come true.

V. CONCLUSION

In this article, the literature review of current state-of-art in physical protection is presented. In order to realize a reliable and stable smart grid operation, the article also focuses in system reliability analysis and failure in protection mechanism. Although smart grid enable power grid to be empowered with intelligent and advanced capabilities, it also opens up many new challenges and risks. Hence some challenges and risks in both topics are also briefly discussed, along with possible solution to overcome it. However, more in depth and throughout research in the physical protection system is required to ensure the operation of smart grid to be reliable and stable.

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