

Chapter 26

Implementation of Flooding Free Routing in Smart Grid: VCP Routing in Smart Grid

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ABSTRACT

Smart Grid is a communication and automatic control capabilities in electric power grid system for improving efficiency, reliability, management, capabilities and security of electric power grid. Routing is important in Smart Grid to send data from one point to another point. Routing in Smart Grid is necessary to search /identify destination point/node for communication and to computer the best available route in the network topology among which the data to be sent during communication. Smart Grid can be a combination of fixed nodes (home appliances, smart meter, control centre, etc.) but the nature of communication between fixed nodes is dynamic due to the switch on/off or the fluctuation in electricity flow. Therefore the fixed nodes can also be disappeared from the network topology in Smart Grid. Existing routing protocols for Smart Grid are based on flooding mechanism. We would like to examine the feasibility of flooding free routing in Smart Grid. Then we will propose a flooding-free routing for Smart.

INTRODUCTION

Introduction of Smart Grid

Energy is a main source of modern economic development world. More energy is required with the increasing of world's population needs. The global demand for energy grows with the growth of developing countries as they enter industrial and services stages of development. The Smart Grid is a complete system that includes the operational and energy measures such as Smart Meters, Smart Home Appliances, different renewable energy sources such as solar & wind energy system and energy efficiency resources. The generation of electricity as per customer requirement and distribution of electricity are the most important aspects of smart grid technology. Smart Grid is a solution of drawbacks in current electric

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grid and is a full suite that can solve the problems from production to distribution in current electric grid. Smart Grid is an addition of Information Technology (IT) in current electric grid. The important part of the motivation of the use of IT in Electric grid for Smart Grid is to be able to provide two way flow of information for communications in Smart Grid among different components. Through Smart Grid solutions the energy requirements can be fulfilled however for this purpose the complete implementation of Smart Grid from the production to consumption point and the necessary communication between all the parts of Smart Grid is necessary.

Smart Grid Requirements and Challenges

In current Electricity System the control centers for monitoring the power grid components are used. This system is called Supervisory Control and Data Acquisition (SCADA). This system provides communication between these control centers and substations of Smart Grid. Smart Grid is the introduction of communications and automatic control capabilities in electric power grid for improving efficiency, reliability, environmental, economics, management, security and safety of electric power grid. Smart Grid can be used for better management of electricity generation, transformation, distribution and load balancing. The reliable, scalable, robust, and secure communication network is important component for the successful operations of Smart Grid. The results of improvement in Electric Grid the resultant Smart Grid have following features/benefits:

- The decrement of rate and deduction in length of outages due to customer awareness of electricity use and prices through smart meters.
- Improvement in Power quality issues that result the reduction in number of disruptions.
- Reduction in Electricity prices due to awareness of lower prices in electricity use information.
- Smart Grid is automatic system therefore the maintenance cost is reduced.
- Smart Grid can use available assets better.
- Security of Smart Grid is improved cyber and physically than Electricity Grid.
- Smart Grid provides safety of electricity Hazards.

In Figure 1 the electricity Power Control is displayed the communication & control management converts traditional electricity system into modern Smart Grid power control system. The Smart Grid is fully accommodating traditional (hydraulic, oil, nuclear etc) and renewable (wind, solar and water etc) energy sources then the electricity is transmitted from generation points to distribution points by Transmission Control Center. The Distribution Control Center communicates with Transmission Control Center and distributes electricity power between industrial, commercial and residential areas. All levels of electricity power are connected through communication network and managed/supervised through control systems.

Applications of Smart Grid

The Smart Grid is an enhancement of traditional electric power grid. The overview of some applications of Smart Grid is as per following for understating the system.

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